

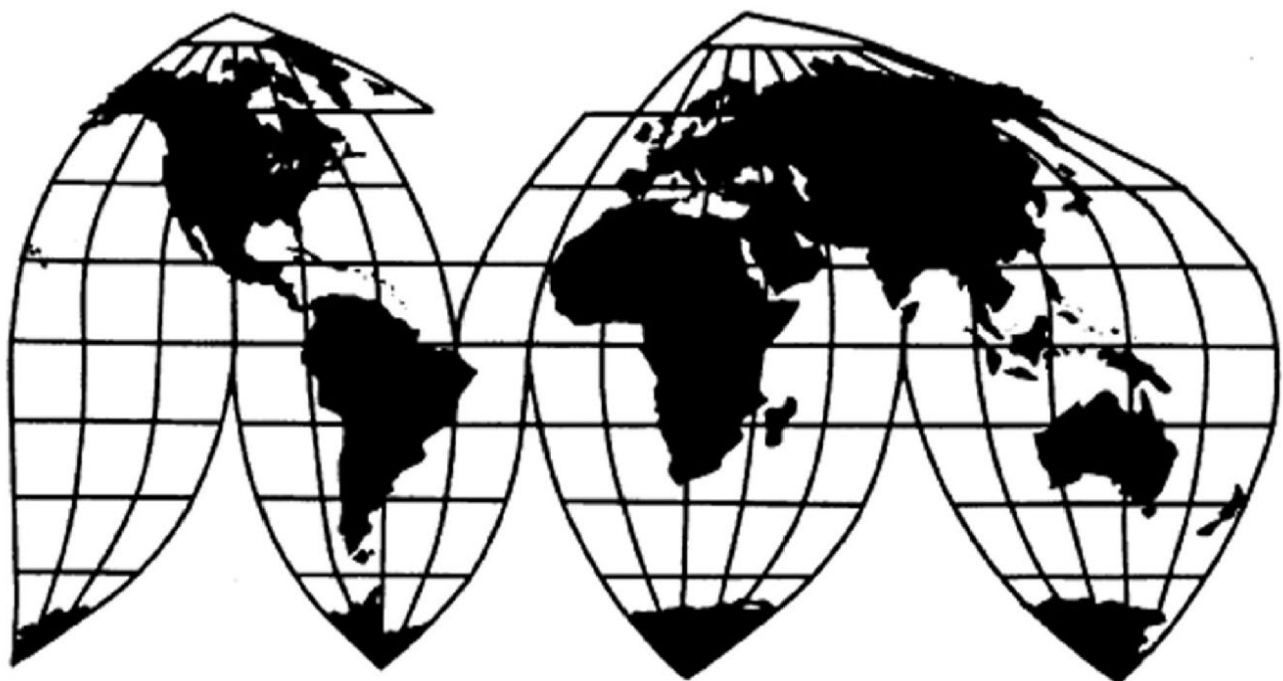
Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules from Cambodia, Malaysia, Thailand, and Vietnam

Investigation Nos. 701-TA-722–725 and 731-TA-1690–1693 (Final)

Publication 5631

June 2025

U.S. International Trade Commission



U.S. International Trade Commission

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Mary Beth Jones, Supervisory Investigator

Address all communications to
Secretary to the Commission
United States International Trade Commission
Washington, DC 20436

U.S. International Trade Commission

Washington, DC 20436
www.usitc.gov

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Note.—Information that would reveal confidential operations of individual firms may not be published. Such information is identified by brackets ([]) in confidential reports and is deleted and replaced with asterisks (***) in public reports. Zeroes, null values, and undefined calculations are suppressed and shown as em dashes (—) in tables. If using a screen reader, we recommend increasing the verbosity setting

UNITED STATES INTERNATIONAL TRADE COMMISSION

Investigation Nos. 701-TA-722-725 and 731-TA-1690-1693 (Final)

Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From Cambodia,
Malaysia, Thailand, and Vietnam

DETERMINATIONS

On the basis of the record¹ developed in the subject investigations, the United States International Trade Commission (“Commission”) determines, pursuant to the Tariff Act of 1930 (“the Act”), that an industry in the United States is materially injured by reason of imports of crystalline silicon photovoltaic cells, whether or not assembled into modules (“CSPV products”), from Malaysia and Vietnam and that a U.S. industry is threatened with material injury by reason of imports of CSPV products from Cambodia and Thailand, provided for in statistical reporting numbers 8541.42.0010 and 8541.43.0010 of the Harmonized Tariff Schedule of the United States², that have been found by the U.S. Department of Commerce (“Commerce”) to be sold in the United States at less than fair value (“LTFV”) and subsidized by the governments of Cambodia, Malaysia, Thailand, and Vietnam.^{3 4}

BACKGROUND

The Commission instituted these investigations effective April 24, 2024, following receipt of petitions filed with the Commission and Commerce by the American Alliance for Solar

¹ The record is defined in § 207.2(f) of the Commission’s Rules of Practice and Procedure (19 CFR 207.2(f)).

² CSPV products may also be imported under subheadings 8501.71, 8501.72, and 8501.80 and statistical reporting number 8507.20.8010.

³ 90 FR 17392, 90 FR 17406, 90 FR 173765, 90 FR 17384, 90 FR 17395, 90 FR 17380, 90 FR 17388, and 90 FR 17399 (April 25, 2025).

⁴ The Commission also finds that imports subject to Commerce’s affirmative critical circumstances determination are not likely to undermine seriously the remedial effect of the countervailing and antidumping duty orders on CSPV products from Vietnam. Because of its threat determination, no critical circumstances findings with regard to imports of this product from Thailand were reached.

Manufacturing Trade Committee. The final phase of the investigations was scheduled by the Commission following notification of preliminary determinations by Commerce that imports of CSPV products from Cambodia, Malaysia, Thailand and Vietnam were subsidized within the meaning of section 703(b) of the Act (19 U.S.C. 1671b(b)) and sold at LTFV within the meaning of 733(b) of the Act (19 U.S.C. 1673b(b)). Notice of the scheduling of the final phase of the Commission's investigations and of a public hearing to be held in connection therewith was given by posting copies of the notice in the Office of the Secretary, U.S. International Trade Commission, Washington, DC, and by publishing the notice in the *Federal Register* on December 30, 2024 and subsequently after (89 FR 106578, December 30, 2024; 90 FR 1191, January 7, 2025; and 90 FR 2023, January 10, 2025). The Commission conducted its hearing on April 15, 2025. All persons who requested the opportunity were permitted to participate.

Views of the Commission

Based on the record in the final phase of these investigations, we determine that an industry in the United States is materially injured by reason of imports of crystalline silicon photovoltaic cells and modules from Malaysia and Vietnam found by the U.S. Department of Commerce (“Commerce”) to be sold in the United States at less than fair value and subsidized by the governments of Malaysia and Vietnam. We also determine that an industry in the United States is threatened with material injury by reason of imports of crystalline silicon photovoltaic cells and modules from Cambodia and Thailand found by Commerce to be sold in the United States at less than fair value and subsidized by the governments of Cambodia and Thailand. Finally, we find that critical circumstances do not exist with respect to imports from Vietnam that are subject to Commerce’s final affirmative critical circumstances determinations in its antidumping and countervailing duty investigations.

I. Background

The American Alliance for Solar Manufacturing Trade Committee (the “Committee” or “Petitioner”) filed the petitions in these investigations on April 24, 2024, with respect to imports of crystalline silicon photovoltaic (“CSPV”) cells, whether or not assembled into modules (“CSPV products”). The Committee consists of Hanwha Q Cells USA, Inc. (“Hanwha”) and Mission Solar Energy LLC (“Mission Solar”), U.S. producers of CSPV products, as well as First Solar, Inc. (“First Solar”), a U.S. producer of thin film solar products, which are expressly excluded from the scope of these investigations.¹ Representatives of Hanwha and Mission Solar appeared at the hearing with counsel and Petitioner submitted prehearing and posthearing briefs, and final comments.² Three non-party U.S. producers participated in these investigations in support of the petitions. A representative of Suniva, a domestic producer of CSPV cells, testified at the hearing in support of the petitions.³ T1 Energy Inc. (“T1 Energy”), a

¹ See *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled in Modules, from Cambodia, Malaysia, Thailand, and Vietnam*, Inv. Nos. 701-TA-722-725 and 731-TA-1690-1693 (Preliminary), USITC Pub. 5517 (June 2024) (“Preliminary Determinations”) at 3-4. When the petitions were filed, the Committee contained a fourth member, Convalt Energy, which stated that it intended to begin production of CSPV products in late 2024. However, Petitioner later amended the petitions to remove Convalt as a member of the Committee. *Id.* at 4, n.4.

² See Petitioner’s Prehearing Brief, EDIS Doc. 848165; Petitioner’s Posthearing Brief, EDIS Doc. 849390; Petitioner’s Final Comments, EDIS Doc. 851350.

³ See Transcript of April 15, 2025 Hearing (“Hearing Tr.”), EDIS Doc. 848832.

U.S. producer of CSPV modules, submitted a prehearing statement in support of the petitions,⁴ but argues that the Commission should find that critical circumstances do not exist with respect to subject imports from Vietnam.⁵ A representative of Talon P.V., a domestic company that plans to produce CSPV cells, testified at the hearing in support of the petitions.⁶

Several respondent entities participated in these investigations in opposition to the petitions. Representatives of Illuminate USA (“Illuminate”), a U.S. producer of CSPV products, appeared at the hearing with counsel, and submitted prehearing and posthearing briefs and final comments.⁷ Representatives of Canadian Solar U.S. Module Manufacturing Corp. and its affiliates (collectively “Canadian Solar”) appeared at the hearing with counsel and submitted prehearing and posthearing briefs and final comments.⁸ Representatives of Jinko Solar (U.S.) Inc., a U.S. producer and importer of subject merchandise, and its affiliates (collectively “Jinko”), appeared at the hearing with counsel and filed prehearing and posthearing briefs and final comments.⁹ Representatives of Trina Solar Science & Technology (Thailand) Ltd. and Trina Solar Energy Development Company Limited, foreign producers of subject merchandise, and Trina Solar Energy Development Company Limited, a U.S. importer of subject merchandise (collectively “Trina”) appeared at the hearing with counsel and submitted prehearing and posthearing briefs.¹⁰ Representatives of BYD America, LLC (“BYD”), a U.S. importer of CSPV products from Cambodia, appeared at the hearing with counsel and submitted prehearing and posthearing briefs and final comments.¹¹ Representatives of Runergy Alabama Inc.

⁴ Comments of T1 Energy, Inc., EDIS Doc. 848180. T1 Energy acquired the U.S. solar manufacturing assets of Trina Solar Co. Ltd. in December 2024. *Id.* at 1.

⁵ See Partial Resubmission of T1 Energy’s Questionnaire Response, EDIS Doc. 849019 at 2.

⁶ See Confidential Staff Report, INV-XX-058 (May 7, 2025) (“CR”) at Appendix B; *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules from Cambodia, Malaysia, Thailand, and Vietnam*, Inv. Nos. 701-TA-722-725 and 731-TA-1690-1693 (Final), USITC Pub. 5631 (June 2025) (“PR”) (together, “CR/PR”).

⁷ See Illuminate Prehearing Brief, EDIS Doc. 848184; Illuminate Posthearing Brief, EDIS Doc. 849386; Illuminate Final Comments, EDIS Doc. 851541.

⁸ See Canadian Solar Prehearing Brief, EDIS Doc. 848179; Canadian Solar Posthearing Brief, EDIS Doc. 849403; Canadian Solar Final Comments, EDIS Doc. 851338. Canadian Solar’s affiliates are Canadian Solar Manufacturing (Thailand) Co., Ltd., Canadian Solar (USA) Inc., and Canadian Solar International Limited. Canadian Solar Posthearing Brief at 1 n.1.

⁹ See Jinko Prehearing Brief, EDIS Doc. 848130; Jinko Posthearing Brief, EDIS Doc. 849365. Jinko’s affiliates are Jinko Solar (U.S.) Industries Inc., a U.S. importer of subject merchandise, and Jinko Solar (Malaysia) Sdn. Bhd. Jinko Solar (Vietnam) Industries Company Limited, and Jinko Solar Technology Sdn. Bhd., foreign producers of subject merchandise.

¹⁰ See Trina Prehearing Brief, EDIS Doc. 848139; Trina Posthearing Brief, EDIS Doc. 849356.

¹¹ See BYD Prehearing Brief, EDIS Doc. 848173; BYD Posthearing Brief, EDIS Doc. 849383; BYD Final Comments, EDIS Doc. 851336.

(“Runergy”), a U.S. producer of CSPV products, and Runergy USA Trading LLC, a U.S. importer of CSPV products (collectively “Runergy”) attended the hearing with counsel and submitted prehearing and posthearing briefs.¹² Boviet Solar Technology Co., Ltd, a foreign producer and exporter of subject merchandise and Boviet Solar USA Ltd., a U.S. importer of subject merchandise (collectively “Boviet”), submitted prehearing and posthearing briefs and final comments.¹³

Representatives of the American Clean Power Association (“ACP”), an industry association, appeared at the hearing with counsel, and ACP jointly submitted prehearing and posthearing briefs, and final comments, with a member firm, Invenergy Solar Equipment Management LLC, a U.S. importer of CSPV products.¹⁴ Representatives of the Solar Energy Industries Association (“SEIA”), an industry association, appeared at the hearing with counsel and submitted prehearing and posthearing briefs and final comments.¹⁵

U.S. industry data are based on the questionnaire responses of one firm accounting for all known U.S. production of CSPV cells and 16 firms accounting for a vast majority of U.S. production of CSPV modules in 2024.¹⁶ U.S. import data are based on questionnaire responses from 45 U.S. importers, representing a large majority (***) percent) of U.S. imports from Cambodia,¹⁷ *** U.S. imports from Malaysia, essentially all (***) percent) of U.S. imports from Thailand, and the vast majority (***) percent) of U.S. imports from Vietnam in 2024 that were reported under HTS subheadings 8541.42.0010 and 8541.43.0010, “basket” categories that also contain out-of-scope merchandise.¹⁸

¹² See Runergy Prehearing Brief, EDIS Doc. 848186; Runergy Posthearing Brief, EDIS Doc. 849412.

¹³ See Boviet Prehearing Brief, EDIS Doc. 848190, Boviet Posthearing Brief, EDIS Doc. 849338; Boviet Final Comments, EDIS Doc. 851332.

¹⁴ See ACP Prehearing Brief, EDIS Doc. 848162; ACP Posthearing Brief, EDIS Doc. 849337; ACP Final Comments, EDIS Doc. 851343.

¹⁵ See SEIA Prehearing Brief, EDIS Doc. 848159; SEIA Posthearing Brief, EDIS Doc. 849411; SEIA Final Comments, EDIS Doc. 851353.

¹⁶ CR/PR at 1.5.

¹⁷ ***, one of the largest importers of subject merchandise from Cambodia, did not submit a response to the Commission’s questionnaires. Staff used proprietary, Census-edited Customs’ records to construct an importer questionnaire responses for *** (“Constructed Questionnaire Response”). Part 4 of the Staff Report incorporates data from the Constructed Questionnaire Response in all tables except in the fungibility tables. CR/PR at 4.1. n.2.

¹⁸ CR/PR at 4.1. Questionnaire responses (including the Constructed Questionnaire Response) account for *** percent of total imports reported in official import statistics. *Id.* All coverage figures are based on imports reported under HTS subheadings 8541.40.0010 and 8541.43.0010, “basket” categories” that also contain out-of-scope merchandise.

II. Domestic Like Product

In determining whether an industry in the United States is materially injured or threatened with material injury by reason of imports of subject merchandise, the Commission first defines the “domestic like product” and the “industry.”¹⁹ Section 771(4)(A) of the Tariff Act of 1930, as amended (“the Tariff Act”), defines the relevant domestic industry as the “producers as a whole of a domestic like product, or those producers whose collective output of a domestic like product constitutes a major proportion of the total domestic production of the product.”²⁰ In turn, the Tariff Act defines “domestic like product” as “a product which is like, or in the absence of like, most similar in characteristics and uses with, the article subject to an investigation.”²¹

By statute, the Commission’s “domestic like product” analysis begins with the “article subject to an investigation,” *i.e.*, the subject merchandise as determined by Commerce.²² Therefore, Commerce’s determination as to the scope of the imported merchandise that is subsidized and/or sold at less than fair value is “necessarily the starting point of the Commission’s like product analysis.”²³ The Commission then defines the domestic like product in light of the imported articles Commerce has identified.²⁴ The decision regarding the appropriate domestic like product(s) in an investigation is a factual determination, and the Commission has applied the statutory standard of “like” or “most similar in characteristics and

¹⁹ 19 U.S.C. § 1677(4)(A).

²⁰ 19 U.S.C. § 1677(4)(A).

²¹ 19 U.S.C. § 1677(10).

²² 19 U.S.C. § 1677(10). The Commission must accept Commerce’s determination as to the scope of the imported merchandise that is subsidized and/or sold at less than fair value. *See, e.g., USEC, Inc. v. United States*, 34 Fed. App’x 725, 730 (Fed. Cir. 2002) (“The ITC may not modify the class or kind of imported merchandise examined by Commerce.”); *Algoma Steel Corp. v. United States*, 688 F. Supp. 639, 644 (Ct. Int’l Trade 1988), *aff’d*, 865 F.3d 240 (Fed. Cir.), *cert. denied*, 492 U.S. 919 (1989).

²³ *Cleo Inc. v. United States*, 501 F.3d 1291, 1298 (Fed. Cir. 2007); *see also Hitachi Metals, Ltd. v. United States*, Case No. 19-1289, slip op. at 8-9 (Fed. Circ. Feb. 7, 2020) (the statute requires the Commission to start with Commerce’s subject merchandise in reaching its own like product determination).

²⁴ *Cleo*, 501 F.3d at 1298 n.1 (“Commerce’s {scope} finding does not control the Commission’s {like product} determination.”); *Hosiden Corp. v. Advanced Display Mfrs.*, 85 F.3d 1561, 1568 (Fed. Cir. 1996) (the Commission may find a single like product corresponding to several different classes or kinds defined by Commerce); *Torrington Co. v. United States*, 747 F. Supp. 744, 748–52 (Ct. Int’l Trade 1990), *aff’d*, 938 F.2d 1278 (Fed. Cir. 1991) (affirming the Commission’s determination defining six like products in investigations where Commerce found five classes or kinds).

uses” on a case-by-case basis.²⁵ No single factor is dispositive, and the Commission may consider other factors it deems relevant based on the facts of a particular investigation.²⁶ The Commission looks for clear dividing lines among possible like products and disregards minor variations.²⁷

A. The Scope of the Investigations

Commerce defined the scope of the imported merchandise under investigation as follows:

The merchandise covered by this proceeding Commerce has defined the subject merchandise as crystalline silicon photovoltaic cells, and modules, laminates, and panels, consisting of crystalline silicon photovoltaic cells, whether or not partially or fully assembled into other products, including, but not limited to, modules, laminates, panels and building integrated materials.

These investigations cover crystalline silicon photovoltaic cells of thickness equal to or greater than 20 micrometers, having a p/n junction formed by any means, whether or not the cell has undergone other processing, including, but not limited to, cleaning, etching, coating, and/or addition of materials (including, but not limited to, metallization

²⁵ See, e.g., *Cleo Inc. v. United States*, 501 F.3d 1291, 1299 (Fed. Cir. 2007); *NEC Corp. v. Department of Commerce*, 36 F. Supp. 2d 380, 383 (Ct. Int’l Trade 1998); *Nippon Steel Corp. v. United States*, 19 CIT 450, 455 (1995); *Torrington Co. v. United States*, 747 F. Supp. 744, 749 n.3 (Ct. Int’l Trade 1990), *aff’d*, 938 F.2d 1278 (Fed. Cir. 1991) (“every like product determination ‘must be made on the particular record at issue’ and the ‘unique facts of each case’”). The Commission generally considers a number of factors, including the following: (1) physical characteristics and uses; (2) interchangeability; (3) channels of distribution; (4) customer and producer perceptions of the products; (5) common manufacturing facilities, production processes, and production employees; and, where appropriate, (6) price. See *Nippon*, 19 CIT at 455 n.4; *Timken Co. v. United States*, 913 F. Supp. 580, 584 (Ct. Int’l Trade 1996).

²⁶ See, e.g., S. Rep. No. 96-249 at 90-91 (1979).

²⁷ *Nippon*, 19 CIT at 455; *Torrington*, 747 F. Supp. at 748-49; see also S. Rep. No. 96-249 at 90-91 (Congress has indicated that the like product standard should not be interpreted in “such a narrow fashion as to permit minor differences in physical characteristics or uses to lead to the conclusion that the product and article are not ‘like’ each other, nor should the definition of ‘like product’ be interpreted in such a fashion as to prevent consideration of an industry adversely affected by the imports under consideration.”).

and conductor patterns) to collect and forward the electricity that is generated by the cell.

Merchandise under consideration may be described at the time of importation as parts for final finished products that are assembled after importation, including, but not limited to, modules, laminates, panels, building integrated modules, building-integrated panels, or other finished goods kits. Such parts that otherwise meet the definition of merchandise under consideration are included in the scope of the investigations.

Excluded from the scope of the investigations are thin film photovoltaic products produced from amorphous silicon (a-Si), cadmium telluride (CdTe), or copper indium gallium selenide (CIGS). Also excluded from the scope of the investigations are crystalline silicon photovoltaic cells, not exceeding 10,000 mm² in surface area, that are permanently integrated into a consumer good whose function is other than power generation and that consumes the electricity generated by the integrated crystalline silicon photovoltaic cell. Where more than one cell is permanently integrated into a consumer good, the surface area for purposes of this exclusion shall be the total combined surface area of all cells that are integrated into the consumer good.

Additionally, excluded from the scope of the investigations are panels with surface area from 3,450 mm² to 33,782 mm² with one black wire and one red wire (each of type 22 AWG or 24 AWG not more than 206 mm in length when measured from panel extrusion), and not exceeding 2.9 volts, 1.1 amps, and 3.19 watts. For the purposes of this exclusion, no panel shall contain an internal battery or external computer peripheral ports.

Also excluded from the scope of the investigations are:

1. Off grid CSPV panels in rigid form with a glass cover, with the following characteristics: (A) a total power output of 100 watts or less per panel; (B) a maximum surface area of 8,000 cm² per panel; (C) do not include a

built-in inverter; (D) must include a permanently connected wire that terminates in either an 8 mm male barrel connector, or a two-port rectangular connector with two pins in square housings of different colors; (E) must include visible parallel grid collector metallic wire lines every 1–4 millimeters across each solar cell; and (F) must be in individual retail packaging (for purposes of this provision, retail packaging typically includes graphics, the product name, its description and/or features, and foam for transport); and

2. Off grid CSPV panels without a glass cover, with the following characteristics: (A) a total power output of 100 watts or less per panel; (B) a maximum surface area of 8,000 cm² per panel; (C) do not include a built-in inverter; (D) must include visible parallel grid collector metallic wire lines every 1–4 millimeters across each solar cell; and (E) each panel is (1) permanently integrated into a consumer good; (2) encased in a laminated material without stitching, or (3) has all of the following characteristics: (i) the panel is encased in sewn fabric with visible stitching, (ii) includes a mesh zippered storage pocket, and (iii) includes a permanently attached wire that terminates in a female USB–A connector.

In addition, the following CSPV panels are excluded from the scope of the investigations: off-grid CSPV panels in rigid form with a glass cover, with each of the following physical characteristics, whether or not assembled into a fully completed off-grid hydropanel whose function is conversion of water vapor into liquid water: (A) a total power output of no more than 80 watts per panel; (B) a surface area of less than 5,000 square centimeters (cm²) per panel; (C) do not include a built-in inverter; (D) do not have a frame around the edges of the panel; (E) include a clear glass back panel; and (F) must include a permanently connected wire that terminates in a two port rectangular connector.

Additionally excluded from the scope of these investigations are off-grid small portable crystalline silicon photovoltaic panels, with or without a glass cover, with the following characteristics: (1) a total power output of 200 watts or less per panel; (2) a maximum surface area of 16,000 cm²

per panel; (3) no built-in inverter; (4) an integrated handle or a handle attached to the package for ease of carry; (5) one or more integrated kickstands for easy installation or angle adjustment; and (6) a wire of not less than 3 meters either permanently connected or attached to the package that terminates in an 8 mm diameter male barrel connector.

Also excluded from the scope of these investigations are off-grid crystalline silicon photovoltaic panels in rigid form with a glass cover, with each of the following physical characteristics, whether or not assembled into a fully completed off-grid hydropanel whose function is conversion of water vapor into liquid water: (A) a total power output of no more than 180 watts per panel at 155 degrees Celsius; (B) a surface area of less than 16,000 square centimeters (cm²) per panel; (C) include a keep-out area of approximately 1,200 cm² around the edges of the panel that does not contain solar cells; (D) do not include a built-in inverter; (E) do not have a frame around the edges of the panel; (F) include a clear glass back panel; (G) must include a permanently connected wire that terminates in a two-port rounded rectangular, sealed connector; (H) include a thermistor installed into the permanently connected wire before the twoport connector; and (I) include exposed positive and negative terminals at opposite ends of the panel, not enclosed in a junction box.

Further excluded from the scope of the investigations are:

1. Off grid rigid CSPV panels with a glass cover, with the following characteristics: (A) a total power output of 200 watts or less per panel, (B) a maximum surface area of 10,500 cm² per panel, (C) do not include a built-in inverter, (D) must include a permanently connected wire that terminates in waterproof connector with a cylindrical positive electrode and a rectangular negative electrode with the positive and negative electrodes having an interlocking structure, (E) must include visible parallel grid collector metallic wire lines every 1–4 millimeters across each solar cell, and (F) must be in individual retail packaging (for

purposes of this provision, retail packaging typically includes graphics, the product name, its description and/or features); and

2. Off-grid small portable crystalline silicon photovoltaic panels, with or without a glass cover, with the following characteristics: (A) a total power output of 200 watts or less per panel, (B) a maximum surface area of 16,000 cm² per panel, (C) no built-in inverter, (D) an integrated handle or a handle attached to the package for ease of carry, (E) one or more integrated kickstands for easy installation or angle adjustment, and (F) a wire either permanently connected or attached to the package terminates in waterproof connector with a cylindrical positive electrode and a rectangular negative electrode with the positive and negative electrodes having an interlocking structure.

Also excluded from the scope of the investigations are:

1. Off grid rigid CSPV panels with a glass cover, with the following characteristics: (A) a total power output of 200 watts or less per panel, (B) a maximum surface area of 10,500 cm² per panel, (C) do not include a built-in inverter, (D) must include a permanently connected wire that terminates in waterproof connector with a cylindrical positive electrode and a rectangular negative electrode with the positive and negative electrodes having an interlocking structure, (E) must include visible parallel grid collector metallic wire lines every 1–4 millimeters across each solar cell, and (F) must be in individual retail packaging (for purposes of this provision, retail packaging typically includes graphics, the product name, its description and/or features); and

2. Small off-grid panels with glass cover, with the following characteristics: (A) surface area from 3,450 mm² to 33,782 mm², (B) with one black wire and one red wire (each of type 22AWG or 28 AWG not more than 350 mm in length when measured from panel extrusion), (C) not exceeding 10 volts, (D) not exceeding 1.1 amps, (E) not exceeding 6 watts, and (F) for the purposes of this exclusion, no panel shall contain an internal battery or external computer peripheral ports.

Additionally excluded from the scope of the investigations are:

1. Off grid rigid CSPV panels with a glass cover, with the following characteristics: (A) a total power output of 175 watts or less per panel, (B) a maximum surface area of 9,000 cm² per panel, (C) do not include a built-in inverter, (D) must include a permanently connected wire that terminates in waterproof connector with a cylindrical positive electrode and a rectangular negative electrode with the positive and negative electrodes having an interlocking structure; (E) must include visible parallel grid collector metallic wire lines every 1–4 millimeters across each solar cell, and (F) must be in individual retail packaging (for purposes of this provision, retail packaging typically includes graphics, the product name, its description and/or features); and
2. Off grid CSPV panels without a glass cover, with the following characteristics, (A) a total power output of 220 watts or less per panel, (B) a maximum surface area of 16,000 cm² per panel, (C) do not include a built-in inverter, (D) must include visible parallel grid collector metallic wire lines every 1–4 millimeters across each solar cell, and (E) each panel is encased in a laminated material without stitching.

Also excluded from the scope of these investigations are off-grid CSPV panels in rigid form, with or without a glass cover, permanently attached to an aluminum extrusion that is an integral component of an automation device that controls natural light, whether or not assembled into a fully completed automation device that controls natural light, with the following characteristics:

1. a total power output of 20 watts or less per panel;
2. a maximum surface area of 1,000 cm² per panel;
3. does not include a built-in inverter for powering third party devices.

Modules, laminates, and panels produced in a third-country from cells produced in a subject country are covered by the investigations; however, modules, laminates, and panels produced in a subject country from cells produced in a third-country are not covered by the investigations.

Also excluded from the scope of these investigations are all products covered by the scope of the antidumping and countervailing duty orders on Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules, from the People's Republic of China: Amended Final Determination of Sales at Less Than Fair Value, and Antidumping Duty Order, 77 FR 73018 (December 7, 2012); and Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules, from the People's Republic of China: Countervailing Duty Order, 77 FR 73017 (December 7, 2012).²⁸

²⁸ See, e.g. *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From Cambodia: Final Affirmative Determination of Sales at Less Than Fair Value*, 90 Fed. Reg. 17,392 (Apr. 25, 2025). The scopes of the antidumping and countervailing duty investigations are identical for each subject country.

As we explained in the preliminary determinations, the scope of these investigations is similar in many ways to the scopes of prior CSPV proceedings. *Preliminary Determinations*, USITC Pub. 5517 at 11. In particular, the first six paragraphs of the current scope are identical to language contained in the scope in the first reviews of the orders on CSPV products from China in 2019. The current scope then adds several paragraphs setting forth more recent exclusions pursuant to changed circumstances reviews in December 2021 and March 2024, in which Commerce revoked the AD/CVD orders in part with respect to imports of certain off-grid small portable CSPV panels. The second- and third-to-last paragraphs are new to these petitions. The third-to-last paragraph states that modules, laminates, and panels produced in a third country from cells produced in a subject country are within the scope of the investigations, but modules produced in a subject country from cells produced in a third country are not within the scope. *Id.*

The next paragraph indicates that products covered by the scope of the 2012 antidumping and countervailing duty orders on CSPV products from China are excluded from the scope of these investigations. This exclusion also covers imports of CSPV products into the United States from the four subject countries that, by reason of Commerce's August 23, 2023, circumvention findings, are covered by the scope of the 2012 orders on CSPV products from China. The remaining, non-circumventing imports from the four subject countries are subject to these investigations. *Id.*

B. Commerce's Circumvention Findings and Treatment of Appendix IV Imports

Following the filing of a circumvention petition on February 8, 2022, by Auxin Solar Inc., Commerce initiated an anticircumvention investigation on April 1, 2022, to determine whether imports of certain solar products completed in Cambodia, Malaysia, Thailand, or Vietnam were circumventing the AD/CVD orders on CSPV products from China. Commerce's Federal Register notice of initiation directed U.S. Customs and Border Protection ("CBP") to apply to imports from these countries the cash deposit rate that would be applicable if they were covered by the scope of the orders on China.²⁹

On June 6, 2022, before Commerce made a preliminary determination in the anticircumvention proceeding, the President issued a proclamation declaring an emergency and authorizing the Secretary of Commerce to take action to permit, for a 24-month period, imports of CSPV products from Cambodia, Malaysia, Thailand, and Vietnam to be free of any antidumping or countervailing duties resulting from the anticircumvention proceeding (the "tariff holiday").³⁰ In September 2022, Commerce issued final rules specifying procedures to implement this proclamation, which directed CBP to discontinue the collection of cash deposits that had begun upon initiation of the circumvention proceeding.³¹ While these procedures under the Presidential Proclamation were in effect, Commerce continued its circumvention proceedings.³²

Effective August 23, 2023, Commerce made final affirmative determinations of circumvention with respect to certain imports from Cambodia, Malaysia, Thailand, and

²⁹ *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules, From the People's Republic of China: Initiation of Circumvention Inquiry on the Antidumping and Countervailing Duty Orders*, 87 Fed. Reg. 19071, 19072 (April 1, 2022).

³⁰ *Presidential Proclamation 10414 of June 6, 2022, Declaration of Emergency and Authorization for Temporary Extensions of Time and Duty-Free Importation of Solar Cells and Modules from Southeast Asia*, 87 Fed. Reg. 35087 (June 9, 2022).

³¹ *Department of Commerce, Procedures Covering Suspension of Liquidation, Duties and Estimated Duties in Accord With Presidential Proclamation 10414*, 87 Fed. Reg. 56868 (Sept. 16, 2022).

³² On December 8, 2022, Commerce made a preliminary determination that imports of certain CSPV products exported from Cambodia, Malaysia, Thailand, and Vietnam using parts and components produced in China were circumventing the AD/CVD orders on CSPV products from China. Commerce identified four companies that it preliminarily found not to be circumventing the orders: New East Solar (Cambodia), Hanwha Q Cells Malaysia, Jinko Solar Technology (Malaysia) and Boviet Solar Technology Co. (Vietnam). *Antidumping and Countervailing Duty Orders on Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules, From the People's Republic of China: Preliminary Affirmative Determinations of Circumvention With Respect to Cambodia, Malaysia, Thailand, and Vietnam*, 87 Fed. Reg. 75221 (Dec. 8, 2022).

Vietnam.³³ Commerce reported that it had individually investigated eight companies in the four countries and found that five of the eight companies were circumventing the orders: BYD Hong Kong (Cambodia), New East Solar (Cambodia), Canadian Solar (Thailand), Trina Solar (Thailand) and Vina Solar (Vietnam). It found that three of the investigated companies were not circumventing the orders: Hanwha Q Cells (Malaysia), Jinko Solar (Malaysia) and Boviet Solar (Vietnam). Commerce also found that companies in Malaysia, Thailand, and Vietnam that did not respond to Commerce’s information request were circumventing the orders and made country-wide circumvention findings for all four countries.³⁴

In its final circumvention determinations, Commerce stated that its circumvention findings covered (1) with respect to CSPV cells, imports that were produced in Cambodia, Malaysia, Thailand, and Vietnam from wafers produced in China, and (2) with respect to CSPV modules/laminates/panels, imports from Cambodia, Malaysia and Thailand produced using wafers produced in China where more than two of the following six components in the module/laminate/panel were produced in China: (a) silver paste, (b) aluminum frames, (c) glass, (d) backsheets, (e) ethylene vinyl acetate sheets, and (f) junction boxes. Commerce stated that if this “wafer-plus-three” requirement was not satisfied, then the merchandise was not subject to the circumvention inquiry, even if the cells were produced in one of the subject countries from wafers produced in China.³⁵

In its final determinations, Commerce provided that entries subject to the circumvention proceeding would not require AD/CVD cash deposits for the duration of the emergency declared in the Presidential Proclamation, so long as those imports occurred on or before the end of the emergency (June 6, 2024) and the imports were assembled into U.S. solar energy products within 180 days thereafter. Commerce also provided a certification mechanism for exporters and importers to establish that particular merchandise qualified for this waiver of applicable AD/CVD cash deposits.³⁶ The notice provided for “Appendix V” certificates to be used for specific entries by the three exporters as to which Commerce had

³³ *Antidumping and Countervailing Duty Orders on Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules, From the People’s Republic of China: Final Scope Determination and Final Affirmative Determinations of Circumvention With Respect to Cambodia, Malaysia, Thailand, and Vietnam*, 88 Fed. Reg. 57419 (Aug. 23, 2023).

³⁴ *Antidumping and Countervailing Duty Orders on Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules, From the People’s Republic of China: Final Scope Determination and Final Affirmative Determinations of Circumvention With Respect to Cambodia, Malaysia, Thailand, and Vietnam*, 88 Fed. Reg. 57419, 57420-57421 (Aug. 23, 2023) (“*Final Circumvention Determinations*”).

³⁵ *Final Circumvention Determinations* at 57419, 57420.

³⁶ *Final Circumvention Determinations* at 57419, 57421-57423.

made negative final circumvention determinations, and for “Appendix VI” certificates to be used by other exporters to establish that specific entries were not circumventing the orders because they met certain “component content requirements.” The notice’s Appendix II listed companies that had not cooperated in Commerce’s anticircumvention proceeding and were accordingly ineligible to use Appendix V or VI certifications. The notice also provided for “Appendix IV” certifications that importers or exporters could use to certify that their merchandise consisted of “applicable entries” eligible for the tariff holiday under the terms of the Presidential Proclamation.³⁷ The tariff holiday ended as scheduled on June 6, 2024. Subsequent imports from the four countries found to be circumventing the AD/CVD orders on CSPV products from China are subject to duties under those orders.

When the Commission issued the U.S. importer questionnaires in the final phase of these investigations, it instructed responding firms to list circumventing imports as non-subject unless the “importer provided an appendix IV or VI certification of non-circumvention from an eligible supplier and that certification was accepted by Commerce and CBP.”³⁸ Canadian Solar contacted the Commission asserting that the instruction to list imports with an Appendix IV certification as subject merchandise was improper. In a letter, it argued that “Appendix IV entries are circumventing merchandise and thus subject to the China solar cell orders.”³⁹ After consulting with petitioning and responding parties, the Commission issued supplemental instructions requesting that importers provide two sets of import data, one treating their Appendix IV entries as subject, and another treating Appendix IV entries as nonsubject.⁴⁰ Part 4 of the Staff Report presents the data treating Appendix IV entries as subject merchandise, while Appendix D of the Staff Report presents the data treating Appendix IV entries as nonsubject. For the reasons discussed further in this opinion, we treat Appendix IV entries as nonsubject imports.

³⁷ *Final Circumvention Determinations* at 57425-33.

³⁸ See Blank U.S. Importers’ Questionnaire, EDIS Doc. 840894. In the preliminary phase, the Commission’s importer questionnaires directed parties to report imports subject to the circumvention findings based on Commerce’s definition as coming from “all other sources” rather than from any subject countries. See *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled in Modules, from Cambodia, Malaysia, Thailand, and Vietnam*, Inv. Nos. 701-TA-722-725 and 731-TA-1690-1693 (Preliminary), USITC Pub. 5517 (June 2024) (“*Preliminary Determinations*”) at 15.

³⁹ Letter from Hogan Lovells on Behalf of Canadian Solar to Secretary Lisa Barton, February 13, 2025, EDIS Doc. 848496.

⁴⁰ Commission Staff Email to Parties, EDIS Doc. 848474.

C. Product Description

CSPV cells are the essential element in CSPV modules (also commonly referred to as panels), which in turn are the main components of CSPV systems that convert sunlight into electricity.⁴¹ There are four main market segments: residential, non-residential (commercial), and utility on-grid applications, and off-grid applications.⁴² Off-grid solar products are excluded from the scope of these investigations.

CSPV cells use either monocrystalline or multicrystalline silicon to convert sunlight to electricity and may be fully square or slightly rounded.⁴³ CSPV cells have a positive layer, a negative layer, and a positive-negative junction (p/n) junction, and vary in size depending on the size of the wafer used to produce the cell.⁴⁴ A cell generates electricity when sunlight strikes it, knocking electrons loose and causing them to travel between the layers. CSPV cells can be monofacial, with a materialized opaque back layer, or bifacial, with a transparent or translucent back that allows the cell to convert light that hits both the front and back of the cell into electricity.⁴⁵

CSPV modules consist of CSPV cells that are soldered together, placed on a matrix, and laminated.⁴⁶ The laminate is then typically framed in aluminum and attached to one or more junction boxes.⁴⁷ CSPV modules can be used in both ground-mounted and rooftop mounted systems, both on and off the electrical grid.⁴⁸ As monofacial and bifacial modules have moved closer to cost parity, manufacturers have adjusted their product lines, including by purchasing bifacial cells as inputs and replacing opaque back sheets with glass.⁴⁹ The most common on-

⁴¹ CR/PR at 1.20.

⁴² CR/PR at 1.20.

⁴³ CR/PR at 1.20. Monocrystalline cells are made from a single grown crystal and tend to have a higher conversion efficiency than multicrystalline cells, which have a random crystal structure. CR/PR at 1.25. Conversion efficiency is the percent of sunlight that is converted to electricity. CR/PR at 1.25, n.30. The record in these investigations shows that producers have shifted away from manufacturing multicrystalline cells, and all of the pricing data relates to products containing monocrystalline cells. *See generally*, CR/PR at Part 5.

⁴⁴ CR/PR at 1.21-1.22. Common sizes of wafers range from 156 to 210 mm in side length. *See* CR/PR at Figure 1.2.

⁴⁵ CR/PR at 1.23-1.24.

⁴⁶ CR/PR at 1.33-1.34.

⁴⁷ CR/PR at 1.27.

⁴⁸ CR/PR at 1.27.

⁴⁹ CR/PR at 1.24. Domestic producers of CSPV products have reported that monofacial and bifacial modules have reached cost parity. CR/PR at 1.24. At the hearing, witnesses from domestic producers testified that producing bifacial cells is as easy and cheap as producing monofacial cells and (Continued...)

grid CSPV modules have 60 cells (or 120 half-cut cells) or 72 cells (or 144 half-cut cells).⁵⁰ There are five principal stages in manufacturing CSPV products: (1) refining of polysilicon; (2) forming of ingots; (3) slicing of wafers; (4) conversion into cells; and (5) assembly into modules.⁵¹

D. Arguments of the Parties

Petitioner's Arguments. Petitioner argues that the Commission should apply its semi-finished product analysis and define a single domestic like product consisting of CSPV cells and modules, coextensive with the scope, as it did in in prior proceedings involving similar products.⁵² Petitioner accepts that application of the Commission's six-factor like product analysis might suggest a clear dividing line between cells and modules but argues that the analysis "should not be employed where it may lead to the anomaly of defining a domestic industry in such a manner as to disregard the impact of certain imports on one segment of a highly interdependent industry, a result which Congress has indicated should be avoided."⁵³ Petitioner contends that the purpose of the semi-finished product analysis is to address situations where unfair trade in the market for the upstream product affects the market for the finished product, and vice versa.⁵⁴ It argues that if the Commission defines cells as a separate domestic like product, and reaches a negative determination, U.S. module producers could use

(...Continued)

that it generally does not make economic sense to change over production lines. Thus, some producers use bifacial cells to assemble monofacial modules. CR/PR at 1.24 n 29.

⁵⁰ CR/PR at 1.28. Half-cut cells result in lower cell current, which reduces power losses and increases cell efficiency and overall module output. CR/PR at 1.26.

⁵¹ CR/PR at 1.29.

⁵² Petitioner's Prehearing Brief at 5 n.16. See *Crystalline Silicon Photovoltaic Cells and Modules from China*, Inv. Nos. 701-TA-481 and 731-TA-1190 (Final), USITC Pub. 4360 (Nov. 2012) at 6 ("CSPV I"); *Certain Crystalline Silicon Photovoltaic Products from China and Taiwan*, Inv. Nos. 701-TA-511 and 731-TA-1246-1247 (Final), USITC Pub. 4519 (Feb. 2015) ("CSPV II"); *Crystalline Silicon Photovoltaic Cells and Modules from China*, Inv. Nos. 701-TA-481 and 731-TA-1190 (Review), USITC Pub. 4874 (Mar. 2019) (Review) at 8; *Certain Crystalline Silicon Photovoltaic Products from China and Taiwan*, Inv. Nos. 701-TA-511 and 731-TA-1246-1247 (Review), USITC Pub. 5112 (Aug. 2020) at 8-9.

⁵³ Petitioner's Postconference Brief, Responses to Commission Questions at 21-22 (quoting *Forged Undercarriage Components from Italy*, Inv. No. 701-TA-201 (Preliminary), USITC Pub. 1394 (June 1983) at 49).

⁵⁴ Petitioner's Postconference Brief, Responses to Commission Questions at 22-23 (citing *Stainless Steel Bar from Brazil, India, Italy, Japan, and Spain*, Inv. Nos. 731-TA-687-682 (Preliminary), USITC Pub. 2734 (Feb. 1994) at I-11).

unfairly traded cells as inputs in their modules, allowing them to sell the modules at lower prices to the detriment of domestic producers that do not source unfairly traded cells.⁵⁵

Petitioner argues that cells are the primary downstream input for modules, and there have been no significant changes in the characteristics of cells, modules, or the production process that would warrant a definition of the domestic like product in these investigations different from the definition used in *CSPV I* and *CSPV II*.⁵⁶

Respondents' Arguments. Several respondent parties urge the Commission to define CSPV cells and CSPV modules as separate domestic like products.^{57 58}

Canadian Solar and Illuminate observe that the Commission's like product determinations are *sui generis*, and argue that the record in these investigations is distinguishable from the facts on which the Commission decided *CSPV I* and *CSPV II*.⁵⁹ Illuminate also asserts that the cell and module manufacturing processes have changed significantly in the more than ten years since the *CSPV II* determination.⁶⁰

Canadian Solar contends that there is a clear dividing line between cells and modules under each of the six traditional like product factors considered by the Commission.⁶¹ Canadian

⁵⁵ Petitioner's Posthearing Brief, Responses to Commission Questions at 23.

⁵⁶ Petitioner's Prehearing Brief at 6; Petitioner's Posthearing Brief at 3.

⁵⁷ See Canadian Solar Prehearing Brief at 16-18; Illuminate Posthearing Brief at 5-6. Of the respondents, Canadian Solar and Illuminate provide extensive analysis on domestic like product issues. ACP, Runergy, and Trina endorse the arguments advanced by Canadian Solar and Illuminate. See ACP Posthearing Brief at 1; Runergy Prehearing Brief at 2-4; see Trina Prehearing Brief at 19. We accordingly treat the Canadian Solar and Illuminate arguments as representing generally the views of respondents, and note where other parties raise issues that neither Canadian Solar nor Illuminate address.

⁵⁸ Respondents refer to the dissenting views in *CSPV II*. See *CSPV II*, USITC Pub. 4519 at 51-56 (Separate and Dissenting Views of Chair Broadbent).

⁵⁹ See Canadian Solar Prehearing Brief at 16-18; Illuminate Posthearing Brief at 5-6.

⁶⁰ Illuminate contends that cell producers have developed wafers that are larger and thinner and include more busbars per unit. It also asserts that the PERC (Passivated Emitter and Rear Contact) technology used on cells made between 2005 and 2020 is now obsolete and that the "TOPCon" (Tunnel Oxide Passivated Contact) technology produces larger, more powerful, and more efficient cells. Illuminate also argues that module production has changed, as module producers servicing utility projects have shifted to larger bifacial modules that are more difficult to produce than monofacial modules. Illuminate Posthearing Brief, Responses to Commission Questions at 20; see also CR/PR at 1.26.

⁶¹ Canadian Solar Prehearing Brief at 25, n.78; Canadian Solar Posthearing Brief, Responses to Commission Questions at 27. Canadian Solar asserts that cells and modules have different physical characteristics, as cells are small and fragile while modules are large, heavy, and durable. It argues that cells are not interchangeable with modules, because cells arranged on their own would not be able to transmit electricity to the grid. Canadian Solar also asserts that cells are distributed to module producers, while modules are distributed to utility customers and other end users. It contends that cells (Continued...)

Solar and Illuminate also argue that if the Commission uses its semi-finished product analysis, it should define two separate like products, as CSPV cells have different end uses, markets, functions, and values as compared to CSPV modules, and the assembly of CSPV cells into modules is a complex process that requires substantial investment.⁶² Canadian Solar argues that CSPV cells have uses distinct from assembly into CSPV modules, citing building-integrated photovoltaics (“BIPV”), which are building materials that incorporate solar cells, such as solar shingles or windows.⁶³ Canadian Solar and Illuminate argue that the market for cells consists of sales by cell producers almost exclusively to module manufacturers, and is distinct from the market for modules, which consists of sales from module assemblers to distributors, installers, and utility customers.⁶⁴ Illuminate argues that there are distinct markets, in that end users of modules do not buy cells, and that cells are internally consumed by integrated solar manufacturers or sold to unaffiliated module producers.⁶⁵

Illuminate and Canadian Solar contend that there are significant differences in the physical characteristics of cells and modules,⁶⁶ as well as their costs.⁶⁷ They also argue that

(...Continued)

and modules do not overlap in their manufacturing facilities or production processes, noting that Canadian Solar produces modules in Texas but plans to produce cells in Indiana once its facility begins operations. It also asserts that customers and producers perceive cells and modules as different products, and that finished modules are significantly higher in costs than cells. See Canadian Solar Posthearing Brief, Responses to Commission Questions at 27-28.

Canadian Solar cites *Portable Electric Typewriters From Singapore*, USITC Inv. No. 731-TA-515 (Final), USITC Pub. 2681 (Sept. 1993) at 5-6 as support for finding the division between solar cells and modules to be a “bright line”. Canadian Solar Posthearing Brief, Responses to Commission Questions at 27. In that investigation, the Commission defined a domestic like product that included portable electric typewriters and excluded portable electric word processors because, although they shared a similar purpose of producing printed text, their physical and technical characteristics were sufficiently different to find a bright line between the products.

⁶² Canadian Solar Posthearing Brief, Responses to Commission Questions at 28-29; Illuminate Prehearing Brief at 12-23.

⁶³ Canadian Solar Prehearing Brief at 19-20.

⁶⁴ Canadian Solar Prehearing Brief at 20-22; Illuminate Posthearing Brief at 6-7. Illuminate criticizes Petitioner’s argument that cells have no market independent of the end-use solar energy market on the ground that it is true of nearly any upstream product and, therefore, would always lead to putting semifinished products in the same like product as finished goods. Illuminate Prehearing Brief at 20-21.

⁶⁵ See Illuminate Prehearing Brief at 14.

⁶⁶ Canadian Solar Prehearing Brief at 22; Canadian Solar Posthearing Brief, Responses to Commission Questions at 27-28.

⁶⁷ Canadian Solar Prehearing Brief at 24.

module assembly involves six processes, which are time-consuming, expensive, and require specialized procedures, and take place in separate facilities from cell production.^{68 69}

E. Analysis

In its preliminary determinations, the Commission found that because “there was no domestic production of CSPV cells . . . the Commission must define a domestic like product to include the domestically produced article ‘most similar’ to the imported CSPV cells within the scope of the investigations.”⁷⁰ The Commission found that the domestically produced article “most similar” to CSPV cells was domestically produced modules, because they possessed characteristics and uses most similar to imported CSPV cells. It accordingly defined domestically produced CSPV modules as the domestic like product corresponding to subject imports of CSPV cells and modules.⁷¹

The factual situation has, however, changed, in that domestic production of CSPV cells began in late 2024.⁷² Thus, the Commission is no longer in the position of identifying the

⁶⁸ Illuminate Prehearing Brief at 20. These six processes include (1) preparing the glass sheets; (2) lamination; (3) stringing cells; (4) framing the module; (5) connecting the junction boxes; and (6) quality testing. Illuminate cites working in a “clean room” to prevent cell contamination as an example of a more complex requirement for module assembly compared to cell production. Illuminate Posthearing Brief at 8.

⁶⁹ ACP argues that applying the Commission’s semi-finished like product analysis would be unlawful under the Supreme Court’s recent decision in *Loper Bright Enters. v. Raimondo*, 603 U.S. 369 (2024). It asserts that the statutory language of 19 U.S.C. § 1677 provides only for a comparison of the distinct physical characteristics and uses of cells and modules, and the remaining factors in both the semi-finished product analysis and six-factor test are “agency-created” and inconsistent with the text of the statute. ACP Posthearing Brief at 6. ACP asserts that decisions upholding the Commission’s six-part test applied the deferential standard under *Chevron U. S. A. Inc. v. Natural Resources Defense Council, Inc.*, 467 U.S. 837, 104 S.Ct. 2778, 81 L.Ed.2d 694 (1984), which has been overruled, and would not survive judicial review under *Loper Bright*’s “best reading” of the statute standard. ACP Posthearing Brief at 4. ACP notes that the Court of International Trade has recently issued a decision applying the “best reading” standard to Commerce decisions but has yet to apply the standard to an appeal from the Commission. ACP Posthearing Brief at 4, n.10 (citing *Bio-Lab, Inc. v. United States*, No. 24-00024, 2025 WL 1099710, at *8 (Ct. Int’l Trade Apr. 14, 2025)).

⁷⁰ *Preliminary Determinations* at 18 (“In the absence of domestic production of CSPV cells, CSPV cells are not capable of examination under the Commission’s traditional like product analysis, which entails comparisons of products that are in fact domestically produced; rather, the Commission must define a domestic like product to include the domestically produced article ‘most similar’ to the imported CSPV cells within the scope of the investigations.”).

⁷¹ *Preliminary Determinations* at 18.

⁷² See CR/PR at 1.3.

domestic product “most similar” to imported CSPV cells that are not produced in the United States.

These facts, however, give rise to a different question – whether to apply the six-factor domestic like product analysis, or the five-factor semifinished product analysis in our evaluation of the domestic like product.⁷³ Although the parties disagree about the significance and extent of cell usage outside the production of modules, there is no dispute that the primary use for CSPV cells is as an input for assembly into CSPV modules. The Commission has stated that in “cases where an issue is presented as to whether articles at different stages of processing should be included in the same like product, the Commission has used the semi-finished like product analysis.”⁷⁴ The Commission has explained that the purpose of the semi-finished product analysis is “to identify a product or products, the producers of which are in as similar a position as possible to one another vis-à-vis the subject imports.”⁷⁵ We consider that the semi-finished product analysis, which is tailored to addressing the differences among products at different stages of the production process, is better suited to the facts of this case than the six-

⁷³ In a semi-finished products analysis, the Commission examines the following: (1) the significance and extent of the processes used to transform the upstream into the downstream articles; (2) whether the upstream article is dedicated to the production of the downstream article or has independent uses; (3) differences in the physical characteristics and functions of the upstream and downstream articles; (4) whether there are perceived to be separate markets for the upstream and downstream articles; and (5) differences in the costs or value of the vertically differentiated articles. See, e.g., *Glycine from India, Japan, and Korea*, Inv. Nos. 731-TA-1111-1113 (Preliminary), USITC Pub. No. 3921 at 7 (May 2007); *Artists' Canvas from China*, Inv. No. 731-TA-1091 (Final), USITC Pub. No. 3853 at 6 (May 2006); *Live Swine from Canada*, Inv. No. 731-TA-1076 (Final), USITC Pub. 3766 at 8 n.40 (Apr. 2005); *Certain Frozen Fish Fillets from Vietnam*, Inv. No. 731-TA-1012 (Preliminary), USITC Pub. No. 3533 at 7 (Aug. 2002).

We have considered, and find unpersuasive, ACP's argument that the “best reading” of the Tariff Act precludes a consideration in our like product analysis of factors other than the physical characteristics and end of the products under consideration. The Tariff Act requires the Commission to determine whether dumped and subsidized imports cause material injury to a domestic industry, defined as the producers of the domestic like product. 19 U.S.C. § 1677(4) and 1677(7). The statute defines the domestic like product, in turn, as “a product which is like, or in the absence of like, most similar in characteristics and uses with” the dumped or subsidized imports. 19 U.S.C. § 1677(10). In the context of examining competition between domestic products and imported articles, factors beyond physical characteristics and ends uses, such as those embodied in the six traditional like product factors or the five semi-finished product factors, may be highly relevant to an evaluation of “likeness.” In particular, these other factors may help us identify which physical characteristics and end uses are relevant to differentiating the domestic like product from other products.

⁷⁴ See *Gas Powered Pressure Washers from China and Vietnam*, Inv. Nos. 701-TA-684 and 731-TA-1597-1598 (Preliminary), USITC Pub. 5409 at 10-12 (Feb. 2023).

⁷⁵ *Stainless Steel Bar from Brazil, India, Italy, Japan, and Spain*, Inv. Nos. 731-TA-687-682 (Preliminary), USITC Pub. 2734 (Feb. 1994) at I-11 (emphasis in original).

factor test, which the Commission normally applies with respect to products at the same stage of production.

Dedication for Use. The Commission has previously explained that the greater the extent to which an upstream article of any kind is “dedicated for use” to the production of a particular downstream article, the more likely it is that producers of both products will be in the same position with respect to the imports of the articles. In such a case, it would therefore be more reasonable to consider the two articles as a single product.⁷⁶

The record shows that, as was the case in prior proceedings involving CSPV products,⁷⁷ the vast majority of CSPV cells covered by these investigations are used for CSPV module production.⁷⁸ Indeed, 13 out of 16 responding U.S. producers, and 35 out of 41 responding U.S. importers indicated that there are no uses for CSPV cells other than for assembly into CSPV modules.⁷⁹ At the preliminary phase staff conference, counsel for respondent Illuminate testified that “cells are used exclusively by the domestic industry” to produce CSPV modules.⁸⁰ Furthermore, *** indicated in its final phase U.S. importer questionnaire response that a ***.”⁸¹ U.S. producer *** similarly stated that “***.”⁸²

Canadian Solar argues that the use of CSPV cells for BIPV applications has grown significantly compared to the period covered by *CSPV II*.⁸³ While there is no dispute that CSPV cells are used to some extent in BIPV applications such as roof shingles and ***,⁸⁴ no respondent party has provided evidence as to the significance or volume of these

⁷⁶ *Stainless Steel Bar from Brazil, India, Italy, Japan, and Spain*, Inv. Nos. 731-TA-687-682 (Preliminary), USITC Pub. 2734 (Feb. 1994) at I-11.

⁷⁷ See *CSPV II*, USITC Pub. 4519 at 13.

⁷⁸ See *CSPV II*, USITC Pub. 4519 at 13.

⁷⁹ CR/PR at Table 1.11.

⁸⁰ Petitioner’s Prehearing Brief at 30 (citing Staff Conference Tr. at 13.). Petitioner cites testimony from representatives of Talon Solar and Mission Solar that solar cells are dedicated entirely for use in solar modules. See *id.* (citing Hearing Tr. at 47 (Tesanovich) and Hearing Tr. at 70 (Martens)).

⁸¹ CR/PR at Table L.2.

⁸² CR/PR at Table L.1.

⁸³ Canadian Solar Prehearing Brief at 19.

⁸⁴ CR/PR at Tables L.1 and L.2. One U.S. producer, ***, stated that it hopes *** in the future, although ***. CR/PR at Table 3.5. Another U.S. producer, ***, indicated that it produces ***. CR/PR at Table 3.24 (3.29). Record evidence that the Consumer Product Safety Commission issued a recall of GAF’s solar roof shingles during the period of investigation indicates that GAF, too, produces BIPV products. CR/PR at 6.31.

applications.⁸⁵ Moreover, the existence of some alternative uses does not detract from the bulk of evidence indicating that the predominant use for domestically produced CSPV cells is in the production of domestically produced CSPV modules, which suggests that they form a single domestic like product.

Separate Markets. It is undisputed that in the United States, CSPV cells are almost exclusively sold by cell manufacturers to module manufacturers (some of whom may be related to the cell manufacturer), while modules are sold by module manufacturers to a wide variety of distributors and end users for generation of solar energy.⁸⁶ We note that 3 of 11 responding purchasers and 26 of 41 responding importers indicated that there are separate markets for CSPV cells and CSPV modules.⁸⁷ However these initial sales of domestically- manufactured cells to module manufacturers lead invariably to the sales of those cells, incorporated into modules, to distributors and end users for the generation of solar energy.

The Commission has previously concluded that there is not a separate market for a semifinished product merely because it is sold to an intermediate processor for conversion to the finished product.⁸⁸ The Commission has also acknowledged that “[e]ven if an upstream article is ‘dedicated for use in a particular downstream market, there can be independent markets for the two articles.’”⁸⁹

In *CSPV II*, the Commission found that there was not any market for CSPV cells beyond their use for assembly into CSPV modules.⁹⁰ In that case, there was domestic cell production,

⁸⁵ See CR/PR at Table L.1.

⁸⁶ See CR/PR at 2.2, 2.4.

⁸⁷ CR/PR at Table 1.11. For example, in its questionnaire response ***.” Furthermore, *** reports that as “***.” CR/PR at Table L.1. *** stated that the ***.” *** stated that “***.” Similarly, *** reported that “***.” *** reported that there are separate markets but responded that ***”

⁸⁸ See, e.g., *Fluid End Blocks from China, Germany, India, & Italy*, Inv. No. 701-TA-632-635 and 731-TA-1466-68, USITC Pub. 5017 (Feb. 1, 2020) (Preliminary), at 11. In *Fluid End Blocks*, the Commission defined a single domestic like product of unfinished fluid end blocks (“FEBS”) and finished FEBS. *Id.* It found that there was no separate market for unfinished FEBS “even though they may be transferred in an unfinished form to an intermediate firm that performs the final finishing operations or sold directly to the end user that performs the final finishing operations itself.” *Id.*; see *Artists’ Canvas from China*, Inv. No. 731-TA-1091 (May 2006) (Final), at 6 (finding no separate market for unfinished and finished product because “[w]hile bulk canvas is sold primarily to converters and the majority of finished canvas is sold to retailers, the ultimate end user of either is the artist”); see also *Carbazole Violet Pigment 23 from China and India*, Inv. Nos. 701-TA-437 and 731-TA-1060 and 1061 (Final), USITC Pub. 3744 at 6 (Dec. 2004) (“Thus, because crude and finished violet 23 are part of a continuous chain of production, their end-use markets are essentially the same.”).

⁸⁹ *Stainless Steel Bar from Brazil, India, Italy, Japan, & Spain*, USITC Inv. No. 731-TA-678-682 (Preliminary), USITC Pub. 2734 (Feb. 1994) at I-11

⁹⁰ *CSPV II*, USITC Pub. 4519 at 13.

but the Commission found that the two existing domestic cell producers' internal consumption of the large majority of domestically produced cells for their own production of modules weighed against finding two separate domestic like products.⁹¹ In these investigations, the situation has shifted. Suniva is responsible for the entirety of domestic production of cells and does not internally consume them.⁹² To the extent that there is internal consumption of cells, it is the consumption of imported cells by U.S. module manufacturers affiliated with the foreign producer of the cells and, therefore, not relevant to an evaluation of whether domestically produced cells and modules form a single domestic like product.

The evidence on this factor is accordingly mixed. The fact that the sole domestic producer, Suniva, participates only in the sale of cells, and not in the sale of modules, suggests that cells are a separate like product. However, we find that this is outweighed by the fact that the U.S. cell market is almost entirely focused on the production of products for sale in the module market, which continues to indicate that domestically produced cells and modules form a domestic single like product.

Differences in Physical Characteristics and Functions of the Upstream and Downstream Articles. Nearly all responding U.S. producers indicated that cells and modules have different physical characteristics and functions,⁹³ but the differences that they list largely stem from CSPV cells and modules being at different stages of processing. The Commission has previously recognized that “***semi-finished products dedicated for use in downstream products do not necessarily encompass all attributes or functions of the finished products.”⁹⁴ The record shows that cells and modules are physically different in that cells are small, averaging up to 7 inches by 7 inches, while modules can be several feet long and weigh more than 70 pounds. Unfinished cells are delicate, brittle, and cannot transmit usable electricity until they are assembled into modules, which are a connected group of cells laminated with special glass or other materials to protect the cells and facilitate electricity generation.⁹⁵

⁹¹ *CSPV II*, USITC 4519 at 13-14.

⁹² See CR/PR at Table 3.3.

⁹³ See CR/PR at Table L.2.

⁹⁴ *CSPV II*, USITC 4519 at 14, n. 69; see also *Live Swine from Canada*, Inv. No. 701-TA-438, 731-TA-1076 (Preliminary), USITC Pub. 3693 (May 2004) at 7 (“Swine at different stages of production are not . . . interchangeable because they have not reached their optimal market weight. However, the Commission has found that it would not be expected that a semifinished product that is dedicated for use as a finished product would possess the attributes of and encompass all the functions of a finished product.”).

⁹⁵ See CR/PR at 1.33-1.34; see also Petitioner’s Prehearing Brief at 34.

The characteristics, however, that enable the conversion of sunlight to electricity are embodied in the cells. The module assembly process does not affect that characteristic, but adds equipment to facilitate the orientation of the constituent cells toward the sun, aggregate their electrical output, and transmit it for use. Indeed, CSPV cells cannot serve their intended function of converting sunlight into usable electricity without being assembled into some product, which in the U.S. market is almost invariably a CSPV module.⁹⁶ Furthermore, the product updates since *CSPV II* that Canadian Solar and Illuminate highlight, such as the shift from PERC cells to TOPCon, largely relate to technological improvements to the cells,⁹⁷ which are developments that have enhanced their ability to produce electricity, rather than alter the ultimate function that cells and modules share. Thus, we consider that physical characteristics and function weigh in favor of finding that domestically produced cells and modules form a single domestic like product.

Differences in Value. The record shows that CSPV cells and modules differ in value. Illuminate USA asserts that each cell costs less than \$1.00 to make, whereas a finished module costs about \$150.⁹⁸ Canadian Solar asserts that cells cost \$*** to \$*** per watt, whereas modules cost \$*** to \$*** per watt.⁹⁹ Thirteen out of 16 responding U.S. producers, and 36 out of 39 responding U.S. importers indicated that there are differences in costs between CSPV cells and CSPV modules.¹⁰⁰ Some U.S. producers in their questionnaire responses indicated that module production incurs production and material costs beyond the cost of cells, and cells have little value unless they are assembled into modules.¹⁰¹

On the other hand, CSPV cells account for a significant portion of a module's value. U.S. producers' questionnaire responses indicate that CSPV cells accounted for *** percent of the total raw material costs for CSPV module production in 2024,¹⁰² and U.S. producers reported that CSPV cells' share of the cost of finished modules ranged from 20 to 60 percent.¹⁰³ U.S.

⁹⁶ See Petitioner's Prehearing Brief at 34.

⁹⁷ See CR/PR at 1.26.

⁹⁸ See Illuminate Posthearing Brief, Responses to Commission Questions at 38; see also Hearing Tr. at 167 (Wagner).

⁹⁹ Canadian Solar Prehearing Brief at 24.

¹⁰⁰ CR/PR at Table 1.11.

¹⁰¹ CR/PR at L.10-L.12.

¹⁰² CR/PR at Table 6.5. In 2024, cells from subject sources accounted for *** percent of U.S. producers' raw material costs and cells from nonsubject sources accounted for *** percent of U.S. producers' raw material costs. *Id.*

¹⁰³ CR/PR at 2.13. The most common on-grid CSPV modules have 60 cells (or 120 half-cut cells) or 72 cells (or 144 half cut cells). CR/PR at 1.28.

importers' reported cost shares ranged from 30 to 60 percent.¹⁰⁴ By their nature, semifinished products will represent some fraction of the value of a finished product. In this case, that fraction appears to be substantial, and likely *** of the value. We consider that on balance, this factor weighs in favor of finding that domestically produced cells and modules form a single domestic like product.

Extent of Processes Used to Transform Upstream Product into Downstream Product. The record shows that the process of assembling cells into modules is generally the most labor-intensive part of the manufacturing process.¹⁰⁵ Twelve out of 14 U.S. producers, and 30 out of 37 responding U.S. importers indicated that the process for transforming cells into modules is capital and labor intensive.¹⁰⁶ Furthermore, the record shows that module assembly generally occurs in separate facilities or production lines, and with separate employees, which weighs against finding a single domestic like product.¹⁰⁷

However, the Commission has previously found that the "processes used to manufacture CSPV modules from CSPV cells are technologically sophisticated, more labor intensive than manufacturing CSPV cells, and add value to the product, but they enhance rather than change the basic function of CSPV cells, which is to convert sunlight into electricity."¹⁰⁸ The record in these investigations does not indicate differently. The five principal stages of the manufacture of CSPV products are (1) refining of polysilicon, (2) formation of ingots, (3) slicing of wafers, (4) conversion to CSPV cells, (5) assembly into the finished product, CSPV modules,¹⁰⁹ and four of those five steps relate to the production of cells.¹¹⁰ While the record indicates that

¹⁰⁴ CR/PR at 2.13. In *CSPV II*, importers reported that CSPV cells accounted for *** percent of the cost of CSPV modules, and the averages reported by U.S. producers and purchasers were *** percent and *** percent, respectively. *CSPV II*, Confidential Final Opinion, EDIS Doc. 551052, at 19. Although the cost shares of cells have decreased since *CSPV II*, cells still make up most of the input cost of a module.

¹⁰⁵ CR/PR at Table L.1; CR/PR at 1.32-1.33.

¹⁰⁶ CR/PR at Table 1.11.

¹⁰⁷ Canadian Solar Posthearing Brief, Responses to Commission Questions at 27-28. The Commission has explained the "significance of the activity necessary to transform the unfinished product to the finished product is important" and that if the "process requires separate facilities or entirely separated production lines, it is more likely to be significant than if it is merely one additional station on a single line." See *Stainless Steel Bar from Brazil, India, Italy, Japan, & Spain*, USITC Inv. No. 731-TA-678-682 (Preliminary), USITC Pub. 2734 (Feb. 1994) at I-12.

¹⁰⁸ *CSPV II*, USITC Pub. 4519 at 15.

¹⁰⁹ CR/PR at 1.23. The production steps may be done in different plants or locations. The ingot and wafer production process differs for monocrystalline and multicrystalline cells. *Id.*

¹¹⁰ CR/PR at 1.23. The Commission has previously defined a single like product in cases where conversion into the downstream product added substantial value. See *Carbazole Violet Pigment 23 from* (Continued...)

the process of assembling cells into modules involves significant costs and labor, module assembly enhances, rather than alters, CSPV cells' function to create electricity.¹¹¹

Conclusion. Many of the differences between CSPV cells and modules stem from their being at different stages of production.¹¹² The evidence demonstrates that cells are dedicated to the production of CSPV modules, and that, although there are differences in size, weight, and finishing, CSPV cells and modules share the same essential characteristics and functions that allow for the conversion of sunlight into electricity. The cell also contributes a substantial portion of the finished value of the module. The record is mixed on the significance and extent of the processes used to transform cells into modules, as module assembly is a labor-intensive and costly operation. On balance, however, module assembly enhances, rather than alters, CSPV cells' essential functions. The record is also mixed on the degree to which domestically produced cells and modules compete in separate markets. We consider that, overall, the evidence indicating that cells and modules form a single domestic like product outweighs the evidence to the contrary. Consequently, we define a single domestic like product consisting of CSPV cells and CSPV modules, coextensive with Commerce's scope definition.¹¹³

(...Continued)

China and India, Inv. Nos. 701-TA-437 and 731-TA-1060 and 1061 (Final), USITC Pub. 3744 at 5-7 (Dec. 2004) (finding one domestic like product where conversion into downstream product added substantial value, but the upstream product was the costliest input used to make the downstream product).

¹¹¹ See CR/PR at 1.29.

¹¹² We have considered, and find unpersuasive, Canadian Solar's reference to our determination in *Portable Electric Typewriters From Singapore* for the proposition that products with a similar purpose (in that case, producing printed text) may have physical and technical characteristics sufficiently different to create a bright line between them for purposes of defining the domestic like product. In particular, *Portable Electric Typewriters* did not involve upstream and downstream products, which present concerns different from those presented by products at the same stage of production.

¹¹³ In the preliminary phase, the Commission did not define the domestic like product to include out-of-scope thin film solar products. *Preliminary Determinations*, USITC Pub. 5517 at 21, n.84. The record in the preliminary phase of these investigations indicated that thin film solar products are produced using different raw materials, manufacturing facilities, manufacturing processes, and production employees, and that thin film solar products differ significantly in physical characteristics, conversion efficiency, and output from CSPV solar cells and modules. *Id.*

The Commission also did not define the domestic like product to include out-of-scope off-grid CSPV modules. *Id.* The Commission found that while off-grid modules are made from the same raw materials as in-scope modules, the record indicated that there are significant differences in their end uses, interchangeability, consumer and producer perceptions, and price. *Id.*

No party has argued that the definition of the domestic like product should include out-of-scope thin film solar products or off-grid modules, and the record in the final phase does not demonstrate any changes in the characteristics of thin film solar products or off-grid modules since the preliminary phase. (Continued...)

III. Domestic Industry

The domestic industry is defined as the domestic “producers as a whole of a domestic like product, or those producers whose collective output of a domestic like product constitutes a major proportion of the total domestic production of the product.”¹¹⁴ In defining the domestic industry, the Commission’s general practice has been to include in the industry producers of all domestic production of the like product, whether toll-produced, captively consumed, or sold in the domestic merchant market. These investigations raise two sets of domestic industry issues. The first concerns what processing activities are sufficient to constitute domestic production. The second concerns whether appropriate circumstances exist to include any domestic producers from the domestic industry pursuant to the related parties provision.

A. Sufficient Production-Related Activities

In deciding whether a firm qualifies as a domestic producer of the domestic like product, the Commission generally analyzes the overall nature of a firm’s U.S. production-related activities, although production-related activity at minimum levels could be insufficient to constitute domestic production.¹¹⁵ The Commission has previously determined that U.S. CSPV module assemblers engage in sufficient production-related activities to include them in the domestic industry as domestic producers of the domestic like product, and the Commission did not exclude module assemblers from the domestic industry in the preliminary phase.¹¹⁶ Because domestic cell production began late in the January 2022 to December 2024 period of investigation (“POI”) and remains quite low, virtually all domestic module production between

(...Continued)

See Petitioner’s Prehearing Brief at 9-10. Therefore, we do not include out-of-scope thin film solar products or off-grid modules in the definition of the domestic like product.

¹¹⁴ 19 U.S.C. § 1677(4)(A).

¹¹⁵ The Commission generally considers six factors: (1) source and extent of the firm’s capital investment; (2) technical expertise involved in U.S. production activities; (3) value added to the product in the United States; (4) employment levels; (5) quantity and type of parts sourced in the United States; and (6) any other costs and activities in the United States directly leading to production of the like product. No single factor is determinative and the Commission may consider any other factors it deems relevant in light of the specific facts of any investigation. *Crystalline Silicon Photovoltaic Cells and Modules from China*, Inv. Nos. 701-TA-481 and 731-TA-1190 (Final), USITC Pub. 4360 at 12-13 (Nov. 2012).

¹¹⁶ See *Preliminary Determinations*, USITC Pub. 5517 at 22 (citing *CSPV II*, USITC Pub. 4519 at 16).

2022 and 2024 required imported cells.¹¹⁷ Although several respondents advocate that the Commission find two separate domestic like products, consisting of CSPV cells and CSPV modules, no party has argued that if the Commission defines a single domestic like product it should not include module assemblers in the domestic industry. Furthermore, based on the record, we find that U.S. module assemblers engage in sufficient production-related activities to include them in the domestic industry as producers of the domestic like product.¹¹⁸ Consequently, we treat their resulting shipments as shipments by the domestic industry, even though almost all the modules assembled in the United States used CSPV cells that are imported from subject and nonsubject sources.

B. Related Parties

We must determine whether any producer of the domestic like product should be excluded from the domestic industry pursuant to section 771(4)(B) of the Tariff Act. This provision allows the Commission, if appropriate circumstances exist, to exclude from the domestic industry producers that are related to an exporter or importer of subject merchandise or which are themselves importers.¹¹⁹ Exclusion of such a producer is within the Commission's discretion based upon the facts presented in each investigation.¹²⁰

¹¹⁷ See CR/PR at 2.11.

¹¹⁸ We also note that U.S. module producers made substantial capital expenditures and incurred significant research and development expenses during the POI. See CR/PR at Table C.3. The record also indicates that module assembly requires high employment levels; see CR/PR at Table C.3, and is the most labor-intensive part of the manufacturing process of CSPV products. See CR/PR at 1.33. Furthermore, we observe that the value added by U.S. module producers to their imports of cells for the production of modules constituted *** percent of the value of their U.S. shipments of modules over the full POI. *Derived from* CR/PR at Table C.4.

¹¹⁹ See *Torrington Co. v. United States*, 790 F. Supp. 1161, 1168 (Ct. Int'l Trade 1992), *aff'd without opinion*, 991 F.2d 809 (Fed. Cir. 1993); *Sandvik AB v. United States*, 721 F. Supp. 1322, 1331-32 (Ct. Int'l Trade 1989), *aff'd mem.*, 904 F.2d 46 (Fed. Cir. 1990); *Empire Plow Co. v. United States*, 675 F. Supp. 1348, 1352 (Ct. Int'l Trade 1987).

¹²⁰ The primary factors the Commission has examined in deciding whether appropriate circumstances exist to exclude a related party include the following:

- (1) the percentage of domestic production attributable to the importing producer;
 - (2) the reason the U.S. producer has decided to import the product subject to investigation (whether the firm benefits from the LTFV sales or subsidies or whether the firm must import in order to enable it to continue production and compete in the U.S. market);
 - (3) whether inclusion or exclusion of the related party will skew the data for the rest of the industry;
 - (4) the ratio of import shipments to U.S. production for the imported product; and
- (Continued...)

The domestic industry is defined as the domestic “producers as a whole of a domestic like product, or those producers whose collective output of a domestic like product constitutes a major proportion of the total domestic production of the product.”¹²¹ In defining the domestic industry, the Commission’s general practice has been to include in the industry producers of all domestic production of the like product, whether toll-produced, captively consumed, or sold in the domestic merchant market.

1. Arguments of the Parties

Petitioner’s Arguments. Petitioner asserts that appropriate circumstances exist to exclude five firms – Canadian Solar, Trina, Illuminate, Jinko, and Runergy – from the domestic industry pursuant to the related parties provision. It argues that they are related to foreign importers or exporters, and that their direct importation of subject imports demonstrates that their interests lie more in importing subject merchandise than in domestic production of CSPV products. Petitioner further argues that appropriate circumstances exist to exclude these five firms, as they are related to Chinese companies that have engaged in unfair trade practices as shown by other investigations, and that their inclusion in the domestic industry would mask injury to the domestic industry with respect to key trade and financial indicators.¹²²

Petitioner argues that Canadian Solar and Trina have most of their CSPV product manufacturing capacity located in China, Thailand, and Vietnam. It contends that Illuminate, Jinko, and Runergy ***, and that Jinko and Runergy ***. It asserts that imports of subject merchandise by each of these firms or its U.S. importer affiliates were *** of that firm’s U.S. production.¹²³

Respondents’ Arguments. Canadian Solar argues that the Commission should define the domestic industry to include all U.S. producers of the domestic like product. It contends that appropriate circumstances do not exist to exclude any firms from the domestic industry, as all U.S. producers of CSPV products have made significant investments in U.S. CSPV manufacturing

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(5) whether the primary interest of the importing producer lies in domestic production or importation. *Changzhou Trina Solar Energy Co. v. USITC*, 100 F. Supp.3d 1314, 1326-31 (Ct. Int’l. Trade 2015); see also *Torrington Co. v. United States*, 790 F. Supp. at 1168.

¹²¹ 19 U.S.C. § 1677(4)(A).

¹²² Petitioner’s Posthearing Brief, Responses to Commission Questions at 85.

¹²³ Petitioner’s Prehearing Brief at 11-12.

and are predominantly interested in U.S. production.¹²⁴ It argues that Canadian Solar accounted for a substantial portion of domestic production, as it was the *** U.S. manufacturer of CSPV modules in 2024.¹²⁵ Canadian Solar explains that it imports subject cells because it requires them to make modules, and that there are virtually no domestic cells available on the commercial market because U.S. cell production only began in late 2024.¹²⁶ Canadian Solar also asserts that it will not import subject CSPV modules in a manner that would undermine its \$1.1 billion in recent investments in U.S. CSPV cell and module manufacturing.

Illuminate argues that no domestic module producer should be excluded from the domestic industry because they all focus primarily on domestic production, and they had no alternative but to use imported cells in the absence of sufficient domestic cell production.¹²⁷ Jinko, Runergy, and Trina did not specifically address the exclusion issue, but each asserts that its use of imports, in the absence of a sufficient supply of domestic cells, is to support the domestic module production that it commenced during the POI.¹²⁸

1. Analysis

Because U.S. production of CSPV cells began late in the POI and was very limited in comparison to apparent domestic consumption, U.S. producers of CSPV modules had to import or purchase foreign produced CSPV cells for domestic module assembly.¹²⁹ The record shows that nine U.S. producers are subject to possible exclusion from the domestic industry under the related parties provision because they imported subject merchandise during the POI, or are affiliated with subject producers, exporters, or importers of CSPV cells and modules from subject countries.¹³⁰

¹²⁴ Canadian Solar Prehearing Brief at 25-26; Canadian Solar Posthearing Brief at 9-10.

¹²⁵ Canadian Solar Posthearing Brief, Responses to Commission Questions at 22.

¹²⁶ Canadian Solar Posthearing Brief, Responses to Commission Questions at 20-21.

¹²⁷ Illuminate Posthearing Brief, Responses to Commission Questions at 32-33.

¹²⁸ See Jinko Prehearing Brief at 12-13; Runergy Posthearing Brief at 2; Trina Prehearing Brief at 16, 19.

¹²⁹ CR/PR at 3.25.

¹³⁰ CR/PR at 3.5. In addition to their own imports, four of these U.S. producers purchased subject merchandise from U.S. importers. CR/PR at Tables 3.25-3.28. Because we find that each of these producers is subject to possible exclusion by reason of its own imports, we see no need to evaluate whether it is additionally subject to possible exclusion by reason of its purchases.

*** did not import subject merchandise and is not affiliated with an importer or foreign producer of subject merchandise, but did purchase subject imports from U.S. importer *** in 2022 and 2023. CR/PR at Table 3.29. A domestic producer that does not itself import subject merchandise or (Continued...)

We consider whether appropriate circumstances exist to exclude any domestic producer subject to the related parties provision from the domestic industry. In considering this issue, we note that in *CSPV II*, the Commission observed that U.S. module producers relied primarily or exclusively on imported subject CSPV cells and thus stated that “we do not find that importation of subject merchandise, by itself, even in appreciable quantities, necessarily warrants excluding a related party.”¹³¹ The Commission concluded that even if module producers rely on imported inputs, the CSPV module assembly process adds value to the product and requires capital investment, R&D expenses, technical expertise, automation, and skilled labor.¹³² In these investigations, the U.S. module producers potentially subject to exclusion are in largely the same situation, as they all relied on imports of CSPV cells in the absence of domestic cell production until late in the POI.¹³³

***, ***, ***, ***, ***, ***, and ***. Each of these domestic producers is potentially subject to exclusion because it or an affiliated firm imported subject merchandise from one or more of the subject countries during the POI.¹³⁴ Each producer or its relevant affiliate imported

(...Continued)

does not share a corporate affiliation with an importer may nonetheless be deemed a related party if it indirectly controls an exporter or importer of subject merchandise. 19 U.S.C. § 1677(4)(B). The Commission has found such control to exist, for example, when the domestic producer's purchases were responsible for a predominant proportion of an importer's subject imports and the importer's subject imports were substantial. *See, e.g., Certain Seamless Carbon and Alloy Steel Standard, Line, and Pressure Pipe from Argentina, Brazil, Germany, and Italy*, Inv. Nos. 701-TA-362 and 731-TA-707-710 (Review), USITC Pub. 3429 at 8-9 (June 2001).

Even if *** were to qualify as a related party, we would find that appropriate circumstances do not exist for its exclusion. As previously stated, *** accounted for *** percent of domestic production of CSPV modules in 2024. CR/PR at Table 3.1. *** reported operating income of \$*** in 2022, and then operating losses of \$*** in 2023 and \$***. CR/PR at Table 6.3. Similarly, it reported net income of \$*** in 2022, and then net losses of \$*** in 2023 and \$*** in 2024. *Id.* Accordingly, the record does not indicate that *** domestic production operations benefitted from its purchases of subject imports to such an extent that its inclusion in the domestic industry would skew industry data or mask injury.

¹³¹ *CSPV II*, USITC Pub. 4519 at 17.

¹³² *CSPV II*, USITC Pub. 4519 at 17-19.

¹³³ Hearing Tr. at 195 (Dogan).

¹³⁴ *** imported subject merchandise from *** in 2022, 2023, and 2024, from *** in 2022, and 2023, and from *** in 2023. CR/PR at Table 3.16. *** imported subject merchandise from *** in 2024 and is related to a producer and exporter, and an importer, of the subject merchandise. CR/PR at Table 3.17. *** imported subject merchandise from *** in 2022, 2023, and 2024, and from *** in 2023. CR/PR at Table 3.18. *** imported subject merchandise from *** in 2024 and is related to an importer and exporter of subject merchandise. CR/PR at Tables 3.2, 3.19. *** imported subject merchandise from *** in 2024 and is related to an importer and exporter of subject merchandise CR/PR at Tables 3.2, 3.21. *** imported subject merchandise from *** in 2022. CR/PR at Table 3.22. *** imported subject

(Continued...)

CSPV cells exclusively for use in U.S. production of CSPV modules or other in-scope CSPV products. *** and *** were *** during the POI, accounting for *** percent, and *** percent, respectively, of U.S. production of CSPV modules in 2024.¹³⁵ *** accounted for *** percent of U.S. production in 2024, while ***, ***, ***, and *** each accounted for *** percent.¹³⁶ ***, ***, ***, and *** each explains that it imported subject merchandise because there was not a sufficient supply of domestically produced CSPV cells to supply its production of CSPV modules in the United States.¹³⁷ ***, ***, and *** each imported volumes of subject CSPV cells substantially in excess of its domestic production of modules in 2024.¹³⁸ *** and *** each imported a volume of subject CSPV cells *** to its domestic production in 2024, while subject imports of CSPV cells by *** and *** were substantially less than their domestic production in 2024.¹³⁹ Each of these firms reported substantial investments in the United States for cell and/or module production.¹⁴⁰ Because each of these firms imports subject CSPV cells to use in the production of CSPV modules, their subject imports are necessarily benefiting their domestic production operations for modules. However, given the limited production of CSPV cells in the United States during the POI, all domestic module producers required imported cells to produce modules and most relied in significant part on imports from subject countries.

(...Continued)

merchandise from *** in 2023 and 2024, and is related to an importer and exporter of subject merchandise. CR/PR at Table 3.2; Table 3.23.

¹³⁵ CR/PR at Table 3.1.

¹³⁶ CR/PR at Table 3.1.

¹³⁷ CR/PR at Table 3.24. *** did not provide a reason for importing in their respective responses to the Commission's questionnaire.

¹³⁸ CR/PR at Tables 3.15, 3.19, 3.21, 3.22, and 3.23. There is no evidence on the record that cells imported in excess of module production were sold in the U.S. commercial market for cells. Rather, it appears likely that *** and ***, which began ***, imported cells in excess of their module production for purposes of building inventory as they ramped up their module production operations. See CR/PR at Table 3.4. ***, which operated at a capacity utilization rate below *** percent throughout the POI, also may have imported cells in excess of its *** production in order to have the necessary material inputs with which to increase its capacity utilization. See CR/PR at Table 3.9.

¹³⁹ CR/PR at Tables 3.16, 3.17, 3.18, and 3.19.

¹⁴⁰ *** reported capital expenditures of \$*** in 2022, \$*** in 2023, and \$*** in 2024 for ***. CR/PR at Tables 6.6 and 6.7. *** reported capital expenditures of \$*** in 2022, \$*** in 2023, and \$*** in 2024. CR/PR at Table 6.6. *** *** reported capital expenditures of \$*** in 2023 and \$*** in 2024 for *** *** reported capital expenditures of \$*** in 2024, ***. CR/PR at Table 6.6. *** reported capital expenditures of \$*** in 2023 and \$*** in 2024, which is ***. CR/PR at Tables 6.3 and 6.6. *** reported capital expenditures of \$*** in 2022, \$*** in 2023, and \$*** in 2024. CR/PR at Table 6.6. It reported capital expenditures of \$*** in 2024, ***. CR/PR at Table 6.6.

Given that *** and *** are currently *** producers of solar modules in the United States and have made substantial investments in current and future production in the United States, and their subject imports of cells are dedicated to the production of CSPV modules, we find that their primary interest is in domestic production. While both companies' domestic production operations would have benefitted from their subject imports of CSPV cells, both reported *** such that it does not appear that their inclusion in the domestic industry would have the effect of masking injury to the domestic industry.¹⁴¹ Nor does the record indicate that their affiliations with subject importers had the effect of shielding them from subject import competition. In light of these considerations, we find that appropriate circumstances do not exist to exclude *** or *** from the domestic industry.

***, ***, ***, ***, and *** all reported substantially less domestic production than did *** and ***. We nonetheless find that their primary interest appears to be in domestic production, as all reported substantial investments for cell and/or module production in the United States, and explained that they used subject imports of CSPV cells because they were necessary to enable domestic production of solar modules ***.¹⁴² As noted, while these companies' subject imports of cells would have benefitted their domestic production of CSPV modules, we do not find these companies' inclusion in the domestic industry is likely to skew the data or mask injury given their *** share of U.S. production, their generally *** performance during the POI, and each of the domestic module producers' reliance in significant part on imports of cells due to cells being unavailable domestically.¹⁴³ Nor does the record indicate that any of these companies' affiliations with subject importers or exporters had the effect of shielding them from subject import competition. In light of these considerations, we find that appropriate circumstances do not exist to exclude ***, ***, ***, ***, and *** from the domestic industry.

¹⁴¹ CR/PR at Table 6.3. In 2024, *** and *** reported operating losses and negative operating income margins of \$*** (**% percent), and \$*** (**% percent), respectively.

¹⁴² *** is a "building-integrated PV," which is included in the scope of these investigations. CSPV cells can be used in BIPV products, which are materials integrated into the building envelope, such as the facade or roof, containing CSPV cells. These BIPV products replace conventional construction materials, such as glass or roof shingles, taking over the function that conventional materials would otherwise perform while also producing electricity. See CR/PR at 1.28.

¹⁴³ Respondents Canadian Solar and ACP have alleged that *** reported losses in 2024 unrelated to import competition that are responsible for much of the overall industry's losses in that year. Section VI.E explains why this concern does not change our conclusion that subject imports caused material injury or threat of material injury to the domestic industry.

. *** imported subject cells and modules from *** in 2022, 2023, and 2024, and is related to an importer and exporter of subject merchandise.¹⁴⁴ It accounted for *** percent of U.S. production of CSPV modules and was the *** U.S. producer in 2024. The ratio of its subject imports to its domestic production was *** percent in 2024.¹⁴⁵ ***.¹⁴⁶ It indicates that ***.¹⁴⁷ It reported capital expenditures of \$ in 2023, and \$*** in 2024, which it states ***.¹⁴⁸ *** began producing in the fourth quarter of 2023 and did not provide financial data for 2022 or 2023. Its net assets relating to its domestic production of modules totaled \$*** in 2024,¹⁴⁹ and in 2024 it posted ***.¹⁵⁰

Given that *** is currently the *** U.S. producer and has made substantial investments in future domestic production of CSPV products, its primary interest appears to be in domestic production. Furthermore, although its ratio of subject imports to domestic production was high, the ratio decreased in 2024, indicating that *** increased its focus on domestic production. In addition, *** subject imports of CSPV cells were dedicated to the production of CSPV modules. While *** domestic module production operations would have benefited from its imports of CSPV cells from subject sources, most domestic module producers relied in significant part on imports of cells from subject countries. In addition, *** had *** in 2024. Thus, it does not appear that *** subject imports benefited its domestic production operations in such a way that would skew the domestic industry data or mask injury to the domestic industry if *** were included in the domestic industry. Further, the record does not indicate that its affiliation with a subject importer and exporter of subject merchandise had the effect of shielding it from subject import competition. In light of these considerations, we find that appropriate circumstances do not exist to exclude *** from the domestic industry.

¹⁴⁴ CR/PR at Tables 3.2 and 3.3. *** is related to foreign producers of subject merchandise, ***, and an importer of subject merchandise, ***. ***. *Id.* at Table 3.2.

¹⁴⁵ CR/PR at Table D.23. *** domestic production was *** kW in 2022, *** kW in 2023, and *** kW in 2024. Its imports from *** were *** kW in 2022, *** kW in 2023, and *** kW in 2024. *Id.* The large majority of *** subject imports (*** percent in 2024) were of modules rather than cells. *Calculated from* *** U.S. Importer Questionnaire, EDIS Doc. *** at Part II.

¹⁴⁶ CR/PR at Table 3.24.

¹⁴⁷ *** stated reason for importing is as follows: *** CR/PR at Table 3.24.

¹⁴⁸ CR/PR at Table 6.6.

¹⁴⁹ CR/PR at Table 6.10.

¹⁵⁰ CR/PR at 6.11. *** reported \$*** in net income in 2024. *** attributes its positive net income to the Inflation Reduction Act benefits it received, and one industry witness testified that “the U.S. producers who reported 45X IRA income show very different results on a net income level {better} than those that did not{.}” Hearing Tr. at 195 (Dougan).

.¹⁵¹ *** is subject to the related party provision because it is related to an exporter of subject merchandise, and imported CSPV cells and modules during the POI.¹⁵² It accounted for *** percent of U.S. production of CSPV modules in 2024,¹⁵³ making it the *** U.S. producer.¹⁵⁴ *** imported subject merchandise from *** and *** in 2022, 2023, and 2024. The ratio of its subject imports to U.S. production was high (percent in 2022, and even higher (more than *** percent) in 2023 and 2024).¹⁵⁵ It reported capital expenditures ***, of \$*** in 2022, \$*** in 2023, and \$*** in 2024.¹⁵⁶ *** net assets relating to its domestic production of modules totaled \$*** in 2022, \$*** in 2023, and \$*** in 2024.¹⁵⁷ *** reported operating and net losses in each year of the POI.¹⁵⁸

*** is the *** U.S. producer of modules and has made substantial investments in future domestic production of CSPV products. The lack of domestic cell production made it necessary for all domestic producers to rely on imported cells to sustain their module production, and *** imports of subject CSPV cells were dedicated to its domestic production of modules. *** stated that to “***.”¹⁵⁹ Thus, on balance we find that, despite its relatively high ratio of subject imports to domestic production, its primary interest is in domestic production. Moreover, while Jinko’s domestic module production operations may have benefitted from its imports of subject CSPV cells, as most domestic producers may have, *** poor financial performance suggests that its inclusion in the domestic industry would not mask injury to the domestic industry. Nor does the record indicate that its affiliation with a subject export had the effect of shielding it from subject import competition. Therefore, we find that appropriate circumstances do not exist to exclude *** from the domestic industry.

Accordingly, consistent with our definition of the domestic like product, we define the domestic industry to include all domestic producers of CSPV cells and modules.

¹⁵¹ *** and is thus related to: ***.

¹⁵² CR/PR at Table 3.20.

¹⁵³ CR/PR at Table 3.1.

¹⁵⁴ CR/PR at Table 3.1.

¹⁵⁵ CR/PR at Table 3.20. *** domestic production was *** kW in 2022, *** kW in 2023, and *** kW in 2024. Its imports from subject sources were *** kW in 2022, *** kW in 2023, and *** kW in 2024. The large majority of *** subject imports (*** percent in 2024) were of modules rather than cells. *Calculated from* *** U.S. Importer Questionnaire, EDIS Doc. *** at Part II.

¹⁵⁶ CR/PR at Table 6.6.

¹⁵⁷ CR/PR at Table 6.10.

¹⁵⁸ CR/PR at Table 6.3. *** operating losses were \$*** in 2022, \$*** in 2023, and \$*** in 2024. *Id.* *** net losses were \$*** in 2022, \$*** in 2023, and \$*** in 2024. *Id.*

¹⁵⁹ CR/PR at Table 3.24.

IV. Negligible Imports

Section 771(24) of the Tariff Act, which defines “negligibility,” provides that imports from a subject country that are less than 3 percent of the volume of all such merchandise imported into the United States in the most recent 12-month period for which data are available that precedes the filing of the petition or self-initiation, as the case may be, shall be deemed negligible.¹⁶⁰ The statute further provides that subject imports from a single country which comprise less than 3 percent of total such imports of the product may not be considered negligible if there are several countries subject to investigation with negligible imports and the sum of such imports from all those countries collectively accounts for more than 7 percent of the volume of all such merchandise imported into the United States.¹⁶¹ In the case of countervailing duty investigations involving developing countries (as designated by the United States Trade Representative), the statute indicates that the negligibility limits are 4 percent and 9 percent, rather than 3 percent and 7 percent.¹⁶²

A. Arguments of the Parties

Petitioner’s Arguments. Petitioner argues that subject imports from Cambodia, Malaysia, Thailand, and Vietnam are not negligible because they are all above the applicable negligibility thresholds according to official import statistics available for the 12-month period preceding the petition. With respect to subject imports from Cambodia and Thailand, Petitioner asserts that, even if the Commission were to find that subject imports from Cambodia were not above the negligibility threshold for purposes of its present material injury analysis, there is evidence indicating that subject imports will exceed the applicable thresholds in the antidumping and countervailing duty investigations.¹⁶³

Petitioner disputes Respondents’ assertion that an importer’s use of the Appendix IV certification means that imports covered by the certification were found to be circumventing, and thus, not subject to these investigations. It argues that companies may have used an

¹⁶⁰ 19 U.S.C. § 1677(24)(A)(i).

¹⁶¹ 19 U.S.C. § 1677(24)(A)(ii).

¹⁶² Cambodia, a source of imports subject to the countervailing duty investigations, is on USTR’s list of least developed countries and therefore is subject to the 4 percent negligibility threshold in the countervailing duty investigation. *See Designations of Developing Countries and Least-Developed Countries Under the Countervailing Duty Law*, 85 Fed. Reg. 7613 (Feb. 10, 2020).

¹⁶³ Petitioner’s Posthearing Brief, Responses to Commission Questions at 15-17.

Appendix IV certificate for non-circumventing merchandise because of easier recordkeeping requirements or because their shipments contained mixed merchandise, and thus, the Commission cannot deem all Appendix IV entries to be nonsubject merchandise.¹⁶⁴ Petitioner also argues that, as these imports were exempt from *CSPV I* duties under the tariff holiday, it would undermine the purpose of the AD/CVD laws to allow them to be treated as nonsubject in these investigations.¹⁶⁵

Petitioner disagrees with the methodology used to identify the volume of Appendix IV imports to treat as nonsubject merchandise for purposes of negligibility calculations in Appendix D of the Staff Report. It argues that staff based the calculations in part on proprietary Customs records regarding Appendix IV imports that are not available to the parties. Petitioner proposes an alternative methodology that begins with official import statistics in both the numerator and denominator, and then adjusts the numerator by subtracting the Appendix IV volumes reported in the questionnaire responses. It asserts that these calculations would indicate that imports from all subject countries substantially exceed the negligibility threshold.¹⁶⁶

Similarly, Petitioner contests the prehearing report's treatment of ***'s imports as nonsubject for purposes of the Constructed Questionnaire Response.¹⁶⁷ Petitioner argues that in the preliminary phase of the circumvention proceedings, Commerce determined that ***. Petitioner acknowledges that Commerce deemed NE Solar to be circumventing in its final affirmative determinations, but Petitioner argues that was "only because NE Solar refused verification, which it could have done for a multitude of reasons, and not due to any substantive aspects of its production process."¹⁶⁸ Petitioner contends that because NE Solar did not submit a questionnaire response, the Commission cannot confirm how many entries were made under Appendix IV versus Appendix V, and it would be inaccurate for the

¹⁶⁴ Similarly, Petitioner argues that at least ***. Petitioner's Posthearing Brief, Responses to Commission Questions at 3.

¹⁶⁵ Petitioner's Posthearing Brief, Responses to Commission Questions at 5, 7-8.

¹⁶⁶ Petitioner's Posthearing Brief, Responses to Commission Questions at 13. Petitioner states that its methodology produces the following percentages of total imports: *** percent for subject imports from Cambodia, *** percent for AD subject imports from Malaysia, *** percent for CVD subject imports from Malaysia, , *** percent for AD subject imports from Thailand, *** percent for CVD subject imports from Thailand, *** percent for AD subject imports from Vietnam, and *** percent for CVD subject imports from Vietnam. *Id.* at 14.

¹⁶⁷ Petitioner's Posthearing Brief, Responses to Commission Questions at 12.

¹⁶⁸ Petitioner's Posthearing Brief, Responses to Commission Questions at 12.

Commission to assume that all entries were circumventing and, thus, excluded from the scope of these investigations.¹⁶⁹

Respondents' Arguments. Several respondent parties argue that imports from Cambodia and Thailand are negligible.

Imports from Cambodia. BYD argues that subject imports from Cambodia are negligible for purposes of material injury and will not imminently exceed the threshold for threat of material injury purposes. BYD argues that the Commission must treat Appendix IV entries as nonsubject merchandise. It also contends that Petitioner's use of official import statistics for the numerator of its negligibility calculation is erroneous because it does not account for the scope's exclusion of products subject to the *CSPV I* orders.¹⁷⁰ Similarly, BYD argues that although NE Solar did not submit a questionnaire response, the Commission must treat its imports as nonsubject because Commerce made an affirmative, company-specific final determination that NE Solar's imports were circumventing the *CSPV I* orders.¹⁷¹

BYD also argues that available data show that imports from Cambodia will not imminently account for more than four percent of imports of subject merchandise. It acknowledges that subject imports from Cambodia *** but argues that in the subsequent months Cambodian producers have closed their manufacturing facilities, laid off workers, and sold production lines.¹⁷² It asserts that the responding Cambodia firms have projected their capacity, production, and exports to be *** by 2026, and thus will not approach the negligibility threshold in the next two years, which it asserts is the maximum timeframe the Commission uses to determine imminence.¹⁷³ BYD also argues that even if Cambodian producers had sufficient production capacity, imports from Cambodia may be subject to 49 percent reciprocal

¹⁶⁹ Petitioner's Posthearing Brief, Responses to Commission Questions at 12-13.

¹⁷⁰ BYD Posthearing Brief at 6-7.

¹⁷¹ BYD Posthearing Brief at 6-7, 11. BYD also argues that NE Solar did not file a request for administrative review as Commerce prescribed in its final circumvention determination, or otherwise seek a changed circumstances review to demonstrate that its merchandise was not circumventing the *CSPV I* orders. *Id.* at 7. Petitioner states that *** did not, to Petitioner's knowledge, request a review of Commerce's circumvention determination. Petitioner's Posthearing Brief, Responses to Commission Questions at 10.

¹⁷² BYD Posthearing Brief at 11. BYD attached to its posthearing brief declarations from representatives of five unaffiliated Cambodian producers stating that their facilities have been permanently closed, and that ***. *Id.*

¹⁷³ BYD Posthearing Brief at 10.

tariffs.¹⁷⁴ It also contends that the largest Cambodia exporters have U.S. affiliates, and will not undermine their affiliates' U.S. investments by increasing shipments to the United States.¹⁷⁵

Imports from Thailand. Canadian Solar argues that subject imports from Thailand are negligible because most of them were Appendix IV entries covered by Commerce's anti-circumvention orders and, therefore, outside the scope of these investigations.¹⁷⁶ It also contends that, as a matter of law, the circumventing imports cannot be subject to the current investigations because they are already subject to separate AD/CVD orders.¹⁷⁷ Canadian Solar disputes Petitioner's contention that importers or exporters had flexibility in choosing among Appendix IV, V, and VI for categorizing imports affected by Commerce's circumvention determinations. It notes that the certifications required for use of each Appendix are sworn legal documents and that each appendix contained different requirements and obligations.¹⁷⁸ Canadian Solar argues that it would have been economically illogical for an importer eligible to use Appendix V or VI to instead choose Appendix IV, as that posed a risk of incurring duties if the imported cells or modules were not installed in a project in the United States quickly enough. It also notes that imports from Thailand were ineligible for Appendix V certification, as Commerce determined that only Jinko Malaysia, Hanwha Malaysia, and Boviet Vietnam could use that mechanism.¹⁷⁹

As to the data, Canadian Solar argues that it is impossible to use the official import statistics to calculate the numerator for purposes of the negligibility analysis because they include significant volumes of out-of-scope merchandise. Canadian Solar argues that, as it did in the preliminary phase, the Commission should rely on official import statistics for the denominator, and should rely on questionnaire response data, which exclude the out-of-scope

¹⁷⁴ BYD Posthearing Brief at 13.

¹⁷⁵ BYD Posthearing Brief at 14.

¹⁷⁶ Canadian Solar Prehearing Brief at 36 (citing *Louis Dreyfus Citrus Inc., v. United States*, 31 C.I.T. 964, 977 (2007)).

¹⁷⁷ Canadian Solar Prehearing Brief at 33-34; Canadian Solar Posthearing Brief at 3-4.

¹⁷⁸ Canadian Solar Posthearing Brief at 5-6.

¹⁷⁹ Canadian Solar Posthearing Brief at 5-6. Trina Solar argues that the Commission must treat Appendix IV entries as nonsubject for similar reasons, and also submitted statements from two Thai importers confirming that all of their entries from Thailand were reported under Appendix IV. See Trina Posthearing Brief at 2. Runergy adds that the fact that Appendix IV imports may have been imported free of duty assessments pursuant to the tariff holiday does not remove them from the scope of the CSPV I orders, or make them subject to the present investigations. Runergy Prehearing Brief at 7.

Appendix IV entries, for the numerator.¹⁸⁰ Canadian Solar asserts that Tables D-6 through D-8 of the Prehearing Report correctly implement that methodology.¹⁸¹

Canadian Solar, Trina, and Runergy argue that subject imports from Thailand are negligible for material injury purposes, but do not contest that subject imports from Thailand will imminently exceed the three percent threshold.¹⁸² They argue that subject imports from Thailand do not threaten the domestic industry with material injury.¹⁸³

BYD argues that aggregated subject imports from Thailand and Cambodia did not exceed the applicable aggregate threshold (7 percent in AD investigations, 9 percent in CVD investigations involving developing countries) during the negligibility period.¹⁸⁴

B. Analysis

For the reasons explained below, we find that imports from Malaysia and Vietnam are not negligible for purposes of present material injury. We also find that subject imports from Cambodia and Thailand are negligible for purposes of present material injury in the antidumping and countervailing duty investigations. We further find that subject imports individually from Cambodia and from Thailand are likely to imminently exceed the applicable negligibility thresholds for purposes of determining threat of material injury in the antidumping and countervailing duty investigations.

As a preliminary matter, we consider how to treat Appendix IV entries and what data to use for calculating import shares for purpose of our negligibility analysis. In the preliminary phase, the Commission stated that

“The scope of these investigations excludes from the scope certain imports of CSPV products from the four subject countries that are covered by the scope of the *CSPV I* orders on China, because they are subject to Commerce’s August 23, 2023, final determinations that they were circumventing the *CSPV I* orders on

¹⁸⁰ Canadian Solar Prehearing Brief at 31-32.

¹⁸¹ Canadian Solar Prehearing Brief at 35 (arguing “the Commission’s record contains the correct, robust data, as reflected in Tables D-6, D-7, and D-8 of the Prehearing Report, to make accurate and lawful findings on the issue of negligibility”). The methodology used in the Staff Report is described in the next section.

¹⁸² See Hearing Tr. at 265 (Stoel) (“We did not make an argument about imminent negligibility. We did make the argument that Thailand should be decumulated{.}”); see also Trina Prehearing Brief at 5-14; Runergy Prehearing Brief at 8-11 (addressing negligibility only for purposes of material injury).

¹⁸³ See Trina Prehearing Brief at 5-14; Canadian Solar Prehearing Brief at 44-68.

¹⁸⁴ BYD Prehearing Brief at 12; .

China. Thus, the non-circumventing imports from the four subject countries are subject to these investigations, but the circumventing imports are not.”¹⁸⁵

The Court of International Trade has stated that a circumvention inquiry is a form of requesting a scope determination from Commerce.¹⁸⁶ The Commission must accept, and cannot modify, Commerce’s definition of the scope of the merchandise under investigation.¹⁸⁷ Commerce determined that merchandise from the subject countries containing solar cells and modules containing wafers produced in China, or modules containing certain Chinese components that were not produced by a producer found not to be circumventing through individual investigation, were circumventing, and thus covered by, the *CSPV I* orders.

Appendix IV of Commerce’s *CSPV I* anticircumvention determination provided a mechanism for importers or exporters to certify that they had made “applicable entries” that complied with the terms of the tariff holiday, and were accordingly exempt from AD/CVD duties. Thus, to qualify for treatment under Appendix IV, importers or exporters had to certify, *inter alia*, that the cells or modules in question:

- (1) were produced in Cambodia, Malaysia, Thailand, or Vietnam *using parts or components manufactured in China*;
- (2) were exported to the U.S. from Cambodia, Malaysia, Thailand, or Vietnam, without further assembly in another country;
- (3) absent the affirmative determination of circumvention, were not covered by the antidumping duty or countervailing duty orders on crystalline silicon photovoltaic cells, whether or not assembled into modules, from the People’s Republic of China;
- (4) were not covered by the AD order on CSPV products from Taiwan;

¹⁸⁵ *Preliminary Determinations*, USITC Pub. 5517 at 15.

¹⁸⁶ See *Deacero S.A. de C.V. v. United States*, 942 F. Supp. 2d 1321, 1326 (Ct. Int’l. Trade 2013) (stating that a “scope determination can take two forms” when Commerce “initiates a scope inquiry” or when Commerce “initiates a circumvention inquiry”).

¹⁸⁷ See, e.g., *Full Member Subgroup of the American Institute of Steel Construction, LLC v. United States*, 81 F.4th 1242, 1252 (Fed. Cir. 2023) (“To be clear, the Commission does not decide which products or merchandise are subject to the investigation (emphasis in original), that task belongs to Commerce.”); see also *Autoliv ASP, Inc. v. United States*, 422 F. Supp. 3d 1295, 1300 (Ct. Int’l Trade 2019) (“The Commission relies on the ‘scope’ of the subject merchandise provided by the U.S. Department of Commerce . . . to serve as the outside parameter for defining the domestic like product.”).

- (5) were entered into the U.S, or withdrawn from warehouse, for consumption before June 6, 2024; and
- (6) if entered or withdrawn from warehouse, after November 15, 2022, the solar cells or modules had to be installed in the U.S. within 180 days after the end of the tariff holiday (Dec 3, 2024) or would face “snapback” of China circumvention AD/CVD duties.¹⁸⁸

This was in contrast to Appendix V, which only applied to three companies that were determined not to be circumventing, and Appendix VI, which required importers/exporters to certify that the merchandise did not contain Chinese-origin wafers or, if they did contain Chinese-origin wafers, that they contained no more than two of six other inputs of Chinese origin.¹⁸⁹ Importers or exporters that utilized Appendix IV certified that their merchandise contained parts or components of Chinese origin that matched or surpassed thresholds that Commerce had determined were subject to its circumvention finding and, therefore, within the scope of the *CSPV I* orders.

Although some importers may have used Appendix IV to import noncircumventing merchandise, as Petitioner argues, the record contains no information that this was the case for any importer.¹⁹⁰ Thus, the only information we have with respect to the nature of importers’ imports under Appendix IV is that they were certified as meeting the physical description of merchandise covered by the *CSPV I* anticircumvention determination.¹⁹¹ The scope of these investigations explicitly excludes any merchandise within the scope of *CSPV I*. For these

¹⁸⁸ See Final Circumvention Determinations, 88 Fed. Reg at 57425.

¹⁸⁹ See Final Circumvention Determinations, 88 Fed. Reg at 57427, 57431-33.

¹⁹⁰ Petitioner contends that importers had flexibility as to which Appendices to use and alleges that *** used an Appendix IV certificate to import non-circumventing merchandise on some occasions. See Petitioner’s Posthearing Brief, Responses to Commission Questions at 3-4. Petitioner, however, did not provide determinative evidence that *** actually entered subject merchandise under Appendix IV, indicate the volume of allegedly subject merchandise that *** imported under Appendix IV, or provide any evidence that other importers used Appendix IV in a similar manner. Petitioner argues that *** may have used both Appendix IV and VI for certain shipments, see Petitioner’s Posthearing Brief, Responses to Commission Questions at 3, n.4. *** provided an affidavit that all of the values and quantities in its importer questionnaire were filed under Appendix IV. See *** Posthearing Brief, Attachment 1, Affidavit and Statement of ***. Petitioner cites *** Foreign Producer Questionnaire, see Petitioner’s Posthearing Brief, Responses to Commission Question at 3, n.4, but there are no data in that questionnaire response that show that *** used both Appendix IV and VI for entries of CSPV products.

¹⁹¹ CR/PR at Table D.7.

reasons, we consider Appendix IV entries to be nonsubject merchandise for purposes of analyzing material injury and threat of material injury to the domestic industry.

Accordingly, we rely on the adjusted data in Table D.7 for our negligibility analysis, which treats imports entered under Appendix IV from the subject countries as imports within the scope of *CSPV I* and therefore nonsubject for purposes of these investigations.¹⁹² We find that importer questionnaire data, as supplemented with data from proprietary, Census-edited Customs records, are the best information available on the record for purposes of calculating the volume of subject imports from each country.¹⁹³ Specifically, these questionnaire data, including the Constructed Questionnaire Response derived from proprietary, Census-edited Customs records, are the only data on the record that allow for the removal of imports of CSPV products subject to the *CSPV I* orders, including Appendix IV entries, that are nonsubject merchandise for purposes of these investigations, from the imports of CSPV products from each subject country.¹⁹⁴

For Cambodia, the Commission did not receive questionnaire data for a significant volume of imports because ***, one of the largest importers of CSPV products from Cambodia, did not submit a questionnaire response in the preliminary or final phase of these investigations. Commission staff used proprietary, Census-edited Customs records to calculate import data for ***.¹⁹⁵ In accordance with our analysis above, because Commerce made a final determination that imports by NE Solar circumvented the *CSPV I* orders, we treat NE Solar's imports as nonsubject in the final phase of these investigations. In the Issues and Decision Memorandum of its final determinations, Commerce found that NE Solar's failure to permit verification rendered its information submitted in the preliminary phase to be unreliable. Commerce accordingly applied adverse facts available and found that subject merchandise produced by NE Solar was circumventing the *CSPV I* orders.¹⁹⁶ The Commission cannot, as Petitioner urges, rely on Commerce's preliminary circumvention determinations that NE Solar was not circumventing on the grounds that there were "several reasons" why NE Solar may not have permitted verification. To do so would amount to the Commission making its own

¹⁹² Compare CR/PR at Table 4.6 with Table D.7.

¹⁹³ See CR/PR at Table D.7.

¹⁹⁴ For these reasons, we find that Table D.7 is more accurate than Table 4.6 for purposes of the negligibility analysis because the questionnaire data used to compile Table 4.6 listed Appendix IV entries as subject, and thus, overstate subject import volumes.

¹⁹⁵ CR/PR at 4.1.

¹⁹⁶ See Final Circumvention Determinations, 88 Fed. Reg. at 57421 ("Based on the adverse facts available used, we determine that the companies listed in Appendix II to this notice exported inquiry merchandise and that U.S. entries of that merchandise are circumventing the *Orders*.").

circumvention determination contrary to Commerce’s determination, which it does not have the authority to do.¹⁹⁷

Based on questionnaire data, as adjusted by Commission staff with data from questionnaire responses and proprietary Census-edited Customs records, during the 12-month period preceding the filing of the petitions (April 2023-March 2024), subject imports from Cambodia accounted for *** percent of total imports, subject imports from Malaysia in the AD investigations accounted for *** percent of total imports, subject imports from Malaysia in the CVD investigations accounted for *** percent of total imports, subject imports from Thailand accounted for *** percent of total imports, and subject imports from Vietnam accounted for *** percent of total imports.¹⁹⁸

Imports from Cambodia are below the three percent negligibility threshold in the AD investigations, and below the four percent negligibility threshold for developing countries in the CVD investigations. Imports from Thailand are below the three percent negligibility threshold in the AD and CVD investigations. Furthermore, in the aggregate, subject imports from Cambodia and Thailand accounted for *** percent of total imports, which is below the applicable statutory thresholds pertinent to aggregated imports from individually negligible sources in the AD and CVD investigations.¹⁹⁹ Consequently, we find that subject imports of CSPV cells and modules from Cambodia and Thailand are negligible in the antidumping and countervailing duty investigations, and subject imports from Malaysia and Vietnam are not negligible in the antidumping and countervailing duty investigations.

We next consider whether subject imports from Cambodia have the potential to imminently exceed the relevant negligibility thresholds.

As discussed above, although subject imports from Cambodia, at *** percent of total imports, were substantially below the applicable negligibility thresholds during the 12-month negligibility period preceding filing of the petition, the record shows that the share of subject

¹⁹⁷ We have also considered Petitioner’s proposed alternate negligibility table and do not find it to be as accurate as the data in Table D.7 for calculating negligibility. See Petitioner’s Posthearing Brief, Responses to Commission Questions at 14. Petitioner proposes that the Commission use official import statistics as both the numerator and denominator for each country, and adjust the numerator by subtracting Appendix IV entries reported in questionnaire responses. However, it is unclear which HTS subheadings Petitioner used to compile the official import statistics in its table. With respect to Cambodia, we note further that although importer questionnaire responses cover a large majority of subject imports, there is some shortfall, which could lead to undercounting of Appendix IV imports.

¹⁹⁸ CR/PR at Table D.7.

¹⁹⁹ CR/PR at Table D.7.

imports from Cambodia increased each month afterward.²⁰⁰ In fact, the volume of subject imports from Cambodia increased to the point of exceeding the three percent AD negligibility threshold in each month from June 2024 to December 2024 and the four percent CVD negligibility threshold for developing countries in each month from July 2024 to December 2024.²⁰¹ Although several responding Cambodian producers reported closing their facilities and some provided attestations that they will not reopen,²⁰² the record shows that at least two of them, *** and ***, explicitly stated that the reason for ***.²⁰³ This evidence suggests that, if excluded on the basis of negligibility, these producers would continue in operation. In addition, publicly available data on the record shows that three non-responding firms, Elite Solar, NE Solar, and SolarSpace, projected 5.65 GW of cell and module production capacity in 2024 and in 2027.²⁰⁴

Other evidence in the record also supports a finding that subject imports from Cambodia are likely to imminently exceed the applicable negligibility thresholds. Specifically, responding Cambodian producers reported that *** percent of their export shipments were to the United States.²⁰⁵ In addition, the practical capacity of responding Cambodian producers increased by *** percent between 2022 and 2024. Capacity utilization increased from *** to *** percent between 2022 and 2023, and declined to *** percent in 2024, which indicates that Cambodian producers have excess capacity as well as an ability to significantly increase

²⁰⁰ CR/PR at Table D.10.

²⁰¹ The monthly share of subject imports from Cambodia after the filing of the petition in April 2024 was *** percent in May, *** percent in June, *** percent in July, *** percent in August, *** percent in September, *** percent in October, *** percent in November, and *** percent in December. CR/PR at Table D.10.

²⁰² See BYD Posthearing Brief, Exhibit 2. BYD submitted unsworn declarations from *** Cambodian producers, ***, in which a representative of each company stated that it ***. The declarations also included ***. Each declarant stated to ***. For example, in the declaration from *** the declarant stated that the ***. ***. See Exhibit 2, *** Declaration, Attachment 1. ***. Furthermore, although Respondents provided photographs purporting to show ***, it is unclear that the ***. For these reasons, we accord little weight to the declarations provided by those *** Cambodian producers. Furthermore, these attestations cover only a limited number of Cambodian producers.

²⁰³ See CR/PR Table 7.8 (7.12).

²⁰⁴ See CR/PR at Figure 7.1. The combined capacity of Elite Solar, NE Solar, and Solar Space would be equal to *** percent of apparent U.S. consumption in 2024. *Calculated from* CR/PR at 1.4; Figure 7.1. ***=*** ***. Furthermore, the estimated capacity of 5.65 GW is likely understated, as Cambodian producer *** and its production capacity is not included in the list of producers in Figure 7.1. (A larger version of Figure 7.1 is available under Research Material, EDIS Doc. 850577.) 2024 and 2027 are the two years provided by this source.

²⁰⁵ CR/PR at Table 7.1.

production.²⁰⁶ Furthermore, we note that the share of total Cambodian shipments that were exported to the U.S. increased from *** percent in 2023 to *** percent in 2024.²⁰⁷

For these reasons, we find that subject imports from Cambodia have the potential to imminently exceed the negligibility thresholds.

Although subject imports from Thailand in the 12-month negligibility period accounted for *** percent of total imports and, thus, were below the applicable negligibility threshold, no Thai respondent disputes that they will imminently exceed the three percent negligibility threshold. In fact, the record shows that the share of subject imports from Thailand increased each month from May 2024 to December 2024, and also equaled or exceeded the three percent negligibility threshold each month, reaching *** percent in December 2024.²⁰⁸ Additionally, the practical capacity of responding Thai producers increased by 188 percent between 2022 and 2024, while production increased by 186 percent.²⁰⁹ Furthermore, the United States has become an increasing focus of Thai shipments, as the share of total Thai shipments that were exported to the U.S. increased from 0 percent in 2022 and 2023 to 36.6 percent in 2024.²¹⁰ Consequently, we find that subject imports from Thailand will likely imminently exceed the negligibility threshold for purposes of assessing threat of material injury.

V. Cumulation

For purposes of evaluating the volume and effects for a determination of material injury by reason of subject imports, section 771(7)(G)(i) of the Tariff Act requires the Commission to cumulate subject imports from all countries as to which petitions were filed and/or investigations self-initiated by Commerce on the same day, if such imports compete with each other and with the domestic like product in the U.S. market. In assessing whether subject imports compete with each other and with the domestic like product, the Commission generally has considered four factors:

²⁰⁶ CR/PR at Table 7.16.

²⁰⁷ CR/PR at Table 7.17.

²⁰⁸ The monthly share of subject imports from Thailand after the filing of the petition in April 2024 was *** percent in May, *** percent in June, *** percent in July, *** percent in August, *** percent in September, *** percent in October, *** percent in November, and *** percent in December. CR/PR at Table D.10.

²⁰⁹ CR/PR at Table 7.16.

²¹⁰ CR/PR at Table 7.17.

- (1) the degree of fungibility between subject imports from different countries and between subject imports and the domestic like product, including consideration of specific customer requirements and other quality related questions;
- (2) the presence of sales or offers to sell in the same geographic markets of subject imports from different countries and the domestic like product;
- (3) the existence of common or similar channels of distribution for subject imports from different countries and the domestic like product; and
- (4) whether the subject imports are simultaneously present in the market.²¹¹

While no single factor is necessarily determinative, and the list of factors is not exhaustive, these factors are intended to provide the Commission with a framework for determining whether the subject imports compete with each other and with the domestic like product.²¹² Only a “reasonable overlap” of competition is required.²¹³

Petitioner argues that the Commission should cumulatively assess imports from all subject countries since all requirements for cumulation are met.²¹⁴ No respondent party contests the cumulation of subject imports for purposes of analyzing present material injury.²¹⁵

As discussed above, we have found that subject imports of CSPV cells and modules from Cambodia and Thailand are negligible and thus ineligible for cumulation for our present material injury analysis. With respect to subject imports from Malaysia and Vietnam, we

²¹¹ See *Certain Cast-Iron Pipe Fittings from Brazil, the Republic of Korea, and Taiwan*, Inv. Nos. 731-TA-278-280 (Final), USITC Pub. 1845 (May 1986), *aff’d*, *Fundicao Tupy, S.A. v. United States*, 678 F. Supp. 898 (Ct. Int’l Trade), *aff’d*, 859 F.2d 915 (Fed. Cir. 1988).

²¹² See, e.g., *Wieland Werke, AG v. United States*, 718 F. Supp. 50 (Ct. Int’l Trade 1989).

²¹³ The Statement of Administrative Action (SAA) to the Uruguay Round Agreements Act (URAA), expressly states that “the new section will not affect current Commission practice under which the statutory requirement is satisfied if there is a reasonable overlap of competition.” H.R. Rep. No. 103-316, Vol. I at 848 (1994) (*citing Fundicao Tupy, S.A. v. United States*, 678 F. Supp. at 902; see *Goss Graphic Sys., Inc. v. United States*, 33 F. Supp. 2d 1082, 1087 (Ct. Int’l Trade 1998) (“cumulation does not require two products to be highly fungible”); *Wieland Werke, AG*, 718 F. Supp. at 52 (“Completely overlapping markets are not required.”)).

²¹⁴ Petitioner’s Prehearing Brief at 23-30.

²¹⁵ BYD argues that the Commission should not cumulate subject imports from Cambodia for its threat analysis and Canadian Solar and Trina argue that the Commission should not cumulate subject imports from Thailand for its threat analysis. We address those arguments below in Section VII.

consider these imports on a cumulated basis because the statutory criteria for cumulation are satisfied. As an initial matter, Petitioner filed the antidumping and countervailing duty petitions with respect to all four subject countries on the same day, April 24, 2024.²¹⁶ There also appears to be a reasonable overlap between subject imports from Malaysia and Vietnam, and among subject imports from each of those sources and the domestic like product, as discussed below.

Fungibility. The record indicates that domestically produced CSPV products and imports from Malaysia and Vietnam are generally fungible. Most responding U.S. producers and responding U.S. importers reported that subject imports from Malaysia and Vietnam were either “always” or “frequently” interchangeable with each other as well as with the domestic like product.²¹⁷

There was some difference in the overlap of the domestic like product with subject imports from Malaysia and Vietnam based on the five CSPV product categories (bifacial cells, non-bifacial cells, non-bifacial modules using bifacial cells, non-bifacial modules using non-bifacial cells, and bifacial modules using bifacial cells), but the record shows that in 2024 the domestic industry’s U.S. shipments of the domestic like product and the responding importers’ U.S. shipments of subject imports from Malaysia and Vietnam overlapped on shipments of bifacial modules using bifacial cells.²¹⁸ Additionally, the pricing product data show that in the six consecutive quarters from the first quarter of 2022 to the second quarter of 2023, U.S. producers and responding U.S. importers of subject merchandise reported sales of pricing

²¹⁶ None of the statutory exceptions to cumulation apply to subject imports from Malaysia and Vietnam. Subject imports from each are alleged to be both dumped and subsidized. The import volumes from Malaysia subject to the AD investigations are less than the import volumes subject to the CVD investigations because Commerce excluded Hanwha Malaysia from the AD investigation on subject imports from Malaysia. Consequently, any decision to cumulate subject imports from Malaysia with subject imports from Vietnam will involve “cross-cumulating” subsidized imports with dumped imports. We have previously explained why we are continuing our longstanding practice of cross-cumulating. See *Polyethylene Terephthalate (PET) Resin from Canada, China, India, and Oman*, Inv. Nos. 701-TA-531-532 and 731-TA-1270-1273 (Final), USITC Pub. 4604 at 9-11 (April 2016). We have determined imports from Cambodia and Thailand will imminently account for more than 3 percent of the volume of subject merchandise imported into the United States. The Tariff Act provides that “{t}he Commission shall consider such imports only for purposes of determining threat of material injury.” 19 U.S.C. §1677(24)(A)(iv).

²¹⁷ CR/PR at Table 2.15, Table 2.16.

²¹⁸ CR/PR at Table D.17. In 2024, *** percent of U.S. producers’ U.S. shipments consisted of bifacial modules using bifacial cells, *** percent of U.S. importers’ U.S. shipments of subject imports from Malaysia consisted of bifacial modules using bifacial cells and *** percent of U.S. importers’ U.S. shipments of subject imports from Vietnam consisted of bifacial modules using bifacial cells. CR/PR at Table D.17.

product 1 from Malaysia and Vietnam.²¹⁹ The pricing data also show that in the six consecutive quarters from the third quarter of 2023 to the fourth quarter of 2024, U.S. producers and responding U.S. imports of subject merchandise reported sales of pricing product 4 from Malaysia and Vietnam.²²⁰

In response to questions concerning how often differences other than price were significant in sales of CSPV products from different sources, most U.S. producers and U.S. importers reported that differences other than price between the domestic like product and subject imports from each country, and among subject imports from each country, were “sometimes” or “never” significant.²²¹ Thus, the record indicates that there was a sufficient degree of fungibility between subject imports from Malaysia and Vietnam and the domestic like product for purposes of cumulation.

Channels of Distribution. The record shows that domestic producers mainly sold to distributors and installers from during 2022 and 2023, and then shifted primarily to utilities and developers, and distributors in 2024.²²² Domestic producers reported no shipments to module assemblers during 2022 and 2023, and a small amount in 2024. Domestic producers and importers of subject merchandise from Malaysia and Vietnam substantially overlapped in their sales to utilities customers in the U.S. in 2024 and overlapped to a lesser degree in the other two years of the POI in sales to utilities customers.²²³

The share of domestic producers’ U.S. shipments to utilities and developers were *** percent in 2022, *** percent in 2023, and *** percent in 2024.²²⁴ Importers sold substantial amounts of CSPV products from Malaysia to utilities from 2022 to 2024, accounting for *** percent of total shipments in 2022, *** percent in 2023, and *** percent in 2024.²²⁵ Importers sold substantial amounts of CSPV products from Vietnam to utilities from 2022 to 2024, accounting for *** percent of shipments in 2022, *** percent in 2023, and *** percent in 2024.²²⁶

²¹⁹ CR/PR at Table H.1

²²⁰ CR/PR at Table H.4.

²²¹ CR/PR at Table 2.19, Table 2.20.

²²² The share of domestic producers’ shipments to utilities and developers was *** percent in 2022, *** percent in 2023, and *** percent in 2024. The share of domestic producers’ U.S. shipments that went to distributors was *** percent in 2022, *** percent in 2023, and *** percent in 2024.

²²³ See CR/PR at Table 2.3.

²²⁴ CR/PR at Table 2.3.

²²⁵ CR/PR at Table 2.3.

²²⁶ CR/PR at Table 2.3.

Geographic Overlap. U.S. producers and importers of subject merchandise from Malaysia and Vietnam each reported selling CSPV products to all regions of the contiguous United States, as well as to other U.S. markets, including Alaska, Hawaii, Puerto Rico, and the U.S. Virgin Islands.²²⁷ Official import statistics indicate that imports from Malaysia and Vietnam entered the United States through ports located at all borders of entry.²²⁸

Simultaneous Presence in Market. The domestic like product was present in the U.S. market throughout the POI. Imports from Malaysia and Vietnam were each present in the U.S. market in every month from January 2022 through December 2024.²²⁹

Conclusion. The record indicates that subject imports from Malaysia and Vietnam are generally fungible with the domestic like product and each other. The record also indicates that there was a substantial overlap in shipments of the domestic like product and merchandise from Malaysia and Vietnam in the utilities distribution channel in 2024.²³⁰ The record further indicates that imports from Malaysia and Vietnam and the domestic like product were generally sold in overlapping geographic markets each year from 2022 to 2024, and were simultaneously present in the U.S. market throughout the POI. In light of these considerations, we find that there is a reasonable overlap of competition between the like product and imports from Malaysia and Vietnam and between imports from each subject country eligible for cumulation.

VI. Material Injury by Reason of Subject Imports

Based on the record in the final phase of this investigation, we find that an industry in the United States is materially injured by reason of imports of CSPV cells and modules from

²²⁷ CR/PR at Table 2.4.

²²⁸ CR/PR at Table 4.15. The largest share of CSPV cells and modules from Malaysia (29.1 percent) entered the United States through ports in the East. The largest share of CSPV cells and modules from Vietnam (39.8 percent) entered the United States through ports in the West. These data reflect unadjusted official import statistics and therefore likely overstate subject import data and understate nonsubject data due to the inclusion of circumventing merchandise from subject countries. CR/PR at Table 4.15.

²²⁹ CR/PR at Table D.18.

²³⁰ We note that most subject imports were sold to utilities in 2022 and 2023, when domestic producers sold a relatively small proportion of the domestic like product in that sector. In light of the evidence on the record indicating that domestic producers tried throughout the POI to gain entry to the utility sector, we take these relatively low levels as stemming not from a lack of competition, but a lack of successful competition despite domestic producers' vigorous efforts. In any event, the data show that by 2024, U.S. producers' and U.S. importers of subject merchandise from Malaysia and Vietnam each made substantial shares of their sales to utilities customers. See CR/PR at Table 2.3.

Malaysia and Vietnam that Commerce has found to be sold in the United States at less than fair value and subsidized by the governments of Malaysia and Vietnam.

A. Legal Standards

In the final phase of antidumping and countervailing duty investigations, the Commission determines whether an industry in the United States is materially injured or threatened with material injury by reason of the imports under investigation.²³¹ In making this determination, the Commission must consider the volume of subject imports, their effect on prices for the domestic like product, and their impact on domestic producers of the domestic like product, but only in the context of U.S. production operations.²³² The statute defines “material injury” as “harm which is not inconsequential, immaterial, or unimportant.”²³³ In assessing whether the domestic industry is materially injured by reason of subject imports, we consider all relevant economic factors that bear on the state of the industry in the United States.²³⁴ No single factor is dispositive, and all relevant factors are considered “within the context of the business cycle and conditions of competition that are distinctive to the affected industry.”²³⁵

Although the statute requires the Commission to determine whether the domestic industry is “materially injured or threatened with material injury by reason of” unfairly traded imports,²³⁶ it does not define the phrase “by reason of,” indicating that this aspect of the injury analysis is left to the Commission’s reasonable exercise of its discretion.²³⁷ In identifying a causal link, if any, between subject imports and material injury to the domestic industry, the Commission examines the facts of record that relate to the significance of the volume and price effects of the subject imports and any impact of those imports on the condition of the domestic industry. This evaluation under the “by reason of” standard must ensure that subject imports

²³¹ 19 U.S.C. §§ 1671d(b), 1673d(b).

²³² 19 U.S.C. § 1677(7)(B). The Commission “may consider such other economic factors as are relevant to the determination” but shall “identify each {such} factor ... and explain in full its relevance to the determination.” 19 U.S.C. § 1677(7)(B).

²³³ 19 U.S.C. § 1677(7)(A).

²³⁴ 19 U.S.C. § 1677(7)(C)(iii).

²³⁵ 19 U.S.C. § 1677(7)(C)(iii).

²³⁶ 19 U.S.C. §§ 1671d(b), 1673d(b).

²³⁷ *Angus Chemical Co. v. United States*, 140 F.3d 1478, 1484-85 (Fed. Cir. 1998) (“{T}he statute does not ‘compel the commissioners’ to employ {a particular methodology}.”), *aff’d*, 944 F. Supp. 943, 951 (Ct. Int’l Trade 1996).

are more than a minimal or tangential cause of injury and that there is a sufficient causal, not merely a temporal, nexus between subject imports and material injury.²³⁸

In many investigations, there are other economic factors at work, some or all of which may also be having adverse effects on the domestic industry. Such economic factors might include nonsubject imports; changes in technology, demand, or consumer tastes; competition among domestic producers; or management decisions by domestic producers. The legislative history explains that the Commission must examine factors other than subject imports to ensure that it is not attributing injury from other factors to the subject imports, thereby inflating an otherwise tangential cause of injury into one that satisfies the statutory material injury threshold.²³⁹ In performing its examination, however, the Commission need not isolate the injury caused by other factors from injury caused by unfairly traded imports.²⁴⁰ Nor does

²³⁸ The Federal Circuit, in addressing the causation standard of the statute, observed that “{a}s long as its effects are not merely incidental, tangential, or trivial, the foreign product sold at less than fair value meets the causation requirement.” *Nippon Steel Corp. v. USITC*, 345 F.3d 1379, 1384 (Fed. Cir. 2003). This was further ratified in *Mittal Steel Point Lisas Ltd. v. United States*, 542 F.3d 867, 873 (Fed. Cir. 2008), where the Federal Circuit, quoting *Gerald Metals, Inc. v. United States*, 132 F.3d 716, 722 (Fed. Cir. 1997), stated that “this court requires evidence in the record ‘to show that the harm occurred ‘by reason of’ the LTFV imports, not by reason of a minimal or tangential contribution to material harm caused by LTFV goods.’” See also *Nippon Steel Corp. v. United States*, 458 F.3d 1345, 1357 (Fed. Cir. 2006); *Taiwan Semiconductor Industry Ass’n v. USITC*, 266 F.3d 1339, 1345 (Fed. Cir. 2001).

²³⁹ SAA at 851-52 (“{T}he Commission must examine other factors to ensure that it is not attributing injury from other sources to the subject imports.”); S. Rep. 96-249 at 75 (1979) (the Commission “will consider information which indicates that harm is caused by factors other than less-than-fair-value imports.”); H.R. Rep. 96-317 at 47 (1979) (“in examining the overall injury being experienced by a domestic industry, the ITC will take into account evidence presented to it which demonstrates that the harm attributed by the petitioner to the subsidized or dumped imports is attributable to such other factors;” those factors include “the volume and prices of nonsubsidized imports or imports sold at fair value, contraction in demand or changes in patterns of consumption, trade restrictive practices of and competition between the foreign and domestic producers, developments in technology and the export performance and productivity of the domestic industry”); accord *Mittal Steel*, 542 F.3d at 877.

²⁴⁰ SAA at 851-52 (“{T}he Commission need not isolate the injury caused by other factors from injury caused by unfair imports.”); *Taiwan Semiconductor Industry Ass’n*, 266 F.3d at 1345 (“{T}he Commission need not isolate the injury caused by other factors from injury caused by unfair imports Rather, the Commission must examine other factors to ensure that it is not attributing injury from other sources to the subject imports.” (emphasis in original)); *Asociacion de Productores de Salmon y Trucha de Chile AG v. United States*, 180 F. Supp. 2d 1360, 1375 (Ct. Int’l Trade 2002) (“{t}he Commission is not required to isolate the effects of subject imports from other factors contributing to injury” or make “bright-line distinctions” between the effects of subject imports and other causes.); see also *Softwood Lumber from Canada*, Inv. Nos. 701-TA-414 and 731-TA-928 (Remand), USITC Pub. 3658 at 100-01 (Dec. 2003) (Commission recognized that “{i}f an alleged other factor is found not to have or threaten to have injurious effects to the domestic industry, i.e., it is not an ‘other causal factor,’ then there is nothing to (Continued...)”).

the “by reason of” standard require that unfairly traded imports be the “principal” cause of injury or contemplate that injury from unfairly traded imports be weighed against other factors, such as nonsubject imports, which may be contributing to overall injury to an industry.²⁴¹ It is clear that the existence of injury caused by other factors does not compel a negative determination.²⁴²

Assessment of whether material injury to the domestic industry is “by reason of” subject imports “does not require the Commission to address the causation issue in any particular way” as long as “the injury to the domestic industry can reasonably be attributed to the subject imports.”²⁴³ The Commission ensures that it has “evidence in the record” to “show that the harm occurred ‘by reason of’ the LTFV imports,” and that it is “not attributing injury from other sources to the subject imports.”²⁴⁴ The Federal Circuit has examined and affirmed various Commission methodologies and has disavowed “rigid adherence to a specific formula.”²⁴⁵

The question of whether the material injury threshold for subject imports is satisfied notwithstanding any injury from other factors is factual, subject to review under the substantial

(...Continued)

further examine regarding attribution to injury”), citing *Gerald Metals*, 132 F.3d at 722 (the statute “does not suggest that an importer of LTFV goods can escape countervailing duties by finding some tangential or minor cause unrelated to the LTFV goods that contributed to the harmful effects on domestic market prices.”).

²⁴¹ S. Rep. 96-249 at 74-75; H.R. Rep. 96-317 at 47.

²⁴² See *Nippon Steel Corp.*, 345 F.3d at 1381 (“an affirmative material-injury determination under the statute requires no more than a substantial-factor showing. That is, the ‘dumping’ need not be the sole or principal cause of injury.”).

²⁴³ *Mittal Steel*, 542 F.3d at 876 & 78; see also *id.* at 873 (“While the Commission may not enter an affirmative determination unless it finds that a domestic industry is materially injured ‘by reason of’ subject imports, the Commission is not required to follow a single methodology for making that determination ... {and has} broad discretion with respect to its choice of methodology.”) citing *United States Steel Group v. United States*, 96 F.3d 1352, 1362 (Fed. Cir. 1996) and S. Rep. 96-249 at 75. In its decision in *Swift-Train v. United States*, 793 F.3d 1355 (Fed. Cir. 2015), the Federal Circuit affirmed the Commission’s causation analysis as comporting with the Court’s guidance in *Mittal*.

²⁴⁴ *Mittal Steel*, 542 F.3d at 873 (quoting from *Gerald Metals*, 132 F.3d at 722), 877-79. We note that one relevant “other factor” may involve the presence of significant volumes of price-competitive nonsubject imports in the U.S. market, particularly when a commodity product is at issue. In appropriate cases, the Commission collects information regarding nonsubject imports and producers in nonsubject countries in order to conduct its analysis.

²⁴⁵ *Nucor Corp. v. United States*, 414 F.3d 1331, 1336, 1341 (Fed. Cir. 2005); see also *Mittal Steel*, 542 F.3d at 879 (“*Bratsk* did not read into the antidumping statute a Procrustean formula for determining whether a domestic injury was ‘by reason’ of subject imports.”).

evidence standard.²⁴⁶ Congress has delegated this factual finding to the Commission because of the agency's institutional expertise in resolving injury issues.²⁴⁷

B. Conditions of Competition and the Business Cycle

The following conditions of competition inform our analysis of whether there is material injury by reason of subject imports.

1. Demand Considerations

U.S. demand for CSPV products derives from demand for solar-generated electricity, which is influenced by factors such as cost competitiveness with traditional nonrenewable energy sources, environmental concerns, a desire for national energy independence, total energy consumption, and the availability of federal, state, and local incentives to produce or install CSPV products.²⁴⁸ While most electricity demand in the United States is supplied by conventional sources, the share of electricity generated from renewable sources has been steadily increasing.²⁴⁹ Over the POI, solar generated-electricity's share of U.S. net electricity generation increased from 3.4 percent in 2022 to 4.0 percent in 2023 and 5.1 percent in 2024.²⁵⁰ There are three on-grid market segments that drive demand for CSPV products: residential, commercial, and utilities. Over the POI, the share of U.S. shipments to utilities customers by domestic producers and importers of merchandise from Vietnam and Malaysia each increased overall.²⁵¹

Most domestic producers and U.S. importers reported that demand for CSPV products increased during the POI.²⁵² Twelve of 16 U.S. producers, 24 of 44 U.S. importers, and 10 of 16

²⁴⁶ We provide in our discussion below a full analysis of other factors alleged to have caused any material injury experienced by the domestic industry.

²⁴⁷ *Mittal Steel*, 542 F.3d at 873; *Nippon Steel Corp.*, 458 F.3d at 1350, *citing U.S. Steel Group*, 96 F.3d at 1357; S. Rep. 96-249 at 75 ("The determination of the ITC with respect to causation is ... complex and difficult, and is a matter for the judgment of the ITC.").

²⁴⁸ CR/PR at 2.1.

²⁴⁹ CR/PR at 2.12.

²⁵⁰ CR/PR at Table 2.7

²⁵¹ U.S. shipments to utilities accounted for *** percent of domestic producers' U.S. shipments in 2022, *** percent in 2022, and *** percent in 2024. CR/PR at Table 2.3. U.S. shipments to utilities accounted for *** percent of the shipments of importers of merchandise from Malaysia and Vietnam in 2022, *** percent in 2023, and *** percent in 2024. CR/PR at Table D.2.

²⁵² CR/PR at Table 2.8.

U.S. purchasers indicated that the U.S. CSPV market is subject to business cycles.²⁵³ Several U.S. producers, importers, and purchasers reported that there are seasonal trends due to weather, with installations increasing during the warmer spring and summer months and declining during the winter months.²⁵⁴ The availability of government incentives was also a significant demand condition during the POI. The Inflation Reduction Act (“IRA”), enacted on August 16, 2022, updated and extended the Investment Tax Credit (“ITC”) and the Manufacturing Production Tax Credit (“MPTC”), two of the major policies that promote solar energy. The IRA has also provided a bonus to existing incentives for the deployment of solar power projects that utilize domestic content.²⁵⁵

During the POI, apparent U.S. consumption of CSPV cells and modules increased from *** kW in 2022 to *** kW in 2023, and to *** kW in 2024, for an overall increase of *** percent.²⁵⁶

2. Supply Considerations

The domestic industry was the smallest source of supply of CSPV cells and modules to the U.S. market throughout the POI, regardless of how the market is measured, with domestic market share falling from 2022 to 2023, and then rising from 2023 to 2024.²⁵⁷ The domestic industry’s share of apparent U.S. consumption of CSPV modules by quantity increased irregularly, decreasing from *** percent in 2022 to *** in 2023 and then increasing to ***

²⁵³ CR/PR at 2.14.

²⁵⁴ CR/PR at 2.14.

²⁵⁵ The IRA updated and extended the ITC and the PTC. The IRA increased the ITC back to 30 percent and extended it through 2034, and extended the PTC of 2.75 cents/kWh through at least 2025 for systems that meet the prevailing wage and apprenticeship requirements or are under 1 MW in size. In addition, the IRA established the Advanced Manufacturing Production Tax Credit and expanded the Advanced Energy Project Investment Tax Credit for manufacturers of eligible components. After January 1, 2025, the ITC and PTC were replaced by the Clean Electricity Investment Tax Credit and the Clean Energy Production Tax Credit CEPTC, which are generally calculated in the same way as the traditional ITC and PTC and function similarly to the traditional ITC and PTC but are not technology specific. CR/PR at 3.5-3.6.

²⁵⁶ CR/PR at 4.41; Table C.4.

²⁵⁷ Domestic and imported cells were used in the production of domestic modules during the POI. Because there was no domestic production of cells until late in 2024, and U.S. producers assembled nearly all modules using imported cells, the domestic industry’s share of apparent U.S. consumption in the total market measured by quantity of cells and modules is *** in 2022 and 2023, and was less than *** percent in 2024. CR/PR at Table C.4. In this calculation, only U.S. shipments of domestically produced cells are reflected in the numerator. In the denominator, these shipments plus U.S. shipments of imported cells and imported modules are included.

percent in 2024, for an overall increase of *** percentage points.²⁵⁸ Domestic producers' ratio of U.S. shipments of modules to apparent U.S. consumption for cells and modules decreased from *** percent in 2022 to *** percent in 2023 and then increased to *** percent in 2024, for an overall increase of *** percentage points.²⁵⁹ The domestic industry's share of apparent U.S. consumption of CSPV cells and modules by value decreased slightly overall from *** percent in 2022 to *** percent in 2023 and increased to *** percent in 2024.²⁶⁰

There were several changes to the domestic industry during the period of investigation. In 2022, domestic producer LG Electronics closed its 550 MW CSPV module facility in Alabama and ***.²⁶¹ Domestic producers Canadian Solar, Elin Energy, Illuminate, Imperial Star Solar, Meyer Burger, Runergy, SEG Solar, and Waaree Energies opened domestic module facilities and began commercial operations.²⁶² Domestic producers Hanwha and Heliene expanded their domestic facilities and added module production capacity.²⁶³ In late 2024, Suniva started domestic production of CSPV cells at its facility in Georgia.²⁶⁴ Overall, the domestic industry's practical capacity for modules increased *** percent over the POI, from *** kW in 2022 to *** kW in 2023 and *** kW in 2024.²⁶⁵

Cumulated subject imports from Malaysia and Vietnam were the second largest source of supply to the U.S. market for cells and modules by quantity throughout the POI but their market share increased each year from 2022 to 2024. Their share of apparent U.S. consumption of cells and modules by quantity increased from *** percent in 2022 to *** percent in 2023 and *** percent in 2024, for an overall increase of *** percentage points.²⁶⁶ Cumulated subject imports from Malaysia and Vietnam were the second largest source of

²⁵⁸ CR/PR at Table C.6.

²⁵⁹ CR/PR at Tables 4.19 and C.4. These are ratios, not shares, as U.S. consumption in this calculation is based on a dataset that includes imported cells but excludes domestically produced modules so as to avoid double counting of the imported cells that the modules contain.

²⁶⁰ Because there was no domestic cell production for most of the POI, the data for U.S. producers' share of apparent U.S. consumption of CSPV cells and modules by value are based on U.S. producers' value added to imports of cells in U.S. production of modules. CR/PR at Table C.4.

²⁶¹ CR/PR at Tables 3.3 and 3.4.

²⁶² CR/PR at Table 3.3. In addition, information from questionnaire responses indicates that ***.
CR/PR at Table 3.4.

²⁶³ CR/PR at Table 3.3. Information from questionnaire responses indicates that ***. CR/PR at Table 3.4.

²⁶⁴ CR/PR at Table 3.3. The record also indicates that in 2025, domestic producer ES Foundry began domestic cell production in South Carolina. *Id.*

²⁶⁵ CR/PR at Table C.1. The domestic industry's practical capacity for cell production was *** kW in 2024. *Id.*

²⁶⁶ CR/PR at Table C.4.

supply to the U.S. market for modules by quantity throughout the POI but their market share increased each year from 2022 to 2024. Their share of apparent U.S. consumption of modules by quantity increased from *** percent in 2022 to *** percent in 2023 and *** percent in 2024, an increase of *** percentage points.²⁶⁷ Cumulated subject imports' share of apparent U.S. consumption of cells and modules by value increased from *** percent in 2022 to *** percent in 2023 and *** percent in 2024, for an overall increase of *** percentage points.²⁶⁸

Nonsubject imports (which as discussed above, include Appendix IV entries as well as imports from Cambodia and Thailand) were the largest source of supply to the U.S. market for cells and modules by quantity throughout the POI but their market share decreased each year from 2022 to 2024.²⁶⁹ Their share of apparent U.S. consumption of cells and modules by quantity decreased from *** percent in 2022 to *** percent in 2023, and decreased to *** percent in 2024, for an overall decrease of *** percentage points.²⁷⁰ Nonsubject imports were also the largest source of supply to the U.S. market for modules by quantity throughout the POI but their market share decreased each year from 2022 to 2024. Their share of apparent U.S. consumption of modules by quantity decreased from *** percent in 2022 to *** percent in 2023 and to *** percent in 2024, for an overall decrease of *** percentage points.²⁷¹ Nonsubject imports' share of apparent U.S. consumption of cells and modules by value decreased from *** percent in 2022 to *** percent in 2023 and to *** percent in 2024, an overall decrease of *** percentage points.²⁷² The largest sources of nonsubject imports were South Korea and India.²⁷³

A small minority of domestic producers (three of 17) reported supply constraints over the POI. One producer reported supply constraints in 2022, one reported supply constraints in 2024 before the filing of the petitions, and two reported supply constraints in 2024 after the

²⁶⁷ CR/PR at Table C.6.

²⁶⁸ CR/PR at Table C.4.

²⁶⁹ CR/PR at Table C.4. As discussed above, we have found that subject imports from Cambodia and Thailand are negligible for purposes of the Commission's analysis of present material injury, and therefore, are considered nonsubject imports and are not cumulated with subject imports from Malaysia and Vietnam for our analysis of present material injury.

²⁷⁰ CR/PR at Table C.4.

²⁷¹ CR/PR at Table C.6.

²⁷² CR/PR at Table C.4.

²⁷³ CR/PR at 2.11. Imports of circumventing merchandise were also a significant source of nonsubject imports. See CR/PR at Table D.6.

filing of the petitions.²⁷⁴ Domestic producers attributed the supply constraints that they experienced to labor and raw material shortages, and difficulty obtaining CSPV cells.²⁷⁵

A minority of importers (15 of 43) reported supply constraints during the POI, including pre- and post-petition in 2024. Eleven importers reported supply constraints in 2022, ten reported supply constraints in 2023, eight reported supply constraints in pre-petition 2024, and nine reported supply constraints in post-petition 2024.²⁷⁶ Several importers attributed the supply constraints that they experienced to raw material shortages due to the withhold release order (“WRO”) pursuant to the Uyghur Forced Labor Prevention Act (“UFLPA”) shipment holds.²⁷⁷

A minority of U.S. purchasers (seven of 16) also reported supply constraints during the POI. One purchaser reported supply constraints from domestic producers in 2022, and seven purchasers reported supply constraints from foreign producers or importers from 2022 to 2024.²⁷⁸ The single purchaser reporting supply constraints from domestic producers stated that Hanwha Q Cells required it to bundle the modules purchase with engineering, procurement, and construction (“EPC”) services supplied by Hanwha. Several purchasers that reported supply constraints from foreign producers or importers cited delayed shipments due to UFLPA-related WRO holds issued by CBP.²⁷⁹

3. Substitutability and Other Conditions

We find that there is a moderate-to-high degree of substitutability between the domestic like product and cumulated subject imports from Malaysia and Thailand.²⁸⁰ Factors that may limit the substitutability of domestically produced CSPV cells and modules and subject imports include differences in sales terms and lead times, as well as availability.²⁸¹ Given that

²⁷⁴ CR/PR at Table 2.6.

²⁷⁵ CR/PR at 2.11.

²⁷⁶ CR/PR at Table 2.6.

²⁷⁷ CR/PR at 2.11. U.S. Customs and Border Protection (CBP) issues a WRO when the agency has reasonable evidence of the use of forced labor in the manufacturing or production of a good or goods entering the U.S. supply chain. A WRO allows CBP to detain the products in question at all U.S. ports of entry until or unless importers can prove the absence of forced labor in their product’s supply chain.

²⁷⁸ CR/PR at Table 2.6.

²⁷⁹ CR/PR at 2.12.

²⁸⁰ CR/PR at 2.15.

²⁸¹ Illuminate contends that although domestically manufactured cells and cells imported from subject sources may be physically similar, they are “emphatically not interchangeable” given the (Continued...)

domestic cell production began only in late 2024, and thus the availability of domestic cells was very limited, we find that substitutability is closer to moderate for cells and closer to high for modules.²⁸²

Most responding U.S. producers, U.S. importers, and purchasers reported that subject imports from each source were either “always” or “frequently” interchangeable with the domestic like product and imports from other subject sources.²⁸³ With the exception of pricing, most responding purchasers rated domestically produced CSPV products as comparable to CSPV products imported from Malaysia and Vietnam with respect to 18 factors that influence purchasing decisions, except that U.S.-produced products were superior with respect to government incentives compared to CSPV products from Malaysia.²⁸⁴ Most purchasers reported that U.S.-produced CSPV products and subject imports from Malaysia and Vietnam always or usually met minimum quality standards.²⁸⁵ A slight majority of purchasers (nine of 16) reported usually or always making purchasing decisions based on the country of origin, while most purchasers (eight of 12) reported that their customers sometimes or never make purchasing decisions based on country of origin.²⁸⁶ While a majority of purchasers (11 of 16) reported always or usually making purchasing decisions based on the producer, most (eight of 12) reported that their customers sometimes or never make purchasing decisions based on the producer.²⁸⁷

We find that on balance, price is the most important factor in purchasing decisions for CSPV cells and modules, although there are other important purchasing factors. Responding U.S. purchasers most often cited price as among their top three purchasing factors (12

(...Continued)

“massive” ITRA benefits associated with the use of domestic inputs. See Illuminate Prehearing Brief at 41.

²⁸² See CR/PR at 2.15.

²⁸³ See CR/PR at Tables 2.15-2.16.

²⁸⁴ CR/PR at 2.21, Table 2.14.

²⁸⁵ CR/PR at Table 2.12. Eleven of 15 responding U.S. purchasers reported that the quality of U.S.-produced CSPV products always or usually met minimum quality standards, 12 of 15 U.S. purchasers reported that the quality of subject imports from Malaysia always or usually met minimum quality standards, and 13 of 15 U.S. purchasers reported that the quality of subject imports from Vietnam always or usually met minimum quality standards. CR/PR at Table 2.12.

²⁸⁶ CR/PR at Table 2.9. Purchasers that reported always or usually making purchases based on country of origin cited preference for local suppliers, human rights and traceability standards, and tariffs as reasons for their preferences. CR/PR at 2.16.

²⁸⁷ CR/PR at Table 2.9. Of the purchasers that reported that they always make purchasing decisions based on the producer, four cited qualification and due diligence requirements, and two reported that they only purchase from affiliates. CR/PR at 2.16.

purchasers), followed by quality (11 purchasers) and availability/supply (11 purchasers). Price and quantity were tied for the factor that firms rated as the first-most important factor, listed by five purchasers each.²⁸⁸ The majority of purchasers (8 of 13) reported that they only sometimes purchase the lowest-priced product. However, most U.S. producers, importers, and purchasers reported that differences other than price were only sometimes or never significant in purchasing decisions for all country comparisons.²⁸⁹

Domestic producers reported that 72.3 percent of their commercial shipments were from inventories with lead times averaging 4.6 days. The remaining 27.7 percent of their commercial shipments were produced to order, with lead times averaging 13.4 days.²⁹⁰ U.S. importers reported that 78.4 percent of their commercial shipments were produced to order, with lead times averaging 167.3 days. U.S. importers sold 16.5 percent of their commercial shipments from US inventories, with average lead times of 36.5 days. U.S. importers reported that 5.1 percent of their commercial shipments were from foreign inventories, with lead times averaging 90 days.²⁹¹

In 2024, most U.S. producers reported selling their CSPV products under short term contracts (***) percent), with lesser quantities sold under annual contracts (***) percent) and long-term contracts (***) percent).²⁹² In 2024, responding U.S. importers of subject merchandise reported that their commercial shipments were through short term contracts (***) percent), followed by annual contracts *** percent and long-term contracts *** percent).²⁹³ The majority of U.S. producers and U.S. importers reported that they set their prices using transaction-by-transaction negotiations and through contracts, with a smaller plurality reporting using a set price list.²⁹⁴

The main raw material for CSPV cells is polysilicon, which is used to make the ingots and wafers that are processed into cells.²⁹⁵ CSPV cells are then assembled, along with other components, including solar glass, aluminum frames, junction boxes, and backsheets, into CSPV

²⁸⁸ CR/PR at Table 2.10.

²⁸⁹ CR/PR at Tables 2.18-2.19.

²⁹⁰ CR/PR at 2.18.

²⁹¹ CR/PR at 2.18.

²⁹² CR/PR at Table 5.4. The duration of short-term contracts reported by U.S. producers ranged from 72 to 180 days. CR/PR at 5.5.

²⁹³ CR/PR at Table 5.4. The duration of short-term contracts reported by U.S. importers ranged from 30 to 180 days. CR/PR at 5.6.

²⁹⁴ CR/PR at Table 5.3.

²⁹⁵ CR/PR at 1.29, 5.1. .

modules.²⁹⁶ The record indicates that the global average price for monocrystalline wafers fluctuated downwards from 2022 to 2024, decreasing overall by *** to *** percent depending on the wafer type, with larger wafers tending to be more expensive than smaller wafers. Similarly, the global average price for monocrystalline cells decreased from 2022 to 2024.²⁹⁷ Raw materials as a share of the domestic industry's total costs of goods sold ("COGS") decreased overall from *** percent in 2022 to *** percent in 2023 and then increased to *** percent in 2024, but represented the largest share of total COGS throughout the POI.²⁹⁸ The average unit raw material costs for CSPV products declined *** percent over the POI, from \$*** per kilowatt in 2022 to \$*** per kilowatt in 2023 and to \$*** per kilowatt in 2024.²⁹⁹

As previously discussed, there have been antidumping and countervailing duties on imports of CSPV products from China since imposition of the *CSPV I* orders in 2012.³⁰⁰ These orders were most recently continued in September 2024 after affirmative determinations in five-year reviews by Commerce and the Commission.³⁰¹ On August 23, 2023, Commerce made a final determination that certain imports of CSPV products exported from Cambodia, Malaysia, Thailand, and Vietnam using parts and components produced in China were circumventing the *CSPV I* orders on China.³⁰² Circumventing imports, which should have been subject to the *CSPV I* orders on CSPV products from China since the time those orders were issued, became subject to the applicable duties under those orders upon expiration of the two-year tariff holiday on June 6, 2024.³⁰³

In 2015, antidumping and countervailing duty orders (the "*CSPV II*" orders) were imposed on additional imports of CSPV products from China, and an antidumping duty order

²⁹⁶ CR/PR at 5.1.

²⁹⁷ CR/PR at Table 5.2.

²⁹⁸ See CR/PR at Table 6.1.

²⁹⁹ CR/PR at Table 6.2, 6.28.

³⁰⁰ See *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From the People's Republic of China: Countervailing Duty Order*, 77 Fed. Reg. 73017 (December 7, 2012); *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From the People's Republic of China: Amended Final Determination of Sales at Less Than Fair Value, and Antidumping Duty Order*, 77 Fed. Reg. 73018 (December 7, 2012); *Crystalline Silicon Photovoltaic Cells and Modules from China*, Inv. Nos. 701-TA-481 and 731-TA-1190 (Final), USITC Pub. 4360 (Nov. 2012).

³⁰¹ See CR/PR at Table 1.2.

³⁰² *Antidumping and Countervailing Duty Orders on Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules, From the People's Republic of China: Final Scope Determination and Final Affirmative Determinations of Circumvention With Respect to Cambodia, Malaysia, Thailand, and Vietnam*, 88 Fed. Reg. 57419 (Aug. 23, 2023).

³⁰³ See CR/PR at 1.19.

was imposed on imports of CSPV products from Taiwan.³⁰⁴ These orders were continued in 2020 after affirmative determinations in five-year reviews by Commerce and the Commission.³⁰⁵

Imports of CSPV cells and modules originating in China also became subject to an additional 25 percent ad valorem duty under section 301 of the Trade Act of 1974, effective August 23, 2018.³⁰⁶ Effective September 27, 2024, following a four-year review by USTR of China's acts, policies, and practices related to technology transfer, intellectual property, and innovation, section 301 duty rates for CSPV cells and modules originating in China were increased to 50 percent ad valorem.³⁰⁷

The President imposed a global safeguard measure on imports of CSPV products under section 201 of the Trade Act of 1974 for a period of four years beginning on February 7, 2018, in the form of (1) a tariff-rate quota on imports of CSPV cells not partially or fully assembled into other products, and (2) an increase in duties on imports of CSPV modules.³⁰⁸ On February 4, 2022, the President announced an extension of the safeguard measure for an additional four years, through February 6, 2026, with modifications. Imports of CSPV products from Malaysia, Thailand, and Vietnam have been subject to the safeguard measure since its inception, while

³⁰⁴ *Certain Crystalline Silicon Photovoltaic Products From the People's Republic of China: Antidumping Duty Order; and Amended Final Affirmative Countervailing Duty Determination and Countervailing Duty Order*, 80 Fed. Reg. 8592 (Feb. 18, 2015); *Certain Crystalline Silicon Photovoltaic Products From Taiwan: Antidumping Duty Order*, 80 Fed. Reg. 8596 (Feb. 18, 2015); *Certain Crystalline Silicon Photovoltaic Products from China and Taiwan*, Inv. Nos. 701-TA-511 and 731-TA-1246-1247 (Final), USITC Pub. 4519 (Feb. 2015).

These orders cover imports of the following: (1) CSPV modules assembled in China from CSPV cells made in Taiwan and (2) CSPV modules assembled in China from CSPV cells made in third countries. Commerce defined the subject merchandise from Taiwan to include U.S. imports of: (1) CSPV cells made in Taiwan; (2) CSPV modules assembled in Taiwan from CSPV cells made in Taiwan; and (3) CSPV modules assembled in third countries other than China from CSPV cells made in Taiwan. Therefore, the module assembly location determined the country of origin for U.S. imports of modules from China, except for modules covered by the prior *CSPV I* orders (which were considered nonsubject merchandise from China in the *CSPV II* investigations), while the cell manufacture location determined the country of origin for U.S. imports of cells and modules from Taiwan. CR/PR at Table I.2, Note.

³⁰⁵ *Crystalline Silicon Photovoltaic Products From the People's Republic of China and Taiwan: Continuation of Antidumping and Countervailing Duty Orders on China and the Antidumping Duty Order on Taiwan*, 85 Fed. Reg. 56215 (Sept. 11, 2020); *Certain Crystalline Silicon Photovoltaic Products from China and Taiwan*, Inv. Nos. 701-TA-511 and 731-TA-1246-1247 (Final), USITC Pub. 5112 (Aug. 2020).

³⁰⁶ CR/PR at 1.18.

³⁰⁷ CR/PR at 1.18.

³⁰⁸ In June 2019, USTR granted an exclusion for bifacial CSPV modules from the safeguard measures. See *Presidential Proclamation 10339 of February 4, 2022*, 87 Fed. Reg. 7357 (Feb. 9, 2022).

imports from Cambodia have not been subject to the safeguard measure, under the exception for certain developing countries.³⁰⁹

While imports of bifacial panels were excluded from the safeguard measure when it was extended in February 2022, Presidential Proclamation 10779 of June 21, 2024, revoked that exclusion, and provided that imports of bifacial panels would be subject to the safeguard measure.³¹⁰

Effective April 5, 2025, CSPV cells and modules originating in Cambodia, Malaysia, Thailand, and Vietnam became subject to an additional 10 percent ad valorem duties under the International Emergency Economic Powers Act (IEEPA). Effective April 9, 2025, Malaysia was assigned an individualized additional duty rate of 24 percent and Vietnam was assigned an individualized additional rate of 46 percent. However, effective April 10, 2025, the individualized country duties were suspended and the additional duty rate for CSPV cells and modules originating in Malaysia and Vietnam returned to the rate of 10 percent.³¹¹

C. Volume of Subject Imports

Section 771(7)(C)(i) of the Tariff Act provides that the “Commission shall consider whether the volume of imports of the merchandise, or any increase in that volume, either in absolute terms or relative to production or consumption in the United States, is significant.”³¹²

The volume of cumulated subject imports of CSPV cells and modules from Malaysia and Vietnam increased by *** percent from 2022 to 2024, from *** kW in 2022, to *** kW in 2023, and to *** kW in 2024.³¹³ As a share of apparent U.S. consumption by quantity, cumulated subject imports of CSPV cells and modules increased from *** percent in 2022 to *** percent

³⁰⁹ See Presidential Proclamation 9693 of January 23, 2018, 83 Fed. Reg. 3541 (Jan. 25, 2018); Presidential Proclamation 10339 of February 4, 2022, 87 Fed. Reg. 7357 (Feb. 9, 2022).

³¹⁰ CR/PR at 1.18.

³¹¹ CR/PR at 1.19. The individualized country reciprocal duties for all countries other than China were suspended until July 9, 2025. CR/PR at 1.19 n.26.

³¹² 19 U.S.C. § 1677(7)(C)(i).

³¹³ CR/PR at Table C.4. Volumes of cumulated subject imports of CSPV cells and modules from Malaysia and Vietnam by value increased by *** percent from 2022 to 2023, from \$*** in 2022, to \$*** in 2023, and \$*** in 2024. *Id.*

Volumes of cumulated subject imports of CSPV modules from Malaysia and Vietnam increased by *** percent from 2022 to 2023, from *** kW in 2022, to *** kW in 2023, and *** kW in 2024. CR/PR at Table C.6.

in 2023 and to *** percent in 2024, a level *** percentage points higher than in 2022.³¹⁴ The ratio of cumulated subject imports by quantity to domestic module production was *** percent in 2022, *** percent in 2023 and *** percent in 2024.³¹⁵

Based on the foregoing, we find that the volume of cumulated subject imports from Malaysia and Thailand is significant in absolute terms and relative to apparent U.S. consumption and domestic production, and that the increase in the volume of cumulated subject imports is significant in absolute terms and relative to domestic consumption.³¹⁶

D. Price Effects of the Subject Imports

Section 771(7)(C)(ii) of the Tariff Act provides that, in evaluating the price effects of the subject imports, the Commission shall consider whether

(I) there has been significant price underselling by the imported merchandise as compared with the price of domestic like products of the United States, and

(II) the effect of imports of such merchandise otherwise depresses prices to a significant degree or prevents price increases, which otherwise would have occurred, to a significant degree.³¹⁷

As discussed in section IV.B.3 above, we find that there is a moderate-to-high degree of substitutability between cumulated subject imports and the domestic like product, and that on

³¹⁴ CR/PR at Table C.4. As a share of apparent U.S. consumption by value, cumulated subject imports of CSPV cells and modules increased by *** percentage points during the POI, going from *** percent in 2022, to *** percent in 2022, to *** percent in 2024. CR/PR at Table C.4.

³¹⁵ CR/PR at Table D.4.

³¹⁶ Illuminate argues that cell import volumes were not injurious because the domestic cell industry is not established, and U.S. module producers need significant volumes of imported cells to support their module assembly operations. Because we have found a single domestic like product, we do not reach a conclusion about whether, in fact, cell imports may have materially retarded the establishment of the domestic cell industry. Furthermore, although our definition of a single domestic like product precludes the need to consider cells and modules separately, we note that even considering solely the market for CSPV modules, subject import volumes were significant. Volumes of cumulated subject imports of CSPV modules from Malaysia and Vietnam increased by *** percent from 2022 to 2024, increasing from *** kW in 2022, to *** kW in 2023, and *** kW in 2024. CR/PR at Table C.6. As a share of apparent U.S. consumption by quantity, cumulated subject imports of CSPV modules increased from *** percent in 2022 to *** percent in 2023 and *** percent in 2024, a level *** percentage points higher than in 2022. CR/PR at Table C.6.

³¹⁷ 19 U.S.C. § 1677(7)(C)(ii).

balance, price is the most important factor in purchasing decisions although there are other important factors.

The Commission collected quarterly quantity and f.o.b. pricing data on sales of four pricing products, all of which were CSPV modules,³¹⁸ shipped to unrelated U.S. customers during the POI.³¹⁹ Nine U.S. producers and 17 importers provided usable pricing data for sales of the four pricing products, although not all firms reported pricing for all products for all quarters. Pricing data reported by these firms accounted for approximately 70.4 percent of U.S. producers' U.S. shipments of CSPV modules, 98.1 percent of U.S. shipments of subject imports from Malaysia, and 94.1 percent of U.S. shipments of subject imports from Vietnam.³²⁰

For similar reasons as explained in Section IV, we find that the data in Appendix H are more accurate for analyzing the price effects of subject imports, as those pricing data are for

³¹⁸ CR/PR at 5.7. The four pricing products are:

Product 1.-- Monocrystalline silicon module with front-side area of less than 2.2 square meters and a peak power wattage between 380w and 450w, inclusive, P-max or Wp as measured under Standard Test Conditions (STC), excluding bifacial modules.

Product 2.-- Monocrystalline silicon module with front-side area of greater than or equal to 2.2 square meters and a peak power wattage between 320w and 440w, inclusive, P-max or Wp as measured under STC, excluding bifacial modules.

Product 3.-- Monocrystalline silicon bifacial module that generates power on both sides of the panel with a front-side area of greater than or equal to 1.9 square meters and a peak power wattage between 320w and 450w, inclusive, P-max or Wp as measured under STC.

Product 4.-- Monocrystalline silicon bifacial module that generates power on both sides of the panel with front-side area of greater than or equal to 1.9 square meters and a peak power wattage greater than or equal to 485w, inclusive, P-max or Wp as measured under STC.

³¹⁹ Before issuing the final phase questionnaires, Commission staff requested comments about whether to request pricing data on cells. Petitioner and Respondents agreed that the Commission was unlikely to obtain usable pricing product comparisons for cells given the limited domestic commercial production of cells that occurred only late in the POI. See Petitioner's Comments on Draft Questionnaires, EDIS Doc. 833529, at 2; see also Joint Respondents Comments on Draft Questionnaires, EDIS Doc. 833408 at 15. Several respondents argue that there is a "domestic price premium" for cells because of domestic content bonuses provided by the IRA. See, e.g., Illuminate Posthearing Brief, Responses to Commission Questions at 22-23. However, the president of Suniva, the only current domestic cell producer, testified that:

even six months after, eight months after we've started production, we're now getting pressure to lower our prices because if you look at the corresponding numbers in the Staff Report from the introduction of the IRA to now, prices on foreign imports have continued to plummet. So what has successfully happened is now it's selling below cost. They're selling past any benefit that the IRA has.

Hearing Tr. at 64 (Card).

³²⁰ CR/PR at 5.8. Pricing coverage is based on U.S. shipments of modules reported in questionnaire responses.

CSPV products imported from subject countries, and exclude data for entries under Commerce's Appendix IV certification, which we have found to be nonsubject merchandise.³²¹

Cumulated subject imports from Malaysia and Vietnam undersold the domestic like product in 51 of 65 comparisons, with underselling margins ranging up to *** percent, and averaging *** percent.³²² Cumulated subject imports from Malaysia and Vietnam oversold the domestic like product in 14 of 65 comparisons, with overselling margins ranging between *** percent and *** percent and averaging *** percent.³²³ Over the POI, the volume of subject import sales in quarters with underselling was *** kW, representing *** percent of subject import sales volume, compared to *** kW in the quarters with overselling, representing *** percent of total reported subject import sales volume.³²⁴ The pricing data, however, indicate that most of the volume of overselling by subject imports is attributable to overselling of product 4 in 2024.³²⁵

Thus, we also consider the quarterly pricing data in each individual year of the POI. In 2022, cumulated subject imports from Malaysia and Vietnam undersold the domestic like product in 21 of 22 comparisons, with underselling margins ranging up to *** percent, and averaging *** percent.³²⁶ Cumulated subject imports from Malaysia and Vietnam oversold the domestic like product in only one of 22 comparisons, with overselling margins of *** percent.³²⁷ Over 2022, the volume of subject import sales in quarters with underselling was *** kW, representing *** percent of subject import sales volume that year, compared to *** kW in the quarters with overselling, representing *** percent of total reported subject import sales volume.³²⁸

In 2023, cumulated subject imports from Malaysia and Vietnam undersold the domestic like product in 15 of 19 comparisons, with underselling margins ranging up to *** percent, and averaging *** percent.³²⁹ Cumulated subject imports from Malaysia and Vietnam oversold the domestic like product in 4 of 19 instances, with overselling margins ranging between *** percent and *** percent and averaging *** percent.³³⁰ Over 2023, the volume of subject

³²¹ CR/PR at 5.8.

³²² CR/PR at Table H.7.

³²³ CR/PR at Table H.8.

³²⁴ CR/PR at Table H.8; *Derived from* CR/PR at Table H.8.

³²⁵ See CR/PR at Tables H.6 and H.8.

³²⁶ CR/PR at Table H.8.

³²⁷ CR/PR at Table H.8.

³²⁸ CR/PR at Table H.8; *Derived from* CR/PR at Table H.8.

³²⁹ CR/PR at Table H.8.

³³⁰ CR/PR at Table H.8.

import sales in quarters with underselling was *** kW, representing *** percent of subject import sales volume that year, compared to *** kW in the quarters with overselling, representing *** percent of total reported subject import sales volume.³³¹

In 2024, cumulated subject imports from Malaysia and Vietnam undersold the domestic like product in 15 of 24 instances, with underselling margins ranging up to *** percent, and averaging *** percent.³³² Cumulated subject imports from Malaysia and Vietnam oversold the domestic like product in the 9 of 24 instances, with overselling margins ranging between *** percent and *** percent and averaging *** percent.³³³ Over 2024, the volume of subject import sales in quarters with underselling was *** kW, representing *** percent of subject import sales volume that year, compared to *** kW in the quarters with overselling, representing *** percent of total reported subject import sales volume.³³⁴

Based on the moderate-to-high degree of substitutability between subject imports and the domestic like product, the importance of price in purchasing decisions, and pricing data showing predominant underselling by cumulated subject imports in 2022 and 2023, we find that cumulated subject imports undersold the domestic like product to a significant degree during those two years of the POI. The underselling led to cumulated subject imports capturing market share from 2022 to 2023 at the expense of the domestic industry. Cumulated subject imports gained *** percentage points of market share for CSPV modules from 2022 to 2023, while the domestic industry's market share decreased by *** percent.³³⁵ While the domestic industry gained market share in 2024, it did so by reducing prices more than costs decreased, as explained further below.

We have also examined price trends during the POI. Between the first quarter of 2022 and the last quarter of 2024 for which data are available, U.S. producers' sales prices for CSPV modules decreased by *** percent for product 1, *** percent for product 2 and *** percent for product 3.³³⁶ For pricing product 4, U.S. producers' sales prices decreased irregularly from \$***

³³¹ CR/PR at Table H.8; *Derived from* CR/PR at Table H.8.

³³² CR/PR at Table H.8.

³³³ CR/PR at Table H.8.

³³⁴ CR/PR at Table H.8; *Derived from* CR/PR at Table H.8.

³³⁵ CR/PR at Table C.6. The trend is similar in the total market for CSPV cells and modules by value. Cumulated subject imports increased their market share by *** percentage points from 2022 to 2023, while the domestic industry's market share decreased by *** percentage points. CR/PR at Table C.4.

³³⁶ CR/PR at Table H.5.

per kW in third quarter of 2023 to \$*** per kW in 2024.³³⁷ These data suggest that U.S. producers' sales prices decreased for all four pricing products.

The sales prices of imports from Malaysia and Vietnam for which there are pricing data available also reflect decreases over the POI. Between the first quarter of 2022 and the last quarter of 2024, sales prices for subject imports from Malaysia decreased by *** percent for product 1, and over the same period, for pricing product 4, the last quarter price for Malaysia is significantly lower than the high price.³³⁸ Between the first quarter of 2022 and the last quarter of 2024, sales prices for subject imports from Vietnam decreased by *** percent for product 1, *** percent for product 3, and *** percent for product 4.

As noted above, prices fell for all pricing products from domestic and subject sources over the POI. Generally, U.S. producer prices increased from the first quarter of 2022 through the third quarter of 2022 and declined thereafter. Subject import prices generally followed the same pattern.³³⁹ As prices generally declined from 2023 to 2024, the domestic industry's net sales AUVs decreased to a greater degree than its per-unit COGS. The domestic industry's net sales AUV was \$*** per kW in 2023, and \$*** per kW in 2024, for an overall decrease of \$*** per kW.³⁴⁰ Per-unit COGS was \$*** per kW in 2023, and \$*** in 2024, for an overall decrease of \$*** per kW.³⁴¹ As declines in the domestic industry's net sales average unit values ("AUVs") outpaced declines in its unit COGS throughout the POI, the industry experienced a cost-price squeeze. As a result, the domestic industry's ratio of COGS to net sales increased by *** percentage points from 2022 to 2024, increasing from an already high *** percent in 2022 to *** percent in 2023 and *** percent in 2024.³⁴² This cost-price squeeze negatively affected the domestic industry's financial condition, as discussed in section VI.E. below.

Furthermore, these data show that in 2023 and 2024, U.S. producers' COGS exceeded the value of their net sales, despite a *** percent increase in apparent U.S. consumption from

³³⁷ See CR/PR at Table H.4. Given that U.S. producers' reported pricing data in only 7 quarters beginning in the third quarter of 2022 to the last quarter of 2024, the data is insufficient to calculate the price trends for the U.S. producers' product from the first quarter of 2022 and the last quarter of 2024 for inclusion in Table H.5.

³³⁸ CR/PR at Table H.5. The highest reported price of product 4 for subject imports from Malaysia between the first quarter of 2022 and the last quarter of 2024 was \$*** per kW, the lowest reported price was \$*** per kW, and the last quarter price was \$*** per kW. *Id.*

³³⁹ See CR/PR at Tables H.1, H.2, and H.3.

³⁴⁰ CR/PR at Table C.1. The domestic industry's net sales AUV thus decreased by *** percent from 2023 to 2024.

³⁴¹ CR/PR at Table C.1. The domestic industry's per-unit COGS thus decreased by *** percent from 2023 to 2024.

³⁴² CR/PR at Table C.1.

2022 to 2023, and a *** percent increase in apparent U.S. consumption from 2023 to 2024.³⁴³ Although no responding U.S. purchasers reported that U.S. producers lowered prices,³⁴⁴ U.S. producers reported having to lower prices to compete with cumulated subject imports.³⁴⁵

Pricing data for pricing product 4 demonstrates the downward pricing pressure on the domestic like product caused by subject imports. Pricing product 4 is the highest wattage module of the four pricing products and was not available in substantial quantities from the domestic industry until the fourth quarter of 2023. Most of the volume of overselling by subject imports is attributable to overselling of product 4 from the fourth quarter of 2023 to the fourth quarter of 2024.³⁴⁶ During those quarters, volumes of subject imports of pricing product 4 substantially increased overall from Vietnam, and remained high from Malaysia.³⁴⁷ During those quarters, U.S. producers' sales volumes also substantially increased, but their prices decreased by *** percent overall.³⁴⁸ These data indicate that the domestic industry had to lower its prices below the prices of subject imports, to increase sales volumes of products previously dominated by subject imports. Given that the domestic industry's sales prices declined in 2023 and 2024, and that the decline in net sales AUV exceeded the decline in unit COGS despite a significant increase in apparent consumption, together with our findings above regarding the degree of substitutability between subject imports and the domestic like product and the importance of price in purchasing decisions, we find that cumulated subject imports depressed prices for the domestic like product to a significant degree in 2023 and 2024.³⁴⁹

In sum, we find that the significant underselling by cumulated subject imports in 2022 to 2023 enabled the cumulated subject imports to gain market share from the domestic industry from 2022 to 2023, and depressed prices for the domestic like product to a significant degree in

³⁴³ CR/PR at Table C.6.

³⁴⁴ CR/PR at 5.26.

³⁴⁵ See CR/PR at Table 6.14. For example, ***. *Id.* Similarly, *** reports that subject imports ***." See *** U.S. Producer Questionnaire Response, EDIS Doc. ***, at IV-17(a) p.2. The president of Mission Solar testified that throughout 2024 "subject imports continued to surge into the U.S. market at basement prices, underselling the domestic industry by significant margins" and thus Mission Solar had to drop its prices. Hearing Tr. at 36 (Martens).

³⁴⁶ CR/PR at Table H.4.

³⁴⁷ CR/PR at Table H.4.

³⁴⁸ CR/PR at Table H.4. U.S. producers' prices for product 4 were \$*** per kW in the third quarter of 2023 and decreased irregularly to \$*** per kW by the end of final quarter of 2024.

³⁴⁹ While several respondents argue that the price declines during the POI are attributable to IRA incentives, and improvements in production efficiencies, given that the domestic industry's unit COGS were higher than its net sales AUVs and, as described in Section VI.E, the domestic industry's net income margin declined, we do not find that these factors explain the significant decrease in prices in 2023 and 2024.

2023 and 2024 as domestic producers lowered prices to regain sales and market share. We therefore find that cumulated subject imports had significant price effects.

E. Impact of the Subject Imports³⁵⁰

Section 771(7)(C)(iii) of the Tariff Act provides that examining the impact of subject imports, the Commission “shall evaluate all relevant economic factors which have a bearing on the state of the industry.”³⁵¹ These factors include output, sales, inventories, capacity utilization, market share, employment, wages, productivity, gross profits, net profits, operating profits, cash flow, return on investment, return on capital, ability to raise capital, ability to service debts, research and development, and factors affecting domestic prices. No single factor is dispositive and all relevant factors are considered “within the context of the business cycle and conditions of competition that are distinctive to the affected industry.”³⁵²

As significant and increasing volumes of low-priced subject imports significantly undersold the domestic like product and captured market share from the domestic industry in from 2022 to 2023, and depressed prices in 2023 and 2024, the domestic industry’s financial

³⁵⁰ The statute instructs the Commission to consider the “magnitude of the dumping margin” in an antidumping proceeding as part of its consideration of the impact of imports. 19 U.S.C. § 1677(7)(C)(iii)(V). In its final antidumping duty determination with respect to CSPV products from Malaysia, Commerce found dumping margins ranging from 0.00 percent for Hanwha Q Cells, to 81.24 percent for four Malaysian firms, with an “all others” rate of 8.59 percent. *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From Malaysia: Final Affirmative Determination of Sales at Less Than Fair Value*, 90 Fed. Reg. 17376 (Apr. 25, 2025). In its final antidumping duty determination with respect to CSPV products from Vietnam, Commerce found dumping margins ranging from 58.07 percent to 271.28 percent. *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From the Socialist Republic of Vietnam: Final Affirmative Determination of Sales at Less Than Fair Value and Final Affirmative Determination of Critical Circumstances, in Part*, 90 Fed. Reg. 17388 (Apr. 25, 2025). We take into account in our analysis the fact that Commerce has made final findings that all subject producers in Malaysia and Vietnam are selling subject imports in the United States at less than fair value. In addition to this consideration, our impact analysis has considered other factors affecting domestic prices. Our analysis of the significant price effects of subject imports, described in both the price effects discussion and below, is particularly probative to an assessment of the impact of the subject imports.

³⁵¹ 19 U.S.C. § 1677(7)(C)(iii); *see also* SAA at 851 and 885 (“In material injury determinations, the Commission considers, in addition to imports, other factors that may be contributing to overall injury. While these factors, in some cases, may account for the injury to the domestic industry, they also may demonstrate that an industry is facing difficulties from a variety of sources and is vulnerable to dumped or subsidized imports.”).

³⁵² 19 U.S.C. § 1677(7)(C)(iii). This provision was amended by the Trade Preferences Extension Act of 2015, Pub. L. 114-27.

indicators either declined or remained weak. The domestic industry's trade indicators were mixed over the POI as the industry's production, sales, and shipments increased overall during the period, while demand increased and the industry's capacity utilization declined.

As to trade indicators, the industry increased its practical capacity for modules by *** percent between 2022 and 2024, from *** kW in 2022, to *** kW in 2023, and *** kW in 2024.³⁵³ The domestic industry's production quantity increased by *** percent between 2022 and 2024, increasing from *** kW in 2022 to *** kW in 2023 and *** kW in 2024.³⁵⁴ Capacity utilization decreased by *** percentage points between 2022 and 2024, decreasing from *** percent in 2022 to *** percent in 2023 and *** percent in 2024.³⁵⁵

The domestic industry's number of production and related workers ("PRWs") increased by *** percent between 2022 and 2024, increasing from *** in 2022 to *** in 2023 and *** in 2024.³⁵⁶ Hours worked increased irregularly by *** percent between 2022 and 2024, decreasing from *** hours in 2022 to *** hours in 2023, and increasing to *** hours in 2024.³⁵⁷ Wages paid increased by *** percent between 2022 and 2024, decreasing from \$*** in 2022 to \$*** in 2023, and then increasing to \$*** in 2024.³⁵⁸ Productivity for modules (in kilowatts per thousand hours) increased by *** percent between 2022 and 2024, from *** kW per thousand hours in 2022, to *** kW per thousand hours in 2023 and to *** kW per thousand hours in 2024.³⁵⁹

The domestic industry's U.S. shipments of modules increased *** percent from 2022 to 2024, increasing from *** kW in 2022 to *** kW in 2023 and *** kW in 2024.³⁶⁰

The industry's share of apparent U.S. consumption of cells and modules by value decreased overall between 2022 and 2024, decreasing from *** percent in 2022 to *** percent in 2023, and increasing to *** percent in 2024.³⁶¹ The domestic industry's market share for CSPV modules increased irregularly by *** percentage points, declining from *** percent in 2022 to *** percent in 2023, and then increasing to *** percent in 2024.

³⁵³ CR/PR at Tables 3.7 and C.1.

³⁵⁴ CR/PR at Tables 3.7 and C.1.

³⁵⁵ CR/PR at Tables 3.7 and C.1.

³⁵⁶ CR/PR at Tables 3.33 and C.1.

³⁵⁷ CR PR at Tables 3.33 and C.1.

³⁵⁸ CR/PR at Tables 3.33 and C.1.

³⁵⁹ CR/PR at Tables 3.32 and C.1. Productivity for cells was *** kW per thousand hours in 2024. CR/PR at Tables 3.31 and C.1.

³⁶⁰ CR/PR at Tables 3.11 and C.1. The domestic industry's U.S. shipments of cells were *** kW in 2024. CR/PR at Tables 3.10 and C.1.

³⁶¹ CR/PR at Tables 4.18 and C.4.

The domestic industry's end-of-period inventories of CSPV modules increased *** percent, from *** kW in 2022 to *** kW in 2023 and to *** kW in 2024.³⁶² As a ratio to U.S. shipments, the industry's end of period inventories increased by *** percentage points over the POI, from *** percent in 2022 to *** percent in 2023 and *** percent in 2024.³⁶³

Despite notable increases in sales volume, the domestic industry's financial performance was generally poor over the POI. The industry's net sales increased *** percent overall between 2022 and 2024, decreasing from \$*** in 2022 to \$*** in 2023, and increasing to \$*** in 2024.³⁶⁴ The domestic industry had a gross profit of \$*** in 2022, but reported gross losses of \$*** in 2023 and \$*** in 2024.³⁶⁵ The industry's operating losses worsened from 2022 to 2024, from *** in 2022 to *** in 2023 and *** in 2024.³⁶⁶ The industry's net losses also worsened overall from 2022 to 2024, improving slightly from *** in 2022 to *** in 2023, and worsening to *** in 2024.³⁶⁷

³⁶² CR/PR at Table C.1.

³⁶³ CR/PR at Table C.1.

³⁶⁴ CR/PR at Tables 6.1 and C.1

³⁶⁵ CR/PR at Tables 6.1 and C.1. ACP and Canadian Solar allege that ***. Canadian Solar Posthearing Brief, Responses to Commission Questions at 44. However, if we were to accept that ***, and that it was appropriate to disregard ***, it would not change our material injury analysis or our threat of material injury analysis. *** accounted for only *** percent of U.S. production, so even significant changes in its results would not materially alter the domestic industry's operating or net income figures. Excluding ***'s data, the domestic industry's operating losses worsened from 2022 to 2024, from *** in 2022 to *** in 2023 and *** in 2024. Calculated from CR/PR at C.1 and removing data from *** U.S. Producer Questionnaire, EDIS Doc. *** at III-9a. The trend of the domestic industry's net income data without *** also showed an overall downward trend during the POI, increasing from *** in 2022 to \$***, and decreasing to *** in 2024. Calculated from CR/PR at C.1 and removing data from *** U.S. Producer Questionnaire, EDIS Doc. *** at III-9a. As we discuss below, we find that data on operating income and operating margins support our determinations of material injury and threat of material injury.

³⁶⁶ CR/PR at Tables 6.1 and C.1.

³⁶⁷ CR/PR at Tables 6.1 and C.1. Several respondents argue that the Commission should consider the domestic industry's net income, as opposed to its operating income, because the net income data account for domestic producers' IRA revenues. We note that even considering net income, as opposed to operating income, the domestic industry's net losses worsened over the POI. As explained in Section IV.B, the IRA established the Advanced Manufacturing Production Tax Credit ("MPTC") and expanded the Advanced Energy Project Investment Tax Credit for manufacturers. Domestic producers were requested to report their MPTC and other IRA credits. Regarding MPTC/IRA income, the domestic industry reported \$*** in 2022, \$*** in 2023, and \$*** in 2024. The domestic industry's "all other income", which may also contain IRA-related revenue, was \$*** in 2022, \$*** in 2023, and \$*** in 2024. *Id.*

The domestic industry's ratio of operating income to net sales decreased from *** percent in 2022 to *** percent in 2023 and *** percent in 2024.³⁶⁸ The domestic industry's net income margin also worsened overall, decreasing from *** percent in 2022 to *** percent in 2023, and slightly improving to *** percent in 2024.³⁶⁹ The industry's net assets increased by *** percent between 2022 and 2024, rising from \$*** in 2022 to \$*** in 2023 and \$*** in 2024.³⁷⁰ The domestic industry's return on assets was *** percent in 2022, *** percent in 2023, and *** percent in 2024.³⁷¹

The domestic industry made substantial capital investments during the POI in new plants, expansions, and new equipment. The industry's capital expenditures increased by *** percent between 2022 and 2024, from \$*** in 2022 to \$*** in 2023 and \$*** in 2024.³⁷² The domestic industry's R&D expenses decreased by *** percent between 2022 and 2024, from \$*** in 2022 to \$*** in 2023, and increasing slightly to \$*** in 2024.³⁷³

Based on the record in the final phase of these investigations, we find that cumulated subject imports from Malaysia and Vietnam prevented the domestic industry from fully capitalizing on the *** percent increase in apparent U.S. consumption from 2022 to 2024. Subject import volume increased significantly during the POI, and significantly undersold the domestic like product from 2022 to 2023, resulting in a market share shift from the domestic industry to cumulated subject imports in that period. Cumulated subject imports also depressed domestic prices to a significant degree in 2023 and 2024, as domestic producers lowered prices to compete with subject imports and win back sales. These price declines occurred as declines in the domestic industry's net sales AUVs outpaced declines in its unit COGS throughout the POI and the industry's ratio of COGS to net sales increased by *** percentage points from 2022 to 2024.³⁷⁴ As a consequence, the domestic industry's operating losses and net losses worsened in absolute terms and as a share of net sales. These financial declines led domestic producers to close facilities, delay expansions, and retract plans for new facilities.³⁷⁵ We find credible Petitioner's claims that these financial declines also jeopardize the economic viability of recent openings and expansions.³⁷⁶ Specifically, while apparent U.S.

³⁶⁸ CR/PR at Tables 6.1 and C.1.

³⁶⁹ CR/PR at Tables 6.1 and C.1.

³⁷⁰ CR/PR at Tables 6.10 and C.1.

³⁷¹ CR/PR at Table 6.11.

³⁷² CR/PR at Tables 6.6 and C.1.

³⁷³ CR/PR at Tables 6.8 and C.1.

³⁷⁴ CR/PR at Table C.1.

³⁷⁵ See CR/PR at Table 3.2; *see also* Petitioner's Prehearing Brief at 59-60.

³⁷⁶ See Petitioner's Prehearing Brief at 58-62.

consumption of modules increased by 27.8 million kW over the POI, and the domestic industry's module production capacity increased by 14.8 million kW,³⁷⁷ the industry's capacity utilization rate fell by *** percentage points,³⁷⁸ as low-priced subject imports seized the greater share of the increase in consumption.

Subject imports significantly undersold the domestic like product and gained market share at the expense of the domestic industry in 2022 and 2023. Significant underselling by cumulated subject imports also depressed prices for the domestic like product to a significant degree, as domestic producers reduced their prices in an effort to compete with low-priced subject imports and regain sales and market share in 2023 and 2024, even as apparent U.S. consumption increased in those years. As a consequence, the domestic industry incurred significant and increasing losses at the gross, operating, and net income levels over the POI, particularly in 2023 and 2024, as cumulated subject imports depressed domestic prices. Accordingly, we conclude that cumulated subject imports had a significant adverse impact on the domestic industry.

We have also considered whether there are other factors that may have had an impact on the domestic industry to ensure that we are not attributing injury from such other factors to subject imports.

Nonsubject imports' share of apparent U.S. consumption of cells and modules by quantity decreased by *** percentage points over the POI, from *** percent in 2022 to *** percent in 2023 to *** percent in 2024.³⁷⁹ Cumulated subject imports' share of apparent consumption by cells and modules increased by *** percentage points over the POI, from *** percent in 2022 to *** percent in 2023 and to *** percent in 2024.³⁸⁰ However, from 2022 to 2023, cumulated subject imports' share of apparent consumption of modules increased by *** percentage points, while nonsubject imports decreased by *** percentage points.³⁸¹ Nonsubject imports' share of apparent U.S. consumption of modules by quantity decreased by *** percentage points over the POI, from *** percent in 2022 to *** percent in 2023 to *** percent in 2024.³⁸² By contrast, cumulated subject imports' share of apparent consumption of modules increased by *** percentage points over the POI, from *** percent in 2022 to ***

³⁷⁷ CR/PR at Table C.3.

³⁷⁸ CR/PR at Table C.1.

³⁷⁹ CR/PR at Table C.4.

³⁸⁰ CR/PR at Table C.6.

³⁸¹ CR/PR at Table C.6. The trend is similar in the total market for CSPV cells and modules by value. Cumulated subject imports increased their market share by *** percentage points from 2022 to 2023, while nonsubject imports' market share decreased by *** percentage points. CR/PR at Table C.4.

³⁸² CR/PR at Table C.6.

percent in 2023 and *** percent in 2024.³⁸³ Accordingly, nonsubject imports cannot explain the material injury that we have attributed to cumulated subject imports.³⁸⁴

Several respondents have argued that we should consider nonsubject imports from South Korea separate from other nonsubject imports.³⁸⁵ Quarterly pricing data for nonsubject imports from South Korea show that while the prices of South Korean importers were generally lower than the domestic like product, they were generally higher than subject imports from Malaysia and Vietnam.³⁸⁶ Moreover, the share of apparent U.S. consumption by quantity of cells and modules by nonsubject imports from South Korea decreased over the POI, from *** percent in 2022 to *** percent in 2023 and to *** percent in 2024.³⁸⁷ Given that nonsubject imports from South Korea lost market share and were generally priced higher than subject imports from Malaysia and Vietnam, nonsubject imports from South Korea cannot explain the material injury that we have attributed to cumulated subject imports.³⁸⁸

³⁸³ CR/PR at Table C.6. Nonsubject imports' share of apparent U.S. consumption of cells and modules by value decreased irregularly by *** percentage points over the POI, from *** percent in 2022 to *** percent in 2023 to *** percent in 2024. CR/PR at Table C.4.

³⁸⁴ We note that the AUVs of nonsubject imports of cells and modules were higher than the AUVs of cumulated subject imports of cells and modules from Malaysia and Vietnam in two of the three years of the POI. The AUVs of nonsubject imports were \$*** per kW in 2022, \$*** kW in 2024, compared to the AUVs of cumulated subject imports from Malaysia and Vietnam of \$*** per kW in 2022, \$*** per kW in 2023, and \$*** per KW in 2024. CR/PR at Table C.4.

³⁸⁵ Several respondents assert that Hanwha imports large volumes of low-priced cells from its South Korean affiliate, and that Hanwha filed the petitions to stifle its U.S. competition now that it has procured a nonsubject supply of cells. See Canadian Solar Prehearing Brief at 1; Canadian Solar Posthearing Brief, Responses to Commission Questions at 45.

³⁸⁶ CR/PR at Table G.5. The average unit values of U.S. shipments of imports from South Korea of pricing products 1 through 4 were lower than the values of U.S. shipments of domestically produced products in 23 out of 34 comparisons. The average unit values of U.S. shipments of imports from South Korea were higher than the average unit values of U.S. shipments of imports from Malaysia in 28 out of 33 comparisons, and higher than the average unit values of U.S. shipments of imports from Vietnam in 25 out of 35 comparisons. *Id.*

³⁸⁷ CR/PR at Table D.19. The share of apparent U.S. consumption by value of cells and modules taken by nonsubject imports from South Korea decreased over the POI, from *** percent in 2022 to *** percent in 2023 and to *** percent in 2024. CR/PR at Table D.20.

The share of apparent U.S. consumption by quantity of modules taken by nonsubject imports from South Korea decreased over the POI, from *** percent in 2022 to *** percent in 2023 and to *** percent in 2024. CR/PR at Table F.4.

³⁸⁸ While not raised by any party, we also have considered whether the adverse impact to the domestic industry is attributable to nonsubject Appendix IV imports. The share of apparent U.S. consumption of CSPV cells and modules by nonsubject Appendix IV imports initially increased from *** percent in 2022 to *** percent in 2023, and then decreased to *** percent in 2024. As explained above, the Appendix IV entries contain large volumes of merchandise that Commerce found to be (Continued...)

We have also considered respondents' arguments that Hanwha's contract terms disincentivized sales by requiring purchasers to accept bundled EPC services, and thereby caused injury to the domestic industry.³⁸⁹ The record shows that only five of 16 responding purchasers reported that Hanwha conditioned sales or prices on the bundling of EPC services, and Hanwha estimates that only *** percent of its sales in 2024 were bundled with EPC services.³⁹⁰ Hanwha did account for the largest share of domestic producers' net sales quantity at *** percent in 2024, but given the relatively small percentage of sales that were bundled, Hanwha's bundling of EPC services does not explain the market share shift of cumulated subject imports in 2022-2023, nor the domestic industry's deteriorating financial performance as a whole.³⁹¹

Several respondents also argue that domestic producers' poor financial performance is due to certain companies' failure or inability to take advantage of certain IRA benefits.³⁹² Petitioner argues that the IRA incentives are contingent on domestic producers' production, and relatedly, ability to make sales.³⁹³ However, the net income data, which take IRA incentives into account, show that most domestic producers posted net losses in 2024. Five companies

(...Continued)

circumventing the *CSPV I* orders. Given that entries of circumventing merchandise were found by Commerce to be unfairly traded but exempt from the disciplining effects of the *CSPV I* orders for the duration of the tariff holiday that ended late in the POI in June 2024, Appendix IV entries likely had some adverse impact on the domestic industry. However, considering that cumulated subject imports' share of apparent U.S. consumption increased each year of the POI, and that Appendix IV imports decreased markedly in 2024, Appendix IV entries do not undermine our finding of a causal nexus between subject imports and material injury to the domestic industry. As the Court of International Trade has explained, "{s}ubject imports do not need to be the sole, principal, substantial, or significant cause of the material injury. *ITG Voma Corp. v. United States Int'l Trade Comm'n*, 253 F. Supp. 3d 1339, 1361 (Ct. Int'l Trade 2017), *aff'd*, 753 F. App'x 913 (Fed. Cir. 2019).

³⁸⁹ See ACP Posthearing Brief, Responses to Commission Questions at Attachment III.

³⁹⁰ CR/PR at 2.6.

³⁹¹ Canadian Solar raises a variation of the argument regarding Hanwha's bundling of EPC services, asserting that the Commission pricing data did not capture the revenue Hanwha likely received through the bundling of EPC services, and Hanwha's financial performance is therefore likely understated. As we stated above, the record indicates that only *** percent of Hanwha's sales were bundled with EPC services. It is also unclear how a failure to adjust pricing data to reflect bundling revenues would affect Hanwha's financial data, which reflect a different dataset.

³⁹² See, e.g., ACP's Posthearing Brief at 10 ("This case is a tale of two industries: one that adapted and modernized and took advantage of the IRA, and one that did not."). Respondents argue that the Commission should thus consider the domestic industry's net income, which they assert captures the IRA incentives, as opposed to operating income.

³⁹³ See Petitioner's Posthearing Brief, Responses to Commission Questions at 90-91.

posted net profits. Of the *** that also reported income in 2023, net income decreased ***.³⁹⁴ ***, the only firm that increased its net income ratio in 2024, accounted for *** percent of module production in 2024.³⁹⁵ Therefore, while IRA benefits may have aided the financial performance of some domestic producers, the domestic industry's financial performance declined over the POI even considering only net income. As such, the IRA benefits received by certain members of the industry did not counteract the injury caused by subject merchandise or explain the negative results of the most poorly performing firms.³⁹⁶

Several respondents argue that subject imports of cells are inherently non-injurious to the domestic industry, given that U.S. cell production began late in the period of investigation, current U.S. producer cell capacity is very low, and all U.S. producers relied on imported cells to produce domestic modules. However, we have defined a single domestic like product consisting of cells and modules because cells are the primary input in CSPV modules, and thus our material injury findings necessarily encompass cells and modules in the collective. Further, the fact that some domestic producers used subject cells to enable domestic module production would not in any way lessen imported subject cells' negative effects on U.S. cell production.³⁹⁷

For the reasons stated above, we determine that an industry in the United States is materially injured by reason of imports of CSPV products from Malaysia and Vietnam found by Commerce to be sold in the United States at LTFV and to be subsidized by the governments of Malaysia and Vietnam.

³⁹⁴ CR/PR at Table 6.3.

³⁹⁵ CR/PR at Tables 3.1, 6.3.

³⁹⁶ Petitioner accurately notes that while U.S. producers that did not report IRA income incurred ***, even producers that did report such income reached a net income margin of just *** percent in 2024, with ***. See Petitioner's Posthearing Brief at 13 and Exhibit 7.

³⁹⁷ We note that evidence in the record indicates that domestic cell production previously ceased because of the effects of unfairly traded imports subject to prior investigations. For example, the president of Mission Solar testified at the hearing: "When we started manufacturing in San Antonio in 2014, we started as a cell and module manufacturer. At the time, there was no incentives for domestic cell manufacturing, and after two years of trying to be a integrated cell and module manufactur{er}, due to the massive inflow of cheap solar cells coming largely from Taiwan and southeast Asia, in order to be sustainable as a company, we made the hard decision to stop our solar cell manufacturing in 2017 because we simply could not compete with these unfairly traded imports." Hearing Tr. at 60 (Martens).

VII. Threat of Material Injury by Reason of Subject Imports

A. Legal Standard

Section 771(7)(F) of the Tariff Act directs the Commission to determine whether the U.S. industry is threatened with material injury by reason of the subject imports by analyzing whether “further dumped or subsidized imports are imminent and whether material injury by reason of imports would occur unless an order is issued or a suspension agreement is accepted.”³⁹⁸ The Commission may not make such a determination “on the basis of mere conjecture or supposition,” and considers the threat factors “as a whole” in making its determination whether dumped or subsidized imports are imminent and whether material injury by reason of subject imports would occur unless an order is issued.³⁹⁹ In making our determination, we consider all statutory threat factors that are relevant to these investigations.⁴⁰⁰

³⁹⁸ 19 U.S.C. § 1677(7)(F)(ii).

³⁹⁹ 19 U.S.C. § 1677(7)(F)(ii).

⁴⁰⁰ These factors are as follows:

(I) if a countervailable subsidy is involved, such information as may be presented to it by the administering authority as to the nature of the subsidy (particularly as to whether the countervailable subsidy is a subsidy described in Article 3 or 6.1 of the Subsidies Agreement) and whether imports of the subject merchandise are likely to increase,

(II) any existing unused production capacity or imminent, substantial increase in production capacity in the exporting country indicating the likelihood of substantially increased imports of the subject merchandise into the United States, taking into account the availability of other export markets to absorb any additional exports,

(III) a significant rate of increase of the volume or market penetration of imports of the subject merchandise indicating the likelihood of substantially increased imports,

(IV) whether imports of the subject merchandise are entering at prices that are likely to have a significant depressing or suppressing effect on domestic prices and are likely to increase demand for further imports,

(V) inventories of the subject merchandise,

(VI) the potential for product-shifting if production facilities in the foreign country, which can be used to produce the subject merchandise, are currently being used to produce other products,

...

(VIII) the actual and potential negative effects on the existing development and production efforts of the domestic industry, including efforts to develop a derivative or more advanced version of the domestic like product, and

(IX) any other demonstrable adverse trends that indicate the probability that there is likely to be material injury by reason of imports (or sale for importation) of the subject merchandise (whether or not it is actually being imported at the time).

(Continued...)

B. Cumulation for Threat

Under section 771(7)(H) of the Tariff Act, the Commission may “to the extent practicable” cumulatively assess the volume and price effects of subject imports from all countries as to which petitions were filed on the same day if the requirements for cumulation in the material injury context are satisfied.⁴⁰¹ Accordingly, for purposes of our analysis of threat of material injury by reason of subject imports from Cambodia and Thailand, subject imports from Cambodia and Thailand are eligible for cumulation with subject imports from Malaysia and Vietnam.

1. Arguments of the Parties

Petitioner claims that subject imports from different subject sources are unlikely to compete under different conditions of competition in the imminent future, contending that imports from all four countries are highly interchangeable with each other and domestically produced CSPV products.⁴⁰² Petitioner also argues that there is significant overlap in both the geographic regions and channels of distribution in which imports from subject countries and the domestic like product are sold, with the latter being primarily to end users through distributors.⁴⁰³ It also argues that subject imports from each country and the domestic like product were simultaneously present in the U.S. market throughout the POI.⁴⁰⁴ Petitioner disputes respondents’ argument that the Commission should not cumulate subject imports from Thailand and Cambodia with the other subject imports because producers in those countries plan to invest in U.S. production, which would result in imports from those subject countries competing under conditions of competition different from imports from Malaysia or Vietnam. Petitioner asserts that subject producers from all four countries have related firms

(...Continued)

19 U.S.C. § 1677(7)(F)(i). To organize our analysis, we discuss the applicable statutory threat factors using the same volume/price/impact framework that applies to our material injury analysis. Statutory threat factors (I), (II), (III), (V), and (VI) are discussed in the analysis of subject import volume. Statutory threat factor (IV) is discussed in the analysis of subject import price effects. Statutory factors (VIII) and (IX) are discussed in the analysis of impact. Statutory factor (VII) concerning agricultural products is inapplicable to this investigation.

⁴⁰¹ 19 U.S.C. § 1677(7)(H).

⁴⁰² Petitioner’s Posthearing Brief, Responses to Commission Questions at 102.

⁴⁰³ Petitioner’s Prehearing Brief at 23-30.

⁴⁰⁴ Petitioner’s Prehearing Brief at 30.

that produce CSPV products in the United States, and that “what is true of all subject countries cannot logically or legally be a basis for decumulation.”⁴⁰⁵

BYD argues that the Commission should decline to exercise its discretion to cumulate subject imports from Cambodia with other subject imports for its threat analysis because subject imports from Cambodia were negligible.⁴⁰⁶ It also argues that subject imports from Cambodia will compete under different conditions than subject imports from the three other countries because Cambodian producers have invested in U.S. production and will not export subject merchandise in a manner that would harm their U.S. affiliates.⁴⁰⁷ BYD contends that the Commission has declined to cumulate subject imports when the record showed that a foreign producer was investing in U.S. manufacturing operations and committed to using U.S.-based suppliers.⁴⁰⁸

Canadian Solar argues that the Commission should decline to exercise its discretion to cumulate subject imports from Thailand with other subject imports for similar reasons. It asserts that imports from Thailand were negligible, and it also argues that several firms that account for the majority of CSPV manufacturing in Thailand have opened solar module production facilities in the United States and plan to commence U.S. manufacturing of cells within the next two years.⁴⁰⁹

2. Analysis

As discussed above in Section V.B, the petitions for these investigations were filed on the same day, and there is a reasonable overlap of competition between subject imports from Malaysia and Vietnam, and among imports from each of these sources and the domestic like product. There is no information on the record to suggest that the reasonable overlap of competition between and among subject imports from Malaysia and Vietnam and the domestic like product will not continue into the imminent future.

We also find that there will likely be a reasonable overlap of competition between and among subject imports from Cambodia and Thailand, subject imports from other sources, and

⁴⁰⁵ Petitioner’s Posthearing Brief, Responses to Commission Questions at 102-3.

⁴⁰⁶ BYD Posthearing Brief at 12-13.

⁴⁰⁷ BYD Prehearing Brief at 17-19.

⁴⁰⁸ BYD Prehearing Brief at 19-20 (citing *Certain Large Residential Washers from Korea and Mexico*, Inv. Nos. 701-TA-488 and 731-TA-1199-1200 (Review), USITC Pub. 4882 (Apr. 2019) at 22-23).

⁴⁰⁹ Canadian Solar Prehearing Brief at 45-50. Trina also argues that the Commission should decline to cumulate subject imports from Thailand for purposes of its threat analysis. Trina Prehearing Brief at 2.

the domestic like product into the imminent future. The record indicates that subject imports from Cambodia and Thailand are generally fungible with one another, and with subject imports from other sources and the domestic like product. Most responding U.S. producers and responding U.S. importers reported that subject imports from each subject country were either always or frequently interchangeable with each other as well as with the domestic like product.⁴¹⁰

In 2024, there was overlap in sales to utilities customers among subject imports from Cambodia and Thailand with one another, with subject imports from other sources, and with the domestic like product. Importers sold *** percent of their shipments of CSPV products from Cambodia to utilities in 2022, *** percent in 2023, and *** percent in 2024.⁴¹¹ Importers sold CSPV products from Thailand mostly to utilities throughout 2022 to 2024, with shipments to utilities accounting for *** percent of shipments in 2022, *** percent in 2023, and *** percent in 2024.⁴¹²

Subject imports from Cambodia and Thailand also overlapped with one another, with subject imports from other sources, and with the domestic like product in geographic markets. U.S. producers and importers of subject merchandise from all four countries each reported

⁴¹⁰ CR/PR at Table 2.15, Table 2.16. There was some difference in the overlap of the domestic like product with subject imports based on the five CSPV product categories (bifacial cells, non-bifacial cells, non-bifacial modules using bifacial cells, non-bifacial modules using non-bifacial cells, and bifacial modules using bifacial cells), but the record shows that in 2024 the domestic industry's U.S. shipments of the domestic like product and the responding importers' U.S. shipments of subject imports from Cambodia, Malaysia, Thailand and Vietnam overlapped on shipments of bifacial modules using bifacial cells. CR/PR at Table D.17. Additionally, the pricing product data show that in the six consecutive quarters from the first quarter of 2022 to the second quarter of 2023, U.S. producers and responding U.S. importers of subject merchandise reported sales of pricing product 1 from all four subject countries. CR/PR at Table H.1. The pricing data also show that in the six consecutive quarters from the third quarter of 2023 to fourth quarter of 2024, U.S. producers and responding U.S. imports of subject merchandise reported sales of pricing product 4 from all subject countries. CR/PR at Table H.4.

⁴¹¹ CR/PR at Table 2.3.

⁴¹² CR/PR at Table 2.3. As we found above, the share of domestic producers' U.S. shipments to utilities and developers were *** percent of total sales in 2022, *** percent in 2023, and *** percent in 2024. *Id.* Importers sold substantial amounts of CSPV products from Malaysia to utilities from 2022 to 2024, accounting for *** percent of total shipments in 2022, *** percent in 2023, and *** percent in 2024. *Id.* Importers sold substantial amounts of CSPV products from Vietnam to utilities from 2022 to 2024, with shipments to utilities accounting for *** percent of shipments in 2022, *** percent in 2023, and *** percent in 2024. *Id.*

selling CSPV products to all regions of the contiguous United States, as well as to other U.S. markets, including Alaska, Hawaii, Puerto Rico, and the U.S. Virgin Islands.⁴¹³

Furthermore, except for December 2024, subject imports from Cambodia were simultaneously present in the U.S. market with subject imports from other sources, and the domestic like product.⁴¹⁴ Likewise, except for June 2022, subject imports from Thailand were simultaneously present in the U.S. market with subject imports from other sources, and the domestic like product.⁴¹⁵ Based on this information, we find that there is a reasonable overlap of competition between and among subject imports from Cambodia, subject imports from Thailand, subject imports from other sources, and the domestic like product that is likely to continue into the imminent future.

We are not persuaded by BYD's arguments that subject imports from Cambodia are likely to compete under different conditions of competition than subject imports from other sources. Although imports from Cambodia were negligible during the 12-month pre-petition period, they immediately exceeded the applicable negligibility threshold in each remaining month of the POI in 2024.⁴¹⁶ Furthermore, although Cambodian producers do have U.S. affiliates and invested in production of CSPV products in the United States, that situation is not a condition of competition that is distinct to Cambodia. In fact, there are CSPV producers from each subject country that have U.S. affiliates that have invested in producing CSPV products in the United States.⁴¹⁷

⁴¹³ CR/PR at 4.17. Official import statistics indicate that imports from each of the subject countries eligible for cumulation entered the United States through ports at all four borders of entry. CR/PR at 4.37.

⁴¹⁴ CR/PR at Table D.18.

⁴¹⁵ CR/PR at Table D.18.

⁴¹⁶ We are not persuaded by BYD's arguments that our finding that subject imports from Cambodia were negligible for material injury purposes would necessarily imply that these imports would compete under different conditions of competition from other subject imports in our analysis of threat of material injury, see BYD Prehearing Brief at 18-19, given that we have determined that subject imports from all sources are non-negligible for purposes of our threat analysis.

⁴¹⁷ See CR/PR at Table 3.2. For example, *** have Malaysian producer affiliates, *** have Thai producer affiliates, and *** has Vietnamese producer affiliates. *Id.* Although BYD cites *Certain Large Residential Washers from Korea and Mexico*, Inv. Nos. 701-TA-488 and 731-TA-1199- 1200 (Review), USITC Pub. 4882 (Apr. 2019) at 22-23, as supporting the proposition that the Commission may decline to cumulate subject imports when foreign subject producers invest in U.S. manufacturing, the facts of those reviews were unique and are not analogous to these investigations. In the *Washers* first five-year review, the Commission declined to exercise its discretion to cumulate subject imports of washing machines from Korea with subject imports from Mexico because two Korean producers, LG and Samsung, accounted for virtually all subject imports from Korea during the original investigations and five-year period of review. During the period of review, Samsung and LG each opened U.S. factories to (Continued...)

For the same reasons, we are not persuaded by Canadian Solar, Trina, and Runergy's arguments that subject imports from Thailand are likely to compete under different conditions of competition than subject imports from other sources. Although imports from Thailand were negligible in the 12-month pre-petition period, they immediately exceeded the 3 percent threshold and remained above it for the remainder of the POI. Furthermore, as we explained above, the fact that Thai producers have U.S. affiliates and have made investments in the United States is not a condition of competition that is distinct to Thailand.⁴¹⁸ We therefore exercise our discretion to cumulate subject imports from Cambodia, Malaysia, Vietnam, and Thailand for our analysis of whether there is a threat of material injury to the domestic industry by reason of imports from Cambodia and Thailand.

C. Analysis of Threat of Material Injury Factors

We find that an industry in the United States is threatened with material injury by reason of imports of CSPV cells and modules from Cambodia and Thailand that have been sold at less than fair value and subsidized by the governments of Cambodia and Thailand.

(...Continued)

produce washers, reduced their volumes of subject imports from Korea, and each implemented a highly coordinated strategy with its parent companies and subsidiaries of localizing the production of washers for the U.S. market. All the entities responsible for LG's and Samsung's corporate strategies of localizing the production of washers for the U.S. market participated in the reviews and all stated unequivocally, in briefs and hearing testimony, that LG and Samsung intended to supply a certain percent of their sales in the U.S. market with washers produced at their new U.S. plants. Furthermore, the conditions of competition were distinct for subject imports from Korea because no producer in Mexico that served the U.S. market produced washers in the United States or had any plans to do so.

⁴¹⁸ Furthermore, even if Thai producers invest in module production in the United States, they will likely continue to import cells.

1. Likely Volumes of Subject Imports⁴¹⁹

⁴¹⁹ In its final countervailing duty determination concerning CSPV cells and modules from Cambodia, Commerce found the following four subsidy programs to be countervailable: (1) Customs Duty Exemption and Related Incentives for Production Equipment for Export QIPs and Supporting Industry Qualified Investment Projects (QIP); (2) Customs Duty Exemption and Related Incentives for Raw Materials for Export QIPs; (3) Cross-Border Provision of Silicon Wafers from the Government of China for Less Than Adequate Remuneration (“LTAR”); (4) Cross-Border Provision of Solar Glass from the Government of the People’s Republic of China for LTAR. *Issues and Decision Memorandum for the Final Affirmative Determination of the Countervailing Duty Investigation of Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules, from Cambodia*, EDIS Doc. 851020 (April 18, 2025), at 4-5. Commerce did not characterize any of these programs as export specific subsidies but did identify transnational subsidies provided by the Government of the People’s Republic of China.

In its final countervailing duty determination concerning CSPV cells and modules from Malaysia, Commerce found the following 21 subsidy programs to be countervailable: (1) Accelerated Capital Allowance; (2) High Impact Fund Grant; (3) Domestic Investment Strategic Fund; (4) Pioneer Status Direct Tax Incentive; (5) Investment Tax Allowance; (6) Special Tax Incentives for Relocation; (7) Reinvestment Allowance; (8) Automation Capital Allowance; (9) Double Deduction for Promotion of Exports; (10) Stamp Duty Exemptions and Reductions on Buildings and Land; (11) Exemption of Import Duties and Sales Taxes for Imported Raw Materials, Machinery Equipment, and Spare Parts/Accessories through Licensed Manufacturing Warehouse (LMW); (12) Exemption of Import Duties and Sales Taxes for Imported Raw Materials, Machinery Equipment, and Spare Parts/Accessories through Free Trade Zones; (13) Preferential Financing from the Malaysia Development Bank; (14) Preferential Financing from the Malaysian Industrial Development Finance Behad Group; (15) Electricity for Less Than Adequate Remuneration (LTAR); (16) Provision of Land for LTAR to Hanwha Q CELLS; (17) The Government of Malaysia Ministry of Finance’s Provision of Loans to Hanwha Q CELLS; (18) Policy Lending from Chinese Banks for BRI Capacity Cooperation Projects; (19) Cross-Border Provision of Chinese-Origin Polysilicon for LTAR; (20) Cross-Border Provision of Chinese-Origin Silver Paste for LTAR, and (21) Cross-Border Provision of Chinese-Origin Solar Glass for LTAR. *Issues and Decision Memorandum for the Final Affirmative Determination of the Countervailing Duty Investigation of Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules, from Malaysia*, EDIS Doc. 851022 (April 18, 2025), at 5-9. Commerce did not characterize any of these programs as export specific subsidies but did identify transnational subsidies provided by the Government of the People’s Republic of China.

In its final countervailing duty determination concerning CSPV cells and modules from Thailand, Commerce found the following 11 subsidy programs to be countervailable: (1) Tax Exemptions, Duty Exemptions, and Other Benefits Under the Investment Promotion Act; (2) Provision of Electricity for LTAR; (3) Industrial Estate Tax Act Privileges; (4) Customs Act BE 2560 (2017) Section 29 Duty Drawback (DDB) on Certain Raw Materials; (5) Tax Coupons for Exported Goods; (6) Export-Import Bank of Thailand (EXIM Thailand) Programs; (7) Policy Lending from Chinese Banks for BRI Capacity Cooperation Projects (BRI Cooperation Program); (8) Cross-Border Provision of Chinese-Origin Polysilicon for LTAR; (9) Cross-Border Provision of Chinese Silicon Wafers for LTAR; (10) Cross-Border Provision of Chinese Solar Glass for LTAR; and (11) Cross-Border Provision of Chinese Silver Paste for LTAR. *Issues and Decision Memorandum for the Final Affirmative Determination of the Countervailing Duty Investigation of Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules, from Thailand*, EDIS Doc. 851023 (April 18, 2025), at 9-14. Commerce did not characterize any of these programs as export (Continued...)

We found in Section VI.C. above that the volume of cumulated subject imports from Malaysia and Vietnam and the increase in the volume of those imports during the POI are significant in absolute and relative terms. We reach the same conclusion with respect to cumulated imports from all four subject countries. Volumes of cumulated subject imports of CSPV cells and modules from all four subject countries increased by *** percent from 2022 to 2024, increasing from *** kW in 2022, to *** kW in 2023, and *** kW in 2024.⁴²⁰ As a share of apparent U.S. consumption by quantity, cumulated subject imports of CSPV cells and modules increased from *** percent in 2022 to *** percent in 2023 and *** percent in 2024, a level *** percentage points higher than in 2022.⁴²¹ The ratio of cumulated subject imports to domestic module production was *** percent in 2022, *** percent in 2023, *** percent in 2024.⁴²² Based on these considerations, we find that the volume of cumulated subject imports during the POI, including from Cambodia and Thailand, was significant, both in absolute terms and relative to apparent U.S. consumption and domestic production, and that the increase in the volume of cumulated subject imports was significant in absolute terms and relative to domestic consumption.

We also find that cumulated subject imports from Cambodia, Malaysia, Thailand, and Vietnam are likely to increase substantially in the imminent future absent trade relief. Cell producers in the four subject countries increased their capacity for cell production from *** kW in 2022 to *** kW in 2023 and *** kW in 2024.⁴²³ These producers' rate of capacity utilization decreased irregularly over the POI, increasing from *** percent in 2022 to *** percent in 2023,

(...Continued)

specific subsidies but did identify transnational subsidies provided by the Government of the People's Republic of China.

In its final countervailing duty determination concerning CSPV cells and modules from Vietnam, Commerce found the following four subsidy programs to be countervailable: (1) Income Tax Programs; (2) Other Tax Programs; (3) Land Programs; and (4) Transnational Subsidy Programs. *Issues and Decision Memorandum for the Final Affirmative Determination of the Countervailing Duty Investigation of Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules, from Vietnam*, EDIS Doc. 851026 (April 18, 2025), at 16-18. Commerce did not characterize any of these programs as export specific subsidies but did identify transnational subsidies provided by the Government of the People's Republic of China.

⁴²⁰ CR/PR at Table C.4.

⁴²¹ CR/PR at Table C.4. Volumes of cumulated subject imports of CSPV modules from all four subject countries increased by *** percent from 2022 to 2024, from *** kW in 2022, to *** kW in 2023, and *** kW in 2024.⁴²¹ As a share of apparent U.S. consumption by quantity, cumulated subject imports of CSPV cells modules increased from *** percent in 2022 to *** percent in 2023 and *** percent in 2024, a level *** percentage points higher than in 2022.

⁴²² CR/PR at Table D.4.

⁴²³ CR/PR at Table 7.14.

and decreasing to *** percent in 2024.⁴²⁴ In 2024, cell producers in the four subject countries possessed excess capacity of *** kW, equivalent to *** percent of apparent U.S. consumption of cells and modules combined, and *** percent of apparent U.S. consumption of cells that year.⁴²⁵

Meanwhile, module producers in the four subject countries increased their capacity from *** kW in 2022 to *** kW in 2023 and *** kW in 2024.⁴²⁶ These producers' rate of capacity utilization decreased irregularly over the POI, increasing from *** percent in 2022 to *** percent in 2023, and decreasing to *** percent in 2024. In 2024, cumulated subject module producers possessed excess capacity of *** kW, equivalent to *** percent of apparent U.S. consumption of cells and modules combined, and *** percent of apparent U.S. consumption of modules that year.⁴²⁷

Although cell producers and subject module producers in the four subject countries project their overall capacity and production to decrease in 2025 and 2026,⁴²⁸ the record indicates that they based their projections on the existence of these investigations. Several subject foreign producers appear to have halted expansion plans or reduced their capacity solely because of the possibility of trade relief due to these investigations. For example, publicly available news articles in early 2025 report that Malaysian producers LONGi and Risen Energy have curtailed expansion and production plans, respectively, in anticipation of increased antidumping and countervailing duties.⁴²⁹ Vietnamese producer ***.⁴³⁰ Similarly, Cambodian producer ***.⁴³¹ Thus, in the absence of trade relief, capacity and production levels in the four subject countries would likely be higher than their current projections.

End-of-period inventories of cell producers and module producers in the four subject countries increased from 2022 to 2023, but slightly decreased overall by the end of the POI.⁴³² However, U.S. importers' U.S. inventories of CSPV cells and modules from subject sources

⁴²⁴ CR/PR at Table 7.14.

⁴²⁵ *Calculated from* CR/PR at Tables 7.14, C.2., and C.4.

⁴²⁶ CR/PR at Table 7.19.

⁴²⁷ *Calculated from* CR/PR at Tables 7.19, C.4., and C.6.

⁴²⁸ See CR/PR at Tables 7.16, 7.21.

⁴²⁹ See CR/PR at Table 7.6.

⁴³⁰ CR/PR at Table 7.8.

⁴³¹ CR/PR at Table 7.8.

⁴³² See CR/PR at Tables 7.18 and 7.23. Subject foreign cell producers' end of period inventories were *** kW in 2022, *** kW in 2023, and *** kW in 2024. CR/PR at Table 7.18. Subject foreign module producers' end of period inventories were *** kW in 2022, *** kW in 2023, and *** kW in 2024.

increased from *** kW in 2022 to *** kW in 2023 and *** kW in 2024.⁴³³ U.S. importers' end-of-year inventories of subject merchandise in 2024 were equivalent to *** percent of apparent U.S. consumption of CSPV cells and modules that year.⁴³⁴ Further, U.S. importers report arranged imports of CSPV cells from subject sources that total *** kW between January 1 to December 31 of 2025.⁴³⁵ The available data do not suggest that U.S. producers and subject producers have the ability to shift production from CSPV cells or modules to alternative products.⁴³⁶

Subject foreign producers also have the incentive to increase exports to the United States in the imminent future, given their high volumes of exported CSPV products and increasing reliance on the U.S. market toward the end of the POI. Subject foreign producers of CSPV modules increased their total exports of modules from *** kW in 2022 to *** kW in 2023 and to *** kW in 2024. Subject foreign producers' exports accounted for between *** and *** percent of their total shipments during the POI.⁴³⁷ Subject module producers' exports to the United States as a share of their total shipments were *** percent in 2022, *** percent in 2023 and *** percent in 2024.⁴³⁸ These data indicate that the subject foreign module producers were export oriented during the POI and exported nearly all of their shipments of modules, with significant and increasing volumes directed to the United States.

The subject foreign producers are less export oriented with respect to CSPV cells, although the volume of exports of cells substantially increased over the POI. Subject foreign producers increased their total exports of cells from *** kW in 2022 to *** kW in 2023 and to *** kW in 2024.⁴³⁹ Although the share of cell exports to total cell shipments decreased over the POI,⁴⁴⁰ the volume of exports to the United States increased.⁴⁴¹ Subject foreign cell

⁴³³ CR/PR at Table 7.26.

⁴³⁴ *Calculated from* CR/PR at Tables 7.26 and C.4. The comparable ratio was *** percent in 2022 and *** percent in 2023. *Id.*

⁴³⁵ CR/PR at Table 7.27.

⁴³⁶ *See* CR/PR at Table 2.5. *** U.S. producers, and *** of subject producers reported the ability to shift production to other products. *Id.*

⁴³⁷ CR/PR at Table 7.19

⁴³⁸ CR/PR at Table 7.19. While exports to the United States as a share of subject module industries' total shipments are projected to decline, they still are projected to remain high *** percent in 2025, and *** percent in 2026. *Id.*

⁴³⁹ CR/PR at Table 7.14.

⁴⁴⁰ CR/PR at Table 7.14. Subject foreign cell producers' exports as a share of their total shipments were *** percent in 2022, *** percent in 2023 and *** percent in 2024. Exports are projected to account for *** percent of subject cell industries' total shipments in 2025, and *** percent in 2026.

⁴⁴¹ CR/PR at Table 7.14.

producers' exports to the United States as a share of their total shipments decreased from *** percent in 2022 to *** percent in 2023, before increasing to *** percent in 2024.⁴⁴² These data indicate that the cell industries in the four subject countries substantially increased their export orientation toward the United States during the last year of the POI.

Moreover, with the expiration of the tariff holiday, the record indicates that producers in subject countries have shifted from exporting circumventing, nonsubject merchandise to subject merchandise within the scope of these investigations. Circumventing sources' share of apparent U.S. consumption of cells and modules by quantity and value declined sharply in 2024, corresponding with the end of the tariff holiday, and subject sources' share of apparent U.S. consumption significantly increased that year.⁴⁴³ The data further indicate that volumes of subject imports will likely continue to increase significantly absent trade relief.

In light of the significant increase in cumulated subject import volume; the shift in market share to subject imports from 2022 to 2023; the large and increasing capacity of the cumulated subject producers, including substantial excess capacity; and the cumulated subject foreign producers' high volumes of exports of CSPV products and increasing reliance on the U.S. market toward the end of the POI, we find that absent relief, the volume of cumulated subject imports from all four subject countries is likely to be significant within the imminent future,

⁴⁴² CR/PR at Table 7.14. Exports to the United States are projected to account for *** percent of subject cell industries' total shipments in 2025, and *** percent in 2026.

⁴⁴³ See CR/PR at Table D.19. Circumventing sources' share of apparent U.S. consumption of cells and modules by quantity decreased overall by *** percentage points over the POI, increasing from *** percent in 2022 to *** percent in 2023, and decreasing to *** percent in 2024. Cumulated subject sources' share of apparent U.S. consumption of cells and modules by quantity increased overall by *** percentage points over the POI, decreasing from *** percent in 2022 to *** percent in 2023, and increasing to *** percent in 2024. *Id.*

Circumventing sources' share of apparent U.S. consumption of cells and modules by value decreased overall by *** percentage points over the POI, increasing from *** percent in 2022 to *** percent in 2023, and decreasing to *** percent in 2024. CR/PR at Table D.20. Cumulated subject sources' share of apparent U.S. consumption of cells and modules by value increased overall by *** percentage points over the POI, increasing from *** percent in 2022 to *** percent in 2023, and increasing to *** percent in 2024. *Id.*

Circumventing sources' share of apparent U.S. consumption of modules by quantity decreased overall by *** percentage points over the POI, increasing from *** percent in 2022 to *** percent in 2023, and decreasing to *** percent in 2024. CR/PR at Table F.7. Cumulated subject sources' share of apparent U.S. consumption of modules by value increased overall by *** percentage points over the POI, decreasing from *** percent in 2022 to *** percent in 2023, and increasing to *** percent in 2024. *Id.*

both in absolute terms and relative to U.S. consumption and production, and that the increase in the volume of subject imports will likely be significant.

2. Likely Price Effects of Cumulated Subject Imports

As discussed in Section VII.B.3 above, we have found a moderate-to-high degree of substitutability between subject imports and the domestic like product, and that price is on balance the most important factor in purchasing decisions, along with other important factors. We found that cumulated subject imports from Malaysia and Vietnam significantly undersold the domestic like product in 2022 to 2023, which enabled them to gain market share from the domestic industry, and depressed prices for the domestic like product to a significant degree in 2023 and 2024. The addition of data regarding subject imports from Cambodia and Thailand does not change these conclusions, and leads us to find with respect to all four countries that significant underselling by the increasing volume of cumulated subject imports is likely in the imminent future, which will likely force domestic producers either to reduce prices still further to remain competitive or lose market share if they try to maintain or raise prices to cover costs.

Cumulated subject imports from all four countries undersold the domestic like product during the POI in 73 of 98 comparisons, with underselling margins ranging up to *** percent, and averaging *** percent.⁴⁴⁴ Cumulated subject imports oversold the domestic like product in 25 instances of 98 comparisons, with overselling margins ranging between *** percent and *** percent and averaging *** percent.⁴⁴⁵ Over the POI, the volume of subject import sales in quarters with underselling was *** kW, representing *** percent of subject import sales volume, compared to *** kW in the quarters with overselling, representing *** percent of total reported subject import sales volume.⁴⁴⁶ The pricing data, however, indicate that most of the volume of overselling by subject imports is attributable to overselling of product 4 in 2024.⁴⁴⁷

Thus, we also consider the quarterly pricing data in each individual year of the POI. In 2022, cumulated subject imports from all four subject countries undersold the domestic like product in 32 of 35 comparisons, with underselling margins ranging up to *** percent, and averaging *** percent.⁴⁴⁸ Cumulated subject imports oversold the domestic like product in the three of 35 comparisons, with overselling margins ranging between *** percent and ***

⁴⁴⁴ CR/PR at Table H.7.

⁴⁴⁵ CR/PR at Table H.8.

⁴⁴⁶ CR/PR at Table H.8; *Derived from* CR/PR at Table H.8.

⁴⁴⁷ See CR/PR at Tables H.6 and H.8.

⁴⁴⁸ CR/PR at Table H.8.

percent and averaging *** percent.⁴⁴⁹ Over 2022, the volume of subject import sales in quarters with underselling was *** kW, representing *** percent of subject import sales volume that year, compared to *** kW in the quarters with overselling, representing *** percent of total reported subject import sales volume.⁴⁵⁰

In 2023, cumulated subject imports from all four subject countries undersold the domestic like product in 23 of 28 comparisons, with underselling margins ranging up to *** percent, and averaging *** percent.⁴⁵¹ Cumulated subject imports oversold the domestic like product in five of 28 comparisons, with overselling margins ranging between *** percent and *** percent and averaging *** percent.⁴⁵² Over 2023, the volume of subject import sales in quarters with underselling was *** kW, representing *** percent of subject import sales volume that year, compared to *** kW in the quarters with overselling, representing *** percent of total reported subject import sales volume.⁴⁵³

In 2024, cumulated subject imports from all four countries undersold the domestic like product in 18 of 35 comparisons, with underselling margins ranging up to *** percent, and averaging *** percent.⁴⁵⁴ Cumulated subject imports oversold the domestic like product in the 17 of 35 comparisons, with overselling margins ranging between *** percent and *** percent and averaging *** percent.⁴⁵⁵ Over 2024, the volume of subject import sales in quarters with underselling was *** kW, representing *** percent of subject import sales volume that year, compared to *** kW in the quarters with overselling, representing *** percent of total reported subject import sales volume.⁴⁵⁶

Based on the moderate-to-high degree of substitutability between subject imports and the domestic like product, the importance of price in purchasing decisions, and pricing data showing predominant underselling by cumulated subject imports in 2022 and 2023, we find that cumulated subject imports undersold the domestic like product to a significant degree during those two years of the POI. The underselling led to cumulated subject imports capturing market share from 2022 to 2023 at the expense of the domestic industry. Cumulated subject

⁴⁴⁹ CR/PR at Table H.8.

⁴⁵⁰ CR/PR at Table H.8; *Derived from* CR/PR at Table H.8.

⁴⁵¹ CR/PR at Table H.8.

⁴⁵² CR/PR at Table H.8.

⁴⁵³ CR/PR at Table H.8; *Derived from* CR/PR at Table H.8.

⁴⁵⁴ CR/PR at Table H.8.

⁴⁵⁵ CR/PR at Table H.8.

⁴⁵⁶ CR/PR at Table H.8; *Derived from* CR/PR at Table H.8.

imports gained *** percentage points of market share for CSPV modules from 2022 to 2023, while the domestic industry's market share decreased by *** percent.⁴⁵⁷

The pricing trends based on the cumulated data for all four subject countries in our threat analysis are similar to those we observed in our material injury analysis. As we explained in Section VI.D, the pricing data indicate that U.S. producers' prices decreased for all four pricing products.⁴⁵⁸

The prices of shipments of imports from all four subject countries for which there are pricing data available overall reflect decreases from the first quarter of 2022 to the last quarter of 2024.⁴⁵⁹ Between the first quarter of 2022 and the last quarter of 2024, sales prices for subject imports from Cambodia decreased by *** percent for product 4.⁴⁶⁰ Between the first quarter of 2022 and the last quarter of 2024, sales prices for subject imports from Thailand decreased by *** percent for product 1 and *** percent for product 4.⁴⁶¹

As we observed in Section VI.D, the domestic industry faced a cost-price squeeze that negatively affected its financial condition. In 2023 and 2024, U.S. producers' COGS exceeded the value of their net sales, despite a *** percent increase in apparent U.S. consumption from 2022 to 2023, and a *** percent increase in apparent U.S. consumption from 2023 to 2024.⁴⁶² As with cumulated imports from Malaysia and Vietnam, we find that data for pricing product 4 for all subject countries demonstrates subject imports' downward pricing pressure on the

⁴⁵⁷ CR/PR at Table C.6.

⁴⁵⁸ Between the first quarter of 2022 and the last quarter of 2024 for which data are available, U.S. producers' sales prices for CSPV modules decreased by *** percent for product 1, *** percent for product 2 and *** percent for product 3. CR/PR at Table H.5. For pricing product 4, U.S. producers' sales prices decreased irregularly from \$*** per kW in third quarter of 2022 to \$*** per kW in 2024. CR/PR at Table H.4.

⁴⁵⁹ As we explained above, between the first quarter of 2022 and the last quarter of 2024, sales prices for subject imports from Malaysia decreased by *** percent for product 1, and for pricing product 4, the last quarter price for Malaysia is significantly lower than its high price, and only \$*** higher than its lowest reported price. CR/PR at Table H.5. Between the first quarter of 2022 and the last quarter of 2024, sales prices for subject imports from Vietnam decreased by *** percent for product 1, *** percent for product 3, and *** percent for product 4. *Id.*

⁴⁶⁰ CR/PR at Table H.5. There were no pricing data reported for subject imports from Cambodia for pricing products 2 and 3. Although quarterly pricing data show that prices for subject imports from Cambodia for product 1 increased overall from the first quarter of 2022 to the fourth quarter of 2024, the volume of these sales was only *** compared to *** kW of subject imports from Cambodia reported for product 4. See CR/PR at Tables H.1 and H.5.

⁴⁶¹ CR/PR at Table H.5. There were only two quarters in which there are pricing data for products 2 and 3 for subject imports from Thailand. *Id.*

⁴⁶² CR/PR at Table C.6.

domestic like product.⁴⁶³ From the fourth quarter of 2023 to the fourth quarter of 2024, when most of the volume of subject import overselling occurred, volumes of subject imports of pricing product 4 substantially increased from all four sources, including from Cambodia and Thailand individually.⁴⁶⁴ During those quarters, U.S. producers' sales volumes, which had previously been quite low, also substantially increased, but their prices decreased by *** percent overall.⁴⁶⁵ These data indicate that the domestic industry had to lower its prices below the prices of subject imports to increase sales volumes of products previously dominated by subject imports. Given that the domestic industry's sales prices declined markedly in 2023 and 2024 despite a significant increase in apparent consumption, we find that cumulated subject imports depressed prices for the domestic like product to a significant degree in 2023 and 2024.

In sum, in light of the moderate-to-high degree of substitutability between the domestic like product and subject imports, the importance of price in purchasing decisions, the significant underselling by cumulated subject imports in 2022 and 2023, and the depressive impact of subject imports on domestic prices in 2023 and 2024, we find that the imminent increase in the volume of subject imports from all four countries will likely significantly undersell the domestic like product, which will force domestic producers either to reduce prices still further to remain competitive or lose market share if they try to maintain or raise prices to cover costs.

3. Likely Impact of Cumulated Subject Imports

As previously discussed in Section VII.E. above, we have found find that significant and increasing volumes of subject imports from Malaysia and Vietnam, on a cumulated basis, significantly undersold the domestic like product in 2022 and 2023 and took market share from the domestic industry, and depressed domestic prices to a significant degree from 2023 to 2024, preventing the domestic industry from fully capitalizing on the substantial increase in apparent U.S. consumption and causing the domestic industry's financial condition to worsen. The domestic industry experienced a cost-price squeeze and significant financial losses. We accordingly find with respect to cumulated subject imports from all four sources that the domestic industry is in a vulnerable condition.

⁴⁶³ CR/PR at Table H.4.

⁴⁶⁴ CR/PR at Table H.4.

⁴⁶⁵ CR/PR at Table H.4. U.S. producers' prices for product 4 were \$*** per kW in the third quarter of 2023 and decreased irregularly to \$*** per kW by the end of final quarter of 2024.

Given our findings that cumulated subject import volume is likely to increase further from already significant levels and continue to undersell the domestic like product, we conclude that, in the absence of trade relief, cumulated subject imports would likely have a significant impact on the domestic industry in the imminent future. Specifically, the likely increased volumes of cumulated subject imports would likely depress domestic prices and/or displace sales of the domestic like product and cause the domestic industry to lose additional market share, adversely affecting the domestic industry's production, employment, revenues, and financial performance. *** U.S. producers reported anticipating negative effects from subject imports in the absence of relief.⁴⁶⁶

As in the preliminary determinations, we are unpersuaded by the argument that subject imports do not threaten the domestic industry because domestic producers need imports of CSPV cells for use in domestic production of CSPV cells. It is undisputed that subject producers supply the domestic industry with CSPV cells, but the record in the final phase of these investigations shows that subject foreign producers' shipments of CSPV modules to the United States were vastly greater than their supply of CSPV cells to the domestic industry. Shipments of subject CSPV cells were *** kW of subject imports in 2022, *** kW in 2023, and *** kW in 2024.⁴⁶⁷ By contrast, shipments of subject modules accounted for more than *** those amounts – *** kW in 2022, *** kW in 2023, and *** kW in 2024.⁴⁶⁸ It is also noteworthy that exports of CSPV modules to the United States accounted for the *** of subject producers' total shipments of CSPV modules during the POI – *** percent in 2022, *** percent in 2023, and *** percent in 2024.⁴⁶⁹ The share of subject producers' home market shipments of CSPV modules remained *** throughout the POI, at *** percent in 2022, *** percent in 2023, and *** percent in 2024.⁴⁷⁰ Thus, the domestic industry's need for imported cells would not prevent increasing volumes of low-priced cumulated subject imports of modules from having a significant impact on the domestic industry in the imminent future absent relief.

Moreover, U.S. domestic cell production restarted at the end of the POI and several domestic producers recently have made substantial investments to establish domestic cell production. For example, Suniva began domestic production of cells in September 2024, and it states ***.⁴⁷¹ Hanwha ***.⁴⁷² We find that the likely imminent increased volumes of low-

⁴⁶⁶ CR/PR at Table 6.14.

⁴⁶⁷ CR/PR at Table C.5.

⁴⁶⁸ CR/PR at Table C.6.

⁴⁶⁹ CR/PR at Table 7.19.

⁴⁷⁰ CR/PR at Table 7.19.

⁴⁷¹ CR/PR at Table 3.5.

priced cumulated subject imports of cells would undermine the viability of these plans, creating a threat of material injury to domestic cell producers.

In sum, we determine that an industry in the United States is threatened with material injury by reason of imports of CSPV cells and modules from Cambodia and Thailand.⁴⁷³

VIII. Critical Circumstances⁴⁷⁴

A. Legal Standards and Party Arguments

In its final antidumping and countervailing duty determinations concerning CSPV cells and modules from Vietnam, Commerce found that critical circumstances exist with respect to subject imports from non-individually examined companies that Commerce found qualified for a separate rate, and for the Vietnam-wide entity in the antidumping duty investigations,⁴⁷⁵ and Bovie Solar, GEP New Energy Viet Nam Company Limited, Vietnam Green Energy Commercial Services Company Ltd., Shengtian New Energy Vina Co., Ltd, and HT Solar Vietnam Limited Company, as well as all other producers and exporters subject to the “all other” subsidy rate in the countervailing duty investigation.⁴⁷⁶ Because we have determined that the domestic industry is materially injured by reason of subject imports from Vietnam, we must further determine “whether the imports subject to the affirmative {Commerce critical circumstances}

(...Continued)

⁴⁷² CR/PR at Table 3.5.

⁴⁷³ Based on the record of these investigations, and notwithstanding our negligibility determinations in section IV, above, we would not have found material injury by reason of subject imports from Cambodia and Thailand but for the suspension of liquidation of entries of subject merchandise. See 19 U.S.C. § 1673d(b)(4)(B).

⁴⁷⁴ Commerce made affirmative critical circumstances determinations with respect to certain subject imports from Thailand and Vietnam in its antidumping and countervailing duty investigations. Because our determinations with respect to Thailand are based on the threat of material injury, we do not make a critical circumstances finding with respect to those subject imports from Thailand. See *Certain Steel Concrete Reinforcing Bars From Belarus, China, Korea, Latvia, and Moldova*, Inv. Nos. 731-TA-873-874 and 877-879 (Final), USITC Pub. 3440 (Jul. 2001) at 14, n. 88; see also *Collated Roofing Nails from China and Taiwan*, Inv. Nos. 731-TA-757 and 759 (Final), USITC Pub. 3070 (Nov. 1997) at 24-25.

⁴⁷⁵ *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From the Socialist Republic of Vietnam: Final Affirmative Determination of Sales at Less Than Fair Value and Final Affirmative Determination of Critical Circumstances, in Part*, 90 Fed. Reg. 17388 (Apr. 25, 2025).

⁴⁷⁶ *Ferrosilicon from the Russian Federation: Final Affirmative Determination of Sales at Less Than Fair Value and Final Affirmative Determination of Critical Circumstances*, 89 Fed. Reg. 76450 (Sept. 18, 2024); *Ferrosilicon from the Russian Federation: Final Affirmative Countervailing Duty Determination and Final Affirmative Determination of Critical Circumstances*, 89 Fed. Reg. 76454 (Sept. 18, 2024).

determination ... are likely to undermine seriously the remedial effect of the antidumping {and/or countervailing duty} order{s} to be issued."⁴⁷⁷

The SAA indicates that the Commission is to determine "whether, by massively increasing imports prior to the effective date of relief, the importers have seriously undermined the remedial effect of the order" and specifically "whether the surge in imports prior to the suspension of liquidation, rather than the failure to provide retroactive relief, is likely to seriously undermine the remedial effect of the order."⁴⁷⁸ The legislative history for the critical circumstances provision indicates that the provision was designed "to deter exporters whose merchandise is subject to an investigation from circumventing the intent of the law by increasing their exports to the United States during the period between initiation of an investigation and a preliminary determination by {Commerce}."⁴⁷⁹ An affirmative critical circumstances determination by the Commission, in conjunction with an affirmative determination of material injury by reason of subject imports, would normally result in the retroactive imposition of duties for those imports subject to the affirmative Commerce critical circumstances determination for a period 90 days prior to the suspension of liquidation. The statute provides that, in making this determination, the Commission shall consider, among other factors it considers relevant,

- (I) the timing and the volume of the imports,
- (II) a rapid increase in inventories of the imports, and
- (III) any other circumstances indicating that the remedial effect of the {order} will be seriously undermined.⁴⁸⁰

In considering the timing and volume of subject imports, the Commission's practice is to consider import quantities prior to the filing of the petition with those subsequent to the filing of the petition using monthly statistics on the record regarding those firms for which Commerce has made an affirmative critical circumstances determination.⁴⁸¹

⁴⁷⁷ 19 U.S.C. §§ 1671d(b)(4)(A)(ii), 1673d(b)(4)(A)(ii).

⁴⁷⁸ SAA at 877.

⁴⁷⁹ *ICC Industries, Inc. v United States*, 812 F.2d 694, 700 (Fed. Cir. 1987), quoting H.R. Rep. No. 96-317 at 63 (1979), *aff'd* 632 F. Supp. 36 (Ct. Int'l Trade 1986). See 19 U.S.C. §§ 1671b(e)(2), 1673b(e)(2).

⁴⁸⁰ 19 U.S.C. §§ 1671d(b)(4)(A)(ii), 1673d(b)(4)(A)(ii).

⁴⁸¹ See *Lined Paper School Supplies from China, India, and Indonesia*, Inv. Nos. 701-TA-442-43, 731-TA-1095-97, USITC Pub. 3884 at 46-48 (Sept. 2006); *Carbazole Violet Pigment from China and India*, Inv. Nos. 701-TA-437 and 731-TA-1060-61 (Final), USITC Pub. 3744 at 26 (Dec. 2004); *Certain Frozen Fish Fillets from Vietnam*, Inv. No. 731-TA-1012 (Final), USITC Pub. 3617 at 20-22 (Aug. 2003).

B. Arguments of the Parties

Petitioner's Arguments. Petitioner argues that there was a significant increase in the volume of subject imports from Vietnam from the pre-petition period to the post-petition period.⁴⁸² Petitioner contends that U.S. importers' end-of-period inventories substantially increased during the POI. It also asserts that Vietnam is affected by oversupply of CSPV products from China, and that CSPV producers in Vietnam shipped *** of their production to the U.S. market during the POI, demonstrating that they are export oriented. Petitioner asserts that these conditions led to a surge during the critical circumstances window and will likely persist.⁴⁸³

Respondents' Arguments. Boviet argues that the timing and volumes of relevant subject imports from Vietnam in the post-petition period do not indicate that they will seriously undermine the remedial effect of the antidumping or countervailing duty orders.⁴⁸⁴ It contends that the volume of subject imports from Vietnam was relatively low compared to import volumes in the prior periods of the POI, and that inventories of subject imports from Vietnam decreased throughout 2024.⁴⁸⁵ It asserts that all U.S. module producers had to rely on imports because of the lack of domestic cell production, and that given that most U.S. importers reported their commercial shipments as made to order, with lead times averaging 125.1 days, the majority of merchandise imported during the post-petition had already been ordered before the filing of the petition.⁴⁸⁶

⁴⁸² Petitioner's Prehearing Br. at 27-28.

⁴⁸³ Petitioner's Posthearing Brief, Responses to Commission Questions at 76-77.

⁴⁸⁴ Boviet Prehearing Brief at 12. Boviet contends that regardless of whether the Commission uses a five- or six-month period of comparison, the Commission should make a negative finding for subject imports from Vietnam. Boviet Posthearing Brief at 3.

⁴⁸⁵ Boviet Prehearing Brief at 11. Jinko also opposes finding critical circumstances for subject imports from Vietnam and argues that the sharp decline in inventories from 2023 to 2024 demonstrates that there are no meaningful stockpiles of imports that would seriously undermine the effects of the orders. Jinko Prehearing Brief at 12.

⁴⁸⁶ Boviet Prehearing Brief at 11-12.

C. Analysis

1. Choice of Time Period

We first consider the appropriate period for comparison of pre-petition and post-petition levels of subject imports from Vietnam. The Commission frequently relies on six-month comparison periods for its critical circumstances analysis. However, it has relied on a shorter comparison period for both its antidumping and countervailing duty investigations when Commerce's preliminary determination applicable to the imports from the subject country fell within the six-month post-petition period the Commission typically considers.⁴⁸⁷ That situation arises here for our critical circumstances analysis of imports from Vietnam because the petition was filed on April 24, 2024, and Commerce's initial preliminary determination, which was in the countervailing duty investigation, was issued on October 4, 2024.⁴⁸⁸ We have thus determined to compare the volume of subject imports five months prior to the filing of the petition (December 2023-April 2024) with the volume of subject imports five months after the filing of the petition (May-September 2024) in our critical circumstances

⁴⁸⁷ See *Carbon and Certain Alloy Steel Wire Rod from Belarus, Russia, and the United Arab Emirates*, Inv. Nos. 731-TA-1349, 1352, and 1357 (Final), USITC Pub. 4752 at 46-47 (Jan. 2018) (regarding subject imports from Russia); *Certain Hot-Rolled Steel Flat Products from Australia, Brazil, Japan, Korea, the Netherlands, Turkey, and the United Kingdom*, Inv. Nos. 701-TA-545-547 and 731-TA-1291-1297 (Final), USITC Pub. 4638 at 49-50 (Sept. 2016) (regarding subject imports from Brazil); *Certain Corrosion-Resistance Steel Products from China, India, Italy, Korea, and Taiwan*, Inv. Nos. 701-TA-534-537 and 731-TA-1274-1278 (Final), USITC Pub. 4620 at 35-40 (July 2016) (regarding subject imports from China, Italy, and Korea); *Carbon and Certain Steel Wire Rod from China*, Inv. Nos. 701-TA-512 and 731-TA-1248 (Final), USITC Pub. 4509 at 25-26 (Jan. 2015).

The Commission is not required to examine the same periods that Commerce examined in performing the critical circumstances analysis. See *Certain Polyester Staple Fiber from China*, Inv. No. 731-TA-1104 (Final), USITC Pub. 3922 at 35 (June 2007); *Steel Concrete Reinforcing Bars from Turkey*, Inv. No. 731-TA-745 (Final), USITC Pub. 3034 at 34 (Apr. 1997).

⁴⁸⁸ CR/PR at Table 1.1. The Commission has used five-month comparison periods where the timing of the initial preliminary Commerce determination authorizing the imposition of provisional duties could have reduced subject import volume in the sixth month of the post-petition period. See, e.g., *MTD Products, Inc. v. United States*, 2023 Ct. Int'l Trade LEXIS 37, Slip Op. 2023-34 at 5-6 (Ct. Int'l Trade, March 16, 2023); *Utility Scale Wind Towers from Canada, Indonesia, Korea, and Vietnam*, Inv. Nos. 701-TA-627-629 and 731-TA-1458-1461 (Final), USITC Pub. 5101 at 49 & n.265 (Aug. 2020). That situation arises here since the preliminary determination in the countervailing duty investigation was issued on October 4, 2024, while the preliminary determination in the antidumping investigation was issued on December 4, 2024.

analysis of imports from Vietnam subject to the antidumping and countervailing duty investigations.⁴⁸⁹ No party has contested five-month comparison periods for this analysis.⁴⁹⁰

Subject imports from Vietnam subject to Commerce's affirmative critical circumstances determination in the antidumping investigations increased from *** kW in the pre-petition period to *** kW in the post-petition period, which is an increase of *** percent.⁴⁹¹ The increase in imports from Vietnam between the pre-and-post petition periods represented *** percent of total subject imports in 2024, and just *** percent of apparent domestic consumption.⁴⁹²

U.S. inventories of the relevant subject imports from Vietnam in the antidumping duty investigation were *** percent lower in September 2024, at *** kW, than in April 2024 at *** kW, indicating that there was no stockpiling of subject imports after the filing of the petitions.⁴⁹³

Subject imports from Vietnam subject to Commerce's affirmative critical circumstances determination in the countervailing duty investigations increased from *** kW in the pre-petition period to *** kW in the post-petition period, which is an increase of *** percent.⁴⁹⁴ The increase in imports from Vietnam between the pre-and-post petition periods represented *** percent of total subject imports in 2024, and just *** percent of apparent domestic consumption.⁴⁹⁵

U.S. inventories of the relevant subject imports from Vietnam in the countervailing duty investigation were *** percent lower in September 2024, at *** kW, than in April 2024 at ***

⁴⁸⁹ Because the petitions were filed on April 24, 2024, that month is included in the pre-petition period. Because Commerce's preliminary determination in the countervailing duty investigation was issued on October 4, 2024, October is not included in the post-petition period.

⁴⁹⁰ See Petitioner's Posthearing Brief, Responses to Commission Questions at 68; see also Boviet Posthearing Brief at 1; Jinko Posthearing Brief at 7.

⁴⁹¹ CR/PR at Table D.13.

⁴⁹² *Calculated from* CR/PR at Tables D.13, C.4.

⁴⁹³ CR/PR at Table D.14. From May 2024 to August 2024, import inventories were higher than in April 2024. Several U.S. producers, importers, and purchasers reported that there is a seasonal trend that solar installations tend to be higher in the spring and summer months. See CR/PR at 2.14. Furthermore, U.S. importers reported that most of their sales (78.4 percent) of CSPV products were produced to order, with lead times averaging 167.3 days. CR/PR at 2.15. This evidence suggests that at least some of the imports in those months were ordered and intended for entry into the United States prior to the filing of the petitions.

⁴⁹⁴ CR/PR at Table D.15.

⁴⁹⁵ *Calculated from* CR/PR at Tables D.15, C.4.

kW, indicating that there was no stockpiling of subject imports after the filing of the petitions.⁴⁹⁶

In light of the comparatively small increase in volumes of CSPV products imported from Vietnam in the post-petition period and the overall decline in the inventories over this period, we find that subject imports from Vietnam subject to Commerce's affirmative determinations of critical circumstances are not likely to undermine seriously the remedial effects of the antidumping or countervailing duty orders. Consequently, we make negative critical circumstances findings with respect to subject imports from Vietnam subject to Commerce's affirmative determinations of critical circumstances.

IX. Conclusion

For the reasons stated above, we determine that an industry in the United States is materially injured by reason of subject imports of CSPV cells and modules from Malaysia and Vietnam that are sold in the United States at less than fair value and subsidized by the governments of Malaysia and Thailand. We also determine that an industry in the United States is threatened with material injury by reason of imports of the subject merchandise from Cambodia and Thailand that are sold in the United States at less than fair value and subsidized by the governments of Cambodia and Thailand. Finally, we find that critical circumstances do not exist with respect to imports from Vietnam that are subject to Commerce's final affirmative critical circumstances determinations in its antidumping and countervailing duty investigations.

⁴⁹⁶ CR/PR at Table D.16. From May 2024 to August 2024, import inventories were higher than in April 2024. As stated above, the record indicates that given that solar installations tend to be higher in summer months, and the long lead times reported by U.S. importers, the record indicates that some of the imports in those months were ordered and intended for entry into the United States prior to the filing of the petitions. See CR/PR at 2.14-2.15.

Part 1: Introduction

Background

These investigations result from petitions filed with the U.S. Department of Commerce (“Commerce”) and the U.S. International Trade Commission (“USITC” or “Commission”) by the American Alliance for Solar Manufacturing Trade Committee, on April 24, 2024, alleging that an industry in the United States is materially injured and threatened with material injury by reason of subsidized and less-than-fair-value (“LTFV”) imports of crystalline silicon photovoltaic cells, whether or not assembled into modules (“CSPV cells and modules”),¹ from Cambodia, Malaysia, Thailand, and Vietnam. Table 1.1 presents information relating to the background of these investigations.^{2 3}

Table 1.1 CSPV cells and modules: Information relating to the background and schedule of this proceeding

Effective date	Action
April 24, 2024	Petitions filed with Commerce and the Commission; institution of the Commission investigations (89 FR 34268, April 30, 2024)
May 20, 2024	Commerce’s notice of initiation (89 FR 43809 and 89 FR 43816, May 20, 2024)
June 10, 2024	Commission’s preliminary determinations (89 FR 50633, June 14, 2024)
October 4, 2024	Commerce’s preliminary CVD determinations (89 FR 80866, 89 FR 80861, 89 FR 80877, and 89 FR 80874, October 4, 2024)
December 4, 2024	Commerce’s preliminary AD determinations (89 FR 96207, 89 FR 96226, 89 FR 96219, 89 FR 96214, December 4, 2024); scheduling of final phase of Commission investigations (89 FR 106578, December 30, 2024; 90 FR 1191, January 7, 2025; and 90 FR 2023, January 10, 2025)
April 15, 2025	Commission’s hearing
April 25, 2025	Commerce’s final determinations (90 FR 17392, 90 FR 17406, 90 FR 173765, 90 FR 17384, 90 FR 17395, 90 FR 17380, 90 FR 17388, and 90 FR 17399, April 25, 2025)
May 20, 2025	Commission’s vote
June 9, 2025	Commission’s views

¹ See the section entitled “The subject merchandise” in Part I of this report for a complete description of the merchandise subject in this proceeding.

² Pertinent Federal Register notices are referenced in appendix A and may be found at the Commission’s website (www.usitc.gov).

³ Appendix B is witnesses appearing at the Commission’s hearing.

Statutory criteria

Section 771(7)(B) of the Tariff Act of 1930 (the “Act”) (19 U.S.C. § 1677(7)(B)) provides that in making its determinations of injury to an industry in the United States, the Commission--

shall consider (I) the volume of imports of the subject merchandise, (II) the effect of imports of that merchandise on prices in the United States for domestic like products, and (III) the impact of imports of such merchandise on domestic producers of domestic like products, but only in the context of production operations within the United States; and. . . may consider such other economic factors as are relevant to the determination regarding whether there is material injury by reason of imports.

Section 771(7)(C) of the Act (19 U.S.C. § 1677(7)(C)) further provides that--⁴

In evaluating the volume of imports of merchandise, the Commission shall consider whether the volume of imports of the merchandise, or any increase in that volume, either in absolute terms or relative to production or consumption in the United States is significant.. . In evaluating the effect of imports of such merchandise on prices, the Commission shall consider whether. . . (I) there has been significant price underselling by the imported merchandise as compared with the price of domestic like products of the United States, and (II) the effect of imports of such merchandise otherwise depresses prices to a significant degree or prevents price increases, which otherwise would have occurred, to a significant degree.. . . In examining the impact required to be considered under subparagraph (B)(i)(III), the Commission shall evaluate (within the context of the business cycle and conditions of competition that are distinctive to the affected industry) all relevant economic factors which have a bearing on the state of the industry in the United States, including, but not limited to. . . (I) actual and potential decline in output, sales, market share, gross profits, operating profits, net profits, ability to service debt, productivity, return on investments, return on assets, and utilization of capacity, (II) factors affecting domestic prices, (III) actual and potential negative effects on cash flow, inventories, employment, wages, growth, ability to raise capital, and investment, (IV) actual and potential negative effects on the existing development and production efforts of the domestic industry, including efforts to develop a derivative or more advanced version of the domestic like product, and (V) in {an antidumping investigation}, the magnitude of the margin of dumping.

⁴ Amended by PL 114-27 (as signed, June 29, 2015), Trade Preferences Extension Act of 2015.

In addition, Section 771(7)(J) of the Act (19 U.S.C. § 1677(7)(J)) provides that—⁵

(J) EFFECT OF PROFITABILITY.—The Commission may not determine that there is no material injury or threat of material injury to an industry in the United States merely because that industry is profitable or because the performance of that industry has recently improved.

Organization of report

Part 1 of this report presents information on the subject merchandise, subsidy rates/dumping margins, and domestic like product. Part 2 of this report presents information on conditions of competition and other relevant economic factors. Part 3 presents information on the condition of the U.S. industry, including data on capacity, production, shipments, inventories, and employment. Parts 4 and 5 present the volume of subject imports and pricing of domestic and imported products, respectively. Part 6 presents information on the financial experience of U.S. producers. Part 7 presents the statutory requirements and information obtained for use in the Commission's consideration of the question of threat of material injury as well as information regarding nonsubject countries.

Market summary

CSPV cells and modules are generally used to absorb sunlight and produce electricity. The leading U.S. producer of CSPV modules is Hanwha Q Cells USA, Inc. ("Hanwha GA"). In 2024, one known firm, Suniva, Inc. ("Suniva") restarted production of CSPV cells in the United States. Leading producers of CSPV cells and modules outside the United States include Solar Long PV-Tech (Cambodia) Co., Ltd. ("Solar Long") of Cambodia; Jinko Solar Technology Sdn. Bhd. ("Jinko Tech Malaysia") and LONGi Malaysia Sdn. Bhd. ("LONGi") of Malaysia; Canadian Solar Manufacturing (Thailand) Co., Ltd. ("Canadian Solar Thailand") of Thailand; and Jinko Solar (Vietnam) Industries Company Limited ("Jinko Solar") of Vietnam.

The leading U.S. importer of CSPV cells and modules from Cambodia is BYD America LLC ("BYD"); the leading importer of CSPV cells and modules from Malaysia is Jinko Solar (U.S.) Industries Inc. ("Jinko US"); the leading importer of CSPV cells and modules from Thailand is Canadian Solar (USA) Inc. ("Canadian (USA)"); and the leading importer of CSPV cells and modules from Vietnam is JA Solar USA Inc. ("JA Solar") The leading importer of product from nonsubject countries (primarily South Korea) is Hanwha GA. U.S. purchasers of CSPV products

⁵ Amended by PL 114-27 (as signed, June 29, 2015), Trade Preferences Extension Act of 2015.

include utility companies/developers, distributors, module assemblers, residential installers, and utility installers. Leading purchasers of CSPV modules include ***, ***, ***, and ***. Only one firm, ***, reported purchases of domestic CSPV cells.

Apparent U.S. consumption of CSPV cells and modules totaled approximately *** megawatts (\$*** billion) in 2024. During 2024, one firm was known to produce CSPV cells, and sixteen firms were known to produce CSPV modules in the United States.⁶ U.S. producers' value added to CSPV cells through module assembly and production of CSPV cells was \$*** in 2024 and accounted for *** percent of apparent U.S. consumption by value. U.S. shipments of imports from subject sources totaled *** megawatts (\$*** billion) in 2024 and accounted for *** percent of apparent U.S. consumption by quantity and *** percent by value. U.S. shipments of imports from nonsubject sources totaled *** megawatts (\$*** billion) in 2024 and accounted for *** percent of apparent U.S. consumption by quantity and *** percent by value.

⁶ One additional producer, Heliene USA Inc. submitted a late U.S. producer questionnaire response, and their data is not included in the staff report.

Summary data and data sources

A summary of data collected in these investigations is presented in appendix C, tables C.1 through C.6. The Commission's questionnaires collected data for the years 2022 to 2024. Except as noted, U.S. industry data are based on questionnaire responses of one firm that accounted for all known U.S. production of CSPV cells and sixteen firms that accounted for the vast majority of U.S. production of CSPV modules during 2024. U.S. imports are based on questionnaire data.⁷

Previous and related investigations

The Commission has conducted a number of previous import relief investigations on CSPV cells and modules or similar merchandise, as presented in table 1.2.⁸

⁷ When noted, importer questionnaire data have been supplemented with proprietary, Census-edited Customs' import records which staff used to create one additional importer questionnaire for ***.

⁸ The global safeguard measure on CSPV products (TA-201-075) is in the form of (1) a TRQ on imports of CSPV cells not partially or fully assembled into other products and (2) an increase in duties on imports of CSPV modules. Crystalline Silicon Photovoltaic Cells, Whether or Not Partially or Fully Assembled Into Other Products, Monitoring Developments in the Domestic Industry, Inv. No. TA-201-075 (Second Monitoring), USITC Publication 5494, February 2024 ("Second monitoring publication"), pp. I.8 to I.10. Imports of CSPV products from Malaysia, Thailand, and Vietnam have been subject to the safeguard measure since its inception, while imports from Cambodia have not been subject to the safeguard measure, under the exception for certain developing countries that are WTO members. Id. at p. I.7 n.22.

Table 1.2**CSPV cells and modules: Previous and related Commission proceedings and current status**

Date	Number	Country	ITC original determination	Current status
2011	701-481	China	Affirmative	Order continued after second review, September 20, 2024
2011	731-1190	China	Affirmative	Order continued after second review, September 20, 2024
2013	701-TA-511	China	Affirmative	Order continued after first review, effective September 11, 2020
2013	731-TA-1246	China	Affirmative	Order continued after first review, effective September 11, 2020
2013	731-TA-1247	Taiwan	Affirmative	Order continued after first review, effective September 11, 2020
2017	TA-201-075	—	Affirmative	Safeguard measure in effect from February 7, 2018 through February 6, 2026

Source: U.S. International Trade Commission publications and Federal Register notices.

Note: “Date” refers to the year in which the investigation was instituted by the Commission.

Note: Investigations 701-TA-481 and 731-TA-1190 do not include U.S. imports of CSPV modules assembled in China from CSPV cells made in a country other than China. Investigations 701-TA-511 and 731-TA-1246-1247 include U.S. imports of the following: (1) CSPV modules assembled in China from CSPV cells made in Taiwan and (2) CSPV modules assembled in China from CSPV cells made in third countries. Commerce defined the subject merchandise from Taiwan to include U.S. imports of: (1) CSPV cells made in Taiwan; (2) CSPV modules assembled in Taiwan from CSPV cells made in Taiwan; and (3) CSPV modules assembled in third countries other than China from CSPV cells made in Taiwan.

Therefore, the module assembly location determined the country of origin for U.S. imports of modules from China, except for modules covered by the prior CSPV 1 orders (which were considered nonsubject merchandise from China in the CSPV 2 investigations); the cell manufacture location determined the country of origin for U.S. imports of cells and modules from Taiwan. 79 FR 76962 and 76970, December 23, 2014.

Nature and extent of subsidies and sales at LTFV

Subsidies

On April 25, 2025, Commerce published a notice in the Federal Register of its final determinations of countervailable subsidies for producers and exporters of CSPV cells and modules from Cambodia, Malaysia, Thailand, and Vietnam.⁹ Tables 1.3 through 1.6 present Commerce's findings of subsidization of CSPV cells and modules in Cambodia, Malaysia, Thailand, and Vietnam, respectively.

Table 1.3 CSPV cells and modules: Commerce's final subsidy determination with respect to imports from Cambodia

Entity	Final countervailable subsidy rate (percent)
Solarspace New Energy (Cambodia) Co., Ltd	534.67
Jintek Photovoltaic Technology Co., Ltd	3403.96
Hounen Solar Inc Co., Ltd	3403.96
ISC Cambodia	3403.96
Solar Long PV-Tech (Cambodia) Co., Ltd	3403.96
All others	534.67

Source: 90 FR 17406, April 25, 2025.

Note: For further information on programs determined to be countervailable, see Commerce's associated Issues and Decision Memorandum. Subsidy rates for Jintek Photovoltaic Technology Co., Ltd, Hounen Solar Inc Co., Ltd, ISC Cambodia, and Solar Long PV-Tech (Cambodia) Co., Ltd are based on facts available with adverse inferences.

⁹ 90 FR 17406, 90 FR 17380, 90 FR 17399, and 90 FR 17399, April 25, 2025.

Table 1.4 CSPV cells and modules: Commerce’s final subsidy determination with respect to imports from Malaysia

Entity	Final countervailable subsidy rate (percent)
Hanwha Q CELLS Malaysia Sdn. Bhd	14.64
Jinko Solar Technology Sdn Bhd and its cross-owned companies: Jinko Solar (Malaysia) Sdn. Bhd. and Omega Solar Sdn. Bhd	38.38
Baojia New Energy	168.80
Pax Union Resources SDN BHD	168.80
SunMax Energy SDN BHD	168.80
All others	32.49

Source: 90 FR 17384, April 25, 2025.

Note: For further information on programs determined to be countervailable, see Commerce’s associated Issues and Decision Memorandum. Subsidy rates for Baojia New Energy, Pax Union Resources SDN BHD, and SunMax Energy SDN BHD Cambodia are based on facts available with adverse inferences.

Table 1.5 CSPV cells and modules: Commerce’s final subsidy determination with respect to imports from Thailand

Entity	Final countervailable subsidy rate (percent)
Trina Solar Science & Technology (Thailand) Ltd	263.74
Sunshine Electrical Energy	799.55
Taihua New Energy (Thailand) Co. Ltd	799.55
All others	263.74

Source: 90 FR 17380, April 25, 2025.

Note: For further information on programs determined to be countervailable, see Commerce’s associated Issues and Decision Memorandum. Subsidy rates for Sunshine Electrical Energy and Taihua New Energy (Thailand) Co. Ltd are based on facts available with adverse inferences.

Table 1.6 CSPV cells and modules: Commerce’s final subsidy determination with respect to imports from Vietnam

Entity	Final countervailable subsidy rate (percent)
Boviet Solar Technology Co., Ltd	230.66
JA Solar Vietnam Company Limited; JA Solar PV Vietnam Company Limited; JA Solar NE Vietnam Company Limited	68.15
GEP New Energy Viet Nam Company Limited	542.64
Vietnam Green Energy Commercial Services Company Ltd	542.64
Shengtian New Energy Vina Co., Ltd	542.64
HT Solar Vietnam Limited Company	542.64
All others	124.57

Source: 90 FR 17399, April 25, 2025.

Note: For further information on programs determined to be countervailable, see Commerce’s associated Issues and Decision Memorandum. Subsidy rates for GEP New Energy Viet Nam Company Limited, Vietnam Green Energy Commercial Services Company Ltd, Shengtian New Energy Vina Co., Ltd, and HT Solar Vietnam Limited Company are based on facts available with adverse inferences.

Sales at LTFV

On April 25, 2025, Commerce published a notice in the Federal Register of its final determinations of sales at LTFV with respect to imports from Cambodia, Malaysia, Thailand, and Vietnam.¹⁰ Tables 1.7 through 1.10 present Commerce’s dumping margins with respect to imports of CSPV cells and modules from Cambodia, Malaysia, Thailand, and Vietnam, respectively.

Table 1.7 CSPV cells and modules: Commerce’s final weighted-average LTFV margins with respect to imports from Cambodia

Exporter or producer	Final dumping margin (percent)	Cash deposit rate (adjusted for subsidy offset(s)) (percent)
Hounen Solar Inc. Co. Ltd	125.37	117.18
Solar Long PV Tech Cambodia Co	125.37	117.18
All others	125.37	117.18

Source: 90 FR 17392, April 25, 2025.

Note: The dumping margins for Hounen Solar Inc. Co. Ltd and Solar Long PV Tech Cambodia Co are based on adverse facts available.

¹⁰ 90 FR 17392, 90 FR 17376, 90 FR 17395, and 90 FR 17388, April 25, 2025.

Table 1.8 CSPV cells and modules: Commerce’s final weighted-average LTFV margins with respect to imports from Malaysia

Exporter or producer	Final dumping margin (percent)	Cash deposit rate (adjusted for subsidy offset(s)) (percent)
Hanwha Q Cells Malaysia Sdn. Bhd	0.00	0.00
Jinko Solar Technology Sdn. Bhd	8.59	1.92
Baojia New Energy Manufacturing Sdn	81.24	81.24
CRC Solar Cell Joint Stock Company	81.24	81.24
Lynter Enterprise	81.24	81.24
Mega PP Sdn. Bhd	81.24	81.24
All others	8.59	1.92

Source: 90 FR 17376, April 25, 2025.

Note: The dumping margins for Baoji New Energy Manufacturing Sdn, CRC Solar Cell Joint Stock Company, Lynter Enterprise, and Mega PP Sdn. Bhd are based on adverse facts available.

Table 1.9 CSPV cells and modules: Commerce’s final weighted-average LTFV margins with respect to imports from Thailand

Exporter or producer	Final dumping margin (percent)	Cash deposit rate (adjusted for subsidy offset(s)) (percent)
Trina Solar Science & Technology (Thailand) Ltd	111.45	111.45
Sunshine Electrical Energy	202.90	172.68
Taihua New Energy (Thailand) Co. Ltd	202.90	172.68
All others	111.45	111.45

Source: 90 FR 17395, April 25, 2025.

Note: The dumping margins for Sunshine Electrical Energy and Taihua New Energy (Thailand) Co. Ltd are based on adverse facts available.

Table 1.10 CSPV cells and modules: Commerce’s final weighted-average LTFV margins with respect to imports from Vietnam

Producer	Exporter	Final dumping margin (percent)	Cash deposit rate (adjusted for subsidy offset(s)) (percent)
JA Solar Vietnam Co. Ltd./JA Solar PV	JA Solar Vietnam Co. Ltd	58.07	52.54
Jinko Solar (Vietnam) Industries Company Limited.	Jinko Solar (Vietnam) Industries Company Limited	125.91	120.38
Blue Moon Vina Co	Blue Moon Vina Co	82.65	77.12
Boviet Solar Technology Co., Ltd	Boviet Solar Technology Co., Ltd	82.65	77.12
Elite Solar Technology (Vietnam) Company Limited.	Elite SNG	82.65	77.12
Letsolar Vietnam Company Limited	Letsolar Vietnam Company Limited	82.65	77.12
Mecen Solar Vina Co., Ltd	Mecen Solar Vina Co., Ltd	82.65	77.12
Nexuns Vietnam Company Limited	Nexuns Vietnam Company Limited	82.65	77.12
Trina Solar Energy Development Company Ltd	Trina Solar Energy Development Company Ltd	82.65	77.12
Vietnergy Co., Ltd. and Tainergy Tech Co., Ltd. (collectively, Vietnergy)	Vietnergy Co., Ltd. and Tainergy Tech Co., Ltd. (collectively, Vietnergy)	82.65	77.12
Vietnam Sunergy Joint Stock Company (f.k.a. Vietnam Sunergy Company Limited)	Vietnam Sunergy Joint Stock Company (f.k.a. Vietnam Sunergy Company Limited)	82.65	77.12
All others	All others	271.28	271.28

Source: 90 FR 17388, April 25, 2025.

Note: The dumping margins for all others is based on adverse facts available.

The subject merchandise

Commerce's scope

In the current proceeding, Commerce has defined the scope as follows:¹¹

The merchandise covered by this proceeding Commerce has defined the subject merchandise as crystalline silicon photovoltaic cells, and modules, laminates, and panels, consisting of crystalline silicon photovoltaic cells, whether or not partially or fully assembled into other products, including, but not limited to, modules, laminates, panels and building integrated materials.

These investigations cover crystalline silicon photovoltaic cells of thickness equal to or greater than 20 micrometers, having a p/n junction formed by any means, whether or not the cell has undergone other processing, including, but not limited to, cleaning, etching, coating, and/or addition of materials (including, but not limited to, metallization and conductor patterns) to collect and forward the electricity that is generated by the cell.

Merchandise under consideration may be described at the time of importation as parts for final finished products that are assembled after importation, including, but not limited to, modules, laminates, panels, building integrated modules, building-integrated panels, or other finished goods kits. Such parts that otherwise meet the definition of merchandise under consideration are included in the scope of the investigations.

Excluded from the scope of the investigations are thin film photovoltaic products produced from amorphous silicon (a-Si), cadmium telluride (CdTe), or copper indium gallium selenide (CIGS). Also excluded from the scope of the investigations are crystalline silicon photovoltaic cells, not exceeding 10,000 mm² in surface area, that are permanently integrated into a consumer good whose function is other than power generation and that consumes the electricity generated by the integrated crystalline silicon photovoltaic cell. Where more than one cell is permanently integrated into a consumer good, the surface area for purposes of this exclusion shall be the total combined surface area of all cells that are integrated into the consumer good.

Additionally, excluded from the scope of the investigations are panels with surface area from 3,450 mm² to 33,782 mm² with one black wire and

¹¹ 89 FR 96229, December 4, 2024.

one red wire (each of type 22 AWG or 24 AWG not more than 206 mm in length when measured from panel extrusion), and not exceeding 2.9 volts, 1.1 amps, and 3.19 watts. For the purposes of this exclusion, no panel shall contain an internal battery or external computer peripheral ports.

Also excluded from the scope of the investigations are:

1. Off grid CSPV panels in rigid form with a glass cover, with the following characteristics: (A) a total power output of 100 watts or less per panel; (B) a maximum surface area of 8,000 cm² per panel; (C) do not include a built-in inverter; (D) must include a permanently connected wire that terminates in either an 8 mm male barrel connector, or a two-port rectangular connector with two pins in square housings of different colors; (E) must include visible parallel grid collector metallic wire lines every 1–4 millimeters across each solar cell; and (F) must be in individual retail packaging (for purposes of this provision, retail packaging typically includes graphics, the product name, its description and/or features, and foam for transport); and

2. Off grid CSPV panels without a glass cover, with the following characteristics: (A) a total power output of 100 watts or less per panel; (B) a maximum surface area of 8,000 cm² per panel; (C) do not include a built-in inverter; (D) must include visible parallel grid collector metallic wire lines every 1–4 millimeters across each solar cell; and (E) each panel is (1) permanently integrated into a consumer good; (2) encased in a laminated material without stitching, or (3) has all of the following characteristics: (i) the panel is encased in sewn fabric with visible stitching, (ii) includes a mesh zippered storage pocket, and (iii) includes a permanently attached wire that terminates in a female USB–A connector.

In addition, the following CSPV panels are excluded from the scope of the investigations: off-grid CSPV panels in rigid form with a glass cover, with each of the following physical characteristics, whether or not assembled into a fully completed off-grid hydropanel whose function is conversion of water vapor into liquid water: (A) a total power output of no more than 80 watts per panel; (B) a surface area of less than 5,000 square centimeters (cm²) per panel; (C) do not include a built-in inverter; (D) do not have a frame around the edges of the panel; (E) include a clear glass back panel; and (F) must include a permanently connected wire that terminates in a two port rectangular connector.

Additionally excluded from the scope of these investigations are off-grid small portable crystalline silicon photovoltaic panels, with or without a glass cover, with the following characteristics: (1) a total power output of 200 watts or less per panel; (2) a maximum surface area of 16,000 cm²

per panel; (3) no built-in inverter; (4) an integrated handle or a handle attached to the package for ease of carry; (5) one or more integrated kickstands for easy installation or angle adjustment; and (6) a wire of not less than 3 meters either permanently connected or attached to the package that terminates in an 8 mm diameter male barrel connector.

Also excluded from the scope of these investigations are off-grid crystalline silicon photovoltaic panels in rigid form with a glass cover, with each of the following physical characteristics, whether or not assembled into a fully completed off-grid hydropanel whose function is conversion of water vapor into liquid water: (A) a total power output of no more than 180 watts per panel at 155 degrees Celsius; (B) a surface area of less than 16,000 square centimeters (cm²) per panel; (C) include a keep-out area of approximately 1,200 cm² around the edges of the panel that does not contain solar cells; (D) do not include a built-in inverter; (E) do not have a frame around the edges of the panel; (F) include a clear glass back panel; (G) must include a permanently connected wire that terminates in a two-port rounded rectangular, sealed connector; (H) include a thermistor installed into the permanently connected wire before the twoport connector; and (I) include exposed positive and negative terminals at opposite ends of the panel, not enclosed in a junction box.

Further excluded from the scope of the investigations are:

1. Off grid rigid CSPV panels with a glass cover, with the following characteristics: (A) a total power output of 200 watts or less per panel, (B) a maximum surface area of 10,500 cm² per panel, (C) do not include a built-in inverter, (D) must include a permanently connected wire that terminates in waterproof connector with a cylindrical positive electrode and a rectangular negative electrode with the positive and negative electrodes having an interlocking structure, (E) must include visible parallel grid collector metallic wire lines every 1–4 millimeters across each solar cell, and (F) must be in individual retail packaging (for purposes of this provision, retail packaging typically includes graphics, the product name, its description and/or features); and

2. Off-grid small portable crystalline silicon photovoltaic panels, with or without a glass cover, with the following characteristics: (A) a total power output of 200 watts or less per panel, (B) a maximum surface area of 16,000 cm² per panel, (C) no built-in inverter, (D) an integrated handle or a handle attached to the package for ease of carry, (E) one or more integrated kickstands for easy installation or angle adjustment, and (F) a wire either permanently connected or attached to the package terminates

in waterproof connector with a cylindrical positive electrode and a rectangular negative electrode with the positive and negative electrodes having an interlocking structure.

Also excluded from the scope of the investigations are:

1. Off grid rigid CSPV panels with a glass cover, with the following characteristics: (A) a total power output of 200 watts or less per panel, (B) a maximum surface area of 10,500 cm² per panel, (C) do not include a built-in inverter, (D) must include a permanently connected wire that terminates in waterproof connector with a cylindrical positive electrode and a rectangular negative electrode with the positive and negative electrodes having an interlocking structure, (E) must include visible parallel grid collector metallic wire lines every 1–4 millimeters across each solar cell, and (F) must be in individual retail packaging (for purposes of this provision, retail packaging typically includes graphics, the product name, its description and/or features); and

2. Small off-grid panels with glass cover, with the following characteristics: (A) surface area from 3,450 mm² to 33,782 mm², (B) with one black wire and one red wire (each of type 22AWG or 28 AWG not more than 350 mm in length when measured from panel extrusion), (C) not exceeding 10 volts, (D) not exceeding 1.1 amps, (E) not exceeding 6 watts, and (F) for the purposes of this exclusion, no panel shall contain an internal battery or external computer peripheral ports.

Additionally excluded from the scope of the investigations are:

1. Off grid rigid CSPV panels with a glass cover, with the following characteristics: (A) a total power output of 175 watts or less per panel, (B) a maximum surface area of 9,000 cm² per panel, (C) do not include a built-in inverter, (D) must include a permanently connected wire that terminates in waterproof connector with a cylindrical positive electrode and a rectangular negative electrode with the positive and negative electrodes having an interlocking structure; (E) must include visible parallel grid collector metallic wire lines every 1–4 millimeters across each solar cell, and (F) must be in individual retail packaging (for purposes of this provision, retail packaging typically includes graphics, the product name, its description and/or features); and

2. Off grid CSPV panels without a glass cover, with the following characteristics, (A) a total power output of 220 watts or less per panel, (B) a maximum surface area of 16,000 cm² per panel, (C) do not include a built-in inverter, (D) must include visible parallel grid collector metallic

wire lines every 1–4 millimeters across each solar cell, and (E) each panel is encased in a laminated material without stitching.

Also excluded from the scope of these investigations are off-grid CSPV panels in rigid form, with or without a glass cover, permanently attached to an aluminum extrusion that is an integral component of an automation device that controls natural light, whether or not assembled into a fully completed automation device that controls natural light, with the following characteristics:

- 1. a total power output of 20 watts or less per panel;*
- 2. a maximum surface area of 1,000 cm² per panel;*
- 3. does not include a built-in inverter for powering third party devices.*

Modules, laminates, and panels produced in a third-country from cells produced in a subject country are covered by the investigations; however, modules, laminates, and panels produced in a subject country from cells produced in a third-country are not covered by the investigations.

Also excluded from the scope of these investigations are all products covered by the scope of the antidumping and countervailing duty orders on Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules, from the People's Republic of China: Amended Final Determination of Sales at Less Than Fair Value, and Antidumping Duty Order, 77 FR 73018 (December 7, 2012); and Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules, from the People's Republic of China: Countervailing Duty Order, 77 FR 73017 (December 7, 2012).

Tariff treatment

Based upon the scope set forth by Commerce, information available to the Commission indicates that the merchandise subject to these investigations are imported under statistical reporting numbers 8541.42.0010 (“crystalline silicon photovoltaic cells not assembled in modules or made up into panels”) and 8541.43.0010 (“crystalline silicon photovoltaic cells assembled in modules or made up into panels”) of the Harmonized Tariff Schedule of the

United States (“HTS”).¹² ¹³ The 2025 general rate of duty is free for HTS subheadings 8541.42.00 and 8541.43.00. These articles may also be imported as parts or subassemblies of goods provided for in HTS subheadings 8507.71, 8501.72, 8501.80, and 8507.20.80.¹⁴ Decisions on the tariff classification and treatment of imported goods are within the authority of U.S. Customs and Border Protection.

As previously discussed, the United States imposed a global safeguard measure on CSPV products, effective February 7, 2018, in the form of a tariff-rate quota (TRQ) on imports of CSPV cells not partially or fully assembled into other products and an increase in duties on imports of CSPV modules.¹⁵ The safeguard measure was extended and remains in effect through February 6, 2026.¹⁶ Imports from nonexempt countries of CSPV cells not partially or fully assembled into other products in excess of the TRQ enter under HTS subheading 9903.45.22 and are subject to duty rates that vary based on the entry period.¹⁷ Imports from nonexempt countries of CSPV modules enter under HTS subheading 9903.45.25 and are subject to duty rates that vary based

¹² For the purposes of HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010, the term “crystalline silicon photovoltaic cells” means crystalline silicon photovoltaic cells of a thickness equal to or greater than 20 micrometers, having a p/n junction (or variant thereof) formed by any means, whether or not the cell imported under HTS statistical reporting number 8541.42.0010 (or subassemblies thereof imported under HTS statistical reporting number 8541.43.0010) has undergone other processing, including, but not limited to, cleaning, etching, coating, and/or addition of materials (including, but not limited to, metallization and conductor patterns) to collect and forward the electricity that is generated by the cell. Such cells include photovoltaic cells that contain crystalline silicon in addition to other photovoltaic materials. This includes, but is not limited to, passivated emitter rear contact cells, heterojunction with intrinsic thin-layer cells, and other so-called hybrid cells. USITC, *Harmonized Tariff Schedule (2025) Revision 1*, January 2025.

¹³ HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 were established effective January 27, 2022. Prior to this, CSPV cells and modules were imported under HTS statistical reporting numbers 8541.40.6015 and 8541.40.6025. USITC, *Harmonized Tariff Schedule (2022) Basic Edition*, January 2022; USITC, *Harmonized Tariff Schedule (2025) Revision 1*, January 2025.

¹⁴ The subject cells may be presented as integral elements of subassemblies of components or of goods of these headings and subheadings, even if not treated as “parts” for tariff purposes.

¹⁵ 83 FR 3541, January 25, 2018.

¹⁶ 87 FR 7357, February 9, 2022.

¹⁷ Duty rates for imports from nonexempt countries of CSPV cells not partially or fully assembled into other products in excess of the TRQ are 14.75 percent ad valorem from February 7, 2022, through February 6, 2023; 14.50 percent ad valorem from February 7, 2023, through February 6, 2024; 14.25 percent ad valorem from February 7, 2024, through February 6, 2025; and 14.00 percent ad valorem from February 7, 2025, through February 6, 2026. U.S. Customs and Border Protection, “QB 25-507 2025 Solar Cells and Modules,” January 27, 2025, <https://www.cbp.gov/trade/quota/bulletins/qb-25-507-2025>.

on the entry period.¹⁸ Imports of CSPV products from Malaysia, Thailand, and Vietnam have been subject to the safeguard measure since its imposition, while imports from Cambodia have not been subject to the safeguard measure, under the exception for certain developing countries that are WTO members.¹⁹ While imports of bifacial panels were excluded from the safeguard measure when it was extended in February 2022, Presidential Proclamation 10779 of June 21, 2024 revoked that exclusion, and provided that imports of bifacial panels would be subject to the safeguard measure.²⁰

Effective August 23, 2018, CSPV cells and modules originating in China are subject to an additional 25 percent ad valorem duty under section 301 of the Trade Act of 1974.²¹ Effective September 27, 2024, following a four-year review of actions taken in the section 301 investigation of China's acts, policies, and practices related to technology transfer, intellectual property, and innovation, duty rates for CSPV cells and modules originating in China were increased to 50 percent ad valorem.²²

On April 1, 2022, Commerce initiated an inquiry into whether Chinese-manufactured CSPV cells and modules circumvented U.S. antidumping and countervailing duty orders.²³ The inquiry was initiated in response to a petition filed by Auxin Solar alleging that CSPV cells and modules imported from Cambodia, Malaysia, Thailand, and Vietnam used CSPV cells and other inputs from China to avoid existing antidumping and countervailing duty orders. On August 23, 2023, Commerce issued its final determination in the circumvention inquiries, finding that CSPV cells and modules exported from, and produced in, Cambodia, Malaysia, Thailand, and Vietnam by certain producers were circumventing the orders. Commerce also made country-wide

¹⁸ Duty rates for imports from nonexempt countries of CSPV modules are 14.75 percent ad valorem from February 7, 2022, through February 6, 2023; 14.50 percent ad valorem from February 7, 2023, through February 6, 2024; 14.25 percent ad valorem from February 7, 2024, through February 6, 2025; and 14.00 percent ad valorem from February 7, 2025, through February 6, 2026. U.S. Customs and Border Protection, "QB 25-507 2025 Solar Cells and Modules," January 27, 2025, <https://www.cbp.gov/trade/quota/bulletins/qb-25-507-2025>.

¹⁹ For a full list of countries exempt from the safeguard measure, see U.S. Customs and Border Protection, "QB 25-507 2025 Solar Cells and Modules," January 27, 2025, <https://www.cbp.gov/trade/quota/bulletins/qb-25-507-2025>.

²⁰ 89 FR 53333, June 26, 2024.

²¹ 83 FR 40823, August 16, 2018. See also HTS subheading 9903.88.02 and U.S. notes 20(c) and 20(d) to subchapter III of chapter 99 and related tariff provisions for this duty treatment. USITC, *Harmonized Tariff Schedule (2024) Revision 1*, U.S. Notes, pp. 99-III-24–99-III-26, 99-III-301, January 2024.

²² 89 FR 76581, September 18, 2024. Effective January 1, 2025, duty rates for wafers and polysilicon originating in China increased from 25 percent to 50 percent ad valorem. 89 FR 101682, December 16, 2024. See also HTS subheading 9903.91.02 and U.S. notes 31(c) to subchapter III of chapter 99 and related tariff provisions for this duty treatment.

²³ 87 FR 19071, April 1, 2022.

circumvention findings with respect to all four countries.²⁴ However, pursuant to the Presidential Proclamation on June 6, 2022, duties were not collected on imports of CSPV cells and modules from these four countries subject to Commerce’s final determination where appropriate certifications were filed with Customs and those imports were used in the United States no later than 180 days after June 6, 2024, the Proclamation’s termination date.²⁵

Effective April 5, 2025, CSPV cells and modules originating in Cambodia, Malaysia, Thailand, and Vietnam were subject to an additional 10 percent ad valorem reciprocal duty under the International Emergency Economic Powers Act (IEEPA). Effective April 9, 2025, the following individualized country reciprocal duty rates were assigned: Cambodia, 49 percent; Malaysia, 24 percent; Thailand, 36 percent; and Vietnam, 46 percent. However, effective April 10, 2025, individualized country reciprocal duties were suspended and the reciprocal duty rate for CSPV cells and modules originating in Cambodia, Malaysia, Thailand, and Vietnam was returned to 10 percent.²⁶

²⁴ 88 FR 57419, August 23, 2023.

²⁵ The notice provided for “Appendix V” certificates to be used for specific entries by the three firms that Commerce had determined were not circumventing the orders, and for “Appendix VI” certificates to be used by other firms to show that specific entries met certain “component content requirements” and were thus not circumventing the orders. Commerce provided that firms that had not cooperated in its investigation were not eligible to use Appendix V or VI certifications, providing a list of such companies, including New East Solar Energy (Cambodia) Co., in Appendix II to the notice. The notice also provided for “Appendix IV” certifications that importers or exporters could use to certify that their merchandise were “applicable entries” in compliance with the terms of the Presidential Proclamation. 87 FR 56868, September 16, 2022; 88 FR 57419, August 23, 2023.

²⁶ Individualized country reciprocal duties for all countries other than China were suspended until July 9, 2025. 90 FR 15041, April 7, 2025. 90 FR 15625, April 15, 2025. See also HTS subheadings 9903.01.25, 9903.01.53, 9903.01.65, 9903.01.72, and 9903.01.75 and U.S. note 2(v) to subchapter III of chapter 99 and related tariff provisions for this duty treatment. USITC, HTS (2025) Revision 8, Publication 5613, April 2025, pp. 99.3.1, 99.3.278.

The product

Description and applications²⁷

CSPV cells are the essential element in CSPV modules (also commonly referred to as panels), which in turn are the main components of CSPV systems. Solar CSPV systems convert sunlight into electricity for on-site use or for distribution through the electric grid.

CSPV cells

CSPV cells use crystalline silicon to convert sunlight to electricity and are the basic elements of a CSPV module. CSPV cells may be fully square or may have slightly rounded corners (figure 1.1).

²⁷ Unless otherwise noted, information in this section is based on Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules from Cambodia, Malaysia, Thailand, and Vietnam, Inv. Nos. 701-TA-722-725 and 731-TA-1690-1693 (Preliminary), USITC Publication 5517, June 2024, pp. I-13-I-23.

Figure 1.1 CSPV cells and modules: CSPV cells



Source: International Energy Agency website, <https://www.iea.org/reports/solar-pv-global-supply-chains>, accessed February 10, 2025.

Common sizes of CSPV cells, as measured by the side length of the cell, and the type of wafer used in producing cells of that size are shown in figure 1.2.

Figure 1.2 CSPV cells and modules: Examples of wafer sizes used in monocrystalline cell production

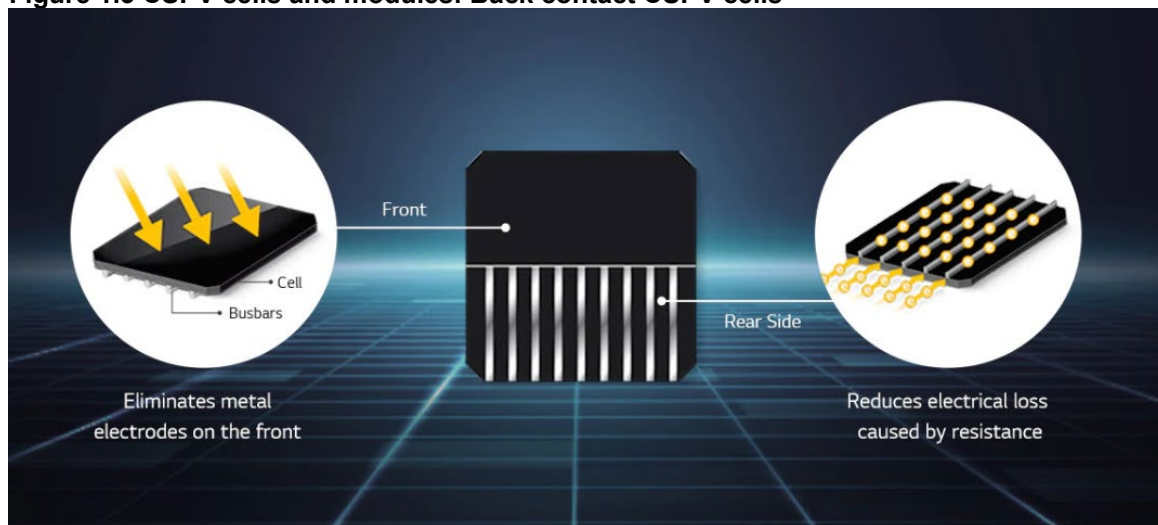
Wafer Size Comparison M0 - M12



Source: Novergy, "Significance of increasing size of mono-crystalline wafers in modules," September 28, 2020, <https://www.novergysolar.com/significance-increasing-size-mono-crystalline-wafers-modules/>.

CSPV cells have a positive layer, a negative layer, and a positive-negative junction (p/n junction). Electricity is generated when sunlight strikes the CSPV cell, knocking electrons loose that flow onto thin metal “fingers” that run across the CSPV cell and conduct electricity to the busbars.²⁸ The number of busbars in cells varies, and has increased over time as more busbars improve efficiency and power output. Further, some cells contain no busbars, which can provide benefits such as reducing electrical losses and increasing the surface area of the CSPV cell that can absorb sunlight. Alternatively, some cells have metal contacts on the rear side of the CSPV cell, creating back (or rear contact) cells (including interdigitated back contact (IBC) cells) (figure 1.3). This provides several advantages such as reduced shading, improved cell interconnection, and better aesthetics.

Figure 1.3 CSPV cells and modules: Back contact CSPV cells

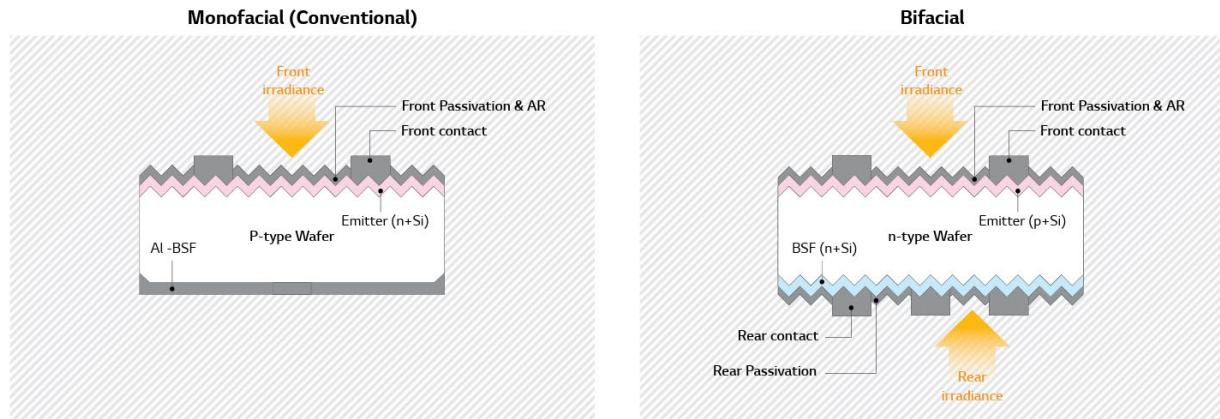


Source: Solar Analytica, “Report: LG Neon R,” May 6, 2023, <https://solaranalytica.com/lg-neon-r-report/>.

CSPV cells can be monofacial or bifacial. Whereas monofacial CSPV cells have a metalized back layer, bifacial CSPV cells have a cell structure on the backside that allows it to convert light that hits both the front and back of the CSPV cell (figure 1.4). Different bifacial CSPV cell technologies, each with unique cell structures, have differing levels of bifaciality and efficiency. Bifaciality is the by-product of the cell technology, such as Passive Emitter Rear Contact (“PERC”) or heterojunction technologies, discussed later in this section.

²⁸ Electricity is carried from the thin metal strips on solar cells to wider metal strips known as busbars. These busbars are interconnected during the manufacturing process so that electricity is carried from the cell to the junction box.

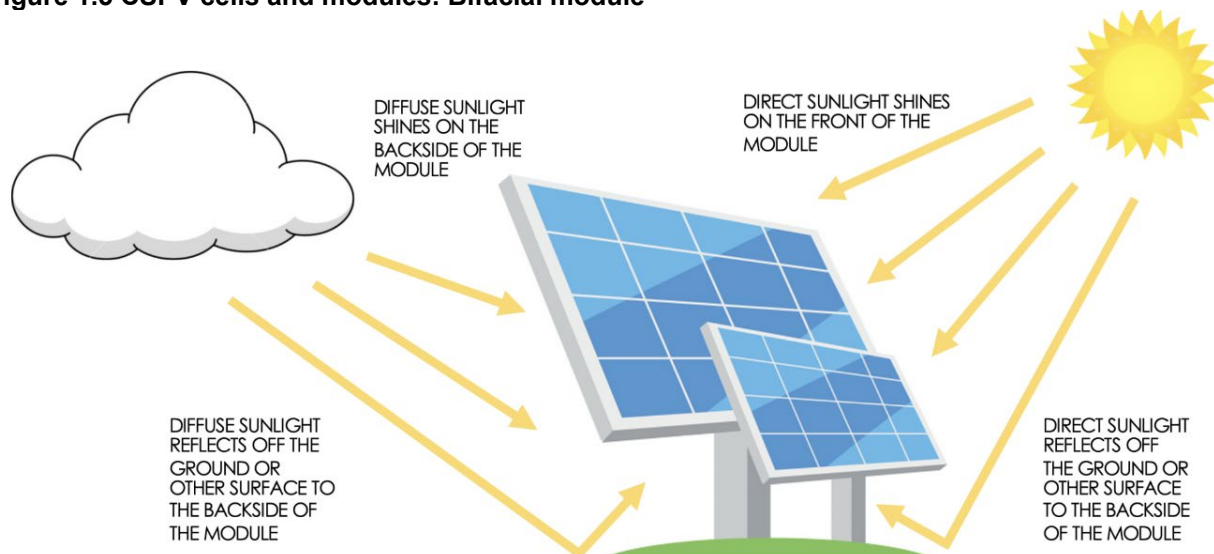
Figure 1.4 CSPV cells and modules: Monofacial and bifacial cell design



Source: LG Electronics Inc., “Bifacial Design Guide,” 2017,
https://www.lg.com/global/business/download/resources/solar/Bifacial_design_guide_Full_ver.pdf.

When assembled into bifacial CSPV modules, the efficiency of CSPV bifacial cells and those with bifaciality characteristics is fully realized when encapsulated in a front and rear glass structure, or a front glass and a rear transparent back sheet layer to allow reflected sunlight on the rear of the CSPV cell (figure 1.5).

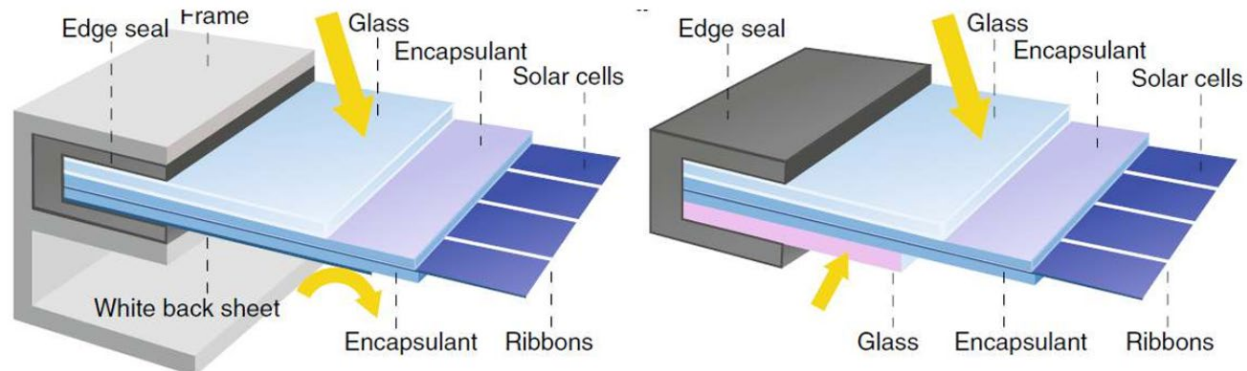
Figure 1.5 CSPV cells and modules: Bifacial module



Source: Kinect Solar, “Everything you need to know about bifacial modules,” November 5, 2020,
<https://kinectsolar.com/everything-you-need-to-know-about-bifacial-modules/>.

Figure 1.6 shows a monofacial module on the left with a traditional opaque back sheet, and a bifacial module on the right with a glass layer that allows light through the back side of the cell. The bifacial module's ability to absorb both direct and ground-reflected irradiance has several advantages over monofacial modules, including an increase in energy yield.

Figure 1.6 CSPV cells and modules: Assembly of monofacial module (left) and bifacial module (right)

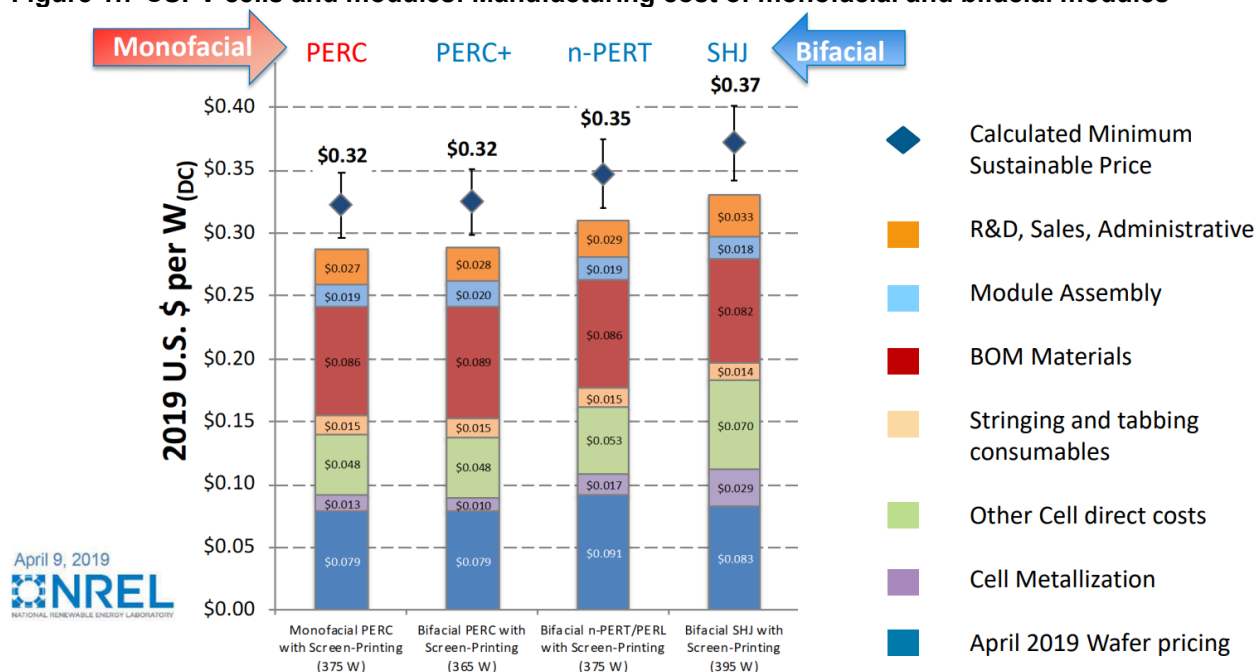


Source: IEA, Bifacial Photovoltaic Modules and Systems: Experience and Results from International Research and Pilot Applications, 2021, p. 28, https://iea-pvps.org/wp-content/uploads/2021/04/IEA-PVPS-T13-14_2021-Bifacial-Photovoltaic-Modules-and-Systems-report.pdf.

Monofacial and bifacial modules have moved closer to cost parity in recent years (figure 1.7), and manufacturers who have switched from assembling monofacial modules to bifacial modules have had to make a few adjustments to their production lines, such as replacing the traditional back sheet with glass and sourcing bifacial cells.²⁹

²⁹ While NREL does not have data more recent than 2019, domestic producers of CSPV products reported that monofacial and bifacial modules have reached cost parity since then. Domestic producers of CSPV products also reported that bifacial cells are as easy and as cheap to produce as monofacial cells such that it doesn't make sense economically to change over a production line from one to the other. Instead, producers use bifacial cells in a lot of cases for a monofacial module product, knowing that there's some capability being wasted by covering the back of the module with aluminum instead of glass, but forgoing the extra expense of making a different production line of monofacial cells. Conference transcript, pp. 122-123 (Martens), pp. 233-234 (Wagner).

Figure 1.7 CSPV cells and modules: Manufacturing cost of monofacial and bifacial modules



Source: NREL, Bifacial PV System Performance: Separating Fact from Fiction, 2019, p. 6, <https://www.nrel.gov/docs/fy19osti/74090.pdf>.

The two main types of CSPV cells are monocrystalline and multicrystalline (or polycrystalline) silicon, though there are various subtypes within these two categories, as discussed below. Monocrystalline cells are made from a single grown crystal and tend to convert sunlight into electricity more efficiently. Multicrystalline cells have a random crystal structure and tend to have a lower conversion efficiency, though there are a range of conversion efficiencies for monocrystalline and multicrystalline CSPV modules.³⁰

³⁰ Conversion efficiency is the percent of sunlight that is converted to electricity.

Monocrystalline and multicrystalline cells commonly use PERC and related technologies.³¹ PERC cells incorporate an additional rear dielectric layer that reflects light that did not generate electricity as it initially passed through the CSPV cell back into the CSPV cell. There is, therefore, another opportunity for the CSPV cell to absorb this light. PERC cells have a higher efficiency and improved performance in certain conditions, such as low light and high heat conditions.

Monocrystalline cells can be either p-type or n-type. In the production of p-type of monocrystalline CSPV wafers, the silicon is doped with boron or gallium to create a positive electrical orientation. In the production of n-type mono wafers, the silicon is doped with phosphorous to create a negative electrical orientation. In the CSPV cell production process, a positive layer is added to create the p/n junction.

N-type CSPV cells can be more expensive to produce, but have a number of benefits, such as higher conversion efficiencies and no light-induced degradation. Heterojunction n-type CSPV cells (including heterojunction with intrinsic thin layer (HIT)) add thin layers of photosensitive semiconductor materials (such as amorphous silicon) on top of an n-type monocrystalline wafer. These additional layers increase the absorption of sunlight and the overall efficiencies of the CSPV cells, as well as improve performance in hot climates. Tunnel Oxide Passivated Contacts (“TOPCon”) is another technology used for n-type cells. TOPCon cells are created by “depositing a nanometer scale layer of silicon oxide, followed by a thicker polycrystalline silicon layer, between the silicon wafer and metal contacts. The layers reduce charge recombination between the wafer and the contacts, increasing carrier lifetime and resulting in a conversion efficiency boost.”

CSPV laminates

CSPV laminates consist of CSPV cells that are connected, encapsulated (most commonly in an ethyl vinyl acetate (“EVA”) film), and covered with a glass front layer and a back sheet or rear glass. The back sheet is most commonly a plastic film composite, though glass is also used in some applications such as bifacial CSPV modules. CSPV laminates can use full cells or cells cut in smaller pieces, such as half-cut cells. These are standard CSPV cells that are cut, such that a standard 60-cell CSPV module would instead have 120 half cells. Half-cut cells result in lower cell currents and, therefore, reduce power losses and increase cell efficiency and overall

³¹ Related technologies include Passivated Emitter Rear Totally Diffused (PERT) and Passivated Emitter Rear Locally Diffused (PERL).

module output. Some products use shingling, paving, and other low or zero gap technologies to reduce the distance between cells.

CSPV modules

CSPV modules typically consist of the laminate that is typically framed in aluminum, and then attached to one or more junction boxes (figure 1.8).³² CSPV modules can be used in both ground-mounted and rooftop-mounted systems and in both the off-grid market segment and the three on-grid market segments—residential, nonresidential, and utility.³³ The junction box can be connected to other modules, an inverter (which converts the direct current generated by the system to alternating current), or, in the case of off-grid modules, a battery and a charge controller (which controls battery charging).

³² Some CSPV modules do not use a frame, which reduces costs. These modules typically use glass as the rear layer to ensure mechanical stability.

³³ Photovoltaics (“PV”) do not include solar water heat and concentrated solar power (“CSP”). While PV uses a photosensitive semiconductor material to convert sunlight directly to electricity, solar water heat uses sunlight to heat water and CSP uses reflected sunlight to generate steam or a vapor that turns a turbine to generate electricity.

Figure 1.8 CSPV cells and modules: CSPV module with half-cut cells



Source: Solar Power World, "Hanwha Q CELLS' newest half-cell module will launch in USA later this year," April 29, 2019, <https://www.solarpowerworldonline.com/2019/04/hanwha-q-cells-newest-half-cell-module-will-launch-in-usa-later-this-year/>.

The most common on-grid CSPV modules have 60 cells (or 120 half-cut cells) or 72 cells (or 144 half cut cells). In addition to standard size CSPV modules, CSPV cells can be used in building-integrated PV ("BIPV products"). BIPV products are materials integrated into the building envelope, such as the facade or roof, containing CSPV cells. These BIPV products replace conventional construction materials, such as glass or roof shingles, taking over the function that conventional materials would otherwise perform while also producing electricity.

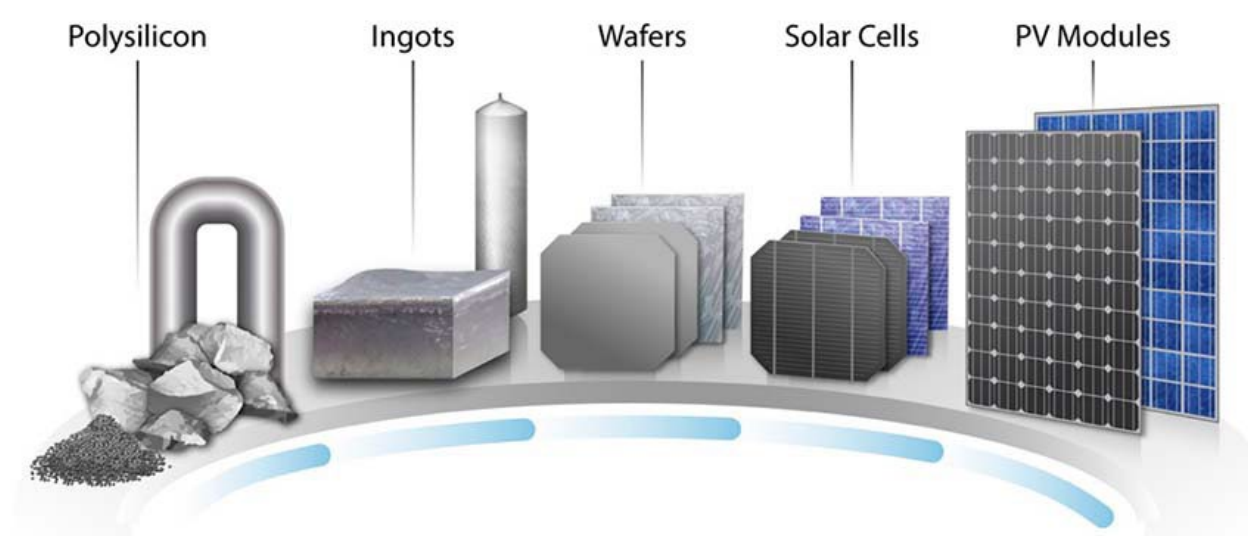
CSPV modules are also used in off-grid applications. In many instances, CSPV modules typically used in on-grid applications may also be used in off-grid applications. For example, a house that is not connected to the electrical grid could use the same CSPV modules as a house that is grid-connected. However, there is a broad range of off-grid applications, such as power generation in remote locations, mobile power solutions, telecommunications power and lighting systems, and portable consumer goods (such as systems for recharging consumer electronics like tablets and phones). The CSPV modules used in some of these applications may be different from those typically used in on-grid applications. For example, these products are

often designed for specific power and portability requirements, and some CSPV modules have different wattages than CSPV modules used in grid-connected applications.

Manufacturing processes³⁴

There are five principal stages involved in the manufacture of CSPV products. First, polysilicon is refined, then it is formed into ingots, which are sliced into wafers, converted to CSPV cells, and assembled into the finished product, modules (figure 1.9). These are discrete production steps that may be done in different plants or locations. Companies may source products at each stage of the value chain or produce the products in-house. CSPV cells are tested and inspected during the production process. The ingot and wafer production process differs for monocrystalline and multicrystalline cells, as discussed below.

Figure 1.9 CSPV cells and modules: Production process



Source: NREL, “Solar Technology Cost Analysis,” accessed February 12, 2025, <https://www.nrel.gov/solar/market-research-analysis/solar-cost-analysis.html>.

Note: For ingots, the cylindrical-shaped ingot is a crystal used in monocrystalline wafers, while the cube-shaped ingot is one used in making multicrystalline wafers.

Polysilicon

The first step in the CSPV value chain is refining polysilicon. There are multiple approaches to polysilicon refining. This discussion will focus on the Siemens method, which

³⁴ Unless otherwise noted, information in this section is based on Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules from Cambodia, Malaysia, Thailand, and Vietnam, Inv. Nos. 701-TA-722-725 and 731-TA-1690-1693 (Preliminary), USITC Publication 5517, June 2024, pp. I-23-I-31.

accounted for approximately 84 percent of total global polysilicon production in 2023, and fluidized bed reactor (“FBR”) technology, which accounts for most of the remaining market.³⁵

In the first step in the Siemens process, quartz (silicon dioxide) and carbon are heated to around 1,800 degrees Celsius. The carbon reacts with the oxygen, resulting in carbon dioxide and silicon with a purity of around 98 to 99 percent. The silicon is then combined with hydrogen chloride gas at 300 to 350 degrees Celsius, with the reaction resulting in the liquid trichlorosilane.

Next, heated silicon rods are inserted into a Siemens reactor, where they are further heated to 1,000 degrees Celsius or more. Hydrogen and trichlorosilane gas are fed into the reactor. The silicon from the trichlorosilane is deposited onto the rods, which steadily increase in size until they are removed from the reactor about a week later. The resulting products are high purity polysilicon chunks or rocks.

Instead of inserting rods, FBR uses seed granules of purified silicon. The seed granules are fed into a chamber that has heated silane gas entering from below and exiting above. The flow of gas ‘fluidizes’ the silicon granules, causing them to flow like a liquid, as the silane gas breaks down and deposits silicon layers on them. The granules grow larger and heavier and exit when they are sufficiently large. As they do so, new seed granules and gas are introduced into the chamber and the process continues. The FBR process, which is newer than the Siemens process, uses 80 to 90 percent less energy, requires a smaller footprint, is a continuous process, takes up less space in shipping and can increase downstream production efficiency. However, the process is difficult to scale and achieve high purity production at low cost.

Ingots and wafers for monocrystalline cells

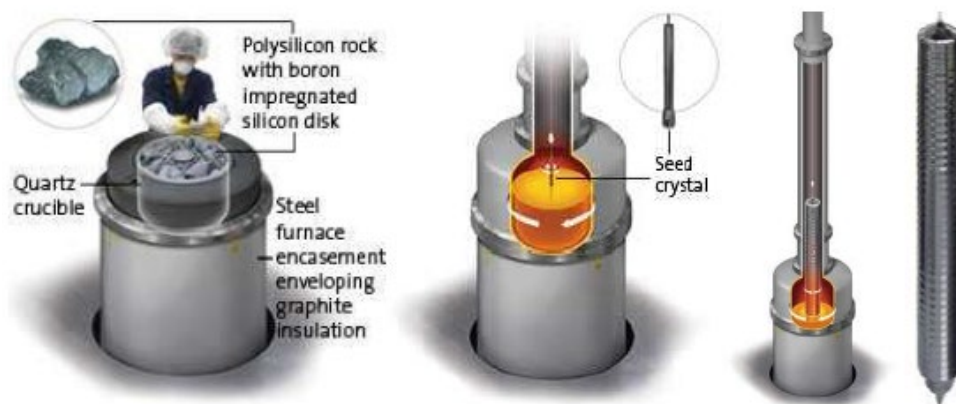
In the Czochralski process for producing crystals used in monocrystalline wafers, polysilicon rocks are first placed into a quartz crucible along with a small amount of boron, which is used to provide a positive electric orientation (figure 1.10). The crucible is then loaded into a Czochralski furnace and heated to about 2,500 degrees Fahrenheit. Once the polysilicon is melted, a seed crystal is lowered into the material and rotated, with the crucible rotated in the opposite direction. The melt starts to solidify on the seed and the seed is slowly raised out of the melt—creating a single long crystal. The crystal is then cooled before it is moved onto the next step. The process of growing the crystal takes about 2.5 days.

Once the crystal has cooled, it is processed into wafers. The top and tail (each end of the cylindrical crystal) are cut off (figure 1.11). The remaining portion of the crystal (or ingot) is cut

³⁵ IEA, *Trends in Photovoltaic Applications 2024*, retrieved February 12, 2025, p. 51, <https://iea-pvps.org/wp-content/uploads/2024/10/IEA-PVPS-Task-1-Trends-Report-2024.pdf>.

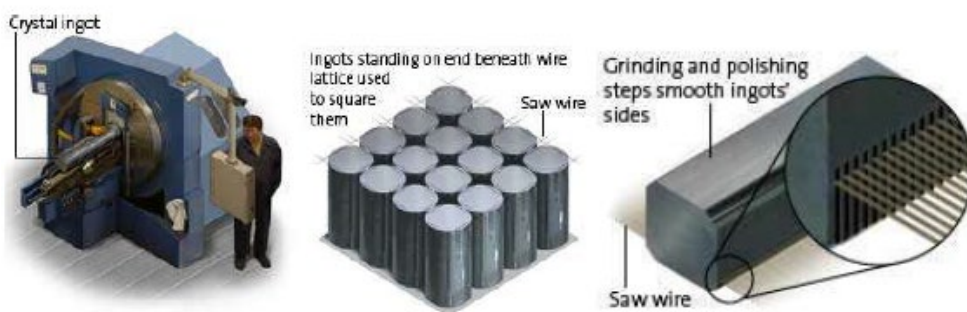
into equal length pieces and then it is squared. In squaring, the rounded sides of the ingot are cut into four flat sides, leaving only rounded corners. A wire saw then slices the ingots into wafers. A majority of global manufacturers have switched to diamond wire saws for monocrystalline wafer slicing, which has several benefits including increasing the speed of the production process. The wafers are then cleaned, dried, and inspected.

Figure 1.10 Czochralski process, crucible loading/charging (left), seed crystal (second from left), crystal growing (second from right), and finished crystal (right)



Source: SolarWorld, "Energy for you and me", pp. 8-9,
<https://www.akamaienergyhawaii.com/dimages/17118/solar-101-eng-solar-photovoltaic.pdf>.

Figure 1.11 Wafer production: Cutting off the top and tail (left), squaring (middle), and slicing into wafers (right)



Source: Source: SolarWorld, "Energy for you and me", pp. 10-11,
<https://www.akamaienergyhawaii.com/dimages/17118/solar-101-eng-solar-photovoltaic.pdf>.

Ingots and wafers for multicrystalline cells

For multicrystalline ingots, the first step is also loading polysilicon into a crucible. This crucible is then loaded into a directional solidification systems (DSS) furnace, where it is cast into ingots. The ingot is then cut into blocks. These blocks are tested and any parts of the block that do not pass these tests are cropped off. The blocks are sliced into wafers using a wire saw. Finally, the wafers are cleaned, dried, and inspected. This process results in square wafers, while the monocrystalline process results in wafers with rounded corners.

CSPV cells

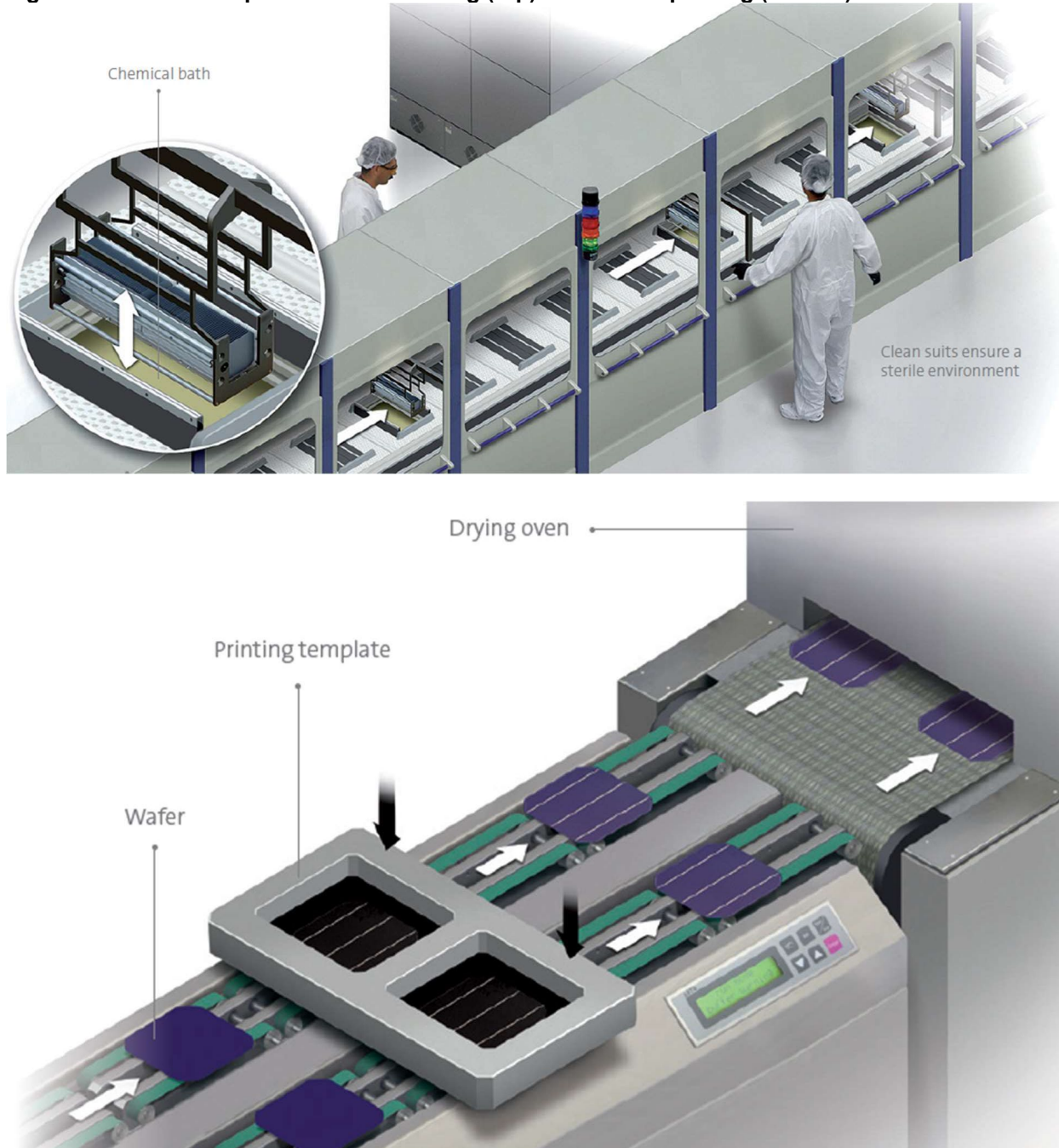
The monocrystalline and multicrystalline wafers, which are 180 to 200 micrometers thick, are next processed into CSPV cells.³⁶ CSPV cell production is capital intensive and requires a skilled workforce. Some firms use a highly automated manufacturing process, while others mix automation and manual labor in their production processes. The main steps in CSPV cell production are as follows:³⁷

- **Cleaning and texturing:** First, the wafers are cleaned, then the surface of the wafer undergoes a chemical treatment that reduces the reflection of sunlight and increases light absorption (figure 1.12).
- **Diffusion:** Wafers are then moved into oven-like chambers where phosphorous is diffused into a thin layer of the surface, which gives the surface a negative potential electrical orientation. The combination of this layer and the boron-doped layer below creates a p/n junction.
- **Edge isolation:** A thin layer of silicon is then removed from the edge of the CSPV cell to separate the positive and negative layers.
- **Coating:** Next, a silicon nitride antireflective coating is added to the PV cells to increase the absorption of sunlight.
- **Printing:** Metals are then printed on the solar CSPV cell to collect the electricity. On the front of the CSPV cell, these metals are printed in thin metal strips called fingers, which are connected to the rest of the module via busbars. A metal layer, typically aluminum, is also printed on the back of the CSPV cell.
- **Testing and sorting:** The final step in the process is the testing and sorting of the CSPV cells based on their characteristics and efficiency.

³⁶ The cell manufacturing process varies by company and technology.

³⁷ This section will discuss the general manufacturing process. There may be additional steps for certain technologies.

Figure 1.12 CSPV cell production: Texturing (top) and screen printing (bottom)



Source: SolarWorld, "Energy for you and me", pp. 12-13,
<https://www.akamaienergyhawaii.com/dimages/17118/solar-101-eng-solar-photovoltaic.pdf>.

CSPV modules

The CSPV cells are next assembled into modules. The extent of automation and manual labor involved in module assembly varies depending on the company, though it is generally the most labor-intensive part of the manufacturing process. First, a string of CSPV cells is soldered together. A piece of glass is placed on the production line, on top of which is added a piece of

ethyl vinyl acetate (“EVA”). The CSPV cells are laid out in a rectangular matrix that will provide the appropriate wattage and power requirements. Typically, a sealant is added, often EVA, and a back sheet is added. The CSPV cells are then laminated in a vacuum and are cured. At this stage, the CSPV cells are referred to as a “laminate.” Frames are then usually attached to the laminate, and a junction box is attached to the back. In the final step, modules are cleaned and inspected. CSPV modules are tested and inspected during the production process.

Domestic like product issues

In the preliminary phase of these investigations, the Commission defined a single domestic like product, consisting of all domestically produced CSPV products within the scope of the investigations. At the time of the preliminary determinations, the only domestically produced products during the period of investigation within the scope consisted of CSPV modules. In the final phase of these investigations, respondents requested data be collected for two separate like products: CSPV cells and CSPV modules.³⁸

Factor comparison responses of U.S. producers and importers regarding differences and similarities between the intermediate and downstream products are presented in table 1.11, while detailed narratives provided by U.S. producers and importers on these five factors are provided in appendix L. Split like product data for CSPV cells and CSPV modules are presented in appendices E and F, respectively.

³⁸ Respondents’ comments on draft questions, p. 13, September 26, 2024.

Table 1.11 CSPV cells and modules: Count of firms' responses regarding semi-finished product analysis comparing CSPV cells to CSPV modules, by factor and firm type

Count in number of firms reporting

Firm type	Factor	No	Yes
U.S. producers	Other uses	13	3
U.S. producers	Separate market	7	10
U.S. producers	Differences in characteristics	3	13
U.S. producers	Differences in costs	3	13
U.S. producers	Transformation intensive	4	12
Importers	Other uses	36	5
Importers	Separate market	15	26
Importers	Differences in characteristics	6	35
Importers	Differences in costs	3	36
Importers	Transformation intensive	7	30
Purchasers	Other uses	11	0
Purchasers	Separate market	8	3
Purchasers	Differences in characteristics	6	6
Purchasers	Differences in costs	5	7
Purchasers	Transformation intensive	5	7

Source: Compiled from data submitted in response to Commission questionnaires.

Note: For U.S. producer and importer narratives see appendix L.

Part 2: Conditions of competition in the U.S. market

U.S. market characteristics

There are three primary on-grid market segments for CSPV products – residential, nonresidential (commercial), and utility. These segments account for the vast majority of CSPV modules sold in the United States while the vast majority of CSPV cells are used in the production of CSPV modules. Modules vary in size, nominal power output, and output efficiency. The current solar industry is characterized by numerous regulatory policies, overlapping incentives, and supply chain disruptions, including the Withhold Release Order (“WRO”) pursuant to the Uyghur Forced Labor Prevention Act (“UFLPA”); the section 301, section 232, and AD/CVD tariffs on CSPV products and certain inputs; the Inflation Reduction Act (“IRA”); section 201 safeguard measure on cells and modules; and Commerce’s anti-circumvention inquiry.

Demand for CSPV products is derived from the demand for solar electricity, which is influenced by factors such as cost competitiveness with traditional energy sources, environmental concerns, a desire for national energy independence, total energy consumption, and the availability of federal, state, and local incentives to produce and/or install CSPV products.¹ According to the U.S. Energy Information Administration (“EIA”), 37 GW of solar power capacity was added to the electric power sector in 2024, almost double solar capacity additions in 2023, and an additional 26 GW of solar capacity is expected to be added in 2025 and 22 GW in 2026.²

Domestic production capacity for CSPV modules grew by 190 percent year-over-year, from 14.5 GW at the end of 2023 to 42.1 GW at the end of 2024, and further increased to over 50 GW in early 2025.³ According to data from Commission questionnaire responses, apparent U.S. consumption of CSPV products by quantity in 2024 was *** percent higher than in 2022, increasing by *** percent between 2022 and 2023, and then further increasing by *** percent between 2023 and 2024.

¹ Crystalline Silicon Photovoltaic Cells Whether or Not Partially or Fully Assembled Into Other Products: Monitoring Developments in the Domestic Industry, Investigation No. TA-201-075 (Second Monitoring), USITC Publication 5494, February 2024, p. II-12.

² Petitioner’s prehearing brief, exh. 5.

³ Data include non-subject thin film modules. Solar Market Insight Report 2024 Year in Review, <https://seia.org/research-resources/solar-market-insight-report-2024-year-in-review/>, retrieved March 16, 2025.

With respect to cells, 9 of 12 responding U.S. producers and 21 of 34 responding importers indicated that the market was subject to distinctive conditions of competition. Specifically, U.S. producers and importers indicated that cells are almost always internally consumed by an affiliated module producer and are typically only sold to unaffiliated firms if the cell producer is not also participating in the module market.⁴ Some U.S. producers and importers also stated that global capacity continues to outpace global demand, resulting in price declines and buildup of inventories. Firms also noted that tariffs and other policies, such as the UFLPA, have limited availability and/or increased costs for cells and raw materials, while government incentives such as the IRA have increased demand for domestic product.

With respect to modules, 11 of 16 responding U.S. producers and 26 of 42 responding importers indicated that the market was subject to distinctive conditions of competition. Specifically, several producers and importers reported increasing global capacity has resulted in price declines and oversupply. Several firms also stated that oversupply combined with difficulties in accessing raw materials due to tariffs and other trade policies have resulted in price fluctuations for modules, while government incentives such as the IRA have increased demand. Multiple firms also reported that frequent improvements in technology are occurring within the industry, with one firm specifically noting shortened life cycles and another firm stating that cost pressures are increasingly pushing producers to address customer needs in efficient and reliable ways. One importer reported that while the supply of modules has been recovering from COVID-19 pandemic related supply shocks, recent increased costs and market uncertainties are once again lowering supply.

⁴ According to U.S. producer Mission Solar, the top ten producers of CSPV cells globally are also the top ten producers of CSPV modules globally. Hearing transcript, p. 70 (Martens). According to U.S. producer and importer Runergy Alabama, Inc., large producers of CSPV modules tend to be vertically integrated while smaller firms typically focus their production on only one product within the CSPV supply chain. Hearing transcript, p. 227 (Xie).

U.S. purchasers

The Commission received 16 usable questionnaire responses from purchasers of CSPV cells and modules.^{5 6} Three responding purchasers are distributors, three are module assemblers, three are residential installers, one is a commercial installer, and nine are utility companies or developers.⁷

Impact of section 301 tariffs and 232 tariffs

U.S. producers, importers, and purchasers were asked to report the impact of section 301 tariffs and section 232 tariffs on overall demand, supply, prices, or raw material costs. Most firms reported that the section 301 tariffs had an impact on the market for CSPV products, with several firms specifically reporting increased costs for raw materials and machinery used to manufacture CSPV products. With respect to the section 232 tariffs, most firms reported that the tariffs did not have an impact on the market for CSPV products or that they did not know if the tariffs had an impact.

Table 2.1 CSPV cells and modules: Count of firms' responses regarding the impact of the section 301 tariffs on Chinese origin products

Firm type	Yes	No	Don't know
U.S. producers	12	2	3
Importers	25	6	12
Purchasers	11	3	2

Source: Compiled from data submitted in response to Commission questionnaires.

Table 2.2 CSPV cells and modules: Count of firms' responses regarding the impact of the section 232 tariffs on steel and aluminum imports

Firm type	Yes	No	Don't know
U.S. producers	5	5	6
Importers	9	15	19
Purchasers	3	5	8

Source: Compiled from data submitted in response to Commission questionnaires.

⁵ Of the 16 responding purchasers, 10 purchased domestic CSPV products, 3 purchased imports from Cambodia, 7 purchased imports from Malaysia, 6 purchased imports from Thailand, 6 purchased imports from Vietnam, and 13 purchased imports from nonsubject countries.

⁶ Fifteen purchasers indicated they had experience or are familiar with the domestic product, 12 of product from Cambodia, 14 of product from Malaysia, 13 of product from Thailand, 15 of product from Vietnam, 9 of product from South Korea, a nonsubject source, and 10 of product from other sources.

⁷ In addition, one firm, ***, reported itself as an independent power producer (IPP) and another firm, ***, reported itself as a utility-scale engineering, procurement, and construction (EPC) provider.

Channels of distribution⁸

U.S. shipments from U.S. producers were primarily sold to distributors and residential installers during 2022 and 2023, and then shifted to primarily utilities and developers, and distributors in 2024.⁹ U.S. producers reported no U.S. shipments to module assemblers during 2022 and 2023, and a small amount in 2024.¹⁰

U.S. shipments of imports from Malaysia, Thailand, and Vietnam were reported for every distribution channel throughout 2022 to 2024, with a large majority of shipments of imports from Thailand and Vietnam going to utilities and developers each year. No U.S. shipments of imports from Cambodia were reported as sold to residential and commercial installers, while the majority were reported as sold to utilities and developers and smaller shares reported as sold to distributors and module assemblers. The share of U.S. shipments of imports from Cambodia, Malaysia, Thailand, and Vietnam that went to utilities and developers ranged from *** percent to *** percent during 2022 to 2024. *** of reported U.S. shipments of imports from Malaysia went to module assemblers in 2022 and 2024, while *** percent went to utilities and developers in 2023. U.S. shipments of imports from nonsubject sources were reported for every distribution channel during 2022 to 2024.

Table 2.3 CSPV cells and modules: Share of U.S. shipments by source, channel of distribution, and period

Shares in percent

Source	Channel	2022	2023	2024
United States	Distributors	***	***	***
United States	Module assemblers	***	***	***
United States	Residential installer	***	***	***
United States	Commercial installer	***	***	***
United States	Utilities and developers	***	***	***
Cambodia	Distributors	***	***	***
Cambodia	Module assemblers	***	***	***
Cambodia	Residential installer	***	***	***
Cambodia	Commercial installer	***	***	***
Cambodia	Utilities and developers	***	***	***

Table continued.

⁸ Data for U.S. producers' and importers' U.S. shipments of modules to each market segment, by source and period, are shown in Appendix M.

⁹ The vast majority of U.S. shipments from U.S. producers to utilities and developers in 2024 were from *** and ***.

¹⁰ U.S. producer shipments to module assemblers in 2024 ***. *** U.S. producer questionnaire response, sections 2.2a and 2.9.

Table 2.3 Continued CSPV cells and modules: Share of U.S. shipments by source, channel of distribution, and period

Shares in percent

Source	Channel	2022	2023	2024
Malaysia	Distributors	***	***	***
Malaysia	Module assemblers	***	***	***
Malaysia	Residential installer	***	***	***
Malaysia	Commercial installer	***	***	***
Malaysia	Utilities and developers	***	***	***
Thailand	Distributors	***	***	***
Thailand	Module assemblers	***	***	***
Thailand	Residential installer	***	***	***
Thailand	Commercial installer	***	***	***
Thailand	Utilities and developers	***	***	***
Vietnam	Distributors	***	***	***
Vietnam	Module assemblers	***	***	***
Vietnam	Residential installer	***	***	***
Vietnam	Commercial installer	***	***	***
Vietnam	Utilities and developers	***	***	***
Subject sources	Distributors	***	***	***
Subject sources	Module assemblers	***	***	***
Subject sources	Residential installer	***	***	***
Subject sources	Commercial installer	***	***	***
Subject sources	Utilities and developers	***	***	***
Subject sources less Cambodia	Distributors	***	***	***
Subject sources less Cambodia	Module assemblers	***	***	***
Subject sources less Cambodia	Residential installer	***	***	***
Subject sources less Cambodia	Commercial installer	***	***	***
Subject sources less Cambodia	Utilities and developers	***	***	***
Nonsubject sources	Distributors	***	***	***
Nonsubject sources	Module assemblers	***	***	***
Nonsubject sources	Residential installer	***	***	***
Nonsubject sources	Commercial installer	***	***	***
Nonsubject sources	Utilities and developers	***	***	***
Nonsubject sources plus Cambodia	Distributors	***	***	***
Nonsubject sources plus Cambodia	Module assemblers	***	***	***
Nonsubject sources plus Cambodia	Residential installer	***	***	***
Nonsubject sources plus Cambodia	Commercial installer	***	***	***
Nonsubject sources plus Cambodia	Utilities and developers	***	***	***
All imports	Distributors	***	***	***
All imports	Module assemblers	***	***	***
All imports	Residential installer	***	***	***
All imports	Commercial installer	***	***	***
All imports	Utilities and developers	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—".

Geographic distribution

U.S. producers and importers reported selling CSPV cells and modules to all regions in the United States (table 2.4). For U.S. producers, 14.0 percent of sales were within 100 miles of their production facility, 49.1 percent were between 101 and 1,000 miles, and 36.9 percent were over 1,000 miles. Importers sold 16.9 percent within 100 miles of their U.S. point of shipment, 72.4 percent between 101 and 1,000 miles, and 10.7 percent over 1,000 miles.

Table 2.4 CSPV cells and modules: Count of U.S. producers' and U.S. importers' geographic markets

Region	U.S. producers	Cambodia	Malaysia	Thailand	Vietnam	Subject sources	South Korea
Northeast	12	3	6	5	11	19	2
Midwest	13	2	7	6	9	17	2
Southeast	14	5	6	6	10	18	2
Central Southwest	14	5	7	7	10	21	2
Mountains	12	2	7	7	9	18	3
Pacific Coast	12	3	7	7	10	21	3
Other	8	2	3	3	7	12	2
All regions (except Other)	10	1	5	5	6	14	2
Reporting firms	16	6	8	8	15	26	4

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Other U.S. markets include AK, HI, PR, and VI.

Engineering, Procurement, and Construction (“EPC”) Services

U.S. producers and importers were asked whether they sell or bundle EPC or other development services together with their CSPV products. One U.S. producer/importer and one U.S. importer reported selling EPC services together with CSPV products. U.S. producer/importer *** estimated that *** percent of its sales in 2024 were bundled with EPC services, while U.S. importer *** estimated that *** percent of its sales in 2024 were bundled with EPC services.

Purchasers were asked whether they have experienced suppliers conditioning the sale or price of CSPV modules on purchasing EPC services. Five purchasers reported experiencing a supplier conditioning the sale or price of its modules on purchasing EPC services, with all five purchasers reporting Hanwha as the supplier that bundled its EPC services. Purchasers were also asked whether the bundling of EPC services with modules incentivizes or disincentivizes their firm from purchasing modules. Out of 13 responding purchasers, seven reported EPC

bundling would disincentivize them from making a purchase while the remaining six purchasers reported it would neither incentivize nor disincentivize them from making a purchase.¹¹

Supply and demand considerations

U.S. supply

Table 2.5 provides a summary of the supply factors regarding CSPV cells and modules, respectively, from U.S. producers and from subject countries. During 2022 to 2024, responding foreign producers' capacity for both cells and modules increased in Cambodia, Thailand, and Vietnam, but decreased in Malaysia. For both cells and modules, the capacity utilization rate of producers in Cambodia increased during 2022 to 2024, but remained below *** percent, and decreased for Malaysia, Thailand, and Vietnam. The share of CSPV modules that were home market shipments in 2024 for each subject source was below ***, while most export shipments from each subject country went to the United States. All but one U.S. producer and one foreign producer reported being unable to shift production to or from alternate products.

Table 2.5 CSPV cells and modules: Supply factors that affect the ability to increase shipments to the U.S. market, by country

Quantity in kilowatts; ratio and share in percent

Factor	Measure	United States	Cambodia	Malaysia	Thailand	Vietnam	Subject sources
Cells: Capacity 2022	Quantity	***	***	***	***	***	***
Cells: Capacity 2024	Quantity	***	***	***	***	***	***
Cells: Capacity utilization 2022	Ratio	***	***	***	***	***	***
Cells: Capacity utilization 2024	Ratio	***	***	***	***	***	***
Cells: Inventories to total shipments 2022	Ratio	***	***	***	***	***	***
Cells: Inventories to total shipments 2024	Ratio	***	***	***	***	***	***
Cells: Home market shipments 2024	Share	***	***	***	***	***	***
Cells: Non-US export market shipments 2024	Share	***	***	***	***	***	***

Table continued.

¹¹ Included in the six purchasers that reported being neutral on EPC bundling are *** and ***.

Table 2.5 CSPV cells and modules: Supply factors that affect the ability to increase shipments to the U.S. market, by country

Quantity in kilowatts; ratio and share in percent

Factor	Measure	United States	Cambodia	Malaysia	Thailand	Vietnam	Subject sources
Modules: Capacity 2022	Quantity	***	***	***	***	***	***
Modules: Capacity 2024	Quantity	***	***	***	***	***	***
Modules: Capacity utilization 2022	Ratio	***	***	***	***	***	***
Modules: Capacity utilization 2024	Ratio	***	***	***	***	***	***
Modules: Inventories to total shipments 2022	Ratio	***	***	***	***	***	***
Modules: Inventories to total shipments 2024	Ratio	***	***	***	***	***	***
Modules: Home market shipments 2024	Share	***	***	***	***	***	***
Modules: Non-US export market shipments 2024	Share	***	***	***	***	***	***
Ability to shift production	Count	***	***	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Counts equal the number of firms reporting "yes". Zeroes, null values, and undefined calculations are suppressed and shown as "—".

Note: Responding U.S. producers accounted for all known U.S. production of CSPV cells and a large majority of known U.S. production of CSPV modules in 2024. Responding foreign producer/exporter firms accounted for *** percent of known production of CSPV cells and *** production of modules in Cambodia, *** percent of cell production and *** percent of module production in Malaysia, *** percent of cell production and *** percent of module production in Thailand, and *** percent of cell production and *** percent of module production in Vietnam during 2024. For additional data on the number of responding firms and their share of U.S. production and of U.S. imports from each subject country, please refer to Parts 3 and 7.

Domestic production

Based on available information, U.S. producers of CSPV products have the ability to respond to changes in demand with small changes in the quantity of shipments of U.S.-produced cells and large changes in the quantity of shipments of U.S.-produced modules to the U.S. market. The main factor mitigating responsiveness of supply in cells is the limited capacity of CSPV cells, as domestic commercial production did not restart until late 2024.¹² The main contributing factors to the high degree of responsiveness of supply in modules include the high availability of unused capacity, increased availability of inventories, and ability to ship to all regions of the United States.¹³

Subject imports from Cambodia

Based on available information, producers of CSPV cells and modules from Cambodia have the ability to respond to changes in demand with large changes in the quantity of shipments of CSPV cells and modules to the U.S. market. The main contributing factors to this degree of responsiveness of supply are the availability of unused capacity for both cell and module production and ability to shift shipments of cells from alternate markets.

Production capacity and the capacity utilization rates for both cells and modules increased irregularly in Cambodia from 2022 to 2024; however, despite these increases the capacity utilization rates remained under *** percent in 2024. During 2022 to 2024, a large share (*** percent) of CSPV cell shipments from Cambodia was reported as internal consumption, while nearly all shipments of CSPV modules reported by producers in Cambodia were reported as exports to the United States.¹⁴

¹² Suniva, the only responding U.S. producer with production of CSPV cells, reported ***. See Suniva's U.S. producer questionnaire response, section 4.19.

¹³ See Part 3 for data on U.S. producers' reported inventories. See table 2.4 for U.S. producers' reported geographic distribution of sales.

¹⁴ See Part 7 for additional data on foreign producers' reported shipments.

Subject imports from Malaysia

Based on available information, producers of CSPV cells and modules from Malaysia have the ability to respond to changes in demand with large changes in the quantity of shipments of CSPV cells and modules to the U.S. market. The main contributing factors to this degree of responsiveness of supply are the availability of unused capacity and ability to shift shipments from alternate markets.

Production capacity for both cells and modules declined in Malaysia during 2022 to 2024, however the capacity utilization rate for cells decreased as well to *** percent and for modules to *** percent. The share of shipments reported as exports to the United States for cells from Malaysia increased from *** percent in 2022 to *** percent in 2024, and from *** percent to *** percent for modules.¹⁵

Subject imports from Thailand

Based on available information, producers of CSPV cells and modules from Thailand have the ability to respond to changes in demand with large changes in the quantity of shipments of CSPV cells and modules to the U.S. market. The main contributing factors to this degree of responsiveness of supply are the availability of unused capacity for both cells and modules and the ability to shift shipments of cells from alternate markets.

Production capacity for both cells and modules increased in Thailand from 2022 to 2024 by *** percent and *** percent respectively. While the capacity utilization rate declined slightly for cells, by *** percentage points, the capacity utilization rate for modules declined by *** percentage points. Similar to other subject sources, a large majority of shipments of modules reported by producers in Thailand were reported as exports to the U.S. market.

¹⁵ See Part 7 for additional data on foreign producers' reported shipments.

Subject imports from Vietnam

Based on available information, producers of CSPV cells and modules from Vietnam have the ability to respond to changes in demand with large changes in the quantity of shipments of CSPV cells and modules to the U.S. market. The main contributing factors to this degree of responsiveness of supply are availability of unused capacity, availability of inventories, and the ability to shift shipments from alternate markets.

Production capacity for both cells and modules increased substantially in Vietnam, however the capacity utilization rates declined to *** percent for cells and *** percent for modules. During 2022 to 2024, a large share (*** percent) of CSPV cell shipments from Vietnam were reported as internal consumption while the vast majority (*** percent) of shipments of CSPV modules were reported as exports to the U.S.

Imports from nonsubject sources

According to official Commerce import statistics, imports from nonsubject countries accounted for 21.5 percent of total U.S. imports in 2024.¹⁶ The largest sources of nonsubject country imports during 2022 to 2024 were South Korea and India, accounting for 42.5 percent and 16.0 percent of imports, respectively by country. Imports from both South Korea and India increased throughout 2022 to 2024, with imports from South Korea increasing by 1.3 million kilowatts (39.5 percent) and imports from India increasing by 2.1 million kilowatts (890.2 percent).¹⁷

Supply constraints

Three of 17 U.S. producers and 15 of 43 importers reported that they had experienced supply constraints since January 1, 2022. Of those that reported they had experienced supply constraints, 12 producers and importers reported constraints occurring during 2022, 10 reported constraints occurring during 2023, 9 during 2024 (pre-petition filing), and 11 during 2024 (post-petition filing) (table 2.6). Constraints reported by domestic producers constraints in labor and/or raw materials availability and limited capacity with regards to CSPV cell production as the domestic industry restarted cell production in late 2024. Several importers that reported supply constraints mentioned limited access to raw materials due to UFLPA-related WRO shipment holds.

¹⁶ Official U.S. import statistics of the Commerce Census Bureau using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010, accessed February 12, 2025.

¹⁷ According to official Commerce import statistics, imports from India increased from 232,421 kilowatts in 2022 to 2.3 million kilowatts in 2024.

Seven of 16 responding purchasers reported that they had experienced supply constraints, with 1 firm reporting supply constraints from domestic producers in 2022 and 7 firms reporting supply constraints from foreign producers or importers during 2022 to 2024. The single purchaser reporting constraints from domestic producers stated that Hanwha Q Cells required them to bundle EPC services. Several purchasers experiencing constraints from foreign producers or importers cited delayed shipments due to the UFLPA WRO.

Table 2.6 CSPV cells and modules: Count of firms' responses regarding timing of supply constraints, by firm type and source

Firm type	Source	2022	2023	2024 pre-petition	2024 post-petition
U.S. producers	Domestic	1	0	1	2
Importers	Imported	11	10	8	9
Purchasers	Domestic	1	0	0	0
Purchasers	Imported	4	1	0	2

Source: Compiled from data submitted in response to Commission questionnaires.

New suppliers

Ten of 16 purchasers indicated that new suppliers entered the U.S. market since January 1, 2022. Purchasers cited several new suppliers in the U.S. and all four subject countries.

U.S. demand

Demand for CSPV products is derived from the demand for solar electricity, which is influenced by factors such as cost competitiveness with traditional energy sources, environmental concerns, a desire for national energy independence, total energy consumption, and the availability of federal, state, and local incentives to produce and/or install CSPV products.¹⁸ According to the EIA, 37 GW of solar power capacity was added to the electric power sector in 2024, almost double solar capacity additions in 2023, and an additional 26 GW of solar capacity is expected to be added in 2025, and 22 GW in 2026.¹⁹

Electricity demand in the United States is supplied primarily by conventional sources, but the share of electricity generated from renewable energy sources has been steadily increasing. As shown in table 2.7, solar energy grew from 3.4 percent to 5.1 percent of utility-scale electricity generation between 2022 and 2024.

¹⁸ Crystalline Silicon Photovoltaic Cells Whether or Not Partially or Fully Assembled Into Other Products: Monitoring Developments in the Domestic Industry, Investigation No. TA-201-075 (Second Monitoring), USITC Publication 5494, February 2024, p. II-12.

¹⁹ Petitioner's prehearing brief, exh. 5.

Based on available information, the overall demand for CSPV products is likely to experience moderate changes in response to changes in price. The main contributing factors are the somewhat limited range of substitute products and the moderate-to-large cost share of CSPV products in most of their end-use products.

Table 2.7 CSPV cells and modules: Share of net electricity generation in the United States, by type and year

Electricity generation type	2022	2023	2024
Natural gas	39.9	43.2	43.3
Coal	19.7	16.1	15.2
Nuclear	18.2	18.5	18.2
Wind	10.3	10.1	10.5
Solar	3.4	4.0	5.1
All other	8.6	8.1	7.7
All electricity generation types	100.0	100.0	100.0

Source: EIA, <http://www.eia.gov/electricity/data/browser/>, retrieved March 14, 2025.

End uses and cost share

The majority of reported end uses for CSPV cells were for assembly into CSPV modules, while the majority of reported end uses for CSPV modules include residential, commercial, and utility systems.²⁰

CSPV products account for a moderate-to-large share of the cost of the end-use products in which they are used. U.S. producer Illuminate estimated that the cost of CSPV cells accounts for approximately one-third of the cost of a finished module.²¹ U.S. producers' reported cost shares for CSPV cells used for modules ranged from 20 to 60 percent, while U.S. importers' reported cost shares for the same application ranged from 30 to 60 percent.

Reported cost shares for CSPV modules were as follows:

- U.S. producers' reported cost shares for modules used in residential systems ranged from 13 percent to 86 percent;
- U.S. producers' reported cost shares for modules used in commercial systems ranged from 15 to 86 percent;
- U.S. producers' reported cost shares for modules used in utility systems ranged from 19 percent to 86 percent;
- U.S. importers' reported cost shares for modules used in residential systems ranged from 10 percent to 95 percent;

²⁰ Other reported end uses for cells include solar roofing shingles, off-grid trucks, off-grid RVs, and off-grid trailers, while other reported end uses for modules include oilfield solar pump systems.

²¹ Conference transcript, pp. 157, 204-205 (Wagner).

- U.S. importers' reported cost shares for modules used in commercial systems ranged from 5 percent to 60 percent,
- U.S. importers' reported cost shares for modules used in utility systems ranged from 19 to 60 percent.

Business cycles

Twelve of 16 U.S. producers, 24 of 44 importers, and 10 of 16 purchasers indicated that the market was subject to business cycles. Several U.S. producers, importers, and purchasers noted that installations decline during the winter months and increase during the warmer spring and summer months. U.S. importers *** and *** stated that the solar industry is subject to the broader macroeconomic cycles of expansion and recession, with demand and production of cells and modules increasing during economic prosperity, but then economic recessions sometimes result in decreased demand, oversupply, and price declines.

Demand trends

A majority of responding U.S. producers, importers, and purchasers reported demand for cells and modules increased both within and outside of the U.S. since January 1, 2022 (table 2.8). Nine out of 16 purchasers reported that demand for their final products incorporating CSPV cells and/or modules, or end use products, increased during the same time period.

Table 2.8 CSPV cells and modules: Count of firms' responses regarding overall domestic and foreign demand, by firm type

Market	Firm type	Steadily Increase	Fluctuate Up	No change	Fluctuate Down	Steadily Decrease
Cells: Domestic demand	U.S. producers	9	2	0	0	0
Cells: Domestic demand	Importers	23	11	0	2	0
Cells: Domestic demand	Purchasers	8	1	0	1	0
Cells: Foreign demand	U.S. producers	7	1	1	0	0
Cells: Foreign demand	Importers	20	5	1	1	0
Cells: Foreign demand	Purchasers	2	2	1	0	1
Modules: Domestic demand	U.S. producers	13	3	0	1	0
Modules: Domestic demand	Importers	25	12	1	2	1
Modules: Domestic demand	Purchasers	9	5	0	3	0
Modules: Foreign demand	U.S. producers	7	3	3	0	0
Modules: Foreign demand	Importers	24	7	1	1	0
Modules: Foreign demand	Purchasers	3	2	1	2	1
Demand for end use products	Purchasers	5	4	3	2	2

Source: Compiled from data submitted in response to Commission questionnaires.

Substitute products

Most responding U.S. producers (12 of 14) and importers (33 of 38) reported there were no substitutes for CSPV cells, while half of U.S. producers (8 of 16) and a majority of importers (25 of 35) reported there were no substitutes for CSPV modules. Similarly, most responding purchasers (12 of 15) reported there were no substitutes for CSPV cells and modules. Nearly all U.S. producers, importers, and purchasers that reported substitutes noted thin film cells and/or modules as substitutes for in-scope CSPV products.

Substitutability issues

This section assesses the degree to which U.S.-produced CSPV products and imports of CSPV products from subject countries can be substituted for one another by examining the importance of certain purchasing factors and the comparability of CSPV products from domestic and imported sources based on those factors.²² Based on available data, staff believes that there is a moderate-to-high degree of substitutability between domestically produced CSPV products and CSPV products imported from subject sources. Factors contributing to the moderate-to-high level of substitutability include the high degree of interchangeability between domestic and subject sources as reported by U.S. producers, importers, and purchasers. In addition, purchasers reported domestic product was comparable to imports from subject sources across all factors other than price. Factors reducing substitutability include differences in how orders are sold and lead times,²³ with a majority of U.S. producers (72.3 percent) reporting shipping from inventories, with lead times averaging 4.6 days, and a majority of U.S. importers (78.4 percent) reporting their commercial shipments as produced-to-order, with lead times averaging 167.3 days. Due to differences in availability, substitutability is likely to be closer to moderate for cells and closer to high for modules.

²² The degree of substitution between domestic and imported CSPV cells and modules depends upon the extent of product differentiation between the domestic and imported products and reflects how easily purchasers can switch from domestically produced CSPV products to the CSPV products imported from subject countries (or vice versa) when prices change. The degree of substitution may include such factors as quality differences (e.g., grade standards, defect rates, etc.), and differences in sales conditions (e.g., lead times between order and delivery dates, reliability of supply, product services, etc.).

²³ Eleven of 13 responding purchasers reported delivery times as a “very important” purchasing factor.

Factors affecting purchasing decisions

Purchaser decisions based on source

As shown in table 2.9, most purchasers reported always make purchasing decisions based on the producer and either always or usually make purchasing decisions based on country of origin. With regards to their own customers' preferences, most purchasers reported that they either sometimes or never make their purchasing decisions based on producer or country of origin. Of the purchasers that reported that they always make purchasing decisions based on the manufacturer, four cited qualification and due diligence requirements, and two firms cited only purchasing from affiliates. Purchasers that reported always or usually making purchases based on country of origin noted personal preference for local suppliers, human rights and traceability standards, and tariffs as reasons for their preferences.

Table 2.9 CSPV cells and modules: Count of purchasers' responses regarding frequency of purchasing decisions based on producer and country of origin

Firm making decision	Decision based on	Always	Usually	Sometimes	Never
Purchaser	Producer	9	2	2	3
Customer	Producer	4	0	6	2
Purchaser	Country	5	4	6	1
Customer	Country	4	0	7	1

Source: Compiled from data submitted in response to Commission questionnaires.

Importance of purchasing domestic product

Fourteen of 15 responding purchasers reported that most or all of their purchases in 2024 did not require purchasing U.S.-produced product. One purchaser, ***, reported that *** percent of its purchases in 2024 were required by its customers to be a domestic product, *** percent were required by law or regulation to be a domestic product, and *** did not require domestic product.

Most important purchase factors

The most often cited top three factors firms consider in their purchasing decisions for CSPV cells and modules were price (12 firms), quality (11 firms), and availability/supply (11 firms) as shown in table 2.10. Price/cost and quality were tied for the most frequently cited first-most important factor (cited by five firms each); quality was the most frequently reported second-most important factor (five firms); and price/cost and availability/supply were tied for the most frequently reported third-most important factors (five firms each).

Table 2.10 CSPV cells and modules: Count of ranking of factors used in purchasing decisions as reported by purchasers, by factor

Factor	First	Second	Third	Total
Price / Cost	5	2	5	12
Quality	5	5	1	11
Availability / Supply	2	4	5	11
Bankability	1	1	1	3
All other factors	3	2	1	6

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Other factors include internal supplier/affiliate, responsible sourcing, and customer demand.

The majority of purchasers (8 of 13) reported that they only sometimes purchase the lowest-priced product.

Importance of specified purchase factors

Purchasers were asked to rate the importance of 18 factors in their purchasing decisions (table 2.11). The factors rated as very important by more than half of responding purchasers were availability, bankability,²⁴ delivery terms, delivery time, payment terms, price, product consistency, quality meets industry standards, quality exceeds industry standards, reliability of supply, technical support/service, and technological compatibility.²⁵

²⁴ According to the American Clean Power Association (“ACP”), if a solar module manufacturer is bankable, financial institutions have more confidence in its reliability as a company and are more willing to invest in such a project. In evaluating a potential supplier’s bankability, purchasers consider two major components: equipment quality and warranty coverage. Respondent ACP’s postconference brief, Exhibit 1, p. 4.

²⁵ The number of purchasers providing a response for each purchasing factor ranged from 11 to 13 firms.

Table 2.11 CSPV cells and modules: Count of purchasers' responses regarding importance of purchase factors, by factor

Factor	Very important	Somewhat important	Not important
Availability	12	1	0
Bankability	10	2	0
Delivery terms	10	3	0
Delivery time	11	2	0
Discounts offered	2	6	3
Government incentives	2	5	5
Minimum quantity requirements	4	5	3
Packaging	2	8	2
Payment terms	9	4	0
Price	11	2	0
Product consistency	10	2	0
Product range	2	9	1
Quality meets industry standards	11	1	0
Quality exceeds industry standards	7	4	1
Reliability of supply	11	1	0
Technical support/service	9	2	1
Technological compatibility	8	3	1
U.S. transportation costs	3	7	3

Source: Compiled from data submitted in response to Commission questionnaires.

Lead times

U.S. producers reported the majority (72.3 percent) of their CSPV cells and modules as sold from inventory, with lead times averaging 4.6 days. The remaining 27.7 percent of their commercial shipments were produced-to-order with lead times averaging 13.4 days. U.S. importers reported most (78.4 percent) of their CSPV products as produced-to-order, with lead times averaging 167.3 days. The remaining 16.5 percent of their commercial shipments were sold from U.S. inventories, with lead times averaging 36.5 days, and 5.1 percent from foreign inventories, with lead times averaging 90 days.

Supplier certification

Ten of 15 responding purchasers require their suppliers to become certified or qualified to sell CSPV cells and modules to their firm. Purchasers reported that the time to qualify a new supplier ranged from 30 to 545 days.²⁶ No purchasers reported that a domestic or foreign supplier had failed in its attempt to qualify CSPV cells and modules or had lost its approved status since 2022.

²⁶ Four firms reported their time to qualify a new supplier was 30 days, two firms reported 90 days, one firm reported 120 days, one firm reported 180 days, and one firm reported 545 days.

Minimum quality specifications

As can be seen from table 2.12, 11 responding purchasers reported that domestically produced product always or usually met minimum quality specifications while 4 purchasers reported they did not know. A majority of responding purchasers reported that CSPV cells and modules imported from Malaysia, Thailand, and Vietnam either always or usually met minimum quality specifications. Half of responding purchasers reported that CSPV products from Cambodia always or usually met minimum quality specifications, and less than half (5 of 11) reported product from nonsubject sources meeting minimum quality specifications.

Table 2.12 CSPV cells and modules: Count of purchasers' responses regarding suppliers' ability to meet minimum quality specifications, by source

Source of purchases	Always	Usually	Sometimes	Rarely or never	Don't Know
United States	5	6	0	0	4
Cambodia	5	2	1	1	5
Malaysia	6	6	0	1	2
Thailand	6	5	1	1	2
Vietnam	7	6	0	1	1
Nonsubject sources	4	1	1	1	4

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Purchasers were asked how often domestically produced or imported CSPV cells and modules meets minimum quality specifications for their own or their customers' uses.

Thirteen of 16 responding purchasers reported factors that determined quality. Quality characteristics noted by purchasers include warranty, durability or degradation coefficient, bankability, product certifications, and factory audits/inspections.

Changes in purchasing patterns

Ten purchasers reported that they had changed suppliers since January 1, 2022, while six reported that they had not. Specifically, two firms dropped or reduced purchases from VSUN because of non-compliance, lack of distribution strategy and selling direct. One firm reported dropping LONGi due to experiencing challenges providing U.S. customs with approval related documentation. One firm reported dropping New East Solar due to tariff risks and one firm reported dropping First Solar due to lack of competitiveness compared to CSPV modules.²⁷ One firm reported dropping Aptos due to differences in goals and strategies and Emmvee due to product quality issues. Firms reported adding or increased purchases from Hanwha Q Cells due to being an affiliated firm or to supply CSPV modules. Firms also added purchases from Jinko as a tier 1 supplier, from Meyer Burger and Moxeon to increase their premium options, from Waaree as it provides product from India, and from Hyundai. Firms also reported changes because they shift their suppliers based on availability and/or price, or are looking to have a geographically diverse range of suppliers.

Purchasers were also asked about changes in their purchasing patterns from different countries since January 1, 2022 (table 2.13). Purchasers reported increased purchases of U.S.-produced product because of increased availability of domestically assembled modules. Most responding purchasers reported decreased purchases, or no purchases, of product from subject sources. With respect to nonsubject sources, no firms reported increased purchases from China and circumventing sources, other than Vietnam,²⁸ three reported increased purchases of product from South Korea, and seven reported increased purchases of product from other nonsubject sources.

²⁷ First Solar is a producer of out-of-scope thin film modules.

²⁸ The single firm reporting increased purchases of product from Vietnam, nonsubject, reported a single purchase in 2024.

Table 2.13 CSPV cells and modules: Count of purchasers' responses regarding changes in purchase patterns from U.S., subject, and nonsubject countries

Source of purchases	Steadily Increase	Fluctuate Up	No change	Fluctuate Down	Steadily Decrease	Did not purchase
United States	5	4	2	1	0	3
Cambodia, subject	2	0	1	0	0	9
Malaysia, subject	1	3	1	0	2	4
Thailand, subject	1	2	1	2	0	5
Vietnam, subject	1	0	1	4	0	6
Cambodia, nonsubject	0	0	1	1	1	7
Malaysia, nonsubject	0	0	1	0	0	9
Thailand, nonsubject	0	0	1	2	0	7
Vietnam, nonsubject	0	1	1	1	1	6
China	0	0	0	0	1	10
South Korea	2	1	1	2	1	5
Other sources	4	3	1	1	1	5
Sources unknown	1	1	1	1	0	6

Source: Compiled from data submitted in response to Commission questionnaires.

Purchase factor comparisons of domestic products, subject imports, and nonsubject imports

Purchasers were asked a number of questions comparing CSPV cells and modules produced in the United States, subject countries, and nonsubject countries. First, purchasers were asked for a country-by-country comparison on the same 18 factors (table 2.14) for which they were asked to rate the importance.

Most responding purchasers reported that U.S.-produced CSPV products were inferior with respect to price when compared to product from subject countries²⁹ and comparable across all other factors, except when comparing government incentives between U.S.-produced products and imports from Malaysia in which most purchasers reported U.S. product as superior. Similar to subject sources, most responding purchasers reported that U.S.-produced CSPV products were inferior with respect to price when compared to product from South Korea and other nonsubject sources, superior with respect to government incentives when compared to product from South Korea, and evenly split between superior and comparable when comparing government incentives for U.S.-produced product relative to other nonsubject sources.

²⁹ With respect to price, a rating of inferior means that the price for the first source in the country pair is generally higher. For example, if a firm reported "U.S. inferior," it meant that the U.S. product was generally priced higher than the imported product.

Table 2.14 CSPV cells and modules: Count of purchasers' responses comparing U.S.-produced and imported product, by factor and country pair

Factor	Country pair	Superior	Comparable	Inferior
Availability	U.S. vs Cambodia	0	7	2
Bankability	U.S. vs Cambodia	1	8	0
Delivery terms	U.S. vs Cambodia	1	8	0
Delivery time	U.S. vs Cambodia	1	7	1
Discounts offered	U.S. vs Cambodia	0	7	2
Government incentives	U.S. vs Cambodia	4	5	0
Minimum quantity requirements	U.S. vs Cambodia	0	8	1
Packaging	U.S. vs Cambodia	0	9	0
Payment terms	U.S. vs Cambodia	1	8	0
Price	U.S. vs Cambodia	0	1	9
Product consistency	U.S. vs Cambodia	0	9	0
Product range	U.S. vs Cambodia	0	8	1
Quality meets industry standards	U.S. vs Cambodia	0	9	0
Quality exceeds industry standards	U.S. vs Cambodia	1	8	0
Reliability of supply	U.S. vs Cambodia	1	7	1
Technical support/service	U.S. vs Cambodia	1	8	0
Technological compatibility	U.S. vs Cambodia	0	8	1
U.S. transportation costs	U.S. vs Cambodia	1	8	1

Table continued.

Table 2.14 (Continued) CSPV cells and modules: Count of purchasers' responses comparing U.S.-produced and imported product, by factor and country pair

Factor	Country pair	Superior	Comparable	Inferior
Availability	U.S. vs Malaysia	0	9	2
Bankability	U.S. vs Malaysia	0	11	0
Delivery terms	U.S. vs Malaysia	0	10	0
Delivery time	U.S. vs Malaysia	1	10	0
Discounts offered	U.S. vs Malaysia	0	6	2
Government incentives	U.S. vs Malaysia	6	3	0
Minimum quantity requirements	U.S. vs Malaysia	0	8	1
Packaging	U.S. vs Malaysia	0	10	0
Payment terms	U.S. vs Malaysia	0	10	0
Price	U.S. vs Malaysia	0	4	8
Product consistency	U.S. vs Malaysia	0	11	0
Product range	U.S. vs Malaysia	0	8	1
Quality meets industry standards	U.S. vs Malaysia	0	9	0
Quality exceeds industry standards	U.S. vs Malaysia	0	8	0
Reliability of supply	U.S. vs Malaysia	0	11	0
Technical support/service	U.S. vs Malaysia	0	10	0
Technological compatibility	U.S. vs Malaysia	0	9	1
U.S. transportation costs	U.S. vs Malaysia	1	11	0

Table continued.

Table 2.14 (Continued) CSPV cells and modules: Count of purchasers' responses comparing U.S.-produced and imported product, by factor and country pair

Factor	Country pair	Superior	Comparable	Inferior
Availability	U.S. vs Thailand	0	8	2
Bankability	U.S. vs Thailand	0	10	0
Delivery terms	U.S. vs Thailand	0	9	0
Delivery time	U.S. vs Thailand	1	9	0
Discounts offered	U.S. vs Thailand	0	5	2
Government incentives	U.S. vs Thailand	4	4	0
Minimum quantity requirements	U.S. vs Thailand	0	7	1
Packaging	U.S. vs Thailand	0	9	0
Payment terms	U.S. vs Thailand	0	9	0
Price	U.S. vs Thailand	0	3	8
Product consistency	U.S. vs Thailand	0	10	0
Product range	U.S. vs Thailand	0	7	1
Quality meets industry standards	U.S. vs Thailand	0	8	0
Quality exceeds industry standards	U.S. vs Thailand	0	7	0
Reliability of supply	U.S. vs Thailand	0	10	0
Technical support/service	U.S. vs Thailand	0	9	0
Technological compatibility	U.S. vs Thailand	0	8	1
U.S. transportation costs	U.S. vs Thailand	1	10	0

Table continued.

Table 2.14 (Continued) CSPV cells and modules: Count of purchasers' responses comparing U.S.-produced and imported product, by factor and country pair

Factor	Country pair	Superior	Comparable	Inferior
Availability	U.S. vs Vietnam	0	7	2
Bankability	U.S. vs Vietnam	1	8	0
Delivery terms	U.S. vs Vietnam	1	8	0
Delivery time	U.S. vs Vietnam	1	7	1
Discounts offered	U.S. vs Vietnam	0	7	2
Government incentives	U.S. vs Vietnam	4	5	0
Minimum quantity requirements	U.S. vs Vietnam	0	8	1
Packaging	U.S. vs Vietnam	0	9	0
Payment terms	U.S. vs Vietnam	1	8	0
Price	U.S. vs Vietnam	0	1	9
Product consistency	U.S. vs Vietnam	0	9	0
Product range	U.S. vs Vietnam	0	8	1
Quality meets industry standards	U.S. vs Vietnam	0	9	0
Quality exceeds industry standards	U.S. vs Vietnam	1	8	0
Reliability of supply	U.S. vs Vietnam	1	7	1
Technical support/service	U.S. vs Vietnam	1	8	0
Technological compatibility	U.S. vs Vietnam	0	8	1
U.S. transportation costs	U.S. vs Vietnam	1	8	1

Table continued.

Table 2.14 (Continued) CSPV cells and modules: Count of purchasers' responses comparing U.S.-produced and imported product, by factor and country pair

Factor	Country pair	Superior	Comparable	Inferior
Availability	U.S. vs South Korea	0	7	0
Bankability	U.S. vs South Korea	0	7	0
Delivery terms	U.S. vs South Korea	1	6	0
Delivery time	U.S. vs South Korea	1	6	0
Discounts offered	U.S. vs South Korea	0	4	2
Government incentives	U.S. vs South Korea	4	2	0
Minimum quantity requirements	U.S. vs South Korea	0	6	0
Packaging	U.S. vs South Korea	0	7	0
Payment terms	U.S. vs South Korea	0	7	0
Price	U.S. vs South Korea	0	3	5
Product consistency	U.S. vs South Korea	0	7	0
Product range	U.S. vs South Korea	0	6	0
Quality meets industry standards	U.S. vs South Korea	0	6	0
Quality exceeds industry standards	U.S. vs South Korea	0	6	0
Reliability of supply	U.S. vs South Korea	0	7	0
Technical support/service	U.S. vs South Korea	0	7	0
Technological compatibility	U.S. vs South Korea	0	6	0
U.S. transportation costs	U.S. vs South Korea	1	7	0

Table continued.

Table 2.14 (Continued) CSPV cells and modules: Count of purchasers' responses comparing U.S.-produced and imported product, by factor and country pair

Factor	Country pair	Superior	Comparable	Inferior
Availability	U.S. vs Nonsubject sources	0	7	2
Bankability	U.S. vs Nonsubject sources	0	8	0
Delivery terms	U.S. vs Nonsubject sources	0	8	0
Delivery time	U.S. vs Nonsubject sources	1	7	1
Discounts offered	U.S. vs Nonsubject sources	0	6	1
Government incentives	U.S. vs Nonsubject sources	4	4	0
Minimum quantity requirements	U.S. vs Nonsubject sources	0	6	1
Packaging	U.S. vs Nonsubject sources	0	8	0
Payment terms	U.S. vs Nonsubject sources	0	8	0
Price	U.S. vs Nonsubject sources	0	3	6
Product consistency	U.S. vs Nonsubject sources	0	8	0
Product range	U.S. vs Nonsubject sources	0	6	1
Quality meets industry standards	U.S. vs Nonsubject sources	0	8	0
Quality exceeds industry standards	U.S. vs Nonsubject sources	0	7	0
Reliability of supply	U.S. vs Nonsubject sources	0	7	1
Technical support/service	U.S. vs Nonsubject sources	0	8	0
Technological compatibility	U.S. vs Nonsubject sources	0	7	1
U.S. transportation costs	U.S. vs Nonsubject sources	1	7	1

Source: Compiled from data submitted in response to Commission questionnaires.

Note: With respect to price, a rating of superior means that the price for the first source in the country pair is generally lower. For example, if a firm reported "U.S. superior," it meant that the U.S. product was generally priced lower than the imported product.

Comparison of U.S.-produced and imported CSPV cells and modules

In order to determine whether U.S.-produced CSPV cells and modules can generally be used in the same applications as imports from Cambodia, Malaysia, Thailand, Vietnam, and nonsubject sources, U.S. producers, importers, and purchasers were asked whether the products can always, frequently, sometimes, or never be used interchangeably. As shown in tables 2.15 to 2.17, most responding firms reported that CSPV products across all sources are either always or frequently interchangeable with each other.

Table 2.15 CSPV cells and modules: Count of U.S. producers reporting the interchangeability between product produced in the United States and in other countries, by country pair

Country pair	Always	Frequently	Sometimes	Never
United States vs. Cambodia	6	1	3	2
United States vs. Malaysia	7	2	3	1
United States vs. Thailand	7	2	4	1
United States vs. Vietnam	7	2	3	1
Cambodia vs. Malaysia	7	2	3	0
Cambodia vs. Thailand	7	2	3	0
Cambodia vs. Vietnam	7	2	3	0
Malaysia vs. Thailand	7	3	3	0
Malaysia vs. Vietnam	7	3	3	0
Thailand vs. Vietnam	7	3	3	0
United States vs. South Korea	7	1	3	1
United States vs. Circumventing	7	2	3	1
United States vs. Other	7	1	3	1
Cambodia vs. South Korea	7	2	3	0
Cambodia vs. Circumventing	7	2	3	0
Cambodia vs. Other	7	2	3	0
Malaysia vs. South Korea	7	2	3	0
Malaysia vs. Circumventing	7	3	3	0
Malaysia vs. Other	7	2	3	0
Thailand vs. South Korea	7	2	3	0
Thailand vs. Circumventing	7	3	3	0
Thailand vs. Other	7	2	3	1
Vietnam vs. South Korea	7	2	3	0
Vietnam vs. Circumventing	7	3	3	0
Vietnam vs. Other	7	2	3	0
South Korea vs. Circumventing	7	2	3	0
South Korea vs. Other	7	2	3	0
Circumventing vs. Other	7	2	3	0

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Circumventing refers to sources in Cambodia, Malaysia, Thailand, and Vietnam that were found by the Department of Commerce to be circumventing the AD/CVD orders on CSPV products from China.

Table 2.16 CSPV cells and modules: Count of importers reporting the interchangeability between product produced in the United States and in other countries, by country pair

Country pair	Always	Frequently	Sometimes	Never
United States vs. Cambodia	19	3	6	1
United States vs. Malaysia	18	3	6	1
United States vs. Thailand	18	4	7	1
United States vs. Vietnam	19	4	7	1
Cambodia vs. Malaysia	16	3	5	0
Cambodia vs. Thailand	17	4	5	0
Cambodia vs. Vietnam	18	3	5	0
Malaysia vs. Thailand	18	4	5	0
Malaysia vs. Vietnam	19	3	6	0
Thailand vs. Vietnam	18	3	5	0
United States vs. South Korea	17	3	5	1
United States vs. Circumventing	17	4	5	1
United States vs. Other	17	4	5	1
Cambodia vs. South Korea	15	4	5	0
Cambodia vs. Circumventing	16	3	5	0
Cambodia vs. Other	16	3	5	0
Malaysia vs. South Korea	16	4	5	0
Malaysia vs. Circumventing	17	3	5	0
Malaysia vs. Other	17	3	5	0
Thailand vs. South Korea	15	4	5	0
Thailand vs. Circumventing	16	3	5	0
Thailand vs. Other	16	3	5	0
Vietnam vs. South Korea	16	4	5	0
Vietnam vs. Circumventing	17	3	5	0
Vietnam vs. Other	17	4	5	0
South Korea vs. Circumventing	15	4	5	0
South Korea vs. Other	15	4	5	0
Circumventing vs. Other	16	4	5	0

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Circumventing refers to sources in Cambodia, Malaysia, Thailand, and Vietnam that were found by the Department of Commerce to be circumventing the AD/CVD orders on CSPV products from China.

Table 2.17 CSPV cells and modules: Count of purchasers reporting the interchangeability between product produced in the United States and in other countries, by country pair

Country pair	Always	Frequently	Sometimes	Never
United States vs. Cambodia	8	2	1	0
United States vs. Malaysia	7	3	3	0
United States vs. Thailand	7	3	3	0
United States vs. Vietnam	8	3	3	0
Cambodia vs. Malaysia	7	2	1	0
Cambodia vs. Thailand	7	2	1	0
Cambodia vs. Vietnam	8	2	1	0
Malaysia vs. Thailand	7	4	2	0
Malaysia vs. Vietnam	7	4	2	0
Thailand vs. Vietnam	7	4	2	0
United States vs. South Korea	7	2	3	0
United States vs. Circumventing	8	3	2	0
United States vs. Other	8	3	2	0
Cambodia vs. South Korea	7	2	1	0
Cambodia vs. Circumventing	8	2	1	0
Cambodia vs. Other	7	2	1	0
Malaysia vs. South Korea	7	2	3	0
Malaysia vs. Circumventing	7	4	1	0
Malaysia vs. Other	7	4	1	0
Thailand vs. South Korea	7	2	3	0
Thailand vs. Circumventing	7	4	1	0
Thailand vs. Other	7	4	1	0
Vietnam vs. South Korea	7	2	3	0
Vietnam vs. Circumventing	8	4	1	0
Vietnam vs. Other	8	4	1	0
South Korea vs. Circumventing	7	3	1	0
South Korea vs. Other	7	3	1	0
Circumventing vs. Other	8	4	1	0

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Circumventing refers to sources in Cambodia, Malaysia, Thailand, and Vietnam that were found by the Department of Commerce to be circumventing the AD/CVD orders on CSPV products from China.

In addition, U.S. producers, importers, and purchasers were asked to assess how often differences other than price were significant in sales of CSPV cells and modules from the United States, subject, or nonsubject countries. As seen in tables 2.18 to 2.20, most responding firms reported that factors other than price were either only sometimes or never significant when comparing CSPV products across all sources.

Table 2.18 CSPV cells and modules: Count of U.S. producers reporting the significance of differences other than price between product produced in the United States and in other countries, by country pair

Country pair	Always	Frequently	Sometimes	Never
United States vs. Cambodia	3	1	5	3
United States vs. Malaysia	3	1	4	4
United States vs. Thailand	3	2	4	4
United States vs. Vietnam	3	1	4	4
Cambodia vs. Malaysia	2	1	6	4
Cambodia vs. Thailand	2	1	6	4
Cambodia vs. Vietnam	2	1	6	4
Malaysia vs. Thailand	2	1	5	5
Malaysia vs. Vietnam	2	1	5	5
Thailand vs. Vietnam	2	1	5	5
United States vs. South Korea	3	1	5	3
United States vs. Circumventing	3	1	5	3
United States vs. Other	3	1	5	3
Cambodia vs. South Korea	2	1	6	4
Cambodia vs. Circumventing	2	1	6	4
Cambodia vs. Other	2	1	6	4
Malaysia vs. South Korea	2	1	6	4
Malaysia vs. Circumventing	2	1	6	4
Malaysia vs. Other	2	1	6	4
Thailand vs. South Korea	2	1	6	4
Thailand vs. Circumventing	2	1	6	4
Thailand vs. Other	2	1	6	4
Vietnam vs. South Korea	2	1	6	4
Vietnam vs. Circumventing	2	1	6	4
Vietnam vs. Other	2	1	6	4
South Korea vs. Circumventing	2	1	6	4
South Korea vs. Other	2	1	6	4
Circumventing vs. Other	2	1	6	4

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Circumventing refers to sources in Cambodia, Malaysia, Thailand, and Vietnam that were found by the Department of Commerce to be circumventing the AD/CVD orders on CSPV products from China.

Table 2.19 CSPV cells and modules: Count of importers reporting the significance of differences between product produced in the United States and in other countries, by country pair

Country pair	Always	Frequently	Sometimes	Never
United States vs. Cambodia	6	3	7	8
United States vs. Malaysia	5	3	6	9
United States vs. Thailand	5	5	7	9
United States vs. Vietnam	5	6	7	10
Cambodia vs. Malaysia	3	2	7	11
Cambodia vs. Thailand	3	2	7	12
Cambodia vs. Vietnam	3	4	7	11
Malaysia vs. Thailand	4	2	6	12
Malaysia vs. Vietnam	4	4	6	11
Thailand vs. Vietnam	3	4	6	12
United States vs. South Korea	4	3	7	8
United States vs. Circumventing	5	4	6	8
United States vs. Other	4	4	8	8
Cambodia vs. South Korea	3	2	7	10
Cambodia vs. Circumventing	3	2	6	11
Cambodia vs. Other	3	3	7	9
Malaysia vs. South Korea	3	2	7	10
Malaysia vs. Circumventing	3	2	6	11
Malaysia vs. Other	3	3	7	9
Thailand vs. South Korea	3	2	7	10
Thailand vs. Circumventing	3	2	6	11
Thailand vs. Other	3	3	7	9
Vietnam vs. South Korea	3	3	7	10
Vietnam vs. Circumventing	3	3	6	11
Vietnam vs. Other	3	4	7	9
South Korea vs. Circumventing	3	2	6	10
South Korea vs. Other	3	3	6	9
Circumventing vs. Other	3	2	7	9

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Circumventing refers to sources in Cambodia, Malaysia, Thailand, and Vietnam that were found by the Department of Commerce to be circumventing the AD/CVD orders on CSPV products from China.

Table 2.20 CSPV cells and modules: Count of purchasers reporting the significance of differences between product produced in the United States and in other countries, by country pair

Country pair	Always	Frequently	Sometimes	Never
United States vs. Cambodia	1	3	2	3
United States vs. Malaysia	2	2	4	3
United States vs. Thailand	2	2	3	3
United States vs. Vietnam	2	3	4	3
Cambodia vs. Malaysia	1	2	2	3
Cambodia vs. Thailand	1	2	2	3
Cambodia vs. Vietnam	1	2	3	3
Malaysia vs. Thailand	2	2	3	3
Malaysia vs. Vietnam	2	2	4	3
Thailand vs. Vietnam	2	2	3	3
United States vs. South Korea	2	2	3	3
United States vs. Circumventing	1	3	4	3
United States vs. Other	1	3	3	3
Cambodia vs. South Korea	1	2	2	3
Cambodia vs. Circumventing	1	2	3	3
Cambodia vs. Other	1	2	3	3
Malaysia vs. South Korea	2	2	3	3
Malaysia vs. Circumventing	1	2	4	3
Malaysia vs. Other	1	2	3	3
Thailand vs. South Korea	2	2	3	3
Thailand vs. Circumventing	1	2	3	3
Thailand vs. Other	1	2	3	3
Vietnam vs. South Korea	2	2	3	3
Vietnam vs. Circumventing	1	2	5	3
Vietnam vs. Other	1	2	4	3
South Korea vs. Circumventing	1	2	3	3
South Korea vs. Other	1	2	2	3
Circumventing vs. Other	1	2	4	3

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Circumventing refers to sources in Cambodia, Malaysia, Thailand, and Vietnam that were found by the Department of Commerce to be circumventing the AD/CVD orders on CSPV products from China.

Elasticity estimates

This section discusses elasticity estimates; parties were encouraged to comment on these estimates however none were submitted.

U.S. supply elasticity

The domestic supply elasticity for CSPV products measures the sensitivity of the quantity supplied by U.S. producers to changes in the U.S. market price of CSPV products. The elasticity of domestic supply depends on several factors including the level of excess capacity, the ease with which producers can alter capacity, producers' ability to shift to production of other products, the existence of inventories, and the availability of alternate markets for U.S.-produced CSPV products. Based on available information, the domestic supply elasticity differs between CSPV cells and CSPV modules; therefore, two distinct elasticity estimates have been provided. With respect to CSPV cells, analysis of these factors above indicates that the U.S. industry has a low ability to increase or decrease shipments of cells to the U.S. market; an estimate in the range of 1 to 3 is suggested. The main factor mitigating responsiveness of supply in cells is limited production capacity for CSPV cells, as domestic commercial production did not restart until late 2024.³⁰ With respect to CSPV modules, staff estimates that the U.S. industry has a high ability to increase or decrease shipments of modules to the U.S. market; an estimate of 6 to 10 is suggested. The main contributing factors to the high degree of responsiveness of supply in modules include the high availability of unused capacity, increased availability of inventories, and ability to ship to all regions of the United States.

U.S. demand elasticity

The U.S. demand elasticity for CSPV products measures the sensitivity of the overall quantity demanded to a change in the U.S. market price of CSPV products. This estimate depends on factors discussed above such as the existence, availability, and commercial viability of substitute products, as well as the component share of the CSPV products in the production of any downstream products. Based on the available information, the aggregate demand for CSPV products is likely to be elastic; a range of -1.5 to -1.0 is suggested.

³⁰ ***. See *** U.S. producer questionnaire response, section 4.19.

Substitution elasticity

The elasticity of substitution depends upon the extent of product differentiation between the domestic and imported products.³¹ Product differentiation, in turn, depends upon such factors as quality (e.g., chemistry, appearance, etc.) and conditions of sale (e.g., availability, sales terms/discounts/promotions, etc.). Based on available information, the elasticity of substitution between U.S.-produced CSPV products and imported CSPV products is likely to be in the range of 3 to 5. Factors contributing to a high level of substitutability include the high degree of interchangeability between domestic and subject sources as reported by U.S. producers, importers, and purchasers. In addition, purchasers reported that domestic product was comparable to imports from subject sources across all factors other than price. Factors reducing substitutability include differences in lead times, which purchasers reported as a “very important” purchasing factor. Due to differences in availability, the elasticity is likely to be closer to the lower end of the range for cells and closer to the higher end of the range for modules.

³¹ The substitution elasticity measures the responsiveness of the relative U.S. consumption levels of the subject imports and the domestic like products to changes in their relative prices. This reflects how easily purchasers switch from the U.S. product to the subject products (or vice versa) when prices change.

Part 3: U.S. producers' production, shipments, and employment

The Commission analyzes a number of factors in making injury determinations (see 19 U.S.C. §§ 1677(7)(B) and 1677(7)(C)). Information on the subsidies and dumping margins was presented in Part 1 of this report and information on the volume and pricing of imports of the subject merchandise is presented in Part 4 and Part 5. Information on the other factors specified is presented in this section and/or Part 6 and (except as noted) is based on the questionnaire responses of sixteen firms that accounted for the vast majority of U.S. production of CSPV modules during 2024 and one additional firm, Suniva, Inc. ("Suniva") that accounted for all known U.S. production of CSPV cells¹ during 2024.²

U.S. producers

The Commission issued a U.S. producer questionnaire to 25 firms based on information contained in the petition and outside sources. Seventeen firms provided usable data on their operations.³ Table 3.1 lists U.S. producers of CSPV cells and modules, their production locations, positions on the petition, and shares of total production.

¹ Respondents testified that ES Foundry began CSPV cell production in the first quarter of 2025, hearing transcript, p. 162 (Roselund).

² [Solar Manufacturing Map | U.S. Department of Energy](https://www.energy.gov/eere/solar/solar-manufacturing-map), <https://www.energy.gov/eere/solar/solar-manufacturing-map>, accessed February 28, 2025.

³ Heliene USA Inc. submitted a late U.S. producer questionnaire response and its data are not included in the staff report. In 2024, ***. Heliene USA Inc.'s U.S. producer questionnaire response, section II-3b.

Table 3.1 CSPV cells and modules: U.S. producers, their positions on the petition, production locations, and shares of reported production, 2024

Shares in percent

Firm	Position on petition	Production location(s)	Share of module production	Share of cell production
Canadian Solar	***	Mesquite, TX	***	***
GAF Energy	***	San Jose, CA Georgetown, TX	***	***
Hanwha GA	Petitioner	Dalton, GA Cartersville, GA	***	***
Hounen	***	Orangeburg, SC	***	***
Illuminate	***	Pataskala, OH	***	***
Jinko US	***	Jacksonville, FL	***	***
Merlin	***	San Jose, CA	***	***
Meyer Burger	Petitioner	Goodyear, AZ	***	***
Mission	Petitioner	San Antonio, TX	***	***
PowerFilm	***	Ames, IA	***	***
Runergy	***	Huntsville, AL	***	***
Silfab	***	Bellingham WA Burlington WA	***	***
Suniva	***	Norcross, GA	***	***
SunTegra	***	Larchmont, NY Endicott, NY	***	***
Tesla	***	Buffalo, NY	***	***
Trina/T1	***	Wilmer, TX	***	***
ZampTech	***	Bend, OR	***	***
All firms	Various	Various	100.0	100.0

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "---". ***. Letter to the Commission from T1 Energy, April 17, 2025, p. 2.

Table 3.2 presents information on U.S. producers' ownership, related and/or affiliated firms.

Table 3.2 CSPV cells and modules: U.S. producers' ownership, related and/or affiliated firms

[illegible]

Table continued.

Table 3.2 (Continued) CSPV cells and modules: U.S. producers' ownership, related and/or affiliated firms

Reporting firm	Relationship type and related firm	Details of relationship
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***

Table continued.

Table 3.2 (Continued) CSPV cells and modules: U.S. producers' ownership, related and/or affiliated firms

Reporting firm	Relationship type and related firm	Details of relationship
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

As indicated in table 3.2, nine U.S. producers are related to foreign producers of the subject merchandise and seven U.S. producers are related to U.S. importers/exporters of the subject merchandise. In addition, as discussed in greater detail below, nine U.S. producers directly import the subject merchandise from subject sources and seven purchase the subject merchandise from U.S. importers from subject sources.

Table 3.3 presents events in the U.S. industry since January 1, 2022. Many industry events and announcements for new facilities took place after the passing of the Inflation Reduction Act (“IRA”) of 2022. The IRA updated and extended the Investment Tax Credit (“ITC”) and the Production Tax Credit (“PTC”), two of the major federal policies that promote solar energy. The IRA increased the ITC back to 30 percent and extended it through 2034, and

extended the PTC of 2.75 cents/kWh through at least 2025 for systems that meet the prevailing wage and apprenticeship requirements or are under 1 MW in size.⁴ In addition, the IRA established the Advanced Manufacturing Production Tax Credit and expanded the Advanced Energy Project Investment Tax Credit for manufacturers of eligible components. After January 1, 2025, the ITC and PTC were replaced by the Clean Electricity Investment Tax Credit and the Clean Energy Production Tax Credit CEPTC, which are generally calculated in the same way as the traditional ITC and PTC and function similarly to the traditional ITC and PTC but are not technology specific.⁵

According to an industry report, domestic capacity to produce CSPV modules and cells experienced strong growth in recent years. U.S. module production capacity increased from 14.5 GW in 2023 to 42.1 GW in 2024 and exceeded 50.0 GW in early 2025.⁶ Additionally, U.S. cell production capacity came back online for the first time since 2019 – Suniva restarted cell production in 2024, and ES Foundry commenced cell production in early 2025.⁷

Table 3.3 CSPV cells and modules: Important industry events since 2022

Item	Firm	Event
Acquisition	Freyr	In December 2024, Freyr completed the \$380 million acquisition of Trina/T1 Solar's 5 GW solar module manufacturing facility located in Wilmer, Texas. The facility began production in late 2024 and is expected to be at full production levels by H2 2025.
Funding	Silfab Solar	In November 2024, Silfab Solar announced it had secured \$100 million in funding to scale its manufacturing facility in Fort Mill, South Carolina. Once operational, the facility will produce 1 GW of solar cells and 1.3 GW of solar modules.
Plant closure	LG Electronics	In June 2022, LG Electronics ceased production at its 550 MW module assembly plant in Huntsville, Alabama, citing supply constraints and increased material and logistics costs.
Plant expansion	Hanwha Q Cells	In October 2023, Hanwha Q Cells completed the expansion of its plant in Dalton, Georgia. This expansion increased its solar capacity by 2 GW, bringing the plant's total capacity to 5.1 GW.

⁴ U.S. Environmental Protection Agency, "Summary of Inflation Reduction Act provisions related to renewable energy," January 28, 2025, <https://www.epa.gov/green-power-markets/summary-inflation-reduction-act-provisions-related-renewable-energy>.

⁵ U.S. Department of Treasury, "U.S. Department of the Treasury Releases Final Rules for Technology-Neutral Clean Electricity Credits," January 7, 2025, <https://home.treasury.gov/news/press-releases/jy2774>.

⁶ Solar Energy Industries Association, "Solar Market Insight Report 2024 Year in Review," March 11, 2025, <https://seia.org/research-resources/solar-market-insight-report-2024-year-in-review/>.

⁷ Ibid.

Item	Firm	Event
Plant expansion	Heliene	In late 2023, Heliene expanded its module production line in Mountain Iron, Minnesota, which increased capacity to 300 MW.
Plant opening	Canadian Solar	During Q4 of 2023, Canadian Solar began commercial production at its 5 GW module assembly plant located in Mesquite, Texas. This is Canadian Solar's first U.S. production facility.
Plant opening	Illuminate	In February 2024, Illuminate began commercial operations at its 5 GW solar panel manufacturing facility located in Pataskala, Ohio.
Plant opening	Elin Energy	In March 2024, Elin Energy began production at its 2 GW solar panel assembly facility located in Waller County, Texas.
Plant opening	Meyer Burger	In June 2024, Meyer Burger started production at its 2 GW module assembly plant located in Goodyear, Arizona.
Plant opening	SEG Solar	In August 2024, SEG Solar began production at its 2 GW solar module facility in Texas. The facility operates two production lines for 182 mm and 210 mm N-type modules.
Plant opening	First Solar	In September 2024, First Solar opened its 3.5 GW thin-film solar manufacturing facility in Lawrence County, Alabama.
Plant opening	Runergy	In October 2024, Runergy began commercial production at its 2 GW solar panel facility in Huntsville, Alabama.
Plant opening	Imperial Star Solar	In December 2024, Imperial Star Solar began production at its 2 GW module manufacturing facility in Tomball, Texas.
Plant opening	Waaree Energies	In January 2025, Waaree Energies started commercial production at its 1.6 GW module manufacturing facility in Brookshire, Texas.
Plant opening	ES Foundry	In early 2025, ES Foundry began production of PERC solar cells at its plant located in South Carolina. The plant is expected to reach shipment capacity of 3 GW by Q3 2025.
Production restart	Suniva	In late 2024, Suniva restarted solar cell production at its facility located in Gwinnett County, Georgia. The firm announced that the revamped facility has the capacity to produce 1 GW of solar cells annually, with plans to expand to 2.5 GW in the future.
Supply chain agreement	Suniva and Heliene	In March 2024, Heliene and Suniva announced a three-year sourcing contract, under which Heliene will produce solar modules using solar cells produced domestically by Suniva.
Supply chain agreement	Suniva and Heliene	In March 2025, Suniva and Heliene announced an agreement with chipmaker Corning to domestically produce solar modules using polysilicon, wafers, and cells manufactured in the United States.

Source: Energy Storage News, "Freyr closes acquisition of Trina/T1's US solar facility," December 30, 2024, <https://www.energy-storage.news/freyr-closes-us380-million-acquisition-of-Trina/T1s-us-solar-facility/>; Solar Power World, "LG to exit solar panel manufacturing and close Alabama plant," February 23, 2022, <https://www.solarpowerworldonline.com/2022/02/lg-to-exit-solar-panel-manufacturing-and-close-alabama-plant/>; Qcells, "Qcells North America Completes Dalton Factory Expansion," October 18, 2023, <https://us.qcells.com/blog/qcells-north-america-completes-dalton-factory-expansion/>; PV Tech, "Canadian Solar launches 5GW TOPCon module assembly plant in Texas," June 12, 2024, <https://www.pv->

[tech.org/canadian-solar-launches-5gw-topcon-module-assembly-plant-texas/](https://www.power-technology.com/news/first-solar-opens-1-1bn-solar-facility-adds-3-5gw-to-us-manufacturing-capacity/?cf-view); Power Technology, “First Solar opens \$1.1bn solar facility, adds 3.5GW to US manufacturing capacity,” September 27, 2024, <https://www.power-technology.com/news/first-solar-opens-1-1bn-solar-facility-adds-3-5gw-to-us-manufacturing-capacity/?cf-view>; Energy Tech, “Illuminate USA Begins Operations at Solar Panel Manufacturing Facility in Ohio,” February 27, 2024, <https://www.energytech.com/renewables/article/21283538/illuminate-usa-begins-operations-at-solar-panel-manufacturing-facility-in-ohio>; Solar Builder, “Elin Energy opens U.S. solar module manufacturing facility,” April 12, 2024, <https://solarbuildermag.com/news/elin-energy-opens-u-s-solar-module-manufacturing-facility/>; PV Tech, “Meyer Burger starts module production in Arizona, secures 600MW PV supply,” June 25, 2024, <https://www.pv-tech.org/meyer-burger-starts-module-production-in-arizona-secures-600mw-pv-supply/>; Power Technology, “SEG Solar opens 2GW PV module plant in Texas,” August 14, 2024, <https://www.power-technology.com/news/seg-solar-opens-2gw-pv-module-plant-in-texas/?cf-view>; PV Tech, “SEG Solar ships first N-Type modules from Houston factory,” November 24, 2024, <https://www.pv-tech.org/industry-updates/seg-solar-ships-first-n-type-modules-from-houston-factory/>; Imperial Star, “Imperial Star Solar Kicks Off Domestic Production at New Houston Manufacturing Facility,” December 20, 2024, <https://www.imperialstar.com/post/imperial-star-kicks-off-domestic-production-at-houston>; PV Tech, “ES Foundry begins producing PERC cells at US manufacturing plant,” February 3, 2025, <https://www.pv-tech.org/es-foundry-begins-producing-perc-cells-at-us-manufacturing-plant/>; Electrek, “The US’s largest solar cell factory is now online in South Carolina,” February 3, 2025, <https://electrek.co/2025/02/03/us-largest-solar-cell-factory-south-carolina/>; AJC News, “Once-shuttered solar factory resumes production outside Atlanta,” November 13, 2024, <https://www.ajc.com/news/business/suniva-once-filed-bankruptcy-its-producing-solar-panels-again/UVX5DKR6QJGHTLTTJEJJH2QHKE/>; Utility Dive, “Corning, Suniva and Heliene form US solar supply chain,” March 11, 2025, <https://www.utilitydive.com/news/corning-suniva-heliene-hemlock-semiconductor-form-us-solar-supply-chain/742155/>; Renewables Now, “Waaree Energies powers up 1.6-GW solar module line in Texas,” January 27, 2025, <https://renewablesnow.com/news/waaree-energies-powers-up-1-6-gw-solar-module-line-in-texas-1269854/>; Solar Power World, “Runergy opens solar panel assembly factory in Alabama,” October 3, 2024, <https://www.solarpowerworldonline.com/2024/10/runergy-opens-solar-panel-assembly-factory-in-alabama/>; PV Tech, “Heliene expands Minnesota TOPCon module line to 300MW,” December 6, 2023, <https://www.pv-tech.org/heliene-expands-minnesota-topcon-module-line-to-300mw/>; PV Magazine, “Suniva, Heliene to jointly produce US-made solar modules,” March 28, 2024, <https://www.pv-magazine.com/2024/03/28/suniva-heliene-to-jointly-produce-us-made-solar-modules/>; Silfab Solar, “Silfab Solar Raises \$100 million to Scale its Cell Manufacturing Facility in Fort Mill, S.C.,” November 21, 2024, <https://silfabsolar.com/silfab-solar-raises-100-million-to-scale-its-cell-manufacturing-facility-in-fort-mill-s-c/>.

Producers in the United States were asked to report any change in the character of their operations or organization relating to the production of CSPV cells and modules since 2022. Fifteen of seventeen producers indicated in their questionnaires that they had experienced such changes. Table 3.4 presents the changes identified by these producers.

Table 3.4 CSPV cells and modules: U.S. producers' reported changes in operations, since January 1, 2022

Item	Firm name and narrative response on changes in operations
Plant openings	***
Plant openings	***
Plant openings	***
Plant openings	***
Plant openings	***
Plant openings	***
Plant openings	***
Plant openings	***
Plant openings	***
Plant openings	***
Plant closings	***
Plant closings	***
Prolonged shutdowns	***
Prolonged shutdowns	***

Table continued.

Table 3.4 (Continued) CSPV cells and modules: U.S. producers' reported changes in operations, since January 1, 2022

Item	Firm name and narrative response on changes in operations
Production curtailments	***
Relocations	***
Relocations	***
Expansions	***
Expansions	***
Expansions	***
Expansions	***
Expansions	***
Expansions	***
Acquisitions	***
Other	***
Other	***

Source: Compiled from data submitted in response to Commission questionnaires.

Table 3.5 presents U.S. producers' reported anticipated changes in operations of CSPV cells and CSPV modules production.

Table 3.5 CSPV cells and modules: U.S. producers' anticipated changes in operations, by product type, since January 1, 2022

Firm	Product type and narrative response on anticipated changes in operations
***	***
***	***
***	***
***	***
***	***
***	***
***	***
***	***
***	***
***	***
***	***
***	***
***	***
***	***
***	***
***	***

Table continued.

Table 3.5 (Continued) CSPV cells and modules: U.S. producers' anticipated changes in operations, by product type, since January 1, 2022

Firm	Product type and narrative response on anticipated changes in operations
***	***
***	***
***	***

Source: Compiled from data submitted in response to Commission questionnaires.

U.S. production, capacity, and capacity utilization

Tables 3.6 and 3.7 present U.S. producers' installed and practical capacity and production on the same equipment used to produce CSPV cells and CSPV modules, respectively. During the period for which data were collected, U.S. CSPV cell production did not begin until 2024, and *** were produced on the same equipment and machinery used to produce CSPV cells. Regarding CSPV modules, during 2022 to 2024, U.S. producers' installed overall capacity and practical overall capacity increased by 612.8 percent and by *** percent, respectively. One U.S. producer *** reported producing *** on the same equipment and machinery used to produce CSPV modules.⁸ Therefore, practical overall capacity compared to practical CSPV module capacity remained the same or similar, as did practical overall production compared to practical CSPV module production. U.S. producers' CSPV module production increased by *** percent during 2022 to 2024.

⁸ ***'s U.S. producer questionnaire, section II.3b.

Table 3.6 CSPV cells: U.S. producers’ installed and practical capacity, production, and capacity utilization on the same equipment as in-scope production, by period

Capacity and production in kilowatts; utilization in percent

Item	Measure	2022	2023	2024
Installed overall	Capacity	***	***	***
Installed overall	Production	***	***	***
Installed overall	Utilization	***	***	***
Practical overall	Capacity	***	***	***
Practical overall	Production	***	***	***
Practical overall	Utilization	***	***	***
Practical CSPV cells	Capacity	***	***	***
Practical CSPV cells	Production	***	***	***
Practical CSPV cells	Utilization	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Zeroes, null values, and undefined calculations are suppressed and shown as “—”.

Table 3.7 CSPV modules: U.S. producers’ installed and practical capacity, production, and capacity utilization on the same equipment as in-scope production, by period

Capacity and production in kilowatts; utilization in percent

Item	Measure	2022	2023	2024
Installed overall	Capacity	3,845,917	7,685,022	27,413,421
Installed overall	Production	***	***	***
Installed overall	Utilization	***	***	***
Practical overall	Capacity	***	***	***
Practical overall	Production	***	***	***
Practical overall	Utilization	***	***	***
Practical CSPV modules	Capacity	3,081,158	4,717,119	17,851,661
Practical CSPV modules	Production	***	***	***
Practical CSPV modules	Utilization	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Table 3.8 presents U.S. producers’ reported narratives regarding practical capacity constraints.

Table 3.8 CSPV cells and modules: U.S. producers' reported capacity constraints since January 1, 2022

Item	Firm name and narrative response on constraints to practical overall capacity
Production bottlenecks	***
Production bottlenecks	***
Production bottlenecks	***
Production bottlenecks	***
Production bottlenecks	***
Existing labor force	***
Existing labor force	***
Existing labor force	***
Existing labor force	***
Existing labor force	***
Existing labor force	***
Existing labor force	***
Existing labor force	***
Existing labor force	***
Supply of material inputs	***
Supply of material inputs	***

Table continued.

Table 3.8 (Continued) CSPV cells and modules: U.S. producers' reported capacity constraints since January 1, 2022

Item	Firm name and narrative response on constraints to practical overall capacity
Supply of material inputs	***
Supply of material inputs	***
Supply of material inputs	***
Supply of material inputs	***
Supply of material inputs	***
Supply of material inputs	***
Supply of material inputs	***
Fuel or energy	***
Storage capacity	***
Logistics/transportation	***
Logistics/transportation	***
Logistics/transportation	***
Logistics/transportation	***

Table continued.

Table 3.8 (Continued) CSPV cells and modules: U.S. producers' reported capacity constraints since January 1, 2022

Item	Firm name and narrative response on constraints to practical overall capacity
Other constraints	***
Other constraints	***
Other constraints	***
Other constraints	***
Other constraints	***
Other constraints	***
Other constraints	***
Other constraints	***
Other constraints	***
Other constraints	***

Source: Compiled from data submitted in response to Commission questionnaires.

Table 3.9 and figure 3.1 present U.S. producers' production, capacity, and capacity utilization pertaining to CSPV modules. During 2022 to 2024, U.S. producers' capacity utilization decreased by *** percentage points. Capacity utilization decreased throughout the period as new firms began CSPV module production and their initial production was low relative to capacity.⁹ Despite *** shutting its CSPV modules production in 2022, overall production increased *** from 2022 to 2024. Overall, industry trends were driven by *** capacity and production increases, as the company accounted for over *** of CSPV module production throughout the period for which data were collected. Despite *

⁹ ***.

** share of overall capacity and production was lowest in 2024 as new firms entered the industry.

Table 3.9 CSPV modules: U.S. producers' output, by firm and period

Practical capacity

Capacity in kilowatts

Firm	2022	2023	2024
Canadian Solar	***	***	***
GAF Energy	***	***	***
Hanwha GA	***	***	***
Hounen	***	***	***
Illuminate	***	***	***
Jinko US	***	***	***
Merlin	***	***	***
Meyer Burger	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
Silfab	***	***	***
SunTegra	***	***	***
Tesla	***	***	***
Trina/T1	***	***	***
ZampTech	***	***	***
All firms	3,081,158	4,717,119	17,851,661

Table continued.

Table 3.9 (Continued) CSPV modules: U.S. producers' output, by firm and period

Production

Production in kilowatts

Firm	2022	2023	2024
Canadian Solar	***	***	***
GAF Energy	***	***	***
Hanwha GA	***	***	***
Hounen	***	***	***
Illuminate	***	***	***
Jinko US	***	***	***
Merlin	***	***	***
Meyer Burger	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
Silfab	***	***	***
SunTegra	***	***	***
Tesla	***	***	***
Trina/T1	***	***	***
ZampTech	***	***	***
All firms	***	***	***

Table continued.

Table 3.9 (Continued) CSPV modules: U.S. producers' output, by firm and period

Capacity utilization

Capacity utilization in percent

Firm	2022	2023	2024
Canadian Solar	***	***	***
GAF Energy	***	***	***
Hanwha GA	***	***	***
Hounen	***	***	***
Illuminate	***	***	***
Jinko US	***	***	***
Merlin	***	***	***
Meyer Burger	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
Silfab	***	***	***
SunTegra	***	***	***
Tesla	***	***	***
Trina/T1	***	***	***
ZampTech	***	***	***
All firms	***	***	***

Note: Capacity utilization ratio represents the ratio of the U.S. producer's production to its production capacity.

Table continued.

Table 3.9 (Continued) CSPV modules: U.S. producers' output, by firm and period**Share of production**

Share in percent

Firm	2022	2023	2024
Canadian Solar	***	***	***
GAF Energy	***	***	***
Hanwha GA	***	***	***
Hounen	***	***	***
Illuminate	***	***	***
Jinko US	***	***	***
Merlin	***	***	***
Meyer Burger	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
Silfab	***	***	***
SunTegra	***	***	***
Tesla	***	***	***
Trina/T1	***	***	***
ZampTech	***	***	***
All firms	100.0	100.0	100.0

Source: Compiled from data submitted in response to Commission questionnaires.

Figure 3.1 CSPV modules: U.S. producers’ output, by period

* * * * *

Source: Compiled from data submitted in response to Commission questionnaires.

Alternative products

Suniva *** report the production of other products on the same equipment and machinery used to produce CSPV cells. U.S. producers reported less than *** percent production of other products on the same equipment and machinery used to produce CSPV modules.

U.S. producers’ U.S. shipments and exports

Tables 3.10 and 3.11 present U.S. producers’ U.S. shipments, export shipments, and total shipments of CSPV cells and CSPV modules, respectively. 2024 was the first year of CSPV cell production and shipments during the period for which data were collected. During 2022 to 2024, U.S. producers’ U.S. shipments of CSPV modules increased overall by *** percent, in terms of quantity, and by *** percent, in terms of value. As a result of shipments increasing greater by quantity compared to value, the unit value of U.S. shipments decreased by *** percent from 2022 to 2024. Export shipments *** during the period for which data were collected.

Table 3.10 CSPV cells: U.S. producers' total shipments, by destination and period

Quantity in kilowatts; value in 1,000 dollars; unit value in dollars per kilowatt; shares in percent

Item	Measure	2022	2023	2024
U.S. shipments	Quantity	***	***	***
Export shipments	Quantity	***	***	***
Total shipments	Quantity	***	***	***
U.S. shipments	Value	***	***	***
Export shipments	Value	***	***	***
Total shipments	Value	***	***	***
U.S. shipments	Unit value	***	***	***
Export shipments	Unit value	***	***	***
Total shipments	Unit value	***	***	***
U.S. shipments	Share of quantity	***	***	***
Export shipments	Share of quantity	***	***	***
Total shipments	Share of quantity	—	—	100.0
U.S. shipments	Share of value	***	***	***
Export shipments	Share of value	***	***	***
Total shipments	Share of value	—	—	100.0

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Zeroes, null values, and undefined calculations are suppressed and shown as “—”.

Table 3.11 CSPV modules: U.S. producers' total shipments, by destination and period

Quantity in kilowatts; value in 1,000 dollars; unit value in dollars per kilowatt; shares in percent

Item	Measure	2022	2023	2024
U.S. shipments	Quantity	***	***	***
Export shipments	Quantity	***	***	***
Total shipments	Quantity	***	***	***
U.S. shipments	Value	***	***	***
Export shipments	Value	***	***	***
Total shipments	Value	***	***	***
U.S. shipments	Unit value	***	***	***
Export shipments	Unit value	***	***	***
Total shipments	Unit value	***	***	***
U.S. shipments	Share of quantity	***	***	***
Export shipments	Share of quantity	***	***	***
Total shipments	Share of quantity	100.0	100.0	100.0
U.S. shipments	Share of value	***	***	***
Export shipments	Share of value	***	***	***
Total shipments	Share of value	100.0	100.0	100.0

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Zeroes, null values, and undefined calculations are suppressed and shown as “—”.

Table 3.12 presents U.S. producers' U.S. shipments of CSPV modules by type. Suniva *** internal consumption or transfers to related firms of CSPV cells during its first year of production in 2024. During 2022 to 2024, U.S. producers' commercial U.S. shipments accounted for between *** percent and *** percent of total U.S. shipments, in terms of quantity and in terms of value. During the period for which data were collected, commercial U.S. shipments, transfers, and internal consumption increased. U.S. producers' transfers to related firms accounted for *** percent of U.S. shipments, in terms of quantity, and *** percent of U.S. shipments, in terms of value, in 2024. During 2022 and 2023, U.S. producers' transfers to related firms accounted for less than *** percent of U.S. shipments both in terms of quantity and in terms of value. *** U.S. producers reported internal consumption, and *** firms reported transfers to related firms.

Table 3.12 CSPV modules: U.S. producers' U.S. shipments, by type and period

Quantity in kilowatts; value in 1,000 dollars; unit value in dollars per kilowatt; shares in percent

Item	Measure	2022	2023	2024
Commercial U.S. shipments	Quantity	***	***	***
Internal consumption	Quantity	***	***	***
Transfers to related firms	Quantity	***	***	***
U.S. shipments	Quantity	***	***	***
Commercial U.S. shipments	Value	***	***	***
Internal consumption	Value	***	***	***
Transfers to related firms	Value	***	***	***
U.S. shipments	Value	***	***	***
Commercial U.S. shipments	Unit value	***	***	***
Internal consumption	Unit value	***	***	***
Transfers to related firms	Unit value	***	***	***
U.S. shipments	Unit value	***	***	***
Commercial U.S. shipments	Share of quantity	***	***	***
Internal consumption	Share of quantity	***	***	***
Transfers to related firms	Share of quantity	***	***	***
U.S. shipments	Share of quantity	***	***	***
Commercial U.S. shipments	Share of value	***	***	***
Internal consumption	Share of value	***	***	***
Transfers to related firms	Share of value	***	***	***
U.S. shipments	Share of value	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "---".

U.S. producers' inventories

Tables 3.13 and 3.14 present U.S. producers' end-of-period inventories and the ratio of these inventories to U.S. producers' production, U.S. shipments, and total shipments of CSPV cells and CSPV modules, respectively. *** U.S. producers reported end-of-period inventories during the period for which data were collected. U.S. producers' end-of-period inventories of CSPV modules increased by 670.7 percent during 2022 to 2024, with most of the increase taking place from 2023 to 2024. Of the *** U.S. CSPV modules producers that reported end-of-period inventories, *** U.S. producers' end-of-period inventories increased during 2022 to 2024. During 2022 to 2024, U.S. producers of CSPV modules' end-of-period inventories as a ratio to U.S. production, U.S. shipments, and total shipments increased, with the three ratios ending *** percentage points, *** percentage points, and *** percentage points higher, respectively, in 2024 compared to 2022.

Table 3.13 CSPV cells: U.S. producers' inventories and their ratio to select items, by period

Quantity in kilowatts; ratio in percent

Item	2022	2023	2024
End-of-period inventory quantity	***	***	***
Inventory ratio to U.S. production	***	***	***
Inventory ratio to U.S. shipments	***	***	***
Inventory ratio to total shipments	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Zeroes, null values, and undefined calculations are suppressed and shown as “—”.

Table 3.14 CSPV modules: U.S. producers' inventories and their ratio to select items, by period

Quantity in kilowatts; ratio in percent

Item	2022	2023	2024
End-of-period inventory quantity	131,428	275,172	1,012,885
Inventory ratio to U.S. production	***	***	***
Inventory ratio to U.S. shipments	***	***	***
Inventory ratio to total shipments	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

U.S. producers' imports from subject sources

U.S. producers' imports of CSPV cells and modules from subject sources are presented in tables 3.15 through 3.23 and reasons for these imports are presented in table 3.24. CSPV cells are needed to produce CSPV modules. During the period for which data were collected, the United States CSPV cell industry did not produce enough CSPV cells to supply U.S. CSPV module producers. Therefore, U.S. producers of CSPV modules either imported or purchased imports of CSPV cells to assemble CSPV modules.

Table 3.15 CSPV cells and modules: *'s U.S. production, subject imports, and ratio of subject imports to production, by source and period**

Quantity in kilowatts; ratio in percent

Item	Measure	2022	2023	2024
U.S. production	Quantity	***	***	***
Imports from ***	Quantity	***	***	***
Imports from *** to U.S. production	Ratio	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Zeroes, null values, and undefined calculations are suppressed and shown as “—”. *** reported a small amount of nonsubject imports from Thailand in 2023 and 2024 that are not included in this table. Appendix D includes a version of this table that reclassifies ***'s Appendix IV imports from Thailand as nonsubject.

Table 3.16 CSPV cells and modules: *'s U.S. production, subject imports, and ratio of subject imports to production, by source and period**

Quantity in kilowatts; ratio in percent

Item	Measure	2022	2023	2024
U.S. production	Quantity	***	***	***
Imports from ***	Quantity	***	***	***
Imports from ***	Quantity	***	***	***
Imports from ***	Quantity	***	***	***
Imports from ***	Quantity	***	***	***
Imports from ***	Quantity	***	***	***
Imports from ***	Quantity	***	***	***
Imports from ***	Quantity	***	***	***
Imports from *** to U.S. production	Ratio	***	***	***
Imports from *** to U.S. production	Ratio	***	***	***
Imports from *** to U.S. production	Ratio	***	***	***
Imports from *** to U.S. production	Ratio	***	***	***
Imports from *** to U.S. production	Ratio	***	***	***
Imports from *** to U.S. production	Ratio	***	***	***
Imports from *** to U.S. production	Ratio	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Zeroes, null values, and undefined calculations are suppressed and shown as “—”.

Table 3.17 CSPV cells and modules: *'s U.S. production, subject imports, and ratio of subject imports to production, by source and period**

Quantity in kilowatts; ratio in percent

Item	Measure	2022	2023	2024
U.S. production	Quantity	***	***	***
Imports from ***	Quantity	***	***	***
Imports from *** to U.S. production	Ratio	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Zeroes, null values, and undefined calculations are suppressed and shown as “—”.

Table 3.18 CSPV cells and modules: *'s U.S. production, subject imports, and ratio of subject imports to production, by source and period**

Quantity in kilowatts; ratio in percent

Item	Measure	2022	2023	2024
U.S. production	Quantity	***	***	***
Imports from ***	Quantity	***	***	***
Imports from ***	Quantity	***	***	***
Imports from ***	Quantity	***	***	***
Imports from *** to U.S. production	Ratio	***	***	***
Imports from *** to U.S. production	Ratio	***	***	***
Imports from *** to U.S. production	Ratio	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Zeroes, null values, and undefined calculations are suppressed and shown as “—”.

Table 3.19 CSPV cells and modules: *'s U.S. production, subject imports, and ratio of subject imports to production, by source and period**

Quantity in kilowatts; ratio in percent

Item	Measure	2022	2023	2024
U.S. production	Quantity	***	***	***
Imports from ***	Quantity	***	***	***
Imports from *** to U.S. production	Ratio	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Zeroes, null values, and undefined calculations are suppressed and shown as “—”.

Table 3.20 CSPV cells and modules: *'s U.S. production, subject imports, and ratio of subject imports to production, by source and period**

Quantity in kilowatts; ratio in percent

Item	Measure	2022	2023	2024
U.S. production	Quantity	***	***	***
Imports from ***	Quantity	***	***	***
Imports from ***	Quantity	***	***	***
Imports from ***	Quantity	***	***	***
Imports from *** to U.S. production	Ratio	***	***	***
Imports from *** to U.S. production	Ratio	***	***	***
Imports from *** to U.S. production	Ratio	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Table 3.21 CSPV cells and modules: *'s U.S. production, subject imports, and ratio of subject imports to production, by source and period**

Quantity in kilowatts; ratio in percent

Item	Measure	2022	2023	2024
U.S. production	Quantity	***	***	***
Imports from ***	Quantity	***	***	***
Imports from *** to U.S. production	Ratio	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Zeroes, null values, and undefined calculations are suppressed and shown as “—”.

Table 3.22 CSPV cells and modules: *'s U.S. production, subject imports, and ratio of subject imports to production, by source and period**

Quantity in kilowatts; ratio in percent

Item	Measure	2022	2023	2024
U.S. production	Quantity	***	***	***
Imports from ***	Quantity	***	***	***
Imports from *** to U.S. production	Ratio	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Zeroes, null values, and undefined calculations are suppressed and shown as “—”.

Table 3.23 CSPV cells and modules: *'s U.S. production, subject imports, and ratio of subject imports to production, by source and period**

Quantity in kilowatts; ratio in percent

Item	Measure	2022	2023	2024
U.S. production	Quantity	***	***	***
Imports from ***	Quantity	***	***	***
Imports from ***	Quantity	***	***	***
Imports from ***	Quantity	***	***	***
Imports from *** to U.S. production	Ratio	***	***	***
Imports from *** to U.S. production	Ratio	***	***	***
Imports from *** to U.S. production	Ratio	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Zeroes, null values, and undefined calculations are suppressed and shown as “—”. Appendix D includes a version of this table that reclassifies ***'s Appendix IV imports from Thailand as nonsubject.

Table 3.24 CSPV cells and modules: U.S. producers' reasons for importing

Item	Narrative response on reasons for importing
***'s reason for importing	***
***'s reason for importing	***
***'s reason for importing	***
***'s reason for importing	***
***'s reason for importing	***
***'s reason for importing	***
***'s reason for importing	***
***'s reason for importing	***
***'s reason for importing	***

Source: Compiled from data submitted in response to Commission questionnaires.

U.S. producers' purchases of imports from subject sources

U.S. producers' purchases of imports from subject sources are presented in tables 3.25 through 3.29 and reasons for these purchases are presented in table 3.30. During the period for which data were collected, the United States CSPV cell industry did not produce enough CSPV cells to supply U.S. CSPV module producers. Therefore, U.S. producers of CSPV modules either imported or purchased imports of CSPV cells to assemble CSPV modules.

Table 3.25 CSPV cells and modules: *'s U.S. production and purchases of imports from subject sources, by source, importer of record, and period**

Quantity in kilowatts; ratio in percent

Item	Measure	2022	2023	2024
***'s U.S. production	Quantity	***	***	***
***'s purchases of U.S. imports from Malaysia imported by ***	Quantity	***	***	***
***'s U.S. imports from Malaysia	Quantity	***	***	***
Ratio 1: ***'s purchases of U.S. imports from Malaysia imported by *** relative to ***'s U.S. imports from Malaysia	Ratio	***	***	***
Overall U.S. imports from Malaysia	Quantity	***	***	***
Ratio 2: ***'s U.S. imports from Malaysia relative to overall U.S. imports from Malaysia	Ratio	***	***	***
Ratio 3: ***'s U.S. imports from Malaysia relative to *** U.S. production	Ratio	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Zeroes, null values, and undefined calculations are suppressed and shown as “—”.

Table 3.26 CSPV cells and modules: *'s U.S. production and purchases of imports from subject sources, by source, importer of record, and period**

Quantity in kilowatts; ratio in percent

Item	Measure	2022	2023	2024
***'s U.S. production	Quantity	***	***	***
***'s purchases of U.S. imports from Malaysia imported by ***	Quantity	***	***	***
***'s U.S. imports from Malaysia	Quantity	***	***	***
Ratio 1: ***'s purchases of U.S. imports from Malaysia imported by *** relative to ***'s U.S. imports from Malaysia	Ratio	***	***	***
Overall U.S. imports from Malaysia	Quantity	***	***	***
Ratio 2: ***'s U.S. imports from Malaysia relative to overall U.S. imports from Malaysia	Ratio	***	***	***
Ratio 3: ***'s U.S. imports from Malaysia relative to ***'s U.S. production	Ratio	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Zeroes, null values, and undefined calculations are suppressed and shown as “—”.

Table 3.27 CSPV cells and modules: *'s U.S. production and purchases of imports from subject sources, by source, importer of record, and period**

Quantity in kilowatts; ratio in percent

Item	Measure	2022	2023	2024
***'s U.S. production	Quantity	***	***	***
***'s purchases of U.S. imports from Thailand imported by ***	Quantity	***	***	***
***'s U.S. imports from Thailand	Quantity	***	***	***
Ratio 1: ***'s purchases of U.S. imports from Thailand imported by *** relative to ***'s U.S. imports from Thailand	Ratio	***	***	***
Overall U.S. imports from Thailand	Quantity	***	***	***
Ratio 2: ***'s U.S. imports from Thailand relative to overall U.S. imports from Thailand	Ratio	***	***	***
Ratio 3: ***'s U.S. imports from Thailand relative to ***'s U.S. production	Ratio	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Zeroes, null values, and undefined calculations are suppressed and shown as “—”.

Table 3.28 CSPV cells and modules: *'s U.S. production and purchases of imports from subject sources, by source, importer of record, and period**

Quantity in kilowatts; ratio in percent

Item	Measure	2022	2023	2024
***'s U.S. production	Quantity	***	***	***
***'s purchases of U.S. imports from Malaysia imported by ***	Quantity	***	***	***
***'s U.S. imports from Malaysia	Quantity	***	***	***
Ratio 1: ***'s purchases of U.S. imports from Malaysia imported by *** relative to ***'s U.S. imports from Malaysia	Ratio	***	***	***
Overall U.S. imports from Malaysia	Quantity	***	***	***
Ratio 2: ***'s U.S. imports from Malaysia relative to overall U.S. imports from Malaysia	Ratio	***	***	***
Ratio 3: ***'s U.S. imports from Malaysia relative to ***'s U.S. production	Ratio	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as “---”.

Table 3.29 CSPV cells and modules: *'s U.S. production and purchases of imports from subject sources, by source, importer of record, and period**

Quantity in kilowatts; ratio in percent

Item	Measure	2022	2023	2024
***'s U.S. production	Quantity	***	***	***
***'s purchases of U.S. imports from Vietnam imported by ***	Quantity	***	***	***
***'s U.S. imports from Vietnam	Quantity	***	***	***
Ratio 1: ***'s purchases of U.S. imports from Vietnam imported by *** relative to ***'s U.S. imports from Vietnam	Ratio	***	***	***
Overall U.S. imports from Vietnam	Quantity	***	***	***
Ratio 2: ***'s purchases of U.S. imports from Vietnam imported by *** relative to overall U.S. imports from Vietnam	Ratio	***	***	***
Ratio 3: ***'s purchases of U.S. imports from Vietnam imported by *** relative to ***'s U.S. production	Ratio	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires. The Commission did not receive an importer questionnaire from ***.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "---".

Table 3.30 CSPV cells and modules: U.S. producers' reasons for purchasing

Item	Narrative response on reasons for purchasing
***'s reason for purchasing	***
***'s reason for purchasing	***
***'s reason for purchasing	***
***'s reason for purchasing	***
***'s reason for purchasing	***

Source: Compiled from data submitted in response to Commission questionnaires.

U.S. employment, wages, and productivity

Tables 3.31 through 3.33 show U.S. producers' employment-related data regarding CSPV cells, CSPV modules, and CSPV cells and modules, respectively. During 2022 to 2024, the number of production related workers ("PRWs") of CSPV cells and modules increased annually and overall by *** percent. The majority of the growth in PRWs took place from 2023 to 2024 with five new firms beginning production in 2024, and six firms adding additional PRWs. As a result, total hours worked and wages paid increased by *** percent and *** percent, respectively, during 2022 to 2024. During 2022 to 2024, hours worked per PRW decreased annually and overall by *** percent as new firms began production during various points throughout the year and PRWs were not working full calendar years during the first year of production. Hourly wages remained stable during 2022 to 2023 and increased by *** percent in 2024.

2024 was the first year of production of CSPV cells. Therefore, there were no changes to report for productivity and unit labor costs. During 2022 to 2024, productivity of CSPV modules increased annually and overall increased, by *** percent. Unit labor costs of CSPV modules decreased annually and overall decreased, by *** percent from 2022 to 2024. Accounting for *** percent and *** percent of PRWs in 2022 and 2023, respectively, *** drove industry employment trends during the first two years in which data were collected. Despite increasing the number of its PRWs by *** percent in 2024, *** accounted for *** percent of total PRWs of U.S. producers of CSPV modules in 2024. In 2024, industry employment trends were driven by ***, who collectively accounted for *** percent of CSPV modules PRWs.

Table 3.31 CSPV cells: U.S. producers' employment related information, by period

Item	2022	2023	2024
Production and related workers (PRWs) (number)	***	***	***
Total hours worked (1,000 hours)	***	***	***
Hours worked per PRW (hours)	***	***	***
Wages paid (\$1,000)	***	***	***
Hourly wages (dollars per hour)	***	***	***
Productivity (kilowatts per 1,000 hours)	***	***	***
Unit labor costs (dollars per kilowatt)	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Table 3.32 CSPV modules: U.S. producers' employment related information, by period

Item	2022	2023	2024
Production and related workers (PRWs) (number)	***	***	***
Total hours worked (1,000 hours)	***	***	***
Hours worked per PRW (hours)	***	***	***
Wages paid (\$1,000)	***	***	***
Hourly wages (dollars per hour)	***	***	***
Productivity (kilowatts per 1,000 hours)	***	***	***
Unit labor costs (dollars per kilowatt)	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Table 3.33 CSPV cells and modules: U.S. producers' employment related information, by period

Item	2022	2023	2024
Production and related workers (PRWs) (number)	1,830	1,967	6,050
Total hours worked (1,000 hours)	3,778	3,693	9,270
Hours worked per PRW (hours)	2,064	1,877	1,532
Wages paid (\$1,000)	94,165	91,269	266,200
Hourly wages (dollars per hour)	\$24.92	\$24.71	\$28.72

Source: Compiled from data submitted in response to Commission questionnaires.

Part 4: U.S. imports, apparent U.S. consumption, and market shares

U.S. importers

The Commission issued importer questionnaires to 84 firms believed to be importers of subject CSPV cells and modules, as well as to all U.S. producers of CSPV cells and modules.¹ Usable questionnaire responses were received² from 45 companies³, representing *** percent of U.S. imports from Cambodia, *** U.S. imports from Malaysia, *** percent of U.S. imports from Thailand, and *** percent of U.S. imports from Vietnam in 2024 under HTS subheadings 8541.42.0010 and 8541.43.0010, “basket” categories.⁴ Table 4.1 lists all responding U.S. importers of CSPV cells and modules from Cambodia, Malaysia, Thailand, Vietnam and other sources, their locations, and their shares of U.S. imports, in 2024.

¹ The Commission issued questionnaires to those firms identified in the petitions; staff research; and proprietary, Census-edited Customs’ import records.

² Using proprietary, Census-edited Customs’ import records staff created one additional importer questionnaires for ***. Data for this company are incorporated throughout part 4 except for fungibility tables.

³ U.S. producer ***. ***, ***, sections 2-8a, 2-10a, and 2-14a.

⁴ Questionnaire responses account for *** percent of total imports reported in official U.S. import statistics.

Table 4.1 CSPV cells and modules: U.S. importers, their headquarters, and share of imports within each source, 2024

Share in percent

Firm	Headquarters	Cambodia	Malaysia	Thailand	Vietnam
Acciona	Chicago, IL	***	***	***	***
Astronergy	Pomona, CA	***	***	***	***
Auxin	San Jose, CA	***	***	***	***
Boviet	San Jose, CA	***	***	***	***
BYD	Pasadena, CA	***	***	***	***
Canadian (USA)	Walnut Creek, CA	***	***	***	***
Canadian Module	Mesquite, TX	***	***	***	***
Cantex	Houston, TX	***	***	***	***
First Solar	Tempe, AZ	***	***	***	***
GAF Energy	San Jose, CA	***	***	***	***
Hanwha	Irvine, CA	***	***	***	***
Hanwha CA	Irvine, CA	***	***	***	***
Hanwha Dalton	Dalton, GA	***	***	***	***
Hanwha GA	White, GA	***	***	***	***
Hounen	Chino, CA	***	***	***	***
Hounen Co	Phnom Penh, Cambodia	***	***	***	***
Hyundai	Seongnam-Si, South Korea	***	***	***	***
Illuminate	Pataskala, OH	***	***	***	***
Invenergy	Chicago, IL	***	***	***	***
JA Solar	San Jose, CA	***	***	***	***
Jinko CA	Campbell, CA	***	***	***	***
Jinko FL	Jacksonville, FL	***	***	***	***
LONGi	San Ramon, CA	***	***	***	***
Maxeon	San Jose, CA	***	***	***	***
Merlin	San Jose, CA	***	***	***	***
Meyer Burger	Goodyear, AZ	***	***	***	***
New East		***	***	***	***
NextEra	Juno Beach, FL	***	***	***	***
Panasonic	Newark, NJ	***	***	***	***
PowerFilm	Ames, IA	***	***	***	***
REC Americas	San Luis Obispo, CA	***	***	***	***
Recurrent	Austin, TX	***	***	***	***
Risen Solar	Kedah Darul Aman, Malaysia	***	***	***	***
Runergy	Huntsville, AL	***	***	***	***
Runergy Trading	City Of Industry, CA	***	***	***	***
Silfab	Burlington, WA	***	***	***	***
Solarmax	Riverside, CA	***	***	***	***
SunTegra	Larchmont, NY	***	***	***	***
Tesla	Austin, CA	***	***	***	***
Trina	Wilmer, TX	***	***	***	***
Trina (U.S.)	Fremont, CA	***	***	***	***

Table continued.

Table 4.1 (Continued) CSPV cells and modules: U.S. importers, their headquarters, and share of imports within each source, 2024

Share in percent

Firm	Headquarters	Cambodia	Malaysia	Thailand	Vietnam
Vikram	Massachusetts, MA	***	***	***	***
Waaree Energies	Navsari, GJ	***	***	***	***
Yingli	Malvern, PA	***	***	***	***
ZampTech	Bend, OR	***	***	***	***
Zhongli	Hong Kong	***	***	***	***
All firms	Various	100.0	100.0	100.0	100.0

Table continued.

Table 4.1 (Continued) CSPV cells and modules: U.S. importers, their headquarters, and share of imports within each source, 2024

Share in percent

Firm	Headquarters	Subject sources	Nonsubject sources	All import sources
Acciona	Chicago, IL	***	***	***
Astronergy	Pomona, CA	***	***	***
Auxin	San Jose, CA	***	***	***
Boviet	San Jose, CA	***	***	***
BYD	Pasadena, CA	***	***	***
Canadian (USA)	Walnut Creek, CA	***	***	***
Canadian Module	Mesquite, TX	***	***	***
Cantex	Houston, TX	***	***	***
First Solar	Tempe, AZ	***	***	***
GAF Energy	San Jose, CA	***	***	***
Hanwha	Irvine, CA	***	***	***
Hanwha CA	Irvine, CA	***	***	***
Hanwha Dalton	Dalton, GA	***	***	***
Hanwha GA	White, GA	***	***	***
Hounen	Chino, CA	***	***	***
Hounen Co	Phnom Penh, Cambodia	***	***	***
Hyundai	Seongnam-Si, South Korea	***	***	***
Illuminate	Pataskala, OH	***	***	***
Invenergy	Chicago, IL	***	***	***
JA Solar	San Jose, CA	***	***	***
Jinko CA	Campbell, CA	***	***	***
Jinko FL	Jacksonville, FL	***	***	***
LONGi	San Ramon, CA	***	***	***
Maxeon	San Jose, CA	***	***	***
Merlin	San Jose, CA	***	***	***
Meyer Burger	Goodyear, AZ	***	***	***

Table continued.

Table 4.1 (Continued) CSPV cells and modules: U.S. importers, their headquarters, and share of imports within each source, 2024

Share in percent

Firm	Headquarters	Subject sources	Nonsubject sources	All import sources
New East		***	***	***
NextEra	Juno Beach, FL	***	***	***
Panasonic	Newark, NJ	***	***	***
PowerFilm	Ames, IA	***	***	***
REC Americas	San Luis Obispo, CA	***	***	***
Recurrent	Austin, TX	***	***	***
Risen Solar	Kedah Darul Aman, Malaysia	***	***	***
Runergy	Huntsville, AL	***	***	***
Runergy Trading	City Of Industry, CA	***	***	***
Silfab	Burlington, WA	***	***	***
Solarmax	Riverside, CA	***	***	***
SunTegra	Larchmont, NY	***	***	***
Tesla	Austin, CA	***	***	***
Trina	Wilmer, TX	***	***	***
Trina (U.S.)	Fremont, CA	***	***	***
Vikram	Massachusetts, MA	***	***	***
Waaree Energies	Navsari, GJ	***	***	***
Yingli	Malvern, PA	***	***	***
ZampTech	Bend, OR	***	***	***
Zhongli	Hong Kong	***	***	***
All firms	Various	100.0	100.0	100.0

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Note: ***. Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—".

U.S. imports

Tables 4.2 through 4.3 and figure 4.1 present data for U.S. imports of CSPV cells and modules from Cambodia, Malaysia, Thailand, Vietnam and all other sources.⁵ During 2022 to 2024, imports of CSPV cells and modules from Cambodia, Thailand, and Vietnam increased both in terms of quantity and in terms of value, with the most growth occurring from 2023 to 2024. Imports of CSPV cells and modules from Malaysia and nonsubject sources were highest in 2023 both in terms of quantity and value. Overall, during 2022 to 2024, imports from Malaysia increased, both in terms of quantity and in terms of value, while imports from nonsubject sources increased in terms of quantity yet decreased in terms of value. The unit values of imports of CSPV cells and modules from Malaysia and nonsubject sources were highest in 2022 while the unit values of imports of CSPV cells and modules from Cambodia, Thailand, and Vietnam were highest in 2023. The unit value for imports of CSPV cells and modules from all four subject sources and nonsubject sources were lowest in 2024.

⁵ U.S. importers were asked to separately report data for imports from Cambodia, Malaysia, Thailand, and Vietnam that were imported under Commerce’s Appendix IV certification and for which they requested the Commission treat as “nonsubject” imports. Importers Astronergy, BYD, Canadian (USA), Invenergy, LONGi, Trina (U.S.), and Zhongli reported trade data for CSPV cells and modules imported under an Appendix IV certification. Alternative trade data for CSPV cells and modules from subject sources, with data for imports under Commerce’s Appendix IV certification removed and classified as nonsubject, are shown in appendix D.

Table 4.2 CSPV cells and modules: U.S. imports by source and period

Quantity in kilowatts; value in 1,000 dollars; unit value in dollars per kilowatts

Source	Measure	2022	2023	2024
Cambodia	Quantity	***	***	***
Malaysia	Quantity	***	***	***
Thailand	Quantity	***	***	***
Vietnam	Quantity	***	***	***
Subject sources	Quantity	15,053,302	25,347,060	40,487,722
Subject sources less Cambodia	Quantity	***	***	***
Nonsubject sources	Quantity	***	***	***
Nonsubject sources plus Cambodia	Quantity	***	***	***
All import sources	Quantity	***	***	***
Cambodia	Value	***	***	***
Malaysia	Value	***	***	***
Thailand	Value	***	***	***
Vietnam	Value	***	***	***
Subject sources	Value	4,847,297	8,355,515	9,002,494
Subject sources less Cambodia	Value	***	***	***
Nonsubject sources	Value	***	***	***
Nonsubject sources plus Cambodia	Value	***	***	***
All import sources	Value	***	***	***
Cambodia	Unit value	***	***	***
Malaysia	Unit value	***	***	***
Thailand	Unit value	***	***	***
Vietnam	Unit value	***	***	***
Subject sources	Unit value	***	***	***
Subject sources less Cambodia	Unit value	***	***	***
Nonsubject sources	Unit value	***	***	***
Nonsubject sources plus Cambodia	Unit value	***	***	***
All import sources	Unit value	***	***	***

Table continued.

Table 4.2 (Continued) CSPV cells and modules: Share of U.S. imports by source and period

Share and ratio in percent; Ratio represents the ratio to U.S. module production

Source	Measure	2022	2023	2024
Cambodia	Share of quantity	***	***	***
Malaysia	Share of quantity	***	***	***
Thailand	Share of quantity	***	***	***
Vietnam	Share of quantity	***	***	***
Subject sources	Share of quantity	***	***	***
Subject sources less Cambodia	Share of quantity	***	***	***
Nonsubject sources	Share of quantity	***	***	***
Nonsubject sources plus Cambodia	Share of quantity	***	***	***
All import sources	Share of quantity	100.0	100.0	100.0
Cambodia	Share of value	***	***	***
Malaysia	Share of value	***	***	***
Thailand	Share of value	***	***	***
Vietnam	Share of value	***	***	***
Subject sources	Share of value	***	***	***
Subject sources less Cambodia	Share of value	***	***	***
Nonsubject sources	Share of value	***	***	***
Nonsubject sources plus Cambodia	Share of value	***	***	***
All import sources	Share of value	100.0	100.0	100.0
Cambodia	Ratio	***	***	***
Malaysia	Ratio	***	***	***
Thailand	Ratio	***	***	***
Vietnam	Ratio	***	***	***
Subject sources	Ratio	***	***	***
Subject sources less Cambodia	Ratio	***	***	***
Nonsubject sources	Ratio	***	***	***
Nonsubject sources plus Cambodia	Ratio	***	***	***
All import sources	Ratio	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Note: ***. Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—".

Figure 4.1 CSPV cells and modules: U.S. import quantities and average unit values, by source and period

* * * * *

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Table 4.3 CSPV cells and modules: Changes in U.S. imports, by source and period

Changes (Δ) in percent (%)

Source	Measure	2022 to 2024	2022 to 2023	2023 to 2024
Cambodia	% Δ Quantity	▲ ***	▼ ***	▲ ***
Malaysia	% Δ Quantity	▲ ***	▲ ***	▼ ***
Thailand	% Δ Quantity	▲ ***	▲ ***	▲ ***
Vietnam	% Δ Quantity	▲ ***	▲ ***	▲ ***
Subject sources	% Δ Quantity	▲ 169.0	▲ 68.4	▲ 59.7
Subject sources less Cambodia	% Δ Quantity	▲ ***	▲ ***	▲ ***
Nonsubject sources	% Δ Quantity	▲ ***	▲ ***	▼ ***
Nonsubject sources plus Cambodia	% Δ Quantity	▲ ***	▲ ***	▼ ***
All import sources	% Δ Quantity	▲ ***	▲ ***	▲ ***
Cambodia	% Δ Value	▲ ***	▼ ***	▲ ***
Malaysia	% Δ Value	▲ ***	▲ ***	▼ ***
Thailand	% Δ Value	▲ ***	▲ ***	▲ ***
Vietnam	% Δ Value	▲ ***	▲ ***	▲ ***
Subject sources	% Δ Value	▲ 85.7	▲ 72.4	▲ 7.7
Subject sources less Cambodia	% Δ Value	▲ ***	▲ ***	▼ ***
Nonsubject sources	% Δ Value	▼ ***	▲ ***	▼ ***
Nonsubject sources plus Cambodia	% Δ Value	▲ ***	▲ ***	▼ ***
All import sources	% Δ Value	▲ ***	▲ ***	▼ ***
Cambodia	% Δ Unit value	▼ ***	▲ ***	▼ ***
Malaysia	% Δ Unit value	▼ ***	▼ ***	▼ ***
Thailand	% Δ Unit value	▼ ***	▲ ***	▼ ***
Vietnam	% Δ Unit value	▼ ***	▲ ***	▼ ***
Subject sources	% Δ Unit value	▼ ***	▲ ***	▼ ***
Subject sources less Cambodia	% Δ Unit value	▼ ***	▲ ***	▼ ***
Nonsubject sources	% Δ Unit value	▼ ***	▼ ***	▼ ***
Nonsubject sources plus Cambodia	% Δ Unit value	▼ ***	▼ ***	▼ ***
All import sources	% Δ Unit value	▼ ***	▼ ***	▼ ***

Table continued.

Table 4.3 (Continued) CSPV cells and modules: Changes in U.S. imports, by source and periodChanges (Δ) in percentage point (ppt)

Source	Measure	2022 to 2024	2022 to 2023	2023 to 2024
Cambodia	ppt Δ Quantity	▲ ***	▼ ***	▲ ***
Malaysia	ppt Δ Quantity	▼ ***	▲ ***	▼ ***
Thailand	ppt Δ Quantity	▲ ***	▼ ***	▲ ***
Vietnam	ppt Δ Quantity	▼ ***	▼ ***	▲ ***
Subject sources	ppt Δ Quantity	▲ 8.7	▼ (13.6)	▲ 22.3
Subject sources less Cambodia	ppt Δ Quantity	▲ ***	▼ ***	▲ ***
Nonsubject sources	ppt Δ Quantity	▼ ***	▲ ***	▼ ***
Nonsubject sources plus Cambodia	ppt Δ Quantity	▼ ***	▲ ***	▼ ***
All import sources	ppt Δ Quantity	***	***	***
Cambodia	ppt Δ Value	▲ ***	▼ ***	▲ ***
Malaysia	ppt Δ Value	▼ ***	▲ ***	▼ ***
Thailand	ppt Δ Value	▲ ***	▼ ***	▲ ***
Vietnam	ppt Δ Value	▲ ***	▼ ***	▲ ***
Subject sources	ppt Δ Value	▲ 12.8	▼ (10.2)	▲ 23.1
Subject sources less Cambodia	ppt Δ Value	▲ ***	▼ ***	▲ ***
Nonsubject sources	ppt Δ Value	▼ ***	▲ ***	▼ ***
Nonsubject sources plus Cambodia	ppt Δ Value	▼ ***	▲ ***	▼ ***
All import sources	ppt Δ Value	***	***	***
Cambodia	ppt Δ Ratio	▲ ***	▼ ***	▲ ***
Malaysia	ppt Δ Ratio	▼ ***	▲ ***	▼ ***
Thailand	ppt Δ Ratio	▼ ***	▲ ***	▼ ***
Vietnam	ppt Δ Ratio	▼ ***	▲ ***	▼ ***
Subject sources	ppt Δ Ratio	▼ ***	▲ ***	▼ ***
Subject sources less Cambodia	ppt Δ Ratio	▼ ***	▲ ***	▼ ***
Nonsubject sources	ppt Δ Ratio	▼ ***	▲ ***	▼ ***
Nonsubject sources plus Cambodia	ppt Δ Ratio	▼ ***	▲ ***	▼ ***
All import sources	ppt Δ Ratio	▼ ***	▲ ***	▼ ***

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Note: ***. Shares and ratios shown as “0.0” percent represent non-zero values less than “0.05” percent (if positive) and greater than “(0.05)” percent (if negative). Zeroes, null values, and undefined calculations are suppressed and shown as “—”. Period changes preceded by a “▲” represent an increase, while period changes preceded by a “▼” represent a decrease.

Tables 4.4 and 4.5 present U.S. producers’ and their affiliates’ U.S. imports by source (subject and nonsubject).

Table 4.4 CSPV cells and modules: U.S. imports from nonsubject sources, by source and period

Quantity in kilowatts; value in 1,000 dollars

Source	Measure	2022	2023	2024
Cambodia, circumventing	Quantity	***	***	***
Malaysia, circumventing	Quantity	***	***	***
Thailand, circumventing	Quantity	***	***	***
Vietnam, circumventing	Quantity	***	***	***
Circumventing sources	Quantity	***	***	***
China	Quantity	***	***	***
South Korea	Quantity	***	***	***
All other sources	Quantity	***	***	***
Nonsubject, other than circumventing	Quantity	***	***	***
Nonsubject sources	Quantity	***	***	***
Cambodia, circumventing	Value	***	***	***
Malaysia, circumventing	Value	***	***	***
Thailand, circumventing	Value	***	***	***
Vietnam, circumventing	Value	***	***	***
Circumventing sources	Value	***	***	***
China	Value	***	***	***
South Korea	Value	***	***	***
All other sources	Value	***	***	***
Nonsubject, other than circumventing	Value	***	***	***
Nonsubject sources	Value	***	***	***

Table continued.

Table 4.4 (Continued) CSPV cells and modules: U.S. imports from nonsubject sources, by source and period

Unit values in dollars per kilowatts; share in percent

Source	Measure	2022	2023	2024
Cambodia, circumventing	Unit value	***	***	***
Malaysia, circumventing	Unit value	***	***	***
Thailand, circumventing	Unit value	***	***	***
Vietnam, circumventing	Unit value	***	***	***
Circumventing sources	Unit value	***	***	***
China	Unit value	***	***	***
South Korea	Unit value	***	***	***
All other sources	Unit value	***	***	***
Nonsubject other than circumventing	Unit value	***	***	***
Nonsubject sources	Unit value	***	***	***
Cambodia, circumventing	Share of quantity	***	***	***
Malaysia, circumventing	Share of quantity	***	***	***
Thailand, circumventing	Share of quantity	***	***	***
Vietnam, circumventing	Share of quantity	***	***	***
Circumventing sources	Share of quantity	***	***	***
China	Share of quantity	***	***	***
South Korea	Share of quantity	***	***	***
All other sources	Share of quantity	***	***	***
Nonsubject, other than circumventing	Share of quantity	***	***	***
Nonsubject sources	Share of quantity	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Note: Ratio calculated as the quantity of imports by U.S. producers and affiliates relative to U.S. imports as shown in table 4.2.

Table 4.5 CSPV cells and modules: U.S. producers' and/or their affiliates' U.S. imports, by source and period

Quantity in kilowatts; ratio in percent

Source	Measure	2022	2023	2024
Cambodia	Quantity	***	***	***
Malaysia	Quantity	***	***	***
Thailand	Quantity	***	***	***
Vietnam	Quantity	***	***	***
Subject sources	Quantity	***	***	***
Subject sources less Cambodia	Quantity	***	***	***
Nonsubject sources	Quantity	***	***	***
Nonsubject sources plus Cambodia	Quantity	***	***	***
All import sources	Quantity	***	***	***
Cambodia	Ratio	***	***	***
Malaysia	Ratio	***	***	***
Thailand	Ratio	***	***	***
Vietnam	Ratio	***	***	***
Subject sources	Ratio	***	***	***
Subject sources less Cambodia	Ratio	***	***	***
Nonsubject sources	Ratio	***	***	***
Nonsubject sources plus Cambodia	Ratio	***	***	***
All import sources	Ratio	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Note: Ratio calculated as the quantity of imports by U.S. producers and affiliates relative to U.S. imports as shown in table 4.2.

Negligibility

The statute requires that an investigation be terminated without an injury determination if imports of the subject merchandise are found to be negligible.⁶ Negligible imports are generally defined in the Act, as amended, as imports from a country of merchandise corresponding to a domestic like product where such imports account for less than 3 percent of the volume of all such merchandise imported into the United States in the most recent 12-month period for which data are available that precedes the filing of the petition or the initiation of the investigation. However, if there are imports of such merchandise from a number of countries subject to investigations initiated on the same day that individually account for less than 3 percent of the total volume of the subject merchandise, and if the imports from those countries collectively account for more than 7 percent of the volume of all such merchandise imported into the United States during the applicable 12-month period, then imports from such countries are deemed not to be negligible. In the case of countervailing duty investigations involving developing countries (as designated by the United States Trade Representative), the statute indicates that the negligibility limits are 4 percent and 9 percent, rather than 3 percent and 7 percent.⁷ Imports from Cambodia, Malaysia, Thailand, and Vietnam are presented in table 4.6. Table 4.7 and figure 4.2 present monthly imports from Cambodia and all other sources during various twelve months periods preceding the filing of the petition and after the petition was filed.

⁶ Sections 703(a)(1), 705(b)(1), 733(a)(1), and 735(b)(1) of the Act (19 U.S.C. §§ 1671b(a)(1), 1671d(b)(1), 1673b(a)(1), and 1673d(b)(1)).

⁷ Section 771 (24) of the Act (19 U.S.C § 1677(24)).

Table 4.6 CSPV cells and modules: U.S. imports in the twelve-month period preceding the filing of the petition, April 2023 through March 2024

Quantity in kilowatts; share in percent

Source of imports	Quantity	Share of quantity
Cambodia	***	***
Malaysia AD	***	***
Malaysia CVD	***	***
Thailand	***	***
Vietnam	***	***
All other sources	***	***
All import sources	***	100.0

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—". Had the data from the proprietary, Census-edited Customs imports records been treated as part of the subject Cambodia category for missing importer ***, Cambodia's share of overall imports from all sources would have been *** percent.

Table 4.7 CSPV cells and modules: U.S. imports from Cambodia and all sources in various twelve-month totals in each month leading up to and immediately following the filing of the petitions, period

Quantity in kilowatts; share in percent

Ending month of twelve-month period	Cambodia quantity	Other than Cambodia quantity	All import sources quantity	Cambodia share	Other than Cambodia share	All import sources share
Jan 2023	***	***	23,247,347	***	***	100.0
Feb 2023	***	***	26,095,477	***	***	100.0
Mar 2023	***	***	29,317,726	***	***	100.0
Apr 2023	***	***	31,459,886	***	***	100.0
May 2023	***	***	33,023,697	***	***	100.0
Jun 2023	***	***	34,964,391	***	***	100.0
Jul 2023	***	***	37,218,299	***	***	100.0
Aug 2023	***	***	39,513,948	***	***	100.0
Sep 2023	***	***	40,944,281	***	***	100.0
Oct 2023	***	***	42,350,463	***	***	100.0
Nov 2023	***	***	43,370,173	***	***	100.0
Dec 2023	***	***	44,218,966	***	***	100.0
Jan 2024	***	***	45,829,615	***	***	100.0
Feb 2024	***	***	46,197,030	***	***	100.0
Mar 2024	***	***	46,504,432	***	***	100.0
Apr 2024	***	***	47,962,408	***	***	100.0
May 2024	***	***	50,747,910	***	***	100.0
Jun 2024	***	***	52,534,649	***	***	100.0
Jul 2024	***	***	53,238,203	***	***	100.0
Aug 2024	***	***	54,235,194	***	***	100.0
Sep 2024	***	***	54,539,709	***	***	100.0
Oct 2024	***	***	53,266,049	***	***	100.0
Nov 2024	***	***	52,825,625	***	***	100.0
Dec 2024	***	***	50,744,394	***	***	100.0

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Note: The twelve-month period immediately prior to the filing of the petition is April 2023 through March 2024. This period is presented in the row of March 2024.

Figure 4.2 CSPV cells and modules: Share of U.S. imports from Cambodia and all sources in various twelve-month totals in each month leading up to and immediately following the filing of the petitions, period

* * * * *

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Note: The twelve-month period immediately prior to the filing of the petition is April 2023 through March 2024. Presented in the figure, this is the negligibility period presented in the red box.

Critical circumstances

On April 25, 2025, Commerce issued its final countervailing and antidumping duty determinations that “critical circumstances” exist with regard to imports from Thailand from all producers and/or exporters.⁸

On April 25, 2025, Commerce issued its final countervailing duty determination that “critical circumstances” exist with regard to imports from Vietnam of CSPV cells for Boviet Solar, GEP New Energy Viet Nam Company Limited, Vietnam Green Energy Commercial Services Company Ltd., Shengtian New Energy Vina Co., Ltd, and HT Solar Vietnam Limited Company as well as all other producers and exporters subject to the all other subsidy rate.⁹ Also on April 25, 2025, Commerce issued its final antidumping determination that “critical circumstances” exist with regard to imports from Vietnam of CSPV cells for non-selected companies eligible for a separate rate and the Vietnam-wide entity.¹⁰

In this investigation, if both Commerce and the Commission make affirmative final critical circumstances determinations, certain subject imports may be subject to countervailing duties retroactive by 90 days from October 4, 2024, the effective date of Commerce’s preliminary affirmative countervailing duty determinations. Similarly, if both Commerce and the Commission make affirmative final critical circumstances determinations, certain subject imports may be subject to antidumping duties retroactive by 90 days from December 4, 2024, the effective date of Commerce’s preliminary affirmative LTFV determination. Tables 4.8 through 4.13 and figures 4.3 through 4.5 present these data.

⁸ 90 FR 17381 and 90 FR 17395, April 25, 2025, referenced in app. A. When petitioners file timely allegations of critical circumstances, Commerce examines whether there is a reasonable basis to believe or suspect that (1) either there is a history of dumping and material injury by reason of dumped imports in the United States or elsewhere of the subject merchandise, or the person by whom, or for whose account, the merchandise was imported knew or should have known that the exporter was selling the subject merchandise at LTFV and that there was likely to be material injury by reason of such sales; and (2) there have been massive imports of the subject merchandise over a relatively short period.

⁹ 90 FR 17399, April 25, 2025.

¹⁰ 90 FR 17388, April 25, 2025.

Table 4.8 CSPV cells and modules: U.S. imports from Thailand subject to Commerce’s affirmative final critical circumstances antidumping and countervailing determinations

Quantity in kilowatts

Month	Relation to petition	Cell quantity	Module quantity	Combined quantity
November 2023	Before	***	***	***
December 2023	Before	***	***	***
January 2024	Before	***	***	***
February 2024	Before	***	***	***
March 2024	Before	***	***	***
April 2024	Before	***	***	***
May 2024	After	***	***	***
June 2024	After	***	***	***
July 2024	After	***	***	***
August 2024	After	***	***	***
September 2024	After	***	***	***
October 2024	After	***	***	***

Table continued.

Table 4.8 (Continued) CSPV cells and modules: U.S. imports from Thailand subject to Commerce’s affirmative final critical circumstances antidumping and countervailing determinations

Quantity in kilowatts

Comparison pre-post petition period	Item	Cumulative before period quantity	Cumulative after period quantity	Difference in percent
1 month	Cells	***	***	***
2 months	Cells	***	***	***
3 months	Cells	***	***	***
4 months	Cells	***	***	***
5 months	Cells	***	***	***
6 months	Cells	***	***	***
1 month	Modules	***	***	***
2 months	Modules	***	***	***
3 months	Modules	***	***	***
4 months	Modules	***	***	***
5 months	Modules	***	***	***
6 months	Modules	***	***	***
1 month	Combined	***	***	***
2 months	Combined	***	***	***
3 months	Combined	***	***	***
4 months	Combined	***	***	***
5 months	Combined	***	***	***
6 months	Combined	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Note: Shares and ratios shown as “0.0” percent represent non-zero values less than “0.05” percent (if positive) and greater than “(0.05)” percent (if negative). Zeroes, null values, and undefined calculations are suppressed and shown as “—”. The Commerce final determinations for Thailand AD/CVD found critical circumstances exist for imports from all suppliers in Thailand.

Figure 4.3 CSPV cells and modules: U.S. imports from Thailand subject to Commerce’s final critical circumstances antidumping and countervailing determinations

* * * * *

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Note: The Commerce final determinations for Thailand AD/CVD found critical circumstances exist for imports from all suppliers in Thailand.

Table 4.9 CSPV cells and modules: U.S. importers' U.S. inventories of imports from Thailand for analysis in relation to a final affirmative Commerce critical circumstances determinations in the AD/CVD investigations, by date

Quantity in kilowatts; index in percent where April 2024 = 100.0 percent

Date	Cell quantity	Cell index	Module quantity	Module index	Combined quantity	Combined index
April 2024	***	100.0	***	100.0	***	100.0
May 2024	***	***	***	***	***	***
June 2024	***	***	***	***	***	***
July 2024	***	***	***	***	***	***
August 2024	***	***	***	***	***	***
September 2024	***	***	***	***	***	***
October 2024	***	***	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Note: The Commerce final determination for Thailand AD found critical circumstances exist for imports from all suppliers in Thailand.

Table 4.10 CSPV cells and modules: U.S. imports from Vietnam subject to Commerce’s affirmative final critical circumstances antidumping determination, by month

Quantity in kilowatts

Month	Relation to petition	Cell quantity	Module quantity	Combined quantity
November 2023	Before	***	***	***
December 2023	Before	***	***	***
January 2024	Before	***	***	***
February 2024	Before	***	***	***
March 2024	Before	***	***	***
April 2024	Before	***	***	***
May 2024	After	***	***	***
June 2024	After	***	***	***
July 2024	After	***	***	***
August 2024	After	***	***	***
September 2024	After	***	***	***
October 2024	After	***	***	***

Table continued.

Table 4.10 (Continued) CSPV cells and modules: U.S. imports from Vietnam subject to Commerce’s affirmative final critical circumstances antidumping determination, by differing number of months before and after the filing of the petitions

Quantity in kilowatts

Comparison pre-post petition period	Item	Cumulative before period quantity	Cumulative after period quantity	Difference in percent
1 month	Cells	***	***	***
2 months	Cells	***	***	***
3 months	Cells	***	***	***
4 months	Cells	***	***	***
5 months	Cells	***	***	***
6 months	Cells	***	***	***
1 month	Modules	***	***	***
2 months	Modules	***	***	***
3 months	Modules	***	***	***
4 months	Modules	***	***	***
5 months	Modules	***	***	***
6 months	Modules	***	***	***
1 month	Combined	***	***	***
2 months	Combined	***	***	***
3 months	Combined	***	***	***
4 months	Combined	***	***	***
5 months	Combined	***	***	***
6 months	Combined	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Note: Shares and ratios shown as “0.0” percent represent non-zero values less than “0.05” percent (if positive) and greater than “(0.05)” percent (if negative). Zeroes, null values, and undefined calculations are suppressed and shown as “—”. The Commerce final determination for Vietnam AD found critical circumstances exist for imports from all suppliers in Vietnam except Jinko, JA Solar, and all other non-selected separate rate respondents.

Figure 4.4 CSPV cells and modules: U.S. imports from Vietnam subject to Commerce’s final critical circumstances antidumping determination, by month

* * * * *

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Note: The Commerce final determination for Vietnam AD found critical circumstances exist for imports from all suppliers in Vietnam except Jinko, JA Solar, and all other non-selected separate rate respondents.

Table 4.11 CSPV cells and modules: U.S. importers' U.S. inventories of imports from Vietnam for analysis in relation to a final affirmative Commerce critical circumstances determination in the AD investigation, by date

Quantity in kilowatts; Index in percent where April 2024 = 100.0 percent

Date	Cell quantity	Cell index	Module quantity	Module index	Combined quantity	Combined index
April 2024	***	100.0	***	100.0	***	100.0
May 2024	***	***	***	***	***	***
June 2024	***	***	***	***	***	***
July 2024	***	***	***	***	***	***
August 2024	***	***	***	***	***	***
September 2024	***	***	***	***	***	***
October 2024	***	***	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Shares and ratios shown as “0.0” percent represent non-zero values less than “0.05” percent (if positive) and greater than “(0.05)” percent (if negative). Zeroes, null values, and undefined calculations are suppressed and shown as “—”. The Commerce final determination for Vietnam AD found critical circumstances exist for imports from all suppliers in Vietnam except Jinko, JA Solar, and all other non-selected separate rate respondents.

Table 4.12 CSPV cells and modules: U.S. imports from Vietnam subject to Commerce’s affirmative final critical circumstances countervailing determination, by month

Quantity in kilowatts

Month	Relation to petition	Cell quantity	Module quantity	Combined quantity
November 2023	Before	***	***	***
December 2023	Before	***	***	***
January 2024	Before	***	***	***
February 2024	Before	***	***	***
March 2024	Before	***	***	***
April 2024	Before	***	***	***
May 2024	After	***	***	***
June 2024	After	***	***	***
July 2024	After	***	***	***
August 2024	After	***	***	***
September 2024	After	***	***	***
October 2024	After	***	***	***

Table continued.

Table 4.12 (Continued) CSPV cells and modules: U.S. imports from Vietnam subject to Commerce’s affirmative final critical circumstances countervailing determination, by differing number of months before and after the filing of the petition

Quantity in kilowatts

Comparison pre-post petition period	Item	Cumulative before period quantity	Cumulative after period quantity	Difference in percent
1 month	Cells	***	***	***
2 months	Cells	***	***	***
3 months	Cells	***	***	***
4 months	Cells	***	***	***
5 months	Cells	***	***	***
6 months	Cells	***	***	***
1 month	Modules	***	***	***
2 months	Modules	***	***	***
3 months	Modules	***	***	***
4 months	Modules	***	***	***
5 months	Modules	***	***	***
6 months	Modules	***	***	***
1 month	Combined	***	***	***
2 months	Combined	***	***	***
3 months	Combined	***	***	***
4 months	Combined	***	***	***
5 months	Combined	***	***	***
6 months	Combined	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Note: Shares and ratios shown as “0.0” percent represent non-zero values less than “0.05” percent (if positive) and greater than “(0.05)” percent (if negative). Zeroes, null values, and undefined calculations are suppressed and shown as “—”. The Commerce final determination for Vietnam CVD found critical circumstances exist for imports from all suppliers in Vietnam except JA Solar.

Figure 4.5 CSPV cells and modules: U.S. imports from Vietnam subject to Commerce’s final critical circumstances countervailing determination, by month

* * * * *

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Note: The Commerce final determination for Vietnam CVD found critical circumstances exist for imports from all suppliers in Vietnam except JA Solar.

Table 4.13 CSPV cells and modules: U.S. importers' U.S. inventories of imports from Vietnam for analysis in relation to a final affirmative Commerce critical circumstances determination in the CVD investigation, by date

Quantity in kilowatts; Index in percent where April 2024 = 100.0 percent

Date	Cell quantity	Cell index	Module quantity	Module index	Combined quantity	Combined index
April 2024	***	100.0	***	100.0	***	100.0
May 2024	***	***	***	***	***	***
June 2024	***	***	***	***	***	***
July 2024	***	***	***	***	***	***
August 2024	***	***	***	***	***	***
September 2024	***	***	***	***	***	***
October 2024	***	***	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Shares and ratios shown as “0.0” percent represent non-zero values less than “0.05” percent (if positive) and greater than “(0.05)” percent (if negative). Zeroes, null values, and undefined calculations are suppressed and shown as “—”. The Commerce final determination for Vietnam CVD found critical circumstances exist for imports from all suppliers in Vietnam except JA Solar.

Cumulation considerations

In assessing whether imports should be cumulated, the Commission determines whether U.S. imports from the subject countries compete with each other and with the domestic like product and has generally considered four factors: (1) fungibility, (2) presence of sales or offers to sell in the same geographical markets, (3) common or similar channels of distribution, and (4) simultaneous presence in the market. Information regarding channels of distribution, market areas, and interchangeability appear in Part 2. Additional information concerning fungibility, geographical markets, and simultaneous presence in the market is presented below.

Fungibility

Table 4.14 and figure 4.6 present U.S. producers' and U.S. importers' U.S. shipments of CSPV cells by type (bifacial and non-bifacial) and CSPV modules by type (non-bifacial using bifacial cells, bifacial using bifacial cells and non-bifacial using non-bifacial cells) in 2024. The majority of U.S. producers' U.S. shipments and U.S. importers' U.S. shipments from each subject source was bifacial modules using bifacial cells. U.S. importers' U.S. shipments from nonsubject sources were about equally shared between bifacial cells and modules using bifacial cells. U.S. importers' U.S. shipments from Cambodia, Malaysia, Thailand, Vietnam, and nonsubject sources contained both bifacial cells and non-bifacial cells and U.S. producers reported shipments of only ***. U.S. importers' U.S. shipments from Malaysia, Thailand, Vietnam, and nonsubject sources as well as U.S. producers' U.S. shipments encompassed all three module categories, whereas U.S. importers' U.S. shipments of CSPV modules from Cambodia were only ***.

Table 4.14 CSPV cells and modules: U.S. producers' and U.S. importers' U.S. shipments, by source and by type, 2024

Quantity in kilowatts

Source	Cells: Bifacial	Cells: Non- bifacial	Modules: Non- bifacial using bifacial cells	Modules: Non- bifacial using non- bifacial cells	Modules: Bifacial using bifacial cells	All cells and modules
U.S. producers	***	***	***	***	***	***
Cambodia	***	***	***	***	***	***
Malaysia	***	***	***	***	***	***
Thailand	***	***	***	***	***	***
Vietnam	***	***	***	***	***	***
Subject sources	***	***	***	***	***	39,397,859
Subject sources less Cambodia	***	***	***	***	***	***
Nonsubject sources	***	***	***	***	***	***
Nonsubject sources plus Cambodia	***	***	***	***	***	***
All import sources	***	***	***	***	***	***
All sources	***	***	***	***	***	***

Table continued.

Table 4.14 (Continued) CSPV cells and modules: U.S. producers' and U.S. importers' U.S. shipments, by source and by type, 2024

Share across in percent

Source	Cells: Bifacial	Cells: Non- bifacial	Modules: Non- bifacial using bifacial cells	Modules: Non- bifacial using non- bifacial cells	Modules: Bifacial using bifacial cells	All cells and modules
U.S. producers	***	***	***	***	***	100.0
Cambodia	***	***	***	***	***	100.0
Malaysia	***	***	***	***	***	100.0
Thailand	***	***	***	***	***	100.0
Vietnam	***	***	***	***	***	100.0
Subject sources	***	***	***	***	***	100.0
Subject sources less Cambodia	***	***	***	***	***	100.0
Nonsubject sources	***	***	***	***	***	100.0
Nonsubject sources plus Cambodia	***	***	***	***	***	100.0
All import sources	***	***	***	***	***	100.0
All sources	***	***	***	***	***	100.0

Table continued.

Table 4.14 (Continued) CSPV cells and modules: U.S. producers' and U.S. importers' U.S. shipments, by source and by type, 2024

Share down in percent

Source	Cells: Bifacial	Cells: Non- bifacial	Modules: Non- bifacial using bifacial cells	Modules: Non- bifacial using non- bifacial cells	Modules: Bifacial using bifacial cells	All cells and modules
U.S. producers	***	***	***	***	***	***
Cambodia	***	***	***	***	***	***
Malaysia	***	***	***	***	***	***
Thailand	***	***	***	***	***	***
Vietnam	***	***	***	***	***	***
Subject sources	***	***	***	***	***	***
Subject sources less Cambodia	***	***	***	***	***	***
Nonsubject sources	***	***	***	***	***	***
Nonsubject sources plus Cambodia	***	***	***	***	***	***
All import sources	***	***	***	***	***	***
All sources	100.0	100.0	100.0	100.0	100.0	100.0

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—".

Figure 4.6 CSPV cells and modules: U.S. producers' and U.S. importers' U.S. shipments, by source and by type, 2024

* * * * *

Source: Compiled from data submitted in response to Commission questionnaires.

Geographical markets

Table 4.15 presents U.S. imports by source and border of entry in 2024. In 2024, U.S. imports of CSPV products from Cambodia, Malaysia, Thailand, Vietnam, and nonsubject sources entered the United States through ports located in all four regions. The largest share of CSPV cells and modules from Cambodia (72.8 percent), Vietnam (39.8 percent) and nonsubject sources (36.2 percent) entered the United States through ports in the West. The largest share of CSPV cells and modules from Malaysia (31.63 percent) entered the United States through ports in the North. The largest share of CSPV cells and modules from Thailand (39.4 percent) entered the United States through ports in the South. Significant shares of imports entered the United States through ports in the East, South, and West.

Table 4.15 CSPV cells and modules: U.S. imports by source and border of entry, 2024

Quantity in kilowatts

Source	East	North	South	West	All borders
Cambodia	495,513	275,890	517,921	3,451,249	4,740,573
Malaysia	2,434,845	2,643,721	950,969	2,333,995	8,363,531
Thailand	3,853,668	945,097	6,011,993	4,466,248	15,277,006
Vietnam	2,625,432	2,574,584	5,147,207	6,847,033	17,194,257
Subject sources	9,409,458	6,439,292	12,628,091	17,098,525	45,575,367
Subject sources less Cambodia	8,913,945	6,163,402	12,110,170	13,647,276	40,834,794
Nonsubject sources	3,860,802	1,210,045	2,904,534	4,524,921	12,500,301
Nonsubject sources plus Cambodia	4,356,315	1,485,935	3,422,455	7,976,169	17,240,874
All import sources	13,270,260	7,649,338	15,532,625	21,623,445	58,075,668

Table continued.

Table 4.15 (Continued) CSPV cells and modules: U.S. imports by source and border of entry, 2024

Share across in percent

Source	East	North	South	West	All borders
Cambodia	10.5	5.8	10.9	72.8	100.0
Malaysia	29.1	31.6	11.4	27.9	100.0
Thailand	25.2	6.2	39.4	29.2	100.0
Vietnam	15.3	15.0	29.9	39.8	100.0
Subject sources	20.6	14.1	27.7	37.5	100.0
Subject sources less Cambodia	21.8	15.1	29.7	33.4	100.0
Nonsubject sources	30.9	9.7	23.2	36.2	100.0
Nonsubject sources plus Cambodia	25.3	8.6	19.9	46.3	100.0
All import sources	22.8	13.2	26.7	37.2	100.0

Table continued.

Table 4.15 (Continued) CSPV cells and modules: U.S. imports by source and border of entry, 2024

Share down in percent

Source	East	North	South	West	All borders
Cambodia	3.7	3.6	3.3	16.0	8.2
Malaysia	18.3	34.6	6.1	10.8	14.4
Thailand	29.0	12.4	38.7	20.7	26.3
Vietnam	19.8	33.7	33.1	31.7	29.6
Subject sources	70.9	84.2	81.3	79.1	78.5
Subject sources less Cambodia	67.2	80.6	78.0	63.1	70.3
Nonsubject sources	29.1	15.8	18.7	20.9	21.5
Nonsubject sources plus Cambodia	32.8	19.4	22.0	36.9	29.7
All import sources	100.0	100.0	100.0	100.0	100.0

Source: Official U.S. import statistics of the U.S. Department of Commerce Census Bureau using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010, accessed February 12, 2025. Imports area based on the imports for consumption data series.

Note: Data reflect unadjusted official import statistics and therefore likely overstate subject and understate nonsubject data due to inclusion of Chinese origin product under subject sources.

Presence in the market

Table 4.16 and figures 4.7 and 4.8 present monthly official U.S. import statistics for subject and nonsubject sources. Imports of CSPV cells and modules from subject and nonsubject sources were present along with the domestic product in every month during January 2022 through December 2024, except for imports of CSPV products from Cambodia which were present in every month except December 2024.

Table 4.16 CSPV cells and modules: Quantity of U.S. imports, by source and month

Quantity in kilowatts

Year	Month	Cambodia	Malaysia	Thailand	Vietnam
2022	January	***	***	***	***
2022	February	***	***	***	***
2022	March	***	***	***	***
2022	April	***	***	***	***
2022	May	***	***	***	***
2022	June	***	***	***	***
2022	July	***	***	***	***
2022	August	***	***	***	***
2022	September	***	***	***	***
2022	October	***	***	***	***
2022	November	***	***	***	***
2022	December	***	***	***	***
2023	January	***	***	***	***
2023	February	***	***	***	***
2023	March	***	***	***	***
2023	April	***	***	***	***
2023	May	***	***	***	***
2023	June	***	***	***	***
2023	July	***	***	***	***
2023	August	***	***	***	***
2023	September	***	***	***	***
2023	October	***	***	***	***
2023	November	***	***	***	***
2023	December	***	***	***	***

Table continued

Table 4.16 (Continued) CSPV cells and modules: U.S. imports from individual subject sources, by month

Quantity in kilowatts

Year	Month	Cambodia	Malaysia	Thailand	Vietnam
2024	January	***	***	***	***
2024	February	***	***	***	***
2024	March	***	***	***	***
2024	April	***	***	***	***
2024	May	***	***	***	***
2024	June	***	***	***	***
2024	July	***	***	***	***
2024	August	***	***	***	***
2024	September	***	***	***	***
2024	October	***	***	***	***
2024	November	***	***	***	***
2024	December	***	***	***	***

Table continued.

Table 4.16 (Continued) CSPV cells and modules: U.S. imports from aggregated subject and nonsubject sources, by month

Quantity in kilowatts

Year	Month	Subject sources	Subject sources less Cambodia	Nonsubject sources	Nonsubject sources plus Cambodia	All import sources
2022	January	539,198	***	***	***	***
2022	February	761,176	***	***	***	***
2022	March	952,425	***	***	***	***
2022	April	691,446	***	***	***	***
2022	May	1,083,127	***	***	***	***
2022	June	1,148,830	***	***	***	***
2022	July	1,009,811	***	***	***	***
2022	August	1,170,105	***	***	***	***
2022	September	1,585,254	***	***	***	***
2022	October	2,201,457	***	***	***	***
2022	November	1,841,621	***	***	***	***
2022	December	2,068,849	***	***	***	***
2023	January	1,624,902	***	***	***	***
2023	February	2,574,124	***	***	***	***
2023	March	3,325,892	***	***	***	***
2023	April	1,898,913	***	***	***	***
2023	May	1,816,045	***	***	***	***
2023	June	1,806,672	***	***	***	***
2023	July	1,974,344	***	***	***	***
2023	August	2,005,123	***	***	***	***
2023	September	1,926,528	***	***	***	***
2023	October	2,296,877	***	***	***	***
2023	November	1,998,206	***	***	***	***
2023	December	2,099,423	***	***	***	***

Table continued.

Table 4.16 (Continued) CSPV cells and modules: U.S. imports from aggregated subject and nonsubject sources, by month

Quantity in kilowatts

Year	Month	Subject sources	Subject sources less Cambodia	Nonsubject sources	Nonsubject sources plus Cambodia	All import sources
2024	January	2,945,243	***	***	***	***
2024	February	2,817,133	***	***	***	***
2024	March	3,894,397	***	***	***	***
2024	April	4,009,129	***	***	***	***
2024	May	4,798,175	***	***	***	***
2024	June	4,860,539	***	***	***	***
2024	July	3,788,903	***	***	***	***
2024	August	4,467,845	***	***	***	***
2024	September	3,258,854	***	***	***	***
2024	October	2,436,514	***	***	***	***
2024	November	2,317,557	***	***	***	***
2024	December	893,428	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Note: Zeroes, null values, and undefined calculations are suppressed and shown as “—”.

Figure 4.7 CSPV cells and modules: U.S. imports from individual subject sources, by source and by month

* * * * *

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Figure 4.8 CSPV cells and modules: U.S. imports from aggregated subject and nonsubject sources, by month

* * * * *

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Apparent U.S. consumption and market shares

Quantity

Table 4.17 and figure 4.9 present data on apparent U.S. consumption and U.S. market shares by quantity for CSPV cells and modules. During 2022 to 2024, apparent U.S. consumption, in terms of quantity, increased annually and overall by *** percent. As there was no U.S. production of CSPV cells in 2022 and 2023, U.S. producers did not account for any apparent U.S. consumption of CSPV cells and modules, in terms of quantity, during the first two years which data were collected. In 2024, U.S. producers accounted for *** percent of apparent U.S. consumption, in terms of quantity. During 2022 to 2024, combined subject sources' market share fluctuated and overall increased by *** percentage points, while the market share of nonsubject imports fluctuated and overall decreased by *** percentage points during 2022 to 2024. While the market share of each subject country fluctuated during the period for which data were collected, overall during 2022 to 2024 subject imports from Cambodia, Thailand, and Vietnam held their largest market share in 2024 while the market share of subject imports from Malaysia was lowest in 2024.

Table 4.17 CSPV cells and modules: Apparent U.S. consumption and market shares based on quantity, by source and period

Quantity in kilowatts; shares in percent

Source	Measure	2022	2023	2024
U.S. producers	Quantity	***	***	***
Cambodia	Quantity	***	***	***
Malaysia	Quantity	***	***	***
Thailand	Quantity	***	***	***
Vietnam	Quantity	***	***	***
Subject sources	Quantity	13,810,317	24,081,297	39,397,862
Subject sources less Cambodia	Quantity	***	***	***
Circumventing sources	Quantity	***	***	***
South Korea	Quantity	***	***	***
All other sources	Quantity	***	***	***
Nonsubject sources	Quantity	***	***	***
Nonsubject sources plus Cambodia	Quantity	***	***	***
All import sources	Quantity	***	***	***
All sources	Quantity	***	***	***
U.S. producers	Share	***	***	***
Cambodia	Share	***	***	***
Malaysia	Share	***	***	***
Thailand	Share	***	***	***
Vietnam	Share	***	***	***
Subject sources	Share	***	***	***
Subject sources less Cambodia	Share	***	***	***
Circumventing sources	Share	***	***	***
South Korea	Share	***	***	***
All other sources	Share	***	***	***
Nonsubject sources	Share	***	***	***
Nonsubject sources plus Cambodia	Share	***	***	***
All import sources	Share	***	***	***
All sources	Share	100.0	100.0	100.0

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—". Quantity for U.S. producers' U.S. shipments is near zero as it only reflects domestically produced cells to assemble into modules. In measuring consumption and market share this methodology avoids reclassifying and/or double counting merchandise already reported as an import. Quantity for circumventing sources and South Korea are import quantities reported in the questionnaire, all other sources quantity is calculated by removing these imports from reported U.S. shipments from nonsubject sources.

Figure 4.9 CSPV cells and modules: Apparent U.S. consumption based on quantity, by source and period

* * * * *

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Note: Quantity for U.S. producers' U.S. shipments is near zero as it only reflects domestically produced cells to assemble into modules. In measuring consumption and market share this methodology avoids reclassifying and/or double counting merchandise already reported as an import.

Value

Table 4.18 and figure 4.10 present data on apparent U.S. consumption and U.S. market shares by value for CSPV cells and modules. During 2022 to 2024, apparent U.S. consumption, in terms of value, was highest in 2023 and overall increased by *** percent from 2022 to 2024. U.S. producers’ value added to imports as a share of apparent U.S. consumption was lowest in 2023 and about the same in 2022 and 2024 despite increasing in terms of value by *** percent from 2022 to 2024. During 2022 to 2024, the market share of subject imports fluctuated and overall increased by *** percentage points. The market share of nonsubject imports was highest in 2023 and overall decreased by *** percentage points.

Table 4.18 CSPV cells and modules: Apparent U.S. consumption and market shares based on value, by source and period

Value in 1,000 dollars; shares in percent

Source	Measure	2022	2023	2024
U.S. producers: Fully domestic value	Value	***	***	***
U.S. producers: Value added to imports	Value	***	***	***
U.S. producers: Overall value	Value	***	***	***
Cambodia	Value	***	***	***
Malaysia	Value	***	***	***
Thailand	Value	***	***	***
Vietnam	Value	***	***	***
Subject sources	Value	4,987,601	8,462,633	10,683,311
Subject sources less Cambodia	Value	***	***	***
Circumventing sources	Value	***	***	***
South Korea	Value	***	***	***
All other sources	Value	***	***	***
Nonsubject sources	Value	***	***	***
Nonsubject sources plus Cambodia	Value	***	***	***
All import sources	Value	***	***	***
All sources	Value	***	***	***
U.S. producers: Fully domestic value	Share	***	***	***
U.S. producers: Value added to imports	Share	***	***	***
U.S. producers: Overall value	Share	***	***	***
Cambodia	Share	***	***	***
Malaysia	Share	***	***	***
Thailand	Share	***	***	***
Vietnam	Share	***	***	***
Subject sources	Share	***	***	***
Subject sources less Cambodia	Share	***	***	***
Circumventing sources	Share	***	***	***
South Korea	Share	***	***	***
All other sources	Share	***	***	***
Nonsubject sources	Share	***	***	***
Nonsubject sources plus Cambodia	Share	***	***	***
All import sources	Share	***	***	***
All sources	Share	100.0	100.0	100.0

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—". Value for U.S. producers' U.S. shipments reflects domestically produced cells to assemble into modules and the incremental value added by U.S. module producers to imported CSPV cells. In measuring consumption and market share this methodology avoids reclassifying and/or double counting merchandise already reported as an import. Value for circumventing sources and South Korea are import values reported in the questionnaire, all other sources value is calculated by removing these imports from reported U.S. shipments from nonsubject sources.

Figure 4.10 CSPV cells and modules: Apparent U.S. consumption based on value, by source and period

* * * * *

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Note: Value for U.S. producers' U.S. shipments reflects domestically produced cells to assemble into modules and the incremental value added by U.S. module producers to imported CSPV cells. In measuring consumption and market share, this methodology avoids reclassifying and/or double counting merchandise already reported as an import.

Table 4.19 presents U.S. producers' U.S. shipments of modules and their ratio to overall apparent U.S. consumption. Both ratios were at their lowest in 2023 and higher in 2024 than in 2022.

Table 4.19 CSPV cells and modules: U.S. producers' U.S. shipments and ratio to overall apparent consumption

Value in 1,000 dollars; ratios in percent

Product type	Measure	2022	2023	2024
Modules	Quantity	***	***	***
Modules	Value	***	***	***
Modules	Quantity ratio	***	***	***
Modules	Value ratio	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: The ratios (i.e., quantity ratio, and value ratio) represent the portion of overall apparent consumption the U.S. producers' shipments of modules account for out of the overall apparent consumption of the single domestic like product version of apparent consumption that includes both cells and modules. These are ratios, not shares, since these numbers were not used to construct the apparent consumption for cells and modules together, rather the inputs into domestic production (cells) were the basis for the combined data. There are likely differences in timing and data coverage between the input used in apparent consumption (cells) and the finished good of the U.S. module producers (modules).

Part 5: Pricing data

Factors affecting prices

Raw material costs

The main underlying raw material input for CSPV cells is polysilicon, which is used to make ingots and wafers. These cells are then assembled, along with other components, including solar glass, aluminum frames, junction boxes, and backsheet, into CSPV modules.

As shown in table 5.1 and figure 5.1, the global average price for monocrystalline wafers fluctuated downwards throughout 2022 to 2024, decreasing overall by *** to *** percent, depending on the wafer type. The prices for different wafer sizes also converged toward the end of the period, though larger wafer sizes (such as 210mm) were still more expensive than smaller ones (such as 156mm). As shown in table 5.2 and figure 5.2, the global average price for monocrystalline cells followed a similar pattern, ending lower in December 2024 than in January 2022. Cell prices showed even greater convergence over the period than wafer prices.

Table 5.1 Wafer prices: Average prices for monocrystalline wafers, by month

Prices in dollar per wafer

Year	Month	210mm N-type mono wafer	210mm mono wafer	182mm N-type mono wafer	182mm mono wafer	161.7mm N-type mono wafer	156mm N-type mono wafer	156mm P-type mono wafer
2022	January	***	***	***	***	***	***	***
2022	February	***	***	***	***	***	***	***
2022	March	***	***	***	***	***	***	***
2022	April	***	***	***	***	***	***	***
2022	May	***	***	***	***	***	***	***
2022	June	***	***	***	***	***	***	***
2022	July	***	***	***	***	***	***	***
2022	August	***	***	***	***	***	***	***
2022	September	***	***	***	***	***	***	***
2022	October	***	***	***	***	***	***	***
2022	November	***	***	***	***	***	***	***
2022	December	***	***	***	***	***	***	***
2023	January	***	***	***	***	***	***	***
2023	February	***	***	***	***	***	***	***
2023	March	***	***	***	***	***	***	***
2023	April	***	***	***	***	***	***	***
2023	May	***	***	***	***	***	***	***
2023	June	***	***	***	***	***	***	***

Table continued.

Table 5.1 Continued Wafer prices: Average prices for monocrystalline wafers, by month

Prices in dollar per wafer

Year	Month	210mm N-type mono wafer	210mm mono wafer	182mm N-type mono wafer	182mm mono wafer	161.7mm N-type mono wafer	156mm N-type mono wafer	156mm P-type mono wafer
2023	July	***	***	***	***	***	***	***
2023	August	***	***	***	***	***	***	***
2023	September	***	***	***	***	***	***	***
2023	October	***	***	***	***	***	***	***
2023	November	***	***	***	***	***	***	***
2023	December	***	***	***	***	***	***	***
2024	January	***	***	***	***	***	***	***
2024	February	***	***	***	***	***	***	***
2024	March	***	***	***	***	***	***	***
2024	April	***	***	***	***	***	***	***
2024	May	***	***	***	***	***	***	***
2024	June	***	***	***	***	***	***	***
2024	July	***	***	***	***	***	***	***
2024	August	***	***	***	***	***	***	***
2024	September	***	***	***	***	***	***	***
2024	October	***	***	***	***	***	***	***
2024	November	***	***	***	***	***	***	***
2024	December	***	***	***	***	***	***	***

Source: *** accessed March 10, 2025.

Figure 5.1 Wafer prices: Average prices for monocrystalline wafers, by month

* * * * *

Source: *** accessed March 10, 2025.

Table 5.2 Cell prices: Average prices for monocrystalline cells, by month

Prices in dollars per kilowatt

Year	Month	Mono cell	N-type mono cell	PERC mono cell
2022	January	***	***	***
2022	February	***	***	***
2022	March	***	***	***
2022	April	***	***	***
2022	May	***	***	***
2022	June	***	***	***
2022	July	***	***	***
2022	August	***	***	***
2022	September	***	***	***
2022	October	***	***	***
2022	November	***	***	***
2022	December	***	***	***
2023	January	***	***	***
2023	February	***	***	***
2023	March	***	***	***
2023	April	***	***	***
2023	May	***	***	***
2023	June	***	***	***
2023	July	***	***	***
2023	August	***	***	***
2023	September	***	***	***
2023	October	***	***	***
2023	November	***	***	***
2023	December	***	***	***
2024	January	***	***	***
2024	February	***	***	***
2024	March	***	***	***
2024	April	***	***	***
2024	May	***	***	***
2024	June	***	***	***
2024	July	***	***	***
2024	August	***	***	***
2024	September	***	***	***
2024	October	***	***	***
2024	November	***	***	***
2024	December	***	***	***

Source: *** accessed March 10, 2025.

Figure 5.2 Cell prices: Average prices for monocrystalline cells, by month



Source: *** accessed March 10, 2025.

Transportation costs to the U.S. market

Transportation costs for CSPV cells and modules shipped from subject countries to the United States averaged 4.8 percent for Cambodia, 4.3 percent for Malaysia, 3.0 percent for Thailand, and 3.0 percent for Vietnam during 2024. These estimates were derived from official Commerce import data and represent transportation and other charges on imports.¹

U.S. inland transportation costs

Eleven responding U.S. producers and 29 importers reported that they typically arrange transportation to their customers. Responding U.S. producers and most responding importers’ reported U.S. inland transportation costs ranged from 0 to 5 percent.²

¹ The estimated transportation costs were obtained by subtracting the customs value from the c.i.f. value of the imports for 2024 and then dividing by the customs value based on the HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010.

² Importers’ reported costs are for imports of CSPV products from subject sources. One importer, ***, reported transportation costs ranging from 4 to 8 percent, and one importer, ***, reported an estimate of 16.7 percent. Importers’ reported costs for imports of CSPV products from South Korea ranged from 0 to 21 percent.

Pricing practices

Pricing methods

U.S. producers and importers reported setting prices using transaction-by-transaction negotiations, contracts, set price lists, and other methods (table 5.3). Most U.S. producers and importers reported setting prices using transaction-by-transaction negotiations and contracts.

Table 5.3 CSPV cells and modules: Count of U.S. producers' and importers' reported price setting methods

Count in number of firms reporting

Method	U.S. producers	U.S. importers
Transaction-by-transaction	11	22
Contract	11	26
Set price list	7	8
Other	2	7
Responding firms	17	36

Source: Compiled from data submitted in response to Commission questionnaires.

Note: The sum of responses down may not add up to the total number of responding firms as each firm was instructed to check all applicable price setting methods employed.

U.S. producers and subject U.S. importers reported using all four sale types (table 5.4). A majority of the domestic industry's reported commercial shipments were through short-term contracts, followed by annual contracts, and smaller shares reported for long-term contracts and spot sales.³ The average duration of a typical short-term contract for responding U.S. producers ranged from 72 to 180 days. Although most domestic industry sales were reported through short-term contracts, four U.S. producers reported most of their sales through long-term contracts and three U.S. producers reported all of their 2024 sales as spot sales.⁴

³ ***.

⁴ Suniva, the only known U.S. producer of cells during the period for which data were collected, reported ***.

A plurality of responding U.S. importers' commercial shipments were through short-term contracts, followed by annual contracts as the second largest share. Over a quarter of importers' commercial shipments were made through long-term contracts, while spot sales held the smallest share of sales. The average duration of a typical short-term contract as reported by U.S. importers ranged from 30 to 180 days, with the most commonly reported duration being 180 days (eight firms).

Purchasers were asked how frequently they make purchases of CSPV cells and modules, and whether their purchasing frequency has changed since January 1, 2022. Seven purchasers reported purchasing monthly, three reported purchasing annually, two reported purchasing quarterly, two reported the frequency of their purchases were project-based, two reported purchasing every one to two years, one reported purchasing weekly, and one reported purchasing semi-annually. Seven of 16 responding purchasers reported that their purchasing frequency had changed since 2022, with three reporting increased production and/or demand, two reporting decreased demand, one reporting fluctuating demand, and one reporting that it was beginning to consider spot purchases.

Table 5.4 CSPV cells and modules: U.S. producers' and importers' shares of commercial U.S. shipments by type of sale, 2024

Share in percent

Sale type	U.S. producers	Subject U.S. importers
Long-term contracts	***	***
Annual contract	***	***
Short-term contracts	***	***
Spot sales	***	***
All sales types	100.0	100.0

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Because of rounding, figures may not add to the totals shown.

Sales terms and discounts

U.S. producers and importers were asked whether their firm's prices of CSPV products from subject sources were usually quoted on a delivered or f.o.b. basis, and to describe their firm's discount policies. Most U.S. producers (10 of 17) and most U.S. importers (20 of 29) reported they usually quote their prices on a delivered basis. Among both U.S. producers (6 of 17) and importers (10 of 36), the most commonly reported form of discount policy was quantity discounts. About half of responding U.S. producers (8 of 17) and most U.S. importers (22 of 36) reported offering no discount policy.

Price leadership

Purchasers were asked to report any firms they considered to be price leaders in CSPV products since January 1, 2022. Six purchasers reported firms they considered to be price leaders in the CSPV cells and modules market. Sources that were reported as price leaders include Hanwha Q Cells (four purchasers), JA Solar (two purchasers), Jinko (two purchasers), LONGi (two purchasers), Trina (two purchasers), Adani (one purchaser), Canadian Solar (one purchaser), First Solar (one purchaser), and producers in subject countries (one purchaser).

Price data

The Commission requested U.S. producers and importers to provide quarterly data for the total quantity and f.o.b. value of the following CSPV cells and modules products shipped to unrelated U.S. customers during 2022 to 2024.

Product 1.-- Monocrystalline silicon module with front-side area of less than 2.2 square meters and a peak power wattage between 380w and 450w, inclusive, P-max or Wp as measured under Standard Test Conditions (STC), excluding bifacial modules.

Product 2.-- Monocrystalline silicon module with front-side area of greater than or equal to 2.2 square meters and a peak power wattage between 320w and 440w, inclusive, P-max or Wp as measured under STC, excluding bifacial modules.

Product 3.-- Monocrystalline silicon bifacial module that generates power on both sides of the panel with a front-side area of greater than or equal to 1.9 square meters and a peak power wattage between 320w and 450w, inclusive, P-max or Wp as measured under STC.

Product 4.-- Monocrystalline silicon bifacial module that generates power on both sides of the panel with front-side area of greater than or equal to 1.9 square meters and a peak power wattage greater than or equal to 485w, inclusive, P-max or Wp as measured under STC.

Nine U.S. producers and 17 importers provided usable pricing data for sales of the requested products, although not all firms reported pricing for all products for all quarters.⁵ Pricing data reported by these firms accounted for approximately 70.4 percent of U.S. producers' U.S. shipments of CSPV modules, 99.4 percent of U.S. shipments of subject imports from Cambodia, 98.1 percent of U.S. shipments of subject imports from Malaysia, all U.S. shipments of subject imports from Thailand, and 94.1 percent of U.S. shipments of subject imports from Vietnam in 2024.⁶ Price data for products 1 to 4 are presented in tables 5.5 to 5.8 and figures 5.3 to 5.6. Pricing data for South Korea, a nonsubject country, are presented in Appendix G. In addition, pricing data for CSPV products imported from subject countries, with reported data for imports under Commerce's Appendix IV certification removed, are presented in Appendix H. Pricing data for South Korea and imports under Commerce's Appendix IV certification are included in Appendix I.

Table 5.5 CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 1 and margins of underselling/(overselling), by source and quarter

Price in dollars per kilowatt, quantity in kilowatts, margin in percent.

Period	U.S. price	U.S. quantity	Cambodia price	Cambodia quantity	Cambodia margin	Malaysia price	Malaysia quantity	Malaysia margin
2022 Q1	***	***	***	***	***	***	***	***
2022 Q2	***	***	***	***	***	***	***	***
2022 Q3	***	***	***	***	***	***	***	***
2022 Q4	***	***	***	***	***	***	***	***
2023 Q1	***	***	***	***	***	***	***	***
2023 Q2	***	***	***	***	***	***	***	***
2023 Q3	***	***	***	***	***	***	***	***
2023 Q4	***	***	***	***	***	***	***	***
2024 Q1	***	***	***	***	***	***	***	***
2024 Q2	***	***	***	***	***	***	***	***
2024 Q3	***	***	***	***	***	***	***	***
2024 Q4	***	***	***	***	***	***	***	***

Table continued.

⁵ Per-unit pricing data are calculated from total quantity and total value data provided by U.S. producers and importers. The precision and variation of these figures may be affected by rounding, limited quantities, and producer or importer estimates.

⁶ Pricing coverage is based on U.S. shipments of modules reported in questionnaires.

Table 5.5 Continued CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 1 and margins of underselling/(overselling), by source and quarter

Price in dollars per kilowatt, quantity in kilowatts, margin in percent.

Period	U.S. price	U.S. quantity	Thailand price	Thailand quantity	Thailand margin	Vietnam price	Vietnam quantity	Vietnam margin
2022 Q1	***	***	***	***	***	***	***	***
2022 Q2	***	***	***	***	***	***	***	***
2022 Q3	***	***	***	***	***	***	***	***
2022 Q4	***	***	***	***	***	***	***	***
2023 Q1	***	***	***	***	***	***	***	***
2023 Q2	***	***	***	***	***	***	***	***
2023 Q3	***	***	***	***	***	***	***	***
2023 Q4	***	***	***	***	***	***	***	***
2024 Q1	***	***	***	***	***	***	***	***
2024 Q2	***	***	***	***	***	***	***	***
2024 Q3	***	***	***	***	***	***	***	***
2024 Q4	***	***	***	***	***	***	***	***

Table continued.

Table 5.5 Continued CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 1 and margins of underselling/(overselling), by source and quarter

Price in dollars per kilowatt, quantity in kilowatts, margin in percent.

Period	U.S. price	U.S. quantity	Subject price	Subject quantity	Subject margin
2022 Q1	***	***	***	***	***
2022 Q2	***	***	***	***	***
2022 Q3	***	***	***	***	***
2022 Q4	***	***	***	***	***
2023 Q1	***	***	***	***	***
2023 Q2	***	***	***	***	***
2023 Q3	***	***	***	***	***
2023 Q4	***	***	***	***	***
2024 Q1	***	***	***	***	***
2024 Q2	***	***	***	***	***
2024 Q3	***	***	***	***	***
2024 Q4	***	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Product 1: Monocrystalline silicon module with front-side area of less than 2.2 square meters and a peak power wattage between 380w and 450w, inclusive, P-max or Wp as measured under Standard Test Conditions (STC), excluding bifacial modules.

Figure 5.3 CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 1, by source and quarter

Price of product 1

* * * * *

Volume of product 1

* * * * *

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Product 1: Monocrystalline silicon module with front-side area of less than 2.2 square meters and a peak power wattage between 380w and 450w, inclusive, P-max or Wp as measured under Standard Test Conditions (STC), excluding bifacial modules.

Table 5.6 CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 2 and margins of underselling/(overselling), by source and quarter

Price in dollars per kilowatt, quantity in kilowatts, margin in percent.

Period	U.S. price	U.S. quantity	Cambodia price	Cambodia quantity	Cambodia margin	Malaysia price	Malaysia quantity	Malaysia margin
2022 Q1	***	***	***	***	***	***	***	***
2022 Q2	***	***	***	***	***	***	***	***
2022 Q3	***	***	***	***	***	***	***	***
2022 Q4	***	***	***	***	***	***	***	***
2023 Q1	***	***	***	***	***	***	***	***
2023 Q2	***	***	***	***	***	***	***	***
2023 Q3	***	***	***	***	***	***	***	***
2023 Q4	***	***	***	***	***	***	***	***
2024 Q1	***	***	***	***	***	***	***	***
2024 Q2	***	***	***	***	***	***	***	***
2024 Q3	***	***	***	***	***	***	***	***
2024 Q4	***	***	***	***	***	***	***	***

Table continued.

Table 5.6 Continued CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 2 and margins of underselling/(overselling), by source and quarter

Price in dollars per kilowatt, quantity in kilowatts, margin in percent.

Period	U.S. price	U.S. quantity	Thailand price	Thailand quantity	Thailand margin	Vietnam price	Vietnam quantity	Vietnam margin
2022 Q1	***	***	***	***	***	***	***	***
2022 Q2	***	***	***	***	***	***	***	***
2022 Q3	***	***	***	***	***	***	***	***
2022 Q4	***	***	***	***	***	***	***	***
2023 Q1	***	***	***	***	***	***	***	***
2023 Q2	***	***	***	***	***	***	***	***
2023 Q3	***	***	***	***	***	***	***	***
2023 Q4	***	***	***	***	***	***	***	***
2024 Q1	***	***	***	***	***	***	***	***
2024 Q2	***	***	***	***	***	***	***	***
2024 Q3	***	***	***	***	***	***	***	***
2024 Q4	***	***	***	***	***	***	***	***

Table continued.

Table 5.6 Continued CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 2 and margins of underselling/(overselling), by source and quarter

Price in dollars per kilowatt, quantity in kilowatts, margin in percent.

Period	U.S. price	U.S. quantity	Subject price	Subject quantity	Subject margin
2022 Q1	***	***	***	***	***
2022 Q2	***	***	***	***	***
2022 Q3	***	***	***	***	***
2022 Q4	***	***	***	***	***
2023 Q1	***	***	***	***	***
2023 Q2	***	***	***	***	***
2023 Q3	***	***	***	***	***
2023 Q4	***	***	***	***	***
2024 Q1	***	***	***	***	***
2024 Q2	***	***	***	***	***
2024 Q3	***	***	***	***	***
2024 Q4	***	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Product 2: Monocrystalline silicon module with front-side area of greater than or equal to 2.2 square meters and a peak power wattage between 320w and 440w, inclusive, P-max or Wp as measured under STC, excluding bifacial modules.

Figure 5.4 CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 2, by source and quarter

Price of product 2

* * * * *

Volume of product 2

* * * * *

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Product 2: Monocrystalline silicon module with front-side area of greater than or equal to 2.2 square meters and a peak power wattage between 320w and 440w, inclusive, P-max or Wp as measured under STC, excluding bifacial modules.

Table 5.7 CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 3 and margins of underselling/(overselling), by source and quarter

Price in dollars per kilowatt, quantity in kilowatts, margin in percent.

Period	U.S. price	U.S. quantity	Cambodia price	Cambodia quantity	Cambodia margin	Malaysia price	Malaysia quantity	Malaysia margin
2022 Q1	***	***	***	***	***	***	***	***
2022 Q2	***	***	***	***	***	***	***	***
2022 Q3	***	***	***	***	***	***	***	***
2022 Q4	***	***	***	***	***	***	***	***
2023 Q1	***	***	***	***	***	***	***	***
2023 Q2	***	***	***	***	***	***	***	***
2023 Q3	***	***	***	***	***	***	***	***
2023 Q4	***	***	***	***	***	***	***	***
2024 Q1	***	***	***	***	***	***	***	***
2024 Q2	***	***	***	***	***	***	***	***
2024 Q3	***	***	***	***	***	***	***	***
2024 Q4	***	***	***	***	***	***	***	***

Table continued.

Table 5.7 Continued CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 3 and margins of underselling/(overselling), by source and quarter

Price in dollars per kilowatt, quantity in kilowatts, margin in percent.

Period	U.S. price	U.S. quantity	Thailand price	Thailand quantity	Thailand margin	Vietnam price	Vietnam quantity	Vietnam margin
2022 Q1	***	***	***	***	***	***	***	***
2022 Q2	***	***	***	***	***	***	***	***
2022 Q3	***	***	***	***	***	***	***	***
2022 Q4	***	***	***	***	***	***	***	***
2023 Q1	***	***	***	***	***	***	***	***
2023 Q2	***	***	***	***	***	***	***	***
2023 Q3	***	***	***	***	***	***	***	***
2023 Q4	***	***	***	***	***	***	***	***
2024 Q1	***	***	***	***	***	***	***	***
2024 Q2	***	***	***	***	***	***	***	***
2024 Q3	***	***	***	***	***	***	***	***
2024 Q4	***	***	***	***	***	***	***	***

Table continued.

Table 5.7 Continued CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 3 and margins of underselling/(overselling), by source and quarter

Price in dollars per kilowatt, quantity in kilowatts, margin in percent.

Period	U.S. price	U.S. quantity	Subject price	Subject quantity	Subject margin
2022 Q1	***	***	***	***	***
2022 Q2	***	***	***	***	***
2022 Q3	***	***	***	***	***
2022 Q4	***	***	***	***	***
2023 Q1	***	***	***	***	***
2023 Q2	***	***	***	***	***
2023 Q3	***	***	***	***	***
2023 Q4	***	***	***	***	***
2024 Q1	***	***	***	***	***
2024 Q2	***	***	***	***	***
2024 Q3	***	***	***	***	***
2024 Q4	***	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Product 3: Monocrystalline silicon bifacial module that generates power on both sides of the panel with a front-side area of greater than or equal to 1.9 square meters and a peak power wattage between 320w and 450w, inclusive, P-max or Wp as measured under STC.

Figure 5.5 CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 3, by source and quarter

Price of product 3

* * * * *

Volume of product 3

* * * * *

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Product 3: Monocrystalline silicon bifacial module that generates power on both sides of the panel with a front-side area of greater than or equal to 1.9 square meters and a peak power wattage between 320w and 450w, inclusive, P-max or Wp as measured under STC.

Table 5.8 CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 4 and margins of underselling/(overselling), by source and quarter

Price in dollars per kilowatt, quantity in kilowatts, margin in percent.

Period	U.S. price	U.S. quantity	Cambodia price	Cambodia quantity	Cambodia margin	Malaysia price	Malaysia quantity	Malaysia margin
2022 Q1	***	***	***	***	***	***	***	***
2022 Q2	***	***	***	***	***	***	***	***
2022 Q3	***	***	***	***	***	***	***	***
2022 Q4	***	***	***	***	***	***	***	***
2023 Q1	***	***	***	***	***	***	***	***
2023 Q2	***	***	***	***	***	***	***	***
2023 Q3	***	***	***	***	***	***	***	***
2023 Q4	***	***	***	***	***	***	***	***
2024 Q1	***	***	***	***	***	***	***	***
2024 Q2	***	***	***	***	***	***	***	***
2024 Q3	***	***	***	***	***	***	***	***
2024 Q4	***	***	***	***	***	***	***	***

Table continued.

Table 5.8 Continued CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 4 and margins of underselling/(overselling), by source and quarter

Price in dollars per kilowatt, quantity in kilowatts, margin in percent.

Period	U.S. price	U.S. quantity	Thailand price	Thailand quantity	Thailand margin	Vietnam price	Vietnam quantity	Vietnam margin
2022 Q1	***	***	***	***	***	***	***	***
2022 Q2	***	***	***	***	***	***	***	***
2022 Q3	***	***	***	***	***	***	***	***
2022 Q4	***	***	***	***	***	***	***	***
2023 Q1	***	***	***	***	***	***	***	***
2023 Q2	***	***	***	***	***	***	***	***
2023 Q3	***	***	***	***	***	***	***	***
2023 Q4	***	***	***	***	***	***	***	***
2024 Q1	***	***	***	***	***	***	***	***
2024 Q2	***	***	***	***	***	***	***	***
2024 Q3	***	***	***	***	***	***	***	***
2024 Q4	***	***	***	***	***	***	***	***

Table continued.

Table 5.8 Continued CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 4 and margins of underselling/(overselling), by source and quarter

Price in dollars per kilowatt, quantity in kilowatts, margin in percent.

Period	U.S. price	U.S. quantity	Subject price	Subject quantity	Subject margin
2022 Q1	***	***	***	***	***
2022 Q2	***	***	***	***	***
2022 Q3	***	***	***	***	***
2022 Q4	***	***	***	***	***
2023 Q1	***	***	***	***	***
2023 Q2	***	***	***	***	***
2023 Q3	***	***	***	***	***
2023 Q4	***	***	***	***	***
2024 Q1	***	***	***	***	***
2024 Q2	***	***	***	***	***
2024 Q3	***	***	***	***	***
2024 Q4	***	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Product 4: Monocrystalline silicon bifacial module that generates power on both sides of the panel with front-side area of greater than or equal to 1.9 square meters and a peak power wattage greater than or equal to 485w, inclusive, P-max or Wp as measured under STC.

Figure 5.6 CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 4, by source and quarter

Price of product 4

* * * * *

Volume of product 4

* * * * *

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Product 4: Monocrystalline silicon bifacial module that generates power on both sides of the panel with front-side area of greater than or equal to 1.9 square meters and a peak power wattage greater than or equal to 485w, inclusive, P-max or Wp as measured under STC.

Price trends

In general, prices decreased during 2022 to 2024. Table 5.9 summarizes the price trends, by country and by product. As shown in the table, domestic price decreases ranged from *** to *** percent while import price decreases ranged from *** to *** percent.

Table 5.9 CSPV modules: Summary of price data, by product and source, 2022 through 2024

Quantity in kilowatts, price in dollars per kilowatt; change in percent

Product	Source	Number of quarters	Quantity	Low price	High price	First quarter price	Last quarter price	Change over period
Product 1	United States	12	***	***	***	***	***	***
Product 1	Cambodia	8	***	***	***	***	***	***
Product 1	Malaysia	12	***	***	***	***	***	***
Product 1	Thailand	12	***	***	***	***	***	***
Product 1	Vietnam	12	***	***	***	***	***	***
Product 2	United States	10	***	***	***	***	***	***
Product 2	Cambodia	—	***	***	***	***	***	***
Product 2	Malaysia	5	***	***	***	***	***	***
Product 2	Thailand	5	***	***	***	***	***	***
Product 2	Vietnam	4	***	***	***	***	***	***
Product 3	United States	12	***	***	***	***	***	***
Product 3	Cambodia	—	***	***	***	***	***	***
Product 3	Malaysia	9	***	***	***	***	***	***
Product 3	Thailand	8	***	***	***	***	***	***
Product 3	Vietnam	12	***	***	***	***	***	***
Product 4	United States	7	***	***	***	***	***	***
Product 4	Cambodia	12	***	***	***	***	***	***
Product 4	Malaysia	11	***	***	***	***	***	***
Product 4	Thailand	12	***	***	***	***	***	***
Product 4	Vietnam	12	***	***	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Percent change column is percentage change from the first quarter 2022 to the last quarter in 2024.

Table 5.10 CSPV modules: Indexed U.S. producer prices, January 2022 through December 2024

Index in percent; 2022 Q1 = 100.0

Period	Product 1	Product 2	Product 3
2022 Q1	100.0	100.0	100.0
2022 Q2	***	***	***
2022 Q3	***	***	***
2022 Q4	***	***	***
2023 Q1	***	***	***
2023 Q2	***	***	***
2023 Q3	***	***	***
2023 Q4	***	***	***
2024 Q1	***	***	***
2024 Q2	***	***	***
2024 Q3	***	***	***
2024 Q4	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—". Data for Product 4 are not presented due to limited sales of the product during the first half of the time period.

Figure 5.7 CSPV modules: Indexed subject U.S. producer prices, January 2022 through December 2024

* * * * *

Source: Compiled from data submitted in response to Commission questionnaires.

Table 5.11 CSPV modules: Indexed subject U.S. importer prices, January 2022 through December 2024

Index in percent; 2022 Q1 = 100.0

Period	Product 1	Product 2	Product 3	Product 4
2022 Q1	100.0	100.0	100.0	100.0
2022 Q2	***	***	***	***
2022 Q3	***	***	***	***
2022 Q4	***	***	***	***
2023 Q1	***	***	***	***
2023 Q2	***	***	***	***
2023 Q3	***	***	***	***
2023 Q4	***	***	***	***
2024 Q1	***	***	***	***
2024 Q2	***	***	***	***
2024 Q3	***	***	***	***
2024 Q4	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—".

Figure 5.8 CSPV modules: Indexed subject U.S. importer prices, January 2022 through December 2024

* * * * *

Source: Compiled from data submitted in response to Commission questionnaires.

Price comparisons

As shown in table 5.13, prices for product imported from Cambodia were below those for U.S.-produced product in 10 of 15 instances (** kilowatts); margins of underselling ranged from ** to ** percent. In the remaining five instances (** kilowatts), prices for product from Cambodia were between ** and ** percent above prices for the domestic product. Prices for product imported from Malaysia were below those for U.S.-produced product in 27 of 33 instances (** kilowatts); margins of underselling ranged from ** to ** percent. In the remaining six instances (** kilowatts), prices for product from Malaysia were between ** and ** percent above prices for the domestic product. Prices for product imported from Thailand were below those for U.S.-produced product in 24 of 31 instances (** kilowatts); margins of underselling ranged from ** to ** percent. In the remaining seven instances (** kilowatts), prices for product from Thailand were between ** and ** percent above prices for the domestic product. Prices for product imported from Vietnam were below those for U.S.-produced product in 26 of 33 instances (** kilowatts); margins of underselling ranged from ** to ** percent. In the remaining seven instances (** kilowatts), prices for product from Vietnam were between ** and ** percent above prices for the domestic product.

Table 5.12 CSPV modules: Instances of underselling and overselling and the range and average of margins, by product, January 2022 through December 2024

Quantity in kilowatts; margin in percent

Products	Aggregation	Type	Number of instances	Quantity	Average margin	Min margin	Max margin
Product 1	Subject sources	Underselling	41	***	***	***	***
Product 2	Subject sources	Underselling	11	***	***	***	***
Product 3	Subject sources	Underselling	26	***	***	***	***
Product 4	Subject sources	Underselling	9	***	***	***	***
All products	Subject sources	Underselling	87	***	***	***	***
Product 1	Subject sources	Overselling	3	***	***	***	***
Product 2	Subject sources	Overselling	—	***	***	***	***
Product 3	Subject sources	Overselling	3	***	***	***	***
Product 4	Subject sources	Overselling	19	***	***	***	***
All products	Subject sources	Overselling	25	***	***	***	***

Table continued.

Table 5.12 Continued CSPV modules: Instances of underselling and overselling and the range and average of margins, by product, January 2022 through December 2024

Quantity in kilowatts; margin in percent

Products	Aggregation	Type	Number of instances	Quantity	Average margin	Min margin	Max margin
Product 1	Subject sources less Cambodia	Underselling	34	***	***	***	***
Product 2	Subject sources less Cambodia	Underselling	11	***	***	***	***
Product 3	Subject sources less Cambodia	Underselling	26	***	***	***	***
Product 4	Subject sources less Cambodia	Underselling	6	***	***	***	***
All products	Subject sources less Cambodia	Underselling	77	***	***	***	***
Product 1	Subject sources less Cambodia	Overselling	2	***	***	***	***
Product 2	Subject sources less Cambodia	Overselling	—	***	***	***	***
Product 3	Subject sources less Cambodia	Overselling	3	***	***	***	***
Product 4	Subject sources less Cambodia	Overselling	15	***	***	***	***
All products	Subject sources less Cambodia	Overselling	20	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: These data include only quarters in which there is a comparison between the U.S. and subject product.

Table 5.13 CSPV modules: Instances of underselling and overselling and the range and average of margins, by source, January 2022 through December 2024

Quantity in kilowatts; margin in percent

Sources	Type	Number of instances	Quantity	Average margin	Min margin	Max margin
Cambodia	Underselling	10	***	***	***	***
Malaysia	Underselling	27	***	***	***	***
Thailand	Underselling	24	***	***	***	***
Vietnam	Underselling	26	***	***	***	***
All subject sources	Underselling	87	***	***	***	***
All subject sources less Cambodia	Underselling	77	***	***	***	***
Cambodia	Overselling	5	***	***	***	***
Malaysia	Overselling	6	***	***	***	***
Thailand	Overselling	7	***	***	***	***
Vietnam	Overselling	7	***	***	***	***
All subject sources	Overselling	25	***	***	***	***
All subject sources less Cambodia	Overselling	20	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: These data include only quarters in which there is a comparison between the U.S. and subject product.

Table 5.14 CSPV modules: Instances of underselling and overselling and the range and average of margins, by year

Quantity in kilowatts; margin in percent

Period	Aggregation	Type	Number of instances	Quantity	Average margin	Min margin	Max margin
2022	Subject sources	Underselling	36	***	***	***	***
2023	Subject sources	Underselling	29	***	***	***	***
2024	Subject sources	Underselling	22	***	***	***	***
All periods	Subject sources	Underselling	87	***	***	***	***
2022	Subject sources	Overselling	4	***	***	***	***
2023	Subject sources	Overselling	4	***	***	***	***
2024	Subject sources	Overselling	17	***	***	***	***
All periods	Subject sources	Overselling	25	***	***	***	***
2022	Subject sources less Cambodia	Underselling	31	***	***	***	***
2023	Subject sources less Cambodia	Underselling	24	***	***	***	***
2024	Subject sources less Cambodia	Underselling	22	***	***	***	***
All periods	Subject sources less Cambodia	Underselling	77	***	***	***	***
2022	Subject sources less Cambodia	Overselling	4	***	***	***	***
2023	Subject sources less Cambodia	Overselling	4	***	***	***	***
2024	Subject sources less Cambodia	Overselling	12	***	***	***	***
All periods	Subject sources less Cambodia	Overselling	20	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: These data include only quarters in which there is a comparison between the U.S. and subject product.

Lost sales and lost revenue

In the preliminary phase of these investigations, the Commission requested that U.S. producers of CSPV cells and modules report purchasers with which they experienced instances of lost sales or revenue due to competition from imports of CSPV cells and modules from Cambodia, Malaysia, Thailand, and Vietnam during January 2021 through December 2023. One U.S. producer, ***, submitted lost sales and lost revenue allegations; identifying 37 firms with which it lost sales or revenue (27 consisting of lost sales allegations, 4 consisting of lost revenue allegations, and 6 consisting of both types of allegations).

In the final phase of these investigations, of the 17 responding U.S. producers, 5 reported that they had to reduce prices, 3 reported that they had to roll back announced price increases, and 6 firms reported that they had lost sales.

Staff contacted 77 purchasers and received responses from 16 purchasers.⁷ Responding purchasers reported purchasing 59.4 million kilowatts of CSPV cells and modules during January 2022 to December 2024 (table 5.15).

Purchasers were asked if they purchased imports, or directly imported, CSPV products from subject sources instead of domestic product at any time since January 1, 2022. Three purchasers reported that, since 2022, they had purchased imported CSPV cells and modules from subject sources instead of U.S.-produced product; none reported purchasing or importing from Cambodia instead of U.S.-produced product (tables 5.16 and 5.17). Two of these purchasers reported that subject import prices were lower than U.S.-produced product, and one of these purchasers (***) reported that price was a primary reason for the decision to purchase imported product rather than U.S.-produced product. Purchaser *** estimated that the quantity of CSPV cells and modules purchased or imported from Malaysia instead of domestic product was *** kilowatts.⁸ Purchasers identified limited availability of U.S. produced CSPV cells as a non-price reason for purchasing imported rather than U.S.-produced product.

No purchasers reported that U.S. producers had reduced prices in order to compete with lower-priced imports from Cambodia, Malaysia, Thailand, and Vietnam; 5 firms reported that they had not reduced prices and 10 reported that they did not know.

⁷ Four purchasers, ***, submitted lost sales lost revenue survey responses in the preliminary phase, but did not submit purchaser questionnaire responses in the final phase. One of those purchasers, ***, ended operations in 2024.

⁸ ***, *** importer questionnaire response, sections 2.7a and 2.8a.

Quantity in kilowatts, share in percent

Source: Compiled from data submitted in response to Commission questionnaires.

5.27

Quantity in kilowatts

Source: Compiled from data submitted in response to Commission questionnaires.

Table 5.17 CSPV cells and modules: Purchasers' responses to purchasing subject imports instead of domestic product, by source

Quantity in kilowatts

Source	Count of purchasers reporting subject instead of domestic	Count of purchasers reported that imports were priced lower	Count of purchasers reporting that price was a primary reason for shift	Quantity
Cambodia	0	0	0	***
Malaysia	2	2	1	***
Thailand	2	1	0	***
Vietnam	1	0	0	***
Any subject source	3	2	1	***

Source: Compiled from data submitted in response to Commission questionnaires.

Part 6: Financial experience of U.S. producers

Background¹

Sixteen U.S. producers provided usable financial results on their CSPV cells and modules operations.² All responding U.S. producers reported financial data on a calendar year basis.³ Fourteen of the responding U.S. producers provided their financial data on the basis of GAAP.⁴ One responding U.S. producer Suniva reported sales of CSPV cells in 2024.⁵

As described earlier in this report, Hanwha is the largest CSPV module producer in the United States and accounted for *** of CSPV module sales from 2022 to 2024. Despite six new module producers and one new cell producer (Suniva) restarting production during the period examined, aggregated financial data for CSPV cells and modules largely reflect the operations of ***.⁶ Virtually all net sales consists of commercial sales and transfers to related firms

¹ The following abbreviations are used in the tables and/or text of this section: generally accepted accounting principles (“GAAP”), fiscal year (“FY”), net sales (“NS”), cost of goods sold (“COGS”), selling, general, and administrative expenses (“SG&A expenses”), average unit values (“AUVs”), research and development expenses (“R&D expenses”), and return on assets (“ROA”), January 1, 2022 to December 31, 2024 (“period examined”), kilowatts (“kw”), and CSPV cells and modules (“CSPV products”).

² One U.S. producer of CSPV modules, (***), started production in 2024 but did not report any financial data and therefore is not included in the aggregated financial results. ***. In addition, sales data of *** were removed from the financial results because no cost information was reported ***. This methodology conforms with the Commission’s general practice as well as GAAP’s matching principal and accrual basis accounting. The differences between U.S. shipments and net sales data were *** percent or less during the period examined and did not have a material impact on the data trends.

³ All 16 U.S. producers’ fiscal year ends on December 31st.

⁴ One company, (***), reported its financial results in accordance with International Financial Reporting Standards (IFRS) while *** reported using a tax accrual basis.

⁵ Suniva restarted CSPV cell production in October 2024, reporting ***. In this section of the report, Suniva’s CSPV cell operations are aggregated with those of CSPV module producers. See appendix J for financial results of Suniva’s CSPV cell operations only.

⁶ During the period examined, seven new companies (***) began production and sales of CSPV products in the United States, while *** shut down its CSPV module operation in 2022. See Part 3 for details on responding U.S. producer’s changes in operations.

(***)⁷ ⁸ Non-commercial sales are included but not presented separately in this section of the report.⁹ Figure 6.1 presents each responding firm's share of the aggregated total net sales quantity of CSPV products in 2024.

Figure 6.1 CSPV cells and modules: U.S. producers' share of net sales quantity in 2024, by firm

* * * * *

Source: Compiled from data submitted in response to Commission questionnaires.

⁷ Commercial sales are made up of domestic sales during the period examined. Four responding U.S. producers reported transfers (***)

⁸ ***, accounting for less than *** percent of aggregated net sales in 2023.

⁹ In this proceeding, ***. Given that *** U.S. shipments in Part II and III and that *** accounts for *** percent of net sales from 2022 to 2024, transfers are not presented separately in this section of the report.

Operations on CSPV cells and modules

Table 6.1 presents aggregated data on U.S. producers' operations in relation to CSPV cells and modules, while table 6.2 presents corresponding changes in AUVs. Table 6.3 presents selected company-specific financial data.^{10 11}

Table 6.1 CSPV cells and modules: U.S. producers' results of operations, by item and period

Quantity in kilowatts; value in 1,000 dollars; ratios in percent

Item	Measure	2022	2023	2024
Total net sales	Quantity	***	***	***
Total net sales	Value	***	***	***
COGS: Raw materials	Value	***	***	***
COGS: Direct labor	Value	***	***	***
COGS: Other factory	Value	***	***	***
COGS: Total	Value	***	***	***
Gross profit or (loss)	Value	***	***	***
SG&A expenses	Value	***	***	***
Operating income or (loss)	Value	***	***	***
Interest expense	Value	***	***	***
All other expenses	Value	***	***	***
45X MPTC/IRA income	Value	***	***	***
All other income	Value	***	***	***
Net income or (loss)	Value	***	***	***
Depreciation/amortization	Value	***	***	***
Cash flow	Value	***	***	***
COGS: Raw materials	Ratio to NS	***	***	***
COGS: Direct labor	Ratio to NS	***	***	***
COGS: Other factory	Ratio to NS	***	***	***
COGS: Total	Ratio to NS	***	***	***
Gross profit	Ratio to NS	***	***	***
SG&A expense	Ratio to NS	***	***	***
Operating income or (loss)	Ratio to NS	***	***	***
Net income or (loss)	Ratio to NS	***	***	***

Table continued.

¹⁰ Appendix J presents the financial results separately for CSPV cell producer Suniva (tables J.1 and J.2) and CSPV module producers (tables J.3 and J.4).

¹¹ Appendix K presents selected financial results of U.S. CSPV module producers based on their primary source of cell inputs (subject or nonsubject).

Table 6.1 (Continued) CSPV cells and modules: U.S. producers' results of operations, by item and period

Shares in percent; unit values in dollars per kilowatt; count in number of firms reporting

Item	Measure	2022	2023	2024
COGS: Raw materials	Share	***	***	***
COGS: Direct labor	Share	***	***	***
COGS: Other factory	Share	***	***	***
COGS: Total	Share	100.0	100.0	100.0
Total net sales	Unit value	***	***	***
COGS: Raw materials	Unit value	***	***	***
COGS: Direct labor	Unit value	***	***	***
COGS: Other factory	Unit value	***	***	***
COGS: Total	Unit value	***	***	***
Gross profit or (loss)	Unit value	***	***	***
SG&A expenses	Unit value	***	***	***
Operating income or (loss)	Unit value	***	***	***
Net income or (loss)	Unit value	***	***	***
Operating losses	Count	5	9	14
Net losses	Count	5	7	10
Data	Count	9	10	15

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Zeroes, null values, and undefined calculations are suppressed and shown as “—”. As noted earlier in Part 3 of this report, the Inflation Reduction Act (“IRA”) established the Advanced Manufacturing Production Tax Credit (“MPTC”) and expanded the Advanced Energy Project Investment Tax Credit for manufacturers. “The IRA created dedicated tax incentives for domestic production along the solar supply chain, including cells and modules, in the form of the Section 45X Manufacturing Production Tax Credit (“45X/MPTC”). The IRA has also provided a bonus to existing incentives for the deployment of solar power projects that utilize domestic content.” Hearing transcript, p. 162 (Roselund).

Table 6.2 CSPV cells and modules: Changes in AUVs between comparison periods

Changes in percent

Item	2022–24	2022–23	2023–24
Total net sales	▼ ***	▼ ***	▼ ***
COGS: Raw materials	▼ ***	▼ ***	▼ ***
COGS: Direct labor	▼ ***	▼ ***	▼ ***
COGS: Other factory	▼ ***	▼ ***	▼ ***
COGS: Total	▼ ***	▼ ***	▼ ***

Table continued.

Table 6.2 (Continued) CSPV cells and modules: Changes in AUVs between comparison periods

Changes in dollars per kilowatt

Item	2022–24	2022–23	2023–24
Total net sales	▼ ***	▼ ***	▼ ***
COGS: Raw materials	▼ ***	▼ ***	▼ ***
COGS: Direct labor	▼ ***	▼ ***	▼ ***
COGS: Other factory	▼ ***	▼ ***	▼ ***
COGS: Total	▼ ***	▼ ***	▼ ***
Gross profit or (loss)	▼ ***	▼ ***	▼ ***
SG&A expense	▼ ***	▲ ***	▼ ***
Operating income or (loss)	▼ ***	▼ ***	▲ ***
Net income or (loss)	▲ ***	▲ ***	▲ ***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Percentages and unit values shown as “0.0” or “0.00” represent values greater than zero, but less than “0.05” or “0.005,” respectively. Period changes preceded by a “▲” represent an increase, while period changes preceded by a “▼” represent a decrease.

Table 6.3 CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

Net sales quantity

Quantity in kilowatts

Firm	2022	2023	2024
Canadian Solar	***	***	***
GAF Energy	***	***	***
Hanwha GA	***	***	***
Houssen	***	***	***
Illuminate	***	***	***
Jinko US	***	***	***
Merlin	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
Silfab	***	***	***
Suniva	***	***	***
SunTegra	***	***	***
Tesla	***	***	***
Trina/T1	***	***	***
ZampTech	***	***	***
All firms	***	***	***

Table continued.

Table 6.3 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

Net sales value

Value in 1,000 dollars

Firm	2022	2023	2024
Canadian Solar	***	***	***
GAF Energy	***	***	***
Hanwha GA	***	***	***
Hounen	***	***	***
Illuminate	***	***	***
Jinko US	***	***	***
Merlin	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
Silfab	***	***	***
Suniva	***	***	***
SunTegra	***	***	***
Tesla	***	***	***
Trina/T1	***	***	***
ZampTech	***	***	***
All firms	***	***	***

Table continued.

Table 6.3 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

COGS

Value in 1,000 dollars

Firm	2022	2023	2024
Canadian Solar	***	***	***
GAF Energy	***	***	***
Hanwha GA	***	***	***
Hounen	***	***	***
Illuminate	***	***	***
Jinko US	***	***	***
Merlin	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
Silfab	***	***	***
Suniva	***	***	***
SunTegra	***	***	***
Tesla	***	***	***
Trina/T1	***	***	***
ZampTech	***	***	***
All firms	***	***	***

Table continued.

Table 6.3 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

Gross profit or (loss)

Value in 1,000 dollars

Firm	2022	2023	2024
Canadian Solar	***	***	***
GAF Energy	***	***	***
Hanwha GA	***	***	***
Hounen	***	***	***
Illuminate	***	***	***
Jinko US	***	***	***
Merlin	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
Silfab	***	***	***
Suniva	***	***	***
SunTegra	***	***	***
Tesla	***	***	***
Trina/T1	***	***	***
ZampTech	***	***	***
All firms	***	***	***

Table continued.

Table 6.3 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

SG&A expenses

Value in 1,000 dollars

Firm	2022	2023	2024
Canadian Solar	***	***	***
GAF Energy	***	***	***
Hanwha GA	***	***	***
Hounen	***	***	***
Illuminate	***	***	***
Jinko US	***	***	***
Merlin	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
Silfab	***	***	***
Suniva	***	***	***
SunTegra	***	***	***
Tesla	***	***	***
Trina/T1	***	***	***
ZampTech	***	***	***
All firms	***	***	***

Table continued.

Table 6.3 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

Operating income or (loss)

Value in 1,000 dollars

Firm	2022	2023	2024
Canadian Solar	***	***	***
GAF Energy	***	***	***
Hanwha GA	***	***	***
Hounen	***	***	***
Illuminate	***	***	***
Jinko US	***	***	***
Merlin	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
Silfab	***	***	***
Suniva	***	***	***
SunTegra	***	***	***
Tesla	***	***	***
Trina/T1	***	***	***
ZampTech	***	***	***
All firms	***	***	***

Table continued.

Table 6.3 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

Net income or (loss)

Value in 1,000 dollars

Firm	2022	2023	2024
Canadian Solar	***	***	***
GAF Energy	***	***	***
Hanwha GA	***	***	***
Hounen	***	***	***
Illuminate	***	***	***
Jinko US	***	***	***
Merlin	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
Silfab	***	***	***
Suniva	***	***	***
SunTegra	***	***	***
Tesla	***	***	***
Trina/T1	***	***	***
ZampTech	***	***	***
All firms	***	***	***

Table continued.

Table 6.3 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

COGS to net sales ratio

Ratios in percent

Firm	2022	2023	2024
Canadian Solar	***	***	***
GAF Energy	***	***	***
Hanwha GA	***	***	***
Hounen	***	***	***
Illuminate	***	***	***
Jinko US	***	***	***
Merlin	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
Silfab	***	***	***
Suniva	***	***	***
SunTegra	***	***	***
Tesla	***	***	***
Trina/T1	***	***	***
ZampTech	***	***	***
All firms	***	***	***

Table continued.

Table 6.3 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

Gross profit or (loss) to net sales ratio

Ratios in percent

Firm	2022	2023	2024
Canadian Solar	***	***	***
GAF Energy	***	***	***
Hanwha GA	***	***	***
Hounen	***	***	***
Illuminate	***	***	***
Jinko US	***	***	***
Merlin	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
Silfab	***	***	***
Suniva	***	***	***
SunTegra	***	***	***
Tesla	***	***	***
Trina/T1	***	***	***
ZampTech	***	***	***
All firms	***	***	***

Table continued.

Table 6.3 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

SG&A expenses to net sales ratio

Ratios in percent

Firm	2022	2023	2024
Canadian Solar	***	***	***
GAF Energy	***	***	***
Hanwha GA	***	***	***
Hounen	***	***	***
Illuminate	***	***	***
Jinko US	***	***	***
Merlin	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
Silfab	***	***	***
Suniva	***	***	***
SunTegra	***	***	***
Tesla	***	***	***
Trina/T1	***	***	***
ZampTech	***	***	***
All firms	***	***	***

Table continued.

Table 6.3 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

Operating income or (loss) to net sales ratio

Ratios in percent

Firm	2022	2023	2024
Canadian Solar	***	***	***
GAF Energy	***	***	***
Hanwha GA	***	***	***
Hounen	***	***	***
Illuminate	***	***	***
Jinko US	***	***	***
Merlin	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
Silfab	***	***	***
Suniva	***	***	***
SunTegra	***	***	***
Tesla	***	***	***
Trina/T1	***	***	***
ZampTech	***	***	***
All firms	***	***	***

Table continued.

Table 6.3 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

Net income or (loss) to net sales ratio

Ratios in percent

Firm	2022	2023	2024
Canadian Solar	***	***	***
GAF Energy	***	***	***
Hanwha GA	***	***	***
Hounen	***	***	***
Illuminate	***	***	***
Jinko US	***	***	***
Merlin	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
Silfab	***	***	***
Suniva	***	***	***
SunTegra	***	***	***
Tesla	***	***	***
Trina/T1	***	***	***
ZampTech	***	***	***
All firms	***	***	***

Table continued.

Table 6.3 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

Unit net sales value

Unit values in dollars per kilowatt

Firm	2022	2023	2024
Canadian Solar	***	***	***
GAF Energy	***	***	***
Hanwha GA	***	***	***
Hounen	***	***	***
Illuminate	***	***	***
Jinko US	***	***	***
Merlin	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
Silfab	***	***	***
Suniva	***	***	***
SunTegra	***	***	***
Tesla	***	***	***
Trina/T1	***	***	***
ZampTech	***	***	***
All firms	***	***	***

Table continued.

Table 6.3 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

Unit raw material costs

Unit values in dollars per kilowatt

Firm	2022	2023	2024
Canadian Solar	***	***	***
GAF Energy	***	***	***
Hanwha GA	***	***	***
Hounen	***	***	***
Illuminate	***	***	***
Jinko US	***	***	***
Merlin	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
Silfab	***	***	***
Suniva	***	***	***
SunTegra	***	***	***
Tesla	***	***	***
Trina/T1	***	***	***
ZampTech	***	***	***
All firms	***	***	***

Table continued.

Table 6.3 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

Unit direct labor costs

Unit values in dollars per kilowatt

Firm	2022	2023	2024
Canadian Solar	***	***	***
GAF Energy	***	***	***
Hanwha GA	***	***	***
Hounen	***	***	***
Illuminate	***	***	***
Jinko US	***	***	***
Merlin	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
Silfab	***	***	***
Suniva	***	***	***
SunTegra	***	***	***
Tesla	***	***	***
Trina/T1	***	***	***
ZampTech	***	***	***
All firms	***	***	***

Table continued.

Table 6.3 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

Unit other factory costs

Unit values in dollars per kilowatt

Firm	2022	2023	2024
Canadian Solar	***	***	***
GAF Energy	***	***	***
Hanwha GA	***	***	***
Hounen	***	***	***
Illuminate	***	***	***
Jinko US	***	***	***
Merlin	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
Silfab	***	***	***
Suniva	***	***	***
SunTegra	***	***	***
Tesla	***	***	***
Trina/T1	***	***	***
ZampTech	***	***	***
All firms	***	***	***

Table continued.

Table 6.3 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

Unit COGS

Unit values in dollars per kilowatt

Firm	2022	2023	2024
Canadian Solar	***	***	***
GAF Energy	***	***	***
Hanwha GA	***	***	***
Hounen	***	***	***
Illuminate	***	***	***
Jinko US	***	***	***
Merlin	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
Silfab	***	***	***
Suniva	***	***	***
SunTegra	***	***	***
Tesla	***	***	***
Trina/T1	***	***	***
ZampTech	***	***	***
All firms	***	***	***

Table continued.

Table 6.3 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

Unit gross profit or (loss)

Unit values in dollars per kilowatt

Firm	2022	2023	2024
Canadian Solar	***	***	***
GAF Energy	***	***	***
Hanwha GA	***	***	***
Hounen	***	***	***
Illuminate	***	***	***
Jinko US	***	***	***
Merlin	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
Silfab	***	***	***
Suniva	***	***	***
SunTegra	***	***	***
Tesla	***	***	***
Trina/T1	***	***	***
ZampTech	***	***	***
All firms	***	***	***

Table continued.

Table 6.3 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

Unit SG&A expenses

Unit values in dollars per kilowatt

Firm	2022	2023	2024
Canadian Solar	***	***	***
GAF Energy	***	***	***
Hanwha GA	***	***	***
Hounen	***	***	***
Illuminate	***	***	***
Jinko US	***	***	***
Merlin	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
Silfab	***	***	***
Suniva	***	***	***
SunTegra	***	***	***
Tesla	***	***	***
Trina/T1	***	***	***
ZampTech	***	***	***
All firms	***	***	***

Table continued.

Table 6.3 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

Unit operating income or (loss)

Unit values in dollars per kilowatt

Firm	2022	2023	2024
Canadian Solar	***	***	***
GAF Energy	***	***	***
Hanwha GA	***	***	***
Hounen	***	***	***
Illuminate	***	***	***
Jinko US	***	***	***
Merlin	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
Silfab	***	***	***
Suniva	***	***	***
SunTegra	***	***	***
Tesla	***	***	***
Trina/T1	***	***	***
ZampTech	***	***	***
All firms	***	***	***

Table continued.

Table 6.3 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

Unit net income or (loss)

Unit values in dollars per kilowatt

Firm	2022	2023	2024
Canadian Solar	***	***	***
GAF Energy	***	***	***
Hanwha GA	***	***	***
Houssen	***	***	***
Illuminate	***	***	***
Jinko US	***	***	***
Merlin	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
Silfab	***	***	***
Suniva	***	***	***
SunTegra	***	***	***
Tesla	***	***	***
Trina/T1	***	***	***
ZampTech	***	***	***
All firms	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—".

Net sales

As presented in table 6.1, aggregated net sales volume consistently increased, and the value of CSPV cells and modules (“CSPV products”) irregularly increased from 2022 to 2024 as new U.S. producers started production and sales.¹² As shown in tables 6.3 and J.3, the large increase of module commercial sales in 2024 was driven by *** and new module producers (***) entering the market.¹³

Table 6.1 shows that the average net sales unit value of CSPV products decreased from 2022 to 2024.¹⁴ Most U.S. producers reported declining net sales AUVs from 2022 to 2024 (table 6.3). The lowest net sales AUV was reported by *** CSPV modules, while *** reported net sales AUVs higher than the industry average.¹⁵ ¹⁶ Net sales AUV differences among producers are partially explained by product mix (e.g., large cell formats such as ***) and CSPV products with high efficiency n-type cells (e.g., TOPCon).¹⁷ ¹⁸

¹² All of ***.

¹³ ***. *** U.S. producer questionnaire, II-2a and petitioner’s prehearing brief, p. 59.

¹⁴ The peak of net sales AUVs in 2022 primarily reflects raw material AUVs being the highest during the period examined.

¹⁵ *** consistently reported the highest net sales AUVs throughout the period examined. ***. Email from Dan Stieler, PowerFilm, May 13, 2024.

¹⁶ ***.

¹⁷ U.S. producer questionnaires, II-2a, III-12b, III-13b, and IV-15. A conference witness testified to changes and modification of CSPV products from technical advances, resulting in CSPV product shifts to larger form factor panels using higher efficiency cells. Conference transcript, pp. 100 to 101 (Moskowitz).

¹⁸ TOPCon is the latest technology for CSPV products that emerged in 2020 but is not yet used in the United States; although Talon PV Solar Solutions testified that it is developing the first TOPCon solar cell manufacturing facility in the United States. In addition, Canadian Solar testified that it stopped production of old CSPV products (e.g., mono PERC) and is moving to selling only TOPCon CSPV products. Hearing transcript, p. 44 (Tesanovich), p. 213 (Koerner), p. 248 (Bowen).

Cost of goods sold and gross profit or loss

As presented in table 6.1, raw material costs represented the most substantial share of total COGS from 2022 to 2024, ranging from *** percent of total COGS. Raw material costs irregularly increased in absolute value and consistently increased as a ratio to net sales as new producers joined the industry. The average unit raw material costs for CSPV products consistently declined from \$*** per kilowatt in 2022 to \$*** per kilowatt in 2023, then declined further to \$*** per kilowatt in 2024.¹⁹ Table 6.3 presents company-specific raw material cost AUVs, with variations partially attributable to the type of CSPV products sold, the volume of sales, and different raw material sourcing practices among U.S. producers.²⁰ Imported CSPV cells made up the majority of total raw material costs in 2024 (no U.S. producer reported using internally produced cells to assemble CSPV modules). Tables 6.4 and 6.5 present raw material cost data for CSPV cells and modules, respectively.²¹

Table 6.4 CSPV cells: U.S. producer *'s raw material costs in 2024**

Value in 1,000 dollars; unit values in dollars per kilowatt; share of value in percent

Item	Value	Unit value	Share of value
Polysilicon or ingot	***	***	***
Wafers	***	***	***
All other material input	***	***	***
All raw materials	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

¹⁹ U.S. producers used a variety of methods to source raw materials. ***. Petitioner's postconference brief, pp. 47 and 142.

²⁰ As noted earlier, CSPV module producers are shifting to making more advanced modules such as the next generation TOPCon module, which requires an additional passivated layer on the cell during assembly. Conference transcript, p. 100 (Moskowitz).

²¹ Seven U.S. producers purchased inputs from related firms in 2024. ***.

Table 6.5 CSPV modules: U.S. producers' raw material costs in 2024

Value in 1,000 dollars; unit values in dollars per kilowatt; share of value in percent

Item	Value	Unit value	Share of value
Purchased cells: Domestic	***	***	***
Purchased cells: Subject	***	***	***
Purchased cells: Nonsubject	***	***	***
Purchased cells: All origins	***	***	***
Domestic cells	***	***	***
Subject cells	***	***	***
Nonsubject cells	***	***	***
All cell costs	***	***	***
Backsheet	***	***	***
Encapsulant	***	***	***
Framing	***	***	***
Junction box	***	***	***
Solar glass	***	***	***
All other material input	***	***	***
All non-cell costs	***	***	***
All raw materials	***	***	100.0

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Shares represent the share of raw materials. Zeroes, null values, and undefined calculations are suppressed and shown as “—”.

Other factory costs accounted for the second largest share of total COGS, and consistently increased in total value and irregularly decreased on a per-unit value basis and as a ratio to net sales from 2022 to 2024.^{22 23} The increase in other factory costs is driven by increased sales *** while the decreases per unit and as a ratio to net sales are attributable to fixed costs spread over larger volumes of production and sales (the more products produced, the lower the fixed cost per unit).²⁴

Direct labor costs, which accounted for the smallest share of total COGS, consistently increased in total value and as a ratio to net sales from 2022 to 2024; mostly the result of

²² *** reported a nonrecurring expense of \$*** of other factory costs related to *** in 2024.

²³ ***.

²⁴ ***: *** U.S. producer questionnaire, III-10d.

***.^{25 26} On a per unit basis, direct labor consistently decreased from 2022 to 2024 for similar reasons as other factory costs (increased production resulting in lower fixed cost per unit).

As presented in table 6.1, total COGS irregularly increased while the ratio of COGS to net sales consistently increased from 2022 to 2024 for the same reasons noted above. The AUVs of total COGS consistently decreased during this period, reflecting the previously discussed decreases in per-unit raw materials, direct labor, and other factory costs (increased production and sales, with selling prices per unit declining faster than COGS items).

Table 6.1 shows that the U.S. industry reported a gross profit in 2022 before declining to increasing gross losses in 2023 and 2024 (driven by COGS increasing more than sales prices). The positive gross profit in 2022 mostly reflects sales prices increasing at a faster rate than increases in COGS.

SG&A expenses and operating income or loss

As presented in table 6.1, U.S. producers' total SG&A expenses and SG&A expense ratios (i.e., total SG&A expenses divided by net sales) consistently increased (mostly a result of increases in net sales), while per-unit SG&A expenses irregularly decreased from 2022 to 2024. As shown in table 6.3, *** U.S. producer (***) reported SG&A expenses increasing annually from 2022 to 2024 (as its sales volumes increased), with its per-unit SG&A expenses consistently declining.²⁷ *** SG&A expense ratios were lower than the industry average throughout the period, but it did consistently increase from 2022 to 2024.²⁸ *** reported much higher than industry average per unit SG&A expenses (and the

²⁵ ***. Ibid.

²⁶ *** reported a nonrecurring expense of \$*** of direct labor related to *** in 2024.

²⁷ ***. *** U.S. producer questionnaire, III-10d.

²⁸ Despite absolute SG&A expenses increasing, ***.

highest in 2022 and 2023).²⁹ New U.S. producers (***) also reported very high per unit SG&A expenses and as a ratio to net sales, due in part to ***. ***,³⁰

Table 6.1 shows that U.S. producers' operating income stayed negative, notably decreasing from *** in 2022 to *** in 2023, and fell further to *** in 2024. As presented in table 6.3, individual U.S. producers of CSPV products reported large variations in operating results from 2022 to 2024, with 14 U.S. producers reporting operating losses in 2024.³¹ *** U.S. producer *** reported positive operating income in 2022, but operating losses in 2023 and 2024, caused by raw materials, other factory costs, and SG&A expenses increasing faster than its net sales values in 2023 and 2024.

All other expenses and net income or loss

Classified below the operating income level are interest expenses, other expenses, and other income. Table 6.1 shows that interest expenses and all other expenses consistently and

²⁹ ***. Email from ***, May 29, 2024; GAF Energy webpage, <https://www.cpsc.gov/Recalls/2023/GAF-Energy-Recalls-Timberline-Solar-Energy-Shingles-Due-to-Fire-Hazard-Recall-Alert>, and Consumer Product Safety Commission webpage, <https://www.cpsc.gov/Recalls/2023/GAF-Energy-Recalls-Timberline-Solar-Energy-Shingles-Due-to-Fire-Hazard-Recall-Alert>, both retrieved May 30, 2024.

³⁰ ***.

³¹ ***.

sharply increased each year from 2022 to 2024, while government incentives and all other income increased but not enough to offset expenses.^{32 33 34}

Net income irregularly decreased from 2022 to 2024 (\$*** in 2022, \$*** in 2023, and \$*** in 2024).³⁵

³² U.S. CSPV producers have expressed uncertainty with regard to the continuation of these incentives and *** expressed confusion on how to qualify for the IRA tax credits. Petitioner's posthearing brief, pp. 62 to 64 and table 3.24.

³³ *** reported several nonrecurring income and expenses related to *** classified as interest and all other expenses. *** reported a nonrecurring expense of *** in 2023 reported as all other expenses. *** reported nonrecurring income of *** classified as 45X MPTC/IRA income.

³⁴ One U.S. producer (***) accounted for most interest expenses, all other expenses, and government incentive (45X MPTC/IRA) income in 2023 and 2024. ***, *** U.S. producer questionnaire, III-10d.

³⁵ A variance analysis is not shown due to *** among the reporting firms.

Capital expenditures and research and development expenses

Table 6.6 presents capital expenditures, by firm, and table 6.8 presents R&D expenses, by firm. Tables 6.7 and 6.9 present the firms' narrative explanations of the nature, focus, and significance of their capital expenditures and R&D expenses, respectively. Aggregated capital expenditures increased notably from 2022 to 2024 as new facilities started producing CPSV products.

Table 6.6 CSPV cells and modules: U.S. producers' capital expenditures, by firm and period

Value in 1,000 dollars

Firm	2022	2023	2024
Canadian Solar	***	***	***
GAF Energy	***	***	***
Hanwha GA	***	***	***
Hounen	***	***	***
Illuminate	***	***	***
Jinko US	***	***	***
Merlin	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
Silfab	***	***	***
Suniva	***	***	***
SunTegra	***	***	***
Tesla	***	***	***
Trina/T1	***	***	***
ZampTech	***	***	***
All firms	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Table 6.7 CSPV cells and modules: U.S. producers' narrative descriptions of their capital expenditures, by firm

Firm	Narrative on capital expenditures
Canadian Solar	***
GAF Energy	***
Hanwha GA	***
Hounen	***
Illuminate	***
Jinko US	***
Merlin	***
Mission	***
PowerFilm	***
Runergy	***
Silfab	***
Suniva	***
SunTegra	***
Tesla	***
Trina/T1	***
ZampTech	***

Source: Compiled from data submitted in response to Commission questionnaires.

Table 6.8 CSPV cells and modules: U.S. producers' R&D expenses, by firm and period

Value in 1,000 dollars

Firm	2022	2023	2024
Canadian Solar	***	***	***
GAF Energy	***	***	***
Hanwha GA	***	***	***
Hounen	***	***	***
Illuminate	***	***	***
Jinko US	***	***	***
Merlin	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
Silfab	***	***	***
Suniva	***	***	***
SunTegra	***	***	***
Tesla	***	***	***
Trina/T1	***	***	***
ZampTech	***	***	***
All firms	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Table 6.9 CSPV cells and modules: U.S. producers' narrative descriptions of their R&D expenses, by firm

Firm	Narrative on R&D expenses
Canadian Solar	***
GAF Energy	***
Hanwha GA	***
Hounen	***
Illuminate	***
Jinko US	***
Merlin	***
Mission	***
PowerFilm	***
Runergy	***
Silfab	***
Suniva	***
SunTegra	***
Tesla	***
Trina/T1	***
ZampTech	***

Source: Compiled from data submitted in response to Commission questionnaires.

Assets and return on assets^{36 37}

Table 6.10 presents data on the U.S. producers' total assets while table 6.11 presents their operating ROA.³⁸ Table 6.12 presents U.S. producers' narrative responses explaining their major asset categories and any significant changes in asset levels over time.

Table 6.10 CSPV cells and modules: U.S. producers' total net assets, by firm and period

Value in 1,000 dollars

Firm	2022	2023	2024
Canadian Solar	***	***	***
GAF Energy	***	***	***
Hanwha GA	***	***	***
Hounen	***	***	***
Illuminate	***	***	***
Jinko US	***	***	***
Merlin	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
Silfab	***	***	***
Suniva	***	***	***
SunTegra	***	***	***
Tesla	***	***	***
Trina/T1	***	***	***
ZampTech	***	***	***
All firms	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

³⁶ Net assets of two U.S. producers that did not report sales or cost data in 2023 have been excluded from total net assets calculations to minimize distorting the ROA calculation of the CSPV products industry for 2023. ***. U.S. producer's questionnaire responses, III-12a.

³⁷ Net assets of *** are excluded because of missing or incomplete submission. ***. Email from ***, March 27, 2025.

³⁸ The operating ROA is calculated as operating income divided by total assets. With respect to a firm's overall operations, the total asset value reflects an aggregation of a number of assets which are generally not product specific. Thus, high-level allocations are generally required in order to report a total asset value on a product-specific basis.

Table 6.11 CSPV cells and modules: U.S. producers' ROA, by firm and period

Ratio in percent

Firm	2022	2023	2024
Canadian Solar	***	***	***
GAF Energy	***	***	***
Hanwha GA	***	***	***
Hounen	***	***	***
Illuminate	***	***	***
Jinko US	***	***	***
Merlin	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
Silfab	***	***	***
Suniva	***	***	***
SunTegra	***	***	***
Tesla	***	***	***
Trina/T1	***	***	***
ZampTech	***	***	***
All firms	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Table 6.12 CSPV cells and modules: U.S. producers' narrative descriptions of their total net assets, by firm

Firm	Narrative on assets
Canadian Solar	***
GAF Energy	***
Hanwha GA	***
Illuminate	***
Jinko US	***
Mission	***
PowerFilm	***
Runergy	***
Silfab	***
Suniva	***
Tesla	***
Trina/T1	***

Source: Compiled from data submitted in response to Commission questionnaires.

Capital and investment

The Commission requested U.S. producers of CSPV cells and modules to describe any actual or potential negative effects of imports of CSPV cells and modules from Cambodia, Malaysia, Thailand, and/or Vietnam on their firms' growth, investment, ability to raise capital, development and production efforts, or the scale of capital investments. Table 6.13 presents the number of firms reporting an impact in each category and table 6.14 provides the U.S. producers' narrative responses, including the responses of ***.

Table 6.13 CSPV cells and modules: Count of firms indicating actual and anticipated negative effects of imports from subject sources on investment, growth, and development since January 1, 2022, by effect

Number of firms reporting

Effect	Category	Count
Cancellation, postponement, or rejection of expansion projects	Investment	6
Denial or rejection of investment proposal	Investment	2
Reduction in the size of capital investments	Investment	3
Return on specific investments negatively impacted	Investment	6
Other investment effects	Investment	4
Any negative effects on investment	Investment	10
Rejection of bank loans	Growth	1
Lowering of credit rating	Growth	0
Problem related to the issue of stocks or bonds	Growth	1
Ability to service debt	Growth	4
Other growth and development effects	Growth	5
Any negative effects on growth and development	Growth	8
Anticipated negative effects of imports	Future	8

Source: Compiled from data submitted in response to Commission questionnaires.

Table 6.14 CSPV cells and modules: U.S. producers' narratives relating to actual and anticipated negative effects of imports on investment, growth, and development, since January 1, 2022, by firm and effect

Item	Firm name and narrative on impact of imports
Cancellation, postponement, or rejection of expansion projects	***
Cancellation, postponement, or rejection of expansion projects	***
Cancellation, postponement, or rejection of expansion projects	***
Cancellation, postponement, or rejection of expansion projects	***
Cancellation, postponement, or rejection of expansion projects	***
Cancellation, postponement, or rejection of expansion projects	***
Denial or rejection of investment proposal	***
Denial or rejection of investment proposal	***
Reduction in the size of capital investments	***
Reduction in the size of capital investments	***
Return on specific investments negatively impacted	***

Table continued.

Item	Firm name and narrative on impact of imports
Return on specific investments negatively impacted	***
Return on specific investments negatively impacted	***
Return on specific investments negatively impacted	***
Return on specific investments negatively impacted	***
Return on specific investments negatively impacted	***
Other negative effects on investments	***
Other negative effects on investments	***
Other negative effects on investments	***
Other negative effects on investments	***
Rejection of bank loans	***
Problem related to the issue of stocks or bonds	***
Ability to service debt	***

Table continued.

Item	Firm name and narrative on impact of imports
Ability to service debt	***
Ability to service debt	***
Other effects on growth and development	***
Other effects on growth and development	***
Other effects on growth and development	***
Other effects on growth and development	***
Other effects on growth and development	***
Anticipated effects of imports	***
Anticipated effects of imports	***

Table continued.

Item	Firm name and narrative on impact of imports
Anticipated effects of imports	***
Anticipated effects of imports	***
Anticipated effects of imports	***
Anticipated effects of imports	***
Anticipated effects of imports	***
Anticipated effects of imports	***
Anticipated effects of imports	***
Anticipated effects of imports	***
Anticipated effects of imports	***

Source: Compiled from data submitted in response to Commission questionnaires.

Part 7: Threat considerations and information on nonsubject countries

Section 771(7)(F)(i) of the Act (19 U.S.C. § 1677(7)(F)(i)) provides that—

In determining whether an industry in the United States is threatened with material injury by reason of imports (or sales for importation) of the subject merchandise, the Commission shall consider, among other relevant economic factors¹--

- (I) if a countervailable subsidy is involved, such information as may be presented to it by the administering authority as to the nature of the subsidy (particularly as to whether the countervailable subsidy is a subsidy described in Article 3 or 6.1 of the Subsidies Agreement), and whether imports of the subject merchandise are likely to increase,*
- (II) any existing unused production capacity or imminent, substantial increase in production capacity in the exporting country indicating the likelihood of substantially increased imports of the subject merchandise into the United States, taking into account the availability of other export markets to absorb any additional exports,*
- (III) a significant rate of increase of the volume or market penetration of imports of the subject merchandise indicating the likelihood of substantially increased imports,*
- (IV) whether imports of the subject merchandise are entering at prices that are likely to have a significant depressing or suppressing effect on domestic prices, and are likely to increase demand for further imports,*
- (V) inventories of the subject merchandise,*

¹ Section 771(7)(F)(ii) of the Act (19 U.S.C. § 1677(7)(F)(ii)) provides that “The Commission shall consider {these factors} . . . as a whole in making a determination of whether further dumped or subsidized imports are imminent and whether material injury by reason of imports would occur unless an order is issued or a suspension agreement is accepted under this title. The presence or absence of any factor which the Commission is required to consider . . . shall not necessarily give decisive guidance with respect to the determination. Such a determination may not be made on the basis of mere conjecture or supposition.”

- (VI) *the potential for product-shifting if production facilities in the foreign country, which can be used to produce the subject merchandise, are currently being used to produce other products,*
- (VII) *in any investigation under this title which involves imports of both a raw agricultural product (within the meaning of paragraph (4)(E)(iv)) and any product processed from such raw agricultural product, the likelihood that there will be increased imports, by reason of product shifting, if there is an affirmative determination by the Commission under section 705(b)(1) or 735(b)(1) with respect to either the raw agricultural product or the processed agricultural product (but not both),*
- (VIII) *the actual and potential negative effects on the existing development and production efforts of the domestic industry, including efforts to develop a derivative or more advanced version of the domestic like product, and*
- (IX) *any other demonstrable adverse trends that indicate the probability that there is likely to be material injury by reason of imports (or sale for importation) of the subject merchandise (whether or not it is actually being imported at the time).²*

Information on the nature of the subsidies was presented earlier in this report; information on the volume and pricing of imports of the subject merchandise is presented in Parts 4 and 5; and information on the effects of imports of the subject merchandise on U.S. producers' existing development and production efforts is presented in Part 6. Information on inventories of the subject merchandise; foreign producers' operations, including the potential for "product-shifting;" any other threat indicators, if applicable; and any dumping in third-country markets, follows. Also presented in this section of the report is information obtained for consideration by the Commission on nonsubject countries.

² Section 771(7)(F)(iii) of the Act (19 U.S.C. § 1677(7)(F)(iii)) further provides that, in antidumping investigations, "... the Commission shall consider whether dumping in the markets of foreign countries (as evidenced by dumping findings or antidumping remedies in other WTO member markets against the same class or kind of merchandise manufactured or exported by the same party as under investigation) suggests a threat of material injury to the domestic industry."

Subject countries

The Commission issued foreign producers' or exporters' questionnaires to 154 firms believed to produce and/or export CSPV cells and modules from Cambodia, Malaysia, Thailand, and Vietnam.³ Usable responses to the Commission's questionnaire were received from 22 firms in total.⁴

Table 7.1 presents the number of producers/exporters that responded to the Commission's questionnaire, their estimated share of total production of CSPV cells and modules, and their exports to the United States as a share of U.S. imports, by each subject country in 2024.

Table 7.1 CSPV cells and modules: Number of responding producers/exporters, approximate share of production, and exports to the United States as a share of U.S. imports, by subject foreign industry, 2024

Subject foreign industry	Number of responding firms	Approximate share of cell production (percent)	Approximate share of module production (percent)	Exports as a share of U.S. imports from subject foreign industry (percent)
Cambodia	5	***	***	***
Malaysia	5	***	***	***
Thailand	5	***	***	***
Vietnam	7	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: "Approximate share of production" reflects the responding firms' estimates of their production as a share of total country production of CSPV cells and modules in 2024. Since not all firms have perfect knowledge of the industry in their home market, different firms might use different denominators in estimating their firm's share of the total requested. The average denominator for reasonably reported estimates is used in the shares presented for all countries. One Vietnamese firm, *** provided an inflated estimate which was adjusted based on the responses from other firms. Approximate shares are rounded to the nearest whole number. Exports as a share of U.S. imports are reported exports to the U.S. of both cells and modules combined relative to U.S. imports by source reported in Table 4.2.

Tables 7.2 through 7.5 present information on the CSPV cells and modules operations of the responding subject producers and exporters during 2024. *** was the leading producer of CSPV cells by kilowatts while *** was the leading exporter of CSPV cells to the United States by kilowatts and had the highest percentage of its total shipments, *** percent, being exported to the United States. *** was the leading producer of CSPV modules by kilowatts in 2024. *** had the highest percentage of its shipments, ***

³ These firms were identified through a review of information submitted in the petition and presented in third-party sources.

⁴ *** indicated subject production but did not submit its questionnaire in time to be included in the dataset.

percent, as exports to the United States while *** was the leading exporter of CSPV modules to the United States by kilowatts. In addition, the majority of all shipments by subject module producers were exports to the United States.

Table 7.2 CSPV cells: Summary data for subject foreign producers, by firm, 2024

Producer and (subject foreign industry)	Production (kilowatts)	Share of reported production (percent)	Exports to the United States (kilowatts)	Share of reported exports to the United States (percent)	Total shipments (kilowatts)	Share of firm's total shipments exported to the United States (percent)
Cambodia: Hounen Co	***	***	***	***	***	***
Cambodia: Imperial Star	***	***	***	***	***	***
Cambodia: Sunflower	***	***	***	***	***	***
Cambodia: Solar Long	***	***	***	***	***	***
Malaysia: Hanwha	***	***	***	***	***	***
Malaysia: Jinko Malaysia	***	***	***	***	***	***
Malaysia: Jinko Technology	***	***	***	***	***	***
Malaysia: LONGi	***	***	***	***	***	***
Malaysia: SunPower	***	***	***	***	***	***
Thailand: Canadian	***	***	***	***	***	***
Thailand: M.L.T.	***	***	***	***	***	***
Thailand: Runergy	***	***	***	***	***	***
Thailand: Talesun	***	***	***	***	***	***
Thailand: Trina Thailand	***	***	***	***	***	***
Vietnam: Allesun	***	***	***	***	***	***
Vietnam: Bovier	***	***	***	***	***	***
Vietnam: JA Solar	***	***	***	***	***	***
Vietnam: Jinko Solar	***	***	***	***	***	***
Vietnam: Trina	***	***	***	***	***	***
Vietnam: Vietnergy	***	***	***	***	***	***
All individual producers	***	100.0	***	100.0	***	***
All individual producers less producers in Cambodia	***	***	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—".

Table 7.3 CSPV cells: Summary data for subject foreign producers, by country, 2024

Subject foreign industry	Production (kilowatts)	Share of reported production (percent)	Exports to the United States (kilowatts)	Share of reported exports to the United States (percent)	Total shipments (kilowatts)	Share of firm's total shipments exported to the United States (percent)
Cambodia	***	***	***	***	***	***
Malaysia	***	***	***	***	***	***
Thailand	***	***	***	***	***	***
Vietnam	***	***	***	***	***	***
All subject foreign industries	***	100.0	***	100.0	***	***
All subject foreign industries less Cambodia	***	***	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—".

Table 7.4 CSPV modules: Summary data for subject foreign producers, by firm, 2024

Producer and (subject foreign industry)	Production (kilowatts)	Share of reported production (percent)	Exports to the United States (kilowatts)	Share of reported exports to the United States (percent)	Total shipments (kilowatts)	Share of firm's total shipments exported to the United States (percent)
Cambodia: Hounen Co	***	***	***	***	***	***
Cambodia: Imperial Star	***	***	***	***	***	***
Cambodia: Shenglong	***	***	***	***	***	***
Cambodia: Solar Long	***	***	***	***	***	***
Malaysia: Hanwha	***	***	***	***	***	***
Malaysia: Jinko Malaysia	***	***	***	***	***	***
Malaysia: Jinko Technology	***	***	***	***	***	***
Malaysia: LONGi	***	***	***	***	***	***
Malaysia: SunPower	***	***	***	***	***	***
Thailand: Canadian	***	***	***	***	***	***
Thailand: M.L.T.	***	***	***	***	***	***
Thailand: Runergy	***	***	***	***	***	***
Thailand: Talesun	***	***	***	***	***	***
Thailand: Trina Thailand	***	***	***	***	***	***
Vietnam: Allesun	***	***	***	***	***	***
Vietnam: Bovier	***	***	***	***	***	***
Vietnam: JA Solar	***	***	***	***	***	***
Vietnam: Jinko Solar	***	***	***	***	***	***
Vietnam: Red Sun	***	***	***	***	***	***
Vietnam: Trina	***	***	***	***	***	***
All individual producers	***	100.0	***	100.0	***	***
All individual producers less producers in Cambodia	***	***	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—".

Table 7.5 CSPV modules: Summary data for subject foreign producers, by country, 2024

Subject foreign industry	Production (kilowatts)	Share of reported production (percent)	Exports to the United States (kilowatts)	Share of reported exports to the United States (percent)	Total shipments (kilowatts)	Share of firm's total shipments exported to the United States (percent)
Cambodia	***	***	***	***	***	***
Malaysia	***	***	***	***	***	***
Thailand	***	***	***	***	***	***
Vietnam	***	***	***	***	***	***
All subject foreign industries	***	100.0	***	100.0	***	***
All subject foreign industries less Cambodia	***	***	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—".

Table 7.6 presents events in the subject countries' industries since January 1, 2022.

Table 7.6 CSPV cells and modules: Important industry events in the subject foreign industries since 2022

Item	Firm	Event
Expansion curtailment (Malaysia)	LONGi	According to industry sources as of early 2025, LONGi has reportedly halted expansion plans for facilities in Malaysia in anticipation of tariff hikes.
Plant opening (Cambodia)	Solarspace	In March 2023, Solarspace started manufacturing activities at a new 1.2 GW solar module factory located in Cambodia's UBE Snoul Special Economic Zone. The factory produces PERC cells and panels.
Plant opening (Malaysia)	LONGi	In October 2023, LONGi commenced operations at its 2.8 GW module plant located in Serendah, Malaysia.
Plant opening (Vietnam)	AD Green	In June 2023, AD Green began manufacturing at its 3 GW solar panel facility in Thai Binh, Vietnam.
Plant opening (Vietnam)	Thornova Solar	In July 2023, Thornova Solar, a U.S.-based provider of bifacial TOPCon and PERC solar modules, began producing at volume at its 1.5 GW manufacturing facility located in Vietnam.
Production curtailment (Malaysia)	Risen Energy	According to industry sources, Risen Energy has reportedly scaled down production in late 2024 and early 2025 at its facility located in Kulim, Malaysia in anticipation of tariff hikes.

Source: The Straits Times, "Chinese solar panel makers close plants, scale back production in Malaysia as US tariffs bite," January 21, 2025, <https://www.straitstimes.com/asia/se-asia/chinese-solar-panel-makers-close-plants-scale-back-production-in-malaysia-as-us-tariffs-bite>; PV Magazine, "Solarspace opens 1.2 GW solar module factory in Cambodia," March 10, 2023, <https://www.pv-magazine.com/2023/03/10/solarspace-opens-1-2-gw-solar-module-factory-in-cambodia/>; Longi, "LONGi Launches New Solar Module Plant In Selangor, Malaysia", October 16, 2023, <https://www.longi.com/en/news/malaysia-serendah-module-plant/>; PV Magazine, "AD Green commissions 3 GW solar module factory in Vietnam," June 20, 2023, <https://www.pv-magazine.com/2023/06/20/ad-green-commissions-3-gw-solar-module-factory-in-vietnam/>; Solar Builder, "U.S.-based Thornova Solar ramps up solar module manufacturing in Vietnam," July 25, 2023, <https://solarbuildermag.com/news/u-s-based-thornova-solar-ramps-up-solar-module-manufacturing-in-vietnam/>; The Straits Times, "Chinese solar panel makers close plants, scale back production in Malaysia as US tariffs bite," January 21, 2025, <https://www.straitstimes.com/asia/se-asia/chinese-solar-panel-makers-close-plants-scale-back-production-in-malaysia-as-us-tariffs-bite>.

Figure 7.1 presents a solar supply chain map for Southeast Asia, including CSPV cells and modules factories in Cambodia, Malaysia, Thailand, and Vietnam as of Q2 2024, their current manufacturing capacity, and planned manufacturing capacity out to 2027.

Laos

21	IMPERIAL STAR	2024	2027
48	SolarSpace	2024	2027

Thailand

4	ASTRONERGY	2024	2027
7	CanadianSolar	2024	2027
15	GINTECH	2024	2027
17	Gstar	2024	2027
25	JETION SOLAR	2024	2027
42	SALO TECH	2024	2027
44	CSICA	Mt	30,000
49	SOLARTRON	2024	2027
51	TALESUN	2024	2027
53	TrinaSolar	2024	2027
58	YINSHI SOLAR	2024	2027

Vietnam

1	ADGREEN	2024	2027
2	Aiiesun	2024	2027
5	BOVIET SOLAR	2024	2027
6	boway	2024	2027
9	CRC SOLAR	2024	2027
10	DEHUI	2024	2027
11	ET Solar	2024	2027
13	First Solar	2024	2027
16	Greenwing	2024	2027
19	HT SOLAR VIETNAM	2024	2027
22	IREX	2024	2027
23	JA SOLAR	2024	2027
26	Jinko	2024	2027
28	LONGI Solar	2024	2027

Cambodia

12	ET Solar	2024	2027
33	NE SOLAR	2024	2027
20	IMPERIAL STAR	2024	2027
47	SolarSpace	2024	2027

Malaysia

8	CMEC	Mt	Mt
14	First Solar	2024	2027
24	JA SOLAR	2024	2027
27	Jinko	2024	2027
29	LONGI Solar	2024	2027
30	LONGI Solar	2024	2027
32	maxeon	2024	2027
35	OCI	Mt	Mt
36	OCI	Mt	Mt
37	PRIME SOLAR	Mt	72,000

Indonesia

3	APOLLO SOLAR INDONESIA	2024	2027
18	Gstar	2024	2027
31	MASDAR	Mt	Mt
34	NE SOLAR	2024	2027
43	SEG SOLAR	2024	2027
50	SUNTECH	2024	2027

Other Companies

40	SOLAR POWER TECHNOLOGY	2024	2027
46	SOLAR POWER TECHNOLOGY	2024	2027
52	TOKUYAMA	Mt	Mt
54	TrinaSolar	2024	2027
55	TrinaSolar	2024	2027
56	VINA SOLAR	2024	2027
57	VSUN	2024	2027
38	acells	2024	2027
41	risen	2024	2027
45	siltronic	2024	2027

Note: Production capacity figures in gigawatts (GW). This map includes production facilities across the solar supply chain: modules (blue), cells (darker purple), wafers (lighter purple), polysilicon (red), and metallurgical-grade silicon (orange). Production capacity figures in gigawatts (GW) for modules, cells, and wafers, and metric tons (mt) for polysilicon and metallurgical-grade silicon.

Changes in operations

Subject producers were asked to report any change in the character of their operations or organization relating to the production of CSPV cells and modules since 2022. All producers indicated in their questionnaires that they had experienced such changes. Firms in all subject countries reported plant openings, prolonged shutdowns, and production curtailments. Tables 7.7 and 7.8 present the changes identified by these producers.

Table 7.7 CSPV cells and modules: Count of reported changes in operations since January 1, 2022, by subject foreign industry and type of change in operation

Count in number of firms reporting

Item	Cambodia	Malaysia	Thailand	Vietnam	Subject producers
Plant openings	4	3	2	2	11
Plant closings	2	3	0	3	8
Prolonged shutdowns	3	1	3	1	8
Production curtailments	1	3	2	2	8
Relocations	0	0	1	0	1
Expansions	2	1	3	1	7
Acquisitions	0	0	0	0	0
Consolidations	0	2	0	0	2
Weather-related or force majeure events	0	0	0	0	0
Other	0	1	2	1	4
Any change	5	5	5	7	22

Source: Compiled from data submitted in response to Commission questionnaires.

Table 7.8 CSPV cells and modules: Reported changes in operations in subject foreign industries since January 1, 2022, by reported change category and firm

Item	Subject foreign industry, firm name, and accompanying narrative response regarding changes in operations
Plant openings	***
Plant openings	***
Plant openings	***
Plant openings	***
Plant openings	***
Plant openings	***
Plant openings	***
Plant openings	***
Plant openings	***
Plant openings	***
Plant openings	***
Plant closings	***
Plant closings	***
Plant closings	***
Plant closings	***
Plant closings	***
Plant closings	***
Plant closings	***

Table continued.

Table 7.8 (Continued) CSPV cells and modules: Reported changes in operations in subject foreign industries since January 1, 2022, by reported change category and firm

Item	Subject foreign industry, firm name, and accompanying narrative response regarding changes in operations
Plant closings	***
Prolonged shutdowns	***
Prolonged shutdowns	***
Prolonged shutdowns	***
Prolonged shutdowns	***
Prolonged shutdowns	***
Prolonged shutdowns	***
Prolonged shutdowns	***
Prolonged shutdowns	***
Prolonged shutdowns	***
Production curtailments	***
Production curtailments	***

Table continued.

Table 7.8 (Continued) CSPV cells and modules: Reported changes in operations in subject foreign industries since January 1, 2022, by reported change category and firm

Item	Subject foreign industry, firm name, and accompanying narrative response regarding changes in operations
Production curtailments	***
Production curtailments	***
Production curtailments	***
Production curtailments	***
Production curtailments	***
Production curtailments	***
Relocations	***
Expansions	***
Expansions	***
Expansions	***
Expansions	***
Expansions	***

Table continued.

Table 7.8 (Continued) CSPV cells and modules: Reported changes in operations in subject foreign industries since January 1, 2022, by reported change category and firm

Item	Subject foreign industry, firm name, and accompanying narrative response regarding changes in operations
Expansions	***
Expansions	***
Expansions	***
Consolidations	***
Consolidations	***
Other	***
Other	***
Other	***
Other	***

Source: Compiled from data submitted in response to Commission questionnaires.

Table 7.9 presents anticipated changes in operations identified by subject producers.

Table 7.9 CSPV cells and modules: Reported anticipated changes in operations in the subject countries, by firm

Producer (and subject foreign industry)	Narrative response on anticipated changes in operations
***	***
***	***
***	***
***	***
***	***
***	***
***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Installed and practical overall capacity

Table 7.10 presents data on subject producers' installed capacity, practical overall capacity, and practical CSPV cells capacity and production on the same equipment and table 7.11 presents data on subject producers' installed capacity, practical overall capacity, and practical CSPV modules capacity and production on the same equipment.

From 2022 to 2024, subject cell producers' installed overall capacity, practical overall capacity, and practical CSPV cells capacity increased annually and overall by *** percent, *** percent, and *** percent, respectively. Practical CSPV cell production increased by *** percent from 2022 to 2023 then decreased by *** percent from 2023 to 2024, for an overall increase of *** percent from 2022 to 2024. Practical CSPV cell capacity utilization increased by *** percentage points from 2022 to 2023 then decreased by *** percentage points from 2023 to 2024, for an overall decrease of *** percentage points from 2022 to 2024.

From 2022 to 2024, subject module producers' installed overall capacity, practical overall capacity, and practical CSPV modules capacity increased by *** percent, by *** percent and by *** percent, respectively. Practical CSPV module production increased by *** percent from 2022 to 2023 then decreased by *** percent from 2023 to 2024, for an

overall increase of *** percent from 2022 to 2024. Practical CSPV module capacity utilization increased by *** percentage points from 2022 to 2023 then decreased by *** percentage points from 2023 to 2024, for an overall decrease of *** percentage points from 2022 to 2024. No out-of-scope production on the same equipment and machinery used to produce CSPV modules was reported during 2022 through 2024.

Table 7.10 CSPV cells: Producers' in subject foreign industries installed and practical capacity and production on the same equipment as subject production, by period, 2024

Capacity and production in kilowatts; utilization in percent

Item	Measure	2022	2023	2024
Installed overall	Capacity	***	***	***
Installed overall	Production	***	***	***
Installed overall	Utilization	***	***	***
Practical overall	Capacity	***	***	***
Practical overall	Production	***	***	***
Practical overall	Utilization	***	***	***
Practical CSPV cells	Capacity	***	***	***
Practical CSPV cells	Production	***	***	***
Practical CSPV cells	Utilization	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Table 7.11 CSPV modules: Producers' in subject foreign industries installed and practical capacity and production on the same equipment as subject production, by period, 2024

Capacity and production in kilowatts; utilization in percent

Item	Measure	2022	2023	2024
Installed overall	Capacity	***	***	***
Installed overall	Production	***	***	***
Installed overall	Utilization	***	***	***
Practical overall	Capacity	***	***	***
Practical overall	Production	***	***	***
Practical overall	Utilization	***	***	***
Practical CSPV modules	Capacity	***	***	***
Practical CSPV modules	Production	***	***	***
Practical CSPV modules	Utilization	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Constraints on capacity

Tables 7.12 and 7.13 present subject producers' reported production and capacity constraints since January 1, 2022. Seventeen of 22 responding firms reported production and capacity constraints.

Table 7.12 CSPV cells and modules: Count of reported production constraints, by subject foreign industry and type of constraint

Count in number of firms reporting

Type of constraint	Cambodia	Malaysia	Thailand	Vietnam	Subject producers
Production bottlenecks	3	1	1	1	6
Existing labor force	3	0	1	0	4
Supply of material inputs	1	0	2	0	3
Fuel or energy	1	0	2	1	4
Storage capacity	0	0	2	0	2
Logistics/transportation	0	0	1	0	1
Other constraints	0	3	2	3	8

Source: Compiled from data submitted in response to Commission questionnaires.

Table 7.13 CSPV cells and modules: Producers' in subject foreign industries reported constraints to practical overall capacity since January 1, 2022, by subject foreign industry, firm, and type of constraint

Type of constraint	Subject foreign industry, firm name, and narrative response on constraints to practical overall capacity
Production bottlenecks	***
Production bottlenecks	***
Production bottlenecks	***
Production bottlenecks	***
Production bottlenecks	***
Production bottlenecks	***
Existing labor force	***
Existing labor force	***
Existing labor force	***
Existing labor force	***
Supply of material inputs	***
Supply of material inputs	***
Supply of material inputs	***
Fuel or energy	***
Fuel or energy	***
Fuel or energy	***
Fuel or energy	***
Storage capacity	***
Storage capacity	***
Logistics/transportation	***
Other constraints	***
Other constraints	***
Other constraints	***

Table continued.

Table 7.13 (Continued) CSPV cells and modules: Producers' in subject foreign industries reported constraints to practical overall capacity since January 1, 2022, by subject foreign industry, firm, and type of constraint

Type of constraint	Subject foreign industry, firm name, and narrative response on constraints to practical overall capacity
Other constraints	***
Other constraints	***
Other constraints	***
Other constraints	***
Other constraints	***

Source: Compiled from data submitted in response to Commission questionnaires.

Operations on CSPV cells and modules

Aggregate CSPV cell operations in the subject countries

Table 7.14 presents information on the CSPV cell operations of the responding subject producers. During 2022 through 2024, subject producers' CSPV capacity increased by *** percent and is projected to decrease by *** percent in 2025 and *** percent in 2026. Subject producers' CSPV cell production increased by *** percent during 2022 to 2024, increasing by *** percent during 2022 to 2023 and decreasing by *** percent during 2023 to 2024.⁵ Subject producers' production is projected to decrease in 2025 and remains largely unchanged in 2026.⁶ Overall, from 2024 to 2026, subject producers project CSPV cell capacity, production, end-of-period inventories, internal consumption, home market shipments, and exports to the United States to decrease. Commercial home shipments and exports to all other markets are expected to increase.

⁵ *** ceased CSPV cell production in 2022.

⁶ ***, projected zero CSPV cell production in 2025. *** reported anticipated changes in operations and *** reported the closing of cell operations in 2024.

Table 7.14 CSPV cells: Data on subject foreign industries, by item and period

Quantity in kilowatts

Item	2022	2023	2024	Projection 2025	Projection 2026
Capacity	***	***	***	***	***
Production	***	***	***	***	***
End-of-period inventories	***	***	***	***	***
Internal consumption	***	***	***	***	***
Commercial home market shipments	***	***	***	***	***
Home market shipments	***	***	***	***	***
Exports to the United States	***	***	***	***	***
Exports to all other markets	***	***	***	***	***
Export shipments	***	***	***	***	***
Total shipments	***	***	***	***	***

Table continued.

Table 7.14 (Continued) CSPV cells: Data on subject foreign industries, by item and period

Shares and ratios in percent

Item	2022	2023	2024	Projection 2025	Projection 2026
Capacity utilization ratio	***	***	***	***	***
Inventory ratio to production	***	***	***	***	***
Inventory ratio to total shipments	***	***	***	***	***
Internal consumption share	***	***	***	***	***
Commercial home market shipments share	***	***	***	***	***
Home market shipments share	***	***	***	***	***
Exports to the United States share	***	***	***	***	***
Exports to all other markets share	***	***	***	***	***
Export shipments share	***	***	***	***	***
Total shipments share	100.0	100.0	100.0	100.0	100.0

Source: Compiled from data submitted in response to Commission questionnaires.

Table 7.15 CSPV cells: Data on subject foreign industries less Cambodia, by item and period

Quantity in kilowatts

Item	2022	2023	2024	Projection 2025	Projection 2026
Capacity	***	***	***	***	***
Production	***	***	***	***	***
End-of-period inventories	***	***	***	***	***
Internal consumption	***	***	***	***	***
Commercial home market shipments	***	***	***	***	***
Home market shipments	***	***	***	***	***
Exports to the United States	***	***	***	***	***
Exports to all other markets	***	***	***	***	***
Export shipments	***	***	***	***	***
Total shipments	***	***	***	***	***

Table continued.

Table 7.15 (Continued) CSPV cells: Data on subject foreign industries less Cambodia, by item and period

Shares and ratios in percent

Item	2022	2023	2024	Projection 2025	Projection 2026
Capacity utilization ratio	***	***	***	***	***
Inventory ratio to production	***	***	***	***	***
Inventory ratio to total shipments	***	***	***	***	***
Internal consumption share	***	***	***	***	***
Commercial home market shipments share	***	***	***	***	***
Home market shipments share	***	***	***	***	***
Exports to the United States share	***	***	***	***	***
Exports to all other markets share	***	***	***	***	***
Export shipments share	***	***	***	***	***
Total shipments share	100.0	100.0	100.0	100.0	100.0

Source: Compiled from data submitted in response to Commission questionnaires.

Practical CSPV cell capacity and production by subject foreign industry

Table 7.16 presents information on the CSPV cell operation of subject producers by country. Subject producers from *** reported low projected practical CSPV cell capacity in 2025, zero projected practical CSPV cell capacity in 2026, and zero projected CSPV cell production from 2025 through 2026. All subject countries reported a decrease in practical capacity from 2024 to 2026. The capacity utilization of each of the subject foreign industries peaked in 2023, and only *** projects a higher utilization rate in 2025 and 2026.

Table 7.16 CSPV cells: Subject foreign industries' output: Practical capacity, by subject foreign industry and period

Capacity in kilowatts

Subject foreign industry	2022	2023	2024	Projection 2025	Projection 2026
Cambodia	***	***	***	***	***
Malaysia	***	***	***	***	***
Thailand	***	***	***	***	***
Vietnam	***	***	***	***	***
All subject foreign industries	***	***	***	***	***
All subject foreign industries less Cambodia	***	***	***	***	***

Table continued.

Table 7.16 (Continued) CSPV cells: Subject foreign industries' output: Production, by subject foreign industry and period

Production in kilowatts

Subject foreign industry	2022	2023	2024	Projection 2025	Projection 2026
Cambodia	***	***	***	***	***
Malaysia	***	***	***	***	***
Thailand	***	***	***	***	***
Vietnam	***	***	***	***	***
All subject foreign industries	***	***	***	***	***
All subject foreign industries less Cambodia	***	***	***	***	***

Table continued.

Table 7.16 (Continued) CSPV cells: Subject foreign industries' output: Capacity utilization ratio, by subject foreign industry and period

Ratio in percent

Subject foreign industry	2022	2023	2024	Projection 2025	Projection 2026
Cambodia	***	***	***	***	***
Malaysia	***	***	***	***	***
Thailand	***	***	***	***	***
Vietnam	***	***	***	***	***
All subject foreign industries	***	***	***	***	***
All subject foreign industries less Cambodia	***	***	***	***	***

Table continued.

Note: Capacity utilization ratio represents the ratio of the subject producer's production to its production capacity.

Table 7.16 (Continued) CSPV cells: Subject foreign industries' output: Share of production, by subject foreign industry and period

Ratio in percent

Subject foreign industry	2022	2023	2024	Projection 2025	Projection 2026
Cambodia	***	***	***	***	***
Malaysia	***	***	***	***	***
Thailand	***	***	***	***	***
Vietnam	***	***	***	***	***
All subject foreign industries	100.0	100.0	100.0	100.0	100.0
All subject foreign industries less Cambodia	***	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Zeroes, null values, and undefined calculations are suppressed and shown as “—”.

CSPV cell exports, by subject country

Table 7.17 presents information on subject producers' CSPV cell exports. Subject producers' exports to the United States increased during 2022 through 2024, but subject producers project exports to the United States will decrease during 2025 through 2026. During 2025, the U.S. will remain an export market for *** but will cease to be an export market for *** in 2026. *** reported no projected exports to the United States for 2025 and 2026. The volume of exports to the U.S. market is projected to be higher in 2026 than in 2022 or 2023, but less than the volume of exports in 2024. Despite the projected decline in exports to the U.S. market, those exports will account for a larger share of exports from these countries than in 2022, 2023, or 2024. Total exports will account for a larger share of total shipments as well.

Table 7.17 CSPV cells: Subject foreign industries' exports: Exports to the United States, by subject foreign industry and period

Quantity in kilowatts

Subject foreign industry	2022	2023	2024	Projection 2025	Projection 2026
Cambodia	***	***	***	***	***
Malaysia	***	***	***	***	***
Thailand	***	***	***	***	***
Vietnam	***	***	***	***	***
All subject foreign industries	***	***	***	***	***
All subject foreign industries less Cambodia	***	***	***	***	***

Table continued.

Table 7.17 (Continued) CSPV cells: Subject foreign industries' exports: Share of total shipments exported to the United States, by subject foreign industry and period

Share in percent

Subject foreign industry	2022	2023	2024	Projection 2025	Projection 2026
Cambodia	***	***	***	***	***
Malaysia	***	***	***	***	***
Thailand	***	***	***	***	***
Vietnam	***	***	***	***	***
All subject foreign industries	***	***	***	***	***
All subject foreign industries less Cambodia	***	***	***	***	***

Table continued.

Table 7.17 (Continued) CSPV cells: Subject foreign industries' exports: Total exports, by subject foreign industry and period

Quantity in kilowatts

Subject foreign industry	2022	2023	2024	Projection 2025	Projection 2026
Cambodia	***	***	***	***	***
Malaysia	***	***	***	***	***
Thailand	***	***	***	***	***
Vietnam	***	***	***	***	***
All subject foreign industries	***	***	***	***	***
All subject foreign industries less Cambodia	***	***	***	***	***

Table continued.

Table 7.17 (Continued) CSPV cells: Subject foreign industries' exports: Share of total shipments exported, by subject foreign industry and period

Share in percent

Subject foreign industry	2022	2023	2024	Projection 2025	Projection 2026
Cambodia	***	***	***	***	***
Malaysia	***	***	***	***	***
Thailand	***	***	***	***	***
Vietnam	***	***	***	***	***
All subject foreign industries	***	***	***	***	***
All subject foreign industries less Cambodia	***	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Zeroes, null values, and undefined calculations are suppressed and shown as “—”.

CSPV cell inventories, by subject foreign industry

Table 7.18 presents information on ending inventory of the responding producers by subject foreign country. The subject foreign industries' ending inventories for CSPV cells increased from 2022 to 2024 in Thailand and Vietnam and decreased for Cambodia and Malaysia. Thailand reported *** ending inventories for 2022 and Cambodia reported *** ending inventories for 2026.⁷ The combined ending inventories of all subject industries increased from 2022 to 2023, then decreased in 2024, and are projected to through 2025, then decrease in 2026. The ratio of inventories to total shipments for all subject foreign industries combined remained constant during 2022 through 2023, then decreased in 2024.

Table 7.18 CSPV cells: Subject foreign industries' ending inventories: End of period inventories, by subject foreign industry and period

Quantity in kilowatts

Subject foreign industry	2022	2023	2024	Projection 2025	Projection 2026
Cambodia	***	***	***	***	***
Malaysia	***	***	***	***	***
Thailand	***	***	***	***	***
Vietnam	***	***	***	***	***
All subject foreign industries	***	***	***	***	***
All subject foreign industries less Cambodia	***	***	***	***	***

Table continued.

⁷ One Cambodian firm, ***, projected an ending inventory of *** kilowatts in 2025 as carry-over from previous years' production.

Table 7.18 (Continued) CSPV cells: Subject foreign industries' ending inventories: Ratio of inventories to total shipments, by source and period

Ratio in percent

Subject foreign industry	2022	2023	2024	Projection 2025	Projection 2026
Cambodia	***	***	***	***	***
Malaysia	***	***	***	***	***
Thailand	***	***	***	***	***
Vietnam	***	***	***	***	***
All subject foreign industries	***	***	***	***	***
All subject foreign industries less Cambodia	***	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Zeroes, null values, and undefined calculations are suppressed and shown as “—”.

Aggregate CSPV module operations in the subject countries

Table 7.19 presents information on the CSPV module operations of the responding subject producers. During 2022 through 2024, subject producers' CSPV capacity increased by *** percent, and is projected to decrease in 2025, then increase in 2026. Subject producers' CSPV module production increased by *** percent from 2022 to 2024, increasing by *** percent during 2022 to 2023 then decreasing by *** percent during 2023 to 2024.⁸ Production peaked in 2023, while exports to the U.S. market and total shipments peaked in 2024. Subject producers' production is projected to decrease in 2025 and then increase in 2026.⁹ Overall, from 2024 to 2026, subject producers project CSPV module production to decrease.

⁸ ***.

⁹ ***.

Table 7.19 CSPV modules: Data on subject foreign industries, by item and period

Quantity in kilowatts

Item	2022	2023	2024	Projection 2025	Projection 2026
Capacity	***	***	***	***	***
Production	***	***	***	***	***
End-of-period inventories	***	***	***	***	***
Internal consumption	***	***	***	***	***
Commercial home market shipments	***	***	***	***	***
Home market shipments	***	***	***	***	***
Exports to the United States	***	***	***	***	***
Exports to all other markets	***	***	***	***	***
Export shipments	***	***	***	***	***
Total shipments	***	***	***	***	***
Resales exported to the United States	***	***	***	***	***
Total exports to the United States	***	***	***	***	***

Table continued.

Table 7.19 (Continued) CSPV modules: Data on subject foreign industries, by item and period

Shares and ratios in percent

Item	2022	2023	2024	Projection 2025	Projection 2026
Capacity utilization ratio	***	***	***	***	***
Inventory ratio to production	***	***	***	***	***
Inventory ratio to total shipments	***	***	***	***	***
Internal consumption share	***	***	***	***	***
Commercial home market shipments share	***	***	***	***	***
Home market shipments share	***	***	***	***	***
Exports to the United States share	***	***	***	***	***
Exports to all other markets share	***	***	***	***	***
Export shipments share	***	***	***	***	***
Total shipments share	100.0	100.0	100.0	100.0	100.0
Share of total exports to the U.S. by producers	***	***	***	***	***
Share of total exports to the U.S. by resellers	***	***	***	***	***
Adjusted share of total shipments exported to the United States	***	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—".

Table 7.20 CSPV modules: Data on subject foreign industries less Cambodia, by item and period

Quantity in kilowatts

Item	2022	2023	2024	Projection 2025	Projection 2026
Capacity	***	***	***	***	***
Production	***	***	***	***	***
End-of-period inventories	***	***	***	***	***
Internal consumption	***	***	***	***	***
Commercial home market shipments	***	***	***	***	***
Home market shipments	***	***	***	***	***
Exports to the United States	***	***	***	***	***
Exports to all other markets	***	***	***	***	***
Export shipments	***	***	***	***	***
Total shipments	***	***	***	***	***

Table continued.

Table 7.20 (Continued) CSPV modules: Data on subject foreign industries less Cambodia, by item and period

Shares and ratios in percent

Item	2022	2023	2024	Projection 2025	Projection 2026
Capacity utilization ratio	***	***	***	***	***
Inventory ratio to production	***	***	***	***	***
Inventory ratio to total shipments	***	***	***	***	***
Internal consumption share	***	***	***	***	***
Commercial home market shipments share	***	***	***	***	***
Home market shipments share	***	***	***	***	***
Exports to the United States share	***	***	***	***	***
Exports to all other markets share	***	***	***	***	***
Export shipments share	***	***	***	***	***
Total shipments share	100.0	100.0	100.0	100.0	100.0

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—".

Practical CSPV modules capacity and production by subject foreign industry

Table 7.21 presents information on the CSPV module operation of subject producers by country. Subject producers from *** reported zero projected practical CSPV module capacity in 2026 and zero projected CSPV module production from 2025 through 2026. Capacity for the combined subject industries is projected to be below 2024 in both 2025 and 2026. Production is projected to remain below 2024 levels for both those years.

Table 7.21 CSPV module: Subject foreign industries' output: Practical capacity, by subject foreign industry and period

Capacity in kilowatts

Subject foreign industry	2022	2023	2024	Projection 2025	Projection 2026
Cambodia	***	***	***	***	***
Malaysia	***	***	***	***	***
Thailand	***	***	***	***	***
Vietnam	***	***	***	***	***
All subject foreign industries	***	***	***	***	***
All subject foreign industries less Cambodia	***	***	***	***	***

Table continued.

Table 7.21 (Continued) CSPV modules: Subject foreign industries' output: Production, by subject foreign industry and period

Production in kilowatts

Subject foreign industry	2022	2023	2024	Projection 2025	Projection 2026
Cambodia	***	***	***	***	***
Malaysia	***	***	***	***	***
Thailand	***	***	***	***	***
Vietnam	***	***	***	***	***
All subject foreign industries	***	***	***	***	***
All subject foreign industries less Cambodia	***	***	***	***	***

Table continued.

Table 7.21 (Continued) CSPV modules: Subject foreign industries' output: Capacity utilization ratio, by subject foreign industry and period

Ratio in percent

Subject foreign industry	2022	2023	2024	Projection 2025	Projection 2026
Cambodia	***	***	***	***	***
Malaysia	***	***	***	***	***
Thailand	***	***	***	***	***
Vietnam	***	***	***	***	***
All subject foreign industries	***	***	***	***	***
All subject foreign industries less Cambodia	***	***	***	***	***

Table continued.

Note: Capacity utilization ratio represents the ratio of the subject producer's production to its production capacity.

Table 7.21 (Continued) CSPV modules: Subject foreign industries' output: Share of production, by subject foreign industry and period

Ratio in percent

Subject foreign industry	2022	2023	2024	Projection 2025	Projection 2026
Cambodia	***	***	***	***	***
Malaysia	***	***	***	***	***
Thailand	***	***	***	***	***
Vietnam	***	***	***	***	***
All subject foreign industries	100.0	100.0	100.0	100.0	100.0
All subject foreign industries less Cambodia	***	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Zeroes, null values, and undefined calculations are suppressed and shown as “—”.

CSPV module exports, by subject country

Table 7.22 presents information on subject producers' CSPV module exports. Subject producers' exports to the United States increased during 2022 through 2024, but subject producers project exports to the United States to decrease in 2025 then remain relatively constant in 2026. During 2025 through 2026, the U.S. will remain an export market for all countries except ***. The volume of exports to the U.S. market is projected to be higher in 2026 than in 2022, but less than the volume of exports in 2024. The subject industries are projected to remain export-orientated.

Table 7.22 CSPV modules: Subject foreign industries' exports: Exports to the United States, by subject foreign industry and period

Quantity in kilowatts

Subject foreign industry	2022	2023	2024	Projection 2025	Projection 2026
Cambodia	***	***	***	***	***
Malaysia	***	***	***	***	***
Thailand	***	***	***	***	***
Vietnam	***	***	***	***	***
All subject foreign industries	***	***	***	***	***
All subject foreign industries less Cambodia	***	***	***	***	***

Table continued.

Table 7.22 (Continued) CSPV modules: Subject foreign industries' exports: Share of total shipments exported to the United States, by subject foreign industry and period

Share in percent

Subject foreign industry	2022	2023	2024	Projection 2025	Projection 2026
Cambodia	***	***	***	***	***
Malaysia	***	***	***	***	***
Thailand	***	***	***	***	***
Vietnam	***	***	***	***	***
All subject foreign industries	***	***	***	***	***
All subject foreign industries less Cambodia	***	***	***	***	***

Table continued.

Table 7.22 (Continued) CSPV modules: Subject foreign industries' exports: Total exports, by subject foreign industry and period

Quantity in kilowatts

Subject foreign industry	2022	2023	2024	Projection 2025	Projection 2026
Cambodia	***	***	***	***	***
Malaysia	***	***	***	***	***
Thailand	***	***	***	***	***
Vietnam	***	***	***	***	***
All subject foreign industries	***	***	***	***	***
All subject foreign industries less Cambodia	***	***	***	***	***

Table continued.

Table 7.22 (Continued) CSPV modules: Subject foreign industries' exports: Share of total shipments exported, by subject foreign industry and period

Share in percent

Subject foreign industry	2022	2023	2024	Projection 2025	Projection 2026
Cambodia	***	***	***	***	***
Malaysia	***	***	***	***	***
Thailand	***	***	***	***	***
Vietnam	***	***	***	***	***
All subject foreign industries	***	***	***	***	***
All subject foreign industries less Cambodia	***	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Zeroes, null values, and undefined calculations are suppressed and shown as “—”.

CSPV module inventories, by subject foreign industry

Table 7.23 presents information on ending inventory of the responding producers by subject foreign country. Thailand reported *** ending inventories in 2022 and Cambodia projected *** ending inventories in 2025 and 2026. The ending inventories of all subject foreign industries combined increased from 2022 to 2023, then decreased in 2024. It is expected to continue to decrease in 2025 and 2026.

Table 7.23 CSPV modules: Subject foreign industries' ending inventories: End of period inventories, by subject foreign industry and period

Quantity in kilowatts

Subject foreign industry	2022	2023	2024	Projection 2025	Projection 2026
Cambodia	***	***	***	***	***
Malaysia	***	***	***	***	***
Thailand	***	***	***	***	***
Vietnam	***	***	***	***	***
All subject foreign industries	***	***	***	***	***
All subject foreign industries less Cambodia	***	***	***	***	***

Table continued.

Table 7.23 (Continued) CSPV modules: Subject foreign industries' ending inventories: Ratio of inventories to total shipments, by source and period

Ratio in percent

Subject foreign industry	2022	2023	2024	Projection 2025	Projection 2026
Cambodia	***	***	***	***	***
Malaysia	***	***	***	***	***
Thailand	***	***	***	***	***
Vietnam	***	***	***	***	***
All subject foreign industries	***	***	***	***	***
All subject foreign industries less Cambodia	***	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Zeroes, null values, and undefined calculations are suppressed and shown as “—”.

Alternative products

Tables 7.24 presents subject producers' overall production on the same equipment and machinery used as subject production of CSPV cells. One firm, ***, reported production of out-of-scope products on the same equipment and machinery used to produce CSPV cells.¹⁰ Production of other products on the same equipment and machinery used to produce CSPV cells decreased from *** percent to *** percent of total production from 2022 to 2024.

The responding producer in the subject countries did not report any production of alternative products using the same equipment and/or labor as those used to produce CSPV modules during the period of investigation.

Table 7.24 CSPV cells: Producers' in subject foreign industries overall production on the same equipment as subject production, by product type and period

Quantity in kilowatts; share in percent

Product type	Measure	2022	2023	2024
CSPV cells	Quantity	***	***	***
Other products	Quantity	***	***	***
All products	Quantity	***	***	***
CSPV cells	Share	***	***	***
Other products	Share	***	***	***
All products	Share	100.0	100.0	100.0

Source: Compiled from data submitted in response to Commission questionnaires.

¹⁰ This includes products outside the scope of these investigations which are subject to the China AD/CVD orders.

Exports

Table 7.25 presents Global Trade Atlas (“GTA”) data for exports of CSPV cells and modules from subject countries to the United States and to all destination markets. According to GTA, the majority of exports of CSPV cells and modules from each subject country were to the United States in 2023.

Table 7.25 CSPV cells and modules: Global exports from subject foreign industries: Exports to the United States, by exporter and period

Value in 1,000 dollars

Exporter	Measure	2021	2022	2023
Cambodia	Value	218,532	768,866	2,392,055
Malaysia	Value	1,549,005	1,771,224	2,907,808
Thailand	Value	1,024,774	1,308,612	3,210,564
Vietnam	Value	2,053,218	3,471,509	4,970,309
Subject exporters	Value	4,845,529	7,320,211	13,480,736

Table continued.

Table 7.25 (Continued) CSPV cells and modules: Global exports from subject exporters: Exports to all destination markets, by exporter and period

Value in 1,000 dollars

Exporter	Measure	2021	2022	2023
Cambodia	Value	236,339	893,743	2,583,927
Malaysia	Value	4,883,605	4,502,406	4,165,078
Thailand	Value	1,978,817	2,154,048	4,237,355
Vietnam	Value	2,949,160	5,389,168	6,790,130
Subject exporters	Value	10,047,921	12,939,365	17,776,490

Table continued.

Table 7.25 (Continued) CSPV cells and modules: Global exports from subject exporters: Share of exports exported to the United States, by exporter and period

Shares in percent

Exporter	Measure	2021	2022	2023
Cambodia	Share	92.5	86.0	92.6
Malaysia	Share	31.7	39.3	69.8
Thailand	Share	51.8	60.8	75.8
Vietnam	Share	69.6	64.4	73.2
Subject exporters	Share	48.2	56.6	75.8

Source: Official exports statistics and official global imports statistics from Cambodia and Vietnam (constructed exports) under HS subheadings 8541.40, 8541.42, and 8541.43 as reported by various national statistical authorities in the Global Trade Atlas Suite (GTAS) database, accessed March 4, 2025. Data for 2021 to 2023 is shown in this report due to unavailability of 2024 data in GTAS. Prior to January 26, 2022, CSPV cells and modules entered under HS subheading 8541.40.

U.S. inventories of imported merchandise

Table 7.26 presents data on U.S. importers' reported inventories of CSPV cells and modules. During 2022 to 2024, U.S. importers from all subject countries reported inventories. U.S. importers' inventories from Malaysia, Thailand, and Vietnam increased by *** percent, *** percent, and *** percent, respectively, from 2022 to 2024. U.S. importers' inventories from Cambodia decreased by *** percent from 2022 to 2024.

As a ratio to imports, U.S. shipments of imports, and total shipments of imports, U.S. importers' inventories from Cambodia and Vietnam increased from 2022 to 2023, then decreased in 2024. As a ratio to imports, U.S. shipments of imports, and total shipments of imports, U.S. importers' inventories from Malaysia and Thailand decreased from 2022 to 2023, then increased in 2024. Overall, the ratio of U.S. importers' inventories from subject sources to imports, U.S. shipments of imports, and total shipments of imports decreased from 2022 to 2024, though the volume of inventories of subject imports rose during 2022 to 2024. In 2024, U.S. importers' inventories from Malaysia and Thailand accounted for a majority of subject inventories. During 2022 to 2024, U.S. importers' inventories from subject sources accounted for the majority of inventories.

Table 7.26 CSPV cells and modules: U.S. importers' inventories and their ratio to select items, by source and period

Quantity in kilowatts; ratio in percent

Measure	Source	2022	2023	2024
Inventories quantity	Cambodia	***	***	***
Ratio to imports	Cambodia	***	***	***
Ratio to U.S. shipments of imports	Cambodia	***	***	***
Ratio to total shipments of imports	Cambodia	***	***	***
Inventories quantity	Malaysia	***	***	***
Ratio to imports	Malaysia	***	***	***
Ratio to U.S. shipments of imports	Malaysia	***	***	***
Ratio to total shipments of imports	Malaysia	***	***	***
Inventories quantity	Thailand	***	***	***
Ratio to imports	Thailand	***	***	***
Ratio to U.S. shipments of imports	Thailand	***	***	***
Ratio to total shipments of imports	Thailand	***	***	***
Inventories quantity	Vietnam	***	***	***
Ratio to imports	Vietnam	***	***	***
Ratio to U.S. shipments of imports	Vietnam	***	***	***
Ratio to total shipments of imports	Vietnam	***	***	***
Inventories quantity	Subject sources	***	***	***
Ratio to imports	Subject sources	***	***	***
Ratio to U.S. shipments of imports	Subject sources	***	***	***
Ratio to total shipments of imports	Subject sources	***	***	***
Inventories quantity	Subject sources less Cambodia	***	***	***
Ratio to imports	Subject sources less Cambodia	***	***	***
Ratio to U.S. shipments of imports	Subject sources less Cambodia	***	***	***
Ratio to total shipments of imports	Subject sources less Cambodia	***	***	***
Inventories quantity	Nonsubject sources	***	***	***
Ratio to imports	Nonsubject sources	***	***	***
Ratio to U.S. shipments of imports	Nonsubject sources	***	***	***
Ratio to total shipments of imports	Nonsubject sources	***	***	***
Inventories quantity	Nonsubject sources plus Cambodia	***	***	***
Ratio to imports	Nonsubject sources plus Cambodia	***	***	***
Ratio to U.S. shipments of imports	Nonsubject sources plus Cambodia	***	***	***
Ratio to total shipments of imports	Nonsubject sources plus Cambodia	***	***	***

Table continued.

Table 7.26 (Continued) CSPV cells and modules: U.S. importers' inventories and their ratio to select items, by source and period

Quantity in kilowatts; ratio in percent

Measure	Source	2022	2023	2024
Inventories quantity	All import sources	***	***	***
Ratio to imports	All import sources	***	***	***
Ratio to U.S. shipments of imports	All import sources	***	***	***
Ratio to total shipments of imports	All import sources	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent.

U.S. importers' outstanding orders

The Commission requested importers to indicate whether they imported or arranged for the importation of CSPV cells and modules from subject and nonsubject sources after December 31, 2024. Seventeen of 45 firms indicated they arranged imports from subject and nonsubject sources. Nonsubject sources accounted for a majority of total arranged imports for 2025. Their reported data are presented in table 7.27.

Table 7.27 CSPV cells and modules: U.S. importers' arranged imports, by source and period

Quantity in kilowatts

Source	Q1 2025	Q2 2025	Q3 2025	Q4 2025	Total
Cambodia	***	***	***	***	***
Malaysia	***	***	***	***	***
Thailand	***	***	***	***	***
Vietnam	***	***	***	***	***
Subject sources	***	***	***	***	***
Subject sources less Cambodia	***	***	***	***	***
Nonsubject sources	***	***	***	***	***
Nonsubject sources plus Cambodia	***	***	***	***	***
All import sources	***	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Zeroes, null values, and undefined calculations are suppressed and shown as "—".

Third-country trade actions

Table 7.28 provides information on trade remedy actions on CSPV cells and modules and related products in third-country markets.

Table 7.28 CSPV cells and modules: Third-country trade remedy actions in effect

Date	Trade remedy action
January 2014	China imposed antidumping duties on solar-grade polysilicon from the United States and South Korea and countervailing duties on solar-grade polysilicon from the United States, all of which were later extended in January 2020.
May 2014	The European Union imposed antidumping and countervailing duties on solar glass from China, which were later extended in July 2020.
July 2015	Canada imposed antidumping and countervailing duties on certain photovoltaic modules and laminates from China, which were later extended in March 2021.
April 2017	Turkey imposed antidumping duties on solar panels from China.
March 2019	India imposed antidumping duties on imports of ethyl vinyl acetate sheet for solar modules from China. India also imposed antidumping duties on ethyl vinyl acetate sheet for solar modules from Malaysia, Saudi Arabia, and Thailand on March 29, 2019, which were later terminated on March 28, 2024.
September 2024	India imposed antidumping duties on imports of aluminum frames for solar panels from China in September 2024.

Source: World Trade Organization, Trade Remedies Data Portal, accessed February 21, 2025, <https://trade-remedies.wto.org/en>.

Information on nonsubject countries

Global production¹¹

According to the International Energy Agency, global PV cell production increased from 394 GW in 2022 to 644 GW in 2023.¹² China is by far the largest producer of PV cells, accounting for 91.8 percent of global production during 2023, followed by Malaysia (2.3 percent), Vietnam (1.7 percent), and South Korea (1.6 percent).¹³ Based on 2023 production volumes, the top manufacturers of PV cells include Tongwei Solar (80.8 GW), Jinkosolar (63.9 GW), LONGi Green Energy Technology (62.3 GW), JA Solar Technology (45.5 GW), and Trina Solar (44.3 GW).¹⁴

As newer global cell production plants come online, the average size of these plants has increased, and this trend is projected to continue through the next decade. In 2023, cell production plants with annual capacity greater than 5 GW accounted for roughly 40 percent of global production. This share increased to approximately 60 percent of global production in 2024 and is projected to grow to nearly 90 percent by 2034.¹⁵

Global PV module production increased from 324 GW in 2022 to 612 GW in 2023.¹⁶ China is the largest producer of PV modules, accounting for 84.6 percent of global production during 2023, followed by Vietnam (3.4 percent), India (2.7 percent), and Thailand (2.3 percent).¹⁷ Based on 2023 production volumes, the top manufacturers of PV module include Jinkosolar (83.5 GW), LONGi Green Energy Technology (72.8 GW), JA Solar Technology (58.9 GW), Trina Solar (58.9 GW), and Canadian Solar (31.4 GW).¹⁸

¹¹ Global capacity and production data in this section for PV cells and modules include both crystalline silicone products and out-of-scope thin film products due to limitations in the availability of the data. Data for 2024 are not yet available.

¹² IEA, *Trends in Photovoltaic Applications 2024*, retrieved February 12, 2025, p. 53, <https://iea-pvps.org/wp-content/uploads/2024/10/IEA-PVPS-Task-1-Trends-Report-2024.pdf>.

¹³ Ibid.

¹⁴ Ibid.

¹⁵ Smaller cell production plants with annual capacity less than 5 GW are projected to account for less than 15 percent of the global market by 2034 and are expected to primarily serve local markets and niche products. VDMA, *International Technology Roadmap for Photovoltaics*, May 2024, p. 35, <https://www.vdma.org/international-technology-roadmap-photovoltaic>.

¹⁶ IEA, *Trends in Photovoltaic Applications 2024*, retrieved February 12, 2025, p. 54, <https://iea-pvps.org/wp-content/uploads/2024/10/IEA-PVPS-Task-1-Trends-Report-2024.pdf>.

¹⁷ Ibid.

¹⁸ IEA, *Trends in Photovoltaic Applications 2024*, retrieved February 12, 2025, p. 53, <https://iea-pvps.org/wp-content/uploads/2024/10/IEA-PVPS-Task-1-Trends-Report-2024.pdf>.

The average size of module production plants has also increased globally over time, and this trend is expected to continue through the next decade. In 2023, module production plants with annual capacity greater than 5 GW accounted for roughly 55 percent of the global market. This share increased to approximately 65 percent in 2024 and is projected to grow to nearly 85 percent by 2034.¹⁹

Global exports

Global exports of CSPV cells and modules increased by 8.0 percent during 2021 to 2023, from \$74.7 billion in 2021 to \$80.8 billion in 2023.²⁰ China was the largest global exporter of CSPV cells and modules in 2023, with exports totaling \$43.8 billion, or 54.2 percent of total exports by value (table 7.27). After China, the next largest global exporters in 2023 were the Netherlands (with exports totaling \$8.1 billion, or 10.0 percent of total exports) and Vietnam (with exports totaling \$6.8 billion, or 8.4 percent of total exports).²¹

¹⁹ Smaller module production plants with annual capacity less than 5 GW are projected to account for less than 20 percent of the global market by 2034 and are expected to primarily serve regional markets and special applications. VDMA, *International Technology Roadmap for Photovoltaics*, May 2024, p. 47, <https://www.vdma.org/international-technology-roadmap-photovoltaic>.

²⁰ Export data for 2021 to 2023 are shown in this section due to unavailability of 2024 data in GTAS.

²¹ The Netherlands is the largest global importer of CSPV modules, the vast majority of which come from China. The Netherlands re-exports approximately 60 percent of those imports, primarily to other countries within the European Union. Statistics Netherlands, “The Netherlands largest importer of Chinese solar panels,” September 8, 2023, <https://www.cbs.nl/en-gb/news/2023/36/the-netherlands-largest-importer-of-chinese-solar-panels>.

Table 7.29 CSPV cells and modules: Global exports by exporter and period

Value in 1,000 dollars; Share in percent

Exporting country	Measure	2021	2022	2023
United States	Value	2,456,468	48,272	93,436
Cambodia	Value	236,339	893,743	2,583,927
Malaysia	Value	4,883,605	4,502,406	4,165,078
Thailand	Value	1,978,817	2,154,048	4,237,355
Vietnam	Value	2,949,160	5,389,168	6,790,130
Subject exporters	Value	10,047,921	12,939,365	17,776,490
Subject exporters less Cambodia	Value	9,811,582	12,045,621	15,192,563
China	Value	33,457,596	46,378,428	43,783,325
Netherlands	Value	5,170,386	8,305,842	8,059,403
South Korea	Value	3,053,825	1,576,203	1,159,182
Indonesia	Value	72,181	210,996	254,305
Portugal	Value	319,779	745,788	629,070
Germany	Value	3,067,642	1,572,670	1,254,512
All other exporters	Value	17,096,783	7,451,247	7,746,099
Nonsubject exporters	Value	62,238,191	66,241,174	62,885,895
Nonsubject exporters plus Cambodia	Value	62,474,530	67,134,917	65,469,822
All reporting exporters	Value	74,742,580	79,228,810	80,755,821
United States	Share of value	3.3	0.1	0.1
Cambodia	Share of value	0.3	1.1	3.2
Malaysia	Share of value	6.5	5.7	5.2
Thailand	Share of value	2.6	2.7	5.2
Vietnam	Share of value	3.9	6.8	8.4
Subject exporters	Share of value	13.4	16.3	22.0
Subject exporters less Cambodia	Share of value	13.1	15.2	18.8
China	Share of value	44.8	58.5	54.2
Netherlands	Share of value	6.9	10.5	10.0
South Korea	Share of value	4.1	2.0	1.4
Indonesia	Share of value	0.1	0.3	0.3
Portugal	Share of value	0.4	0.9	0.8
Germany	Share of value	4.1	2.0	1.6
All other exporters	Share of value	22.9	9.4	9.6
Nonsubject exporters	Share of value	83.3	83.6	77.9
Nonsubject exporters plus Cambodia	Share of value	83.6	84.7	81.1
All reporting exporters	Share of value	100.0	100.0	100.0

Source: Official exports statistics and official global imports statistics from Cambodia and Vietnam (constructed exports) under HS subheadings 8541.40, 8541.42, and 8541.43 as reported by various national statistical authorities in the Global Trade Atlas Suite (GTAS) database, accessed March 4, 2025.

Note: Export data for 2021 to 2023 are shown in this section due to unavailability of 2024 data in GTAS. Prior to January 26, 2022, CSPV cells and modules entered under HS subheading 8541.40. United States is shown at the top followed by the countries under investigation, all remaining top exporting countries in descending order of 2023 data. These data may be overstated as HS subheading 8541.40 may contain products outside the scope of these investigations, including photosensitive semiconductor devices and light-emitting diodes.

China

China is the largest global producer of PV cells and modules (including out-of-scope thin film products) by a wide margin, accounting for the large majority of total production in both sectors. China's capacity to produce PV cells increased by 83.8 percent from 506 GW in 2022 to 930 GW in 2023.²² Chinese PV cell production increased by 78.5 percent from 331 GW in 2022 to 591 GW in 2023.²³ During 2022 to 2023, Chinese PV module capacity increased from 552 GW to 920 GW (66.7 percent) and Chinese PV module production increased from 295 GW to 510 GW (72.9 percent).²⁴ Moreover, China increased its share of global production in both sectors between 2022 and 2023—increasing from 84.0 percent to 91.8 percent of total PV cell production and increasing from 77.8 percent to 84.6 percent of total PV module production.²⁵

China's exports of CSPV cells and modules totaled \$43.8 billion in 2023.²⁶ The top destinations for such exports from China were the Netherlands (\$9.0 billion), Brazil (\$3.7 billion), India (\$3.2 billion), and Spain (\$2.2 billion).²⁷

²² IEA, *Trends in Photovoltaic Applications 2023*, accessed February 12, 2025, p. 50, https://iea-pvps.org/wp-content/uploads/2023/10/PVPS_Trends_Report_2023_WEB.pdf; IEA, *Trends in Photovoltaic Applications 2024*, accessed February 12, 2025, p. 53, <https://iea-pvps.org/wp-content/uploads/2024/10/IEA-PVPS-Task-1-Trends-Report-2024.pdf>.

²³ Ibid.

²⁴ IEA, *Trends in Photovoltaic Applications 2023*, accessed February 12, 2025, p. 51, https://iea-pvps.org/wp-content/uploads/2023/10/PVPS_Trends_Report_2023_WEB.pdf; IEA, *Trends in Photovoltaic Applications 2024*, accessed February 12, 2025, p. 54, <https://iea-pvps.org/wp-content/uploads/2024/10/IEA-PVPS-Task-1-Trends-Report-2024.pdf>.

²⁵ IEA, *Trends in Photovoltaic Applications 2023*, accessed February 12, 2025, pp. 50-51, https://iea-pvps.org/wp-content/uploads/2023/10/PVPS_Trends_Report_2023_WEB.pdf; IEA, *Trends in Photovoltaic Applications 2024*, accessed February 12, 2025, pp. 53-54, <https://iea-pvps.org/wp-content/uploads/2024/10/IEA-PVPS-Task-1-Trends-Report-2024.pdf>.

²⁶ Official export statistics under HS subheadings 8541.40, 8541.42, and 8541.43 as reported by China Customs in the Global Trade Atlas Suite (GTAS) database, accessed March 12, 2025.

²⁷ Ibid.

APPENDIX A

FEDERAL REGISTER NOTICES

The Commission makes available notices relevant to its investigations and reviews on its website, www.usitc.gov. In addition, the following tabulation presents, in chronological order, Federal Register notices issued by the Commission and Commerce during the current proceeding.

Citation	Title	Link
89 FR 34268, April 30, 2024	<i>Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From Cambodia, Malaysia, Thailand and Vietnam; Institution of Antidumping and Countervailing Duty Investigations and Scheduling of Preliminary Phase Investigations</i>	https://www.govinfo.gov/content/pkg/FR-2024-04-30/pdf/2024-09307.pdf
89 FR 43816, May 20, 2024	<i>Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From Cambodia, Malaysia, Thailand, and the Socialist Republic of Vietnam: Initiation of Countervailing Duty Investigations</i>	https://www.govinfo.gov/content/pkg/FR-2024-05-20/pdf/2024-11027.pdf
89 FR 43809, May 20, 2024	<i>Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From Cambodia, Malaysia, Thailand, and the Socialist Republic of Vietnam: Initiation of Less-Than-Fair-Value Investigations</i>	https://www.govinfo.gov/content/pkg/FR-2024-05-20/pdf/2024-11031.pdf
89 FR 50633, June 14, 2024	<i>Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From Cambodia, Malaysia, Thailand, and Vietnam; Determinations</i>	https://www.govinfo.gov/content/pkg/FR-2024-06-14/pdf/2024-13066.pdf
89 FR 80877, October 4, 2024	<i>Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules From the Kingdom of Cambodia: Preliminary Affirmative Countervailing Duty Determination and Alignment of Final Determination With Final Antidumping Duty Determination</i>	https://www.govinfo.gov/content/pkg/FR-2024-10-04/pdf/2024-22999.pdf
89 FR 80861, October 4, 2024	<i>Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From Malaysia: Preliminary Affirmative Countervailing Duty</i>	https://www.govinfo.gov/content/pkg/FR-2024-10-04/pdf/2024-22997.pdf

Citation	Title	Link
	<i>Determination and Alignment of Final Determination With Final Antidumping Duty Determination</i>	
89 FR 80874, October 4, 2024	<i>Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From Thailand: Preliminary Affirmative Countervailing Duty Determination, Preliminary Affirmative Critical Circumstances Determination, in Part, and Alignment of Final Determination With Final Antidumping Duty Determination</i>	https://www.govinfo.gov/content/pkg/FR-2024-10-04/pdf/2024-22993.pdf
89 FR 80866, October 4, 2024	<i>Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From the Socialist Republic of Vietnam: Preliminary Affirmative Countervailing Duty Determination, Preliminary Affirmative Critical Circumstances Determination, in Part, and Alignment of Final Determination With Final Antidumping Duty Determination</i>	https://www.govinfo.gov/content/pkg/FR-2024-10-04/pdf/2024-22994.pdf
89 FR 96226, December 4, 2024	<i>Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From Cambodia: Affirmative Preliminary Determination of Sales at Less Than Fair Value, Postponement of Final Determination, and Extension of Provisional Measures</i>	https://www.govinfo.gov/content/pkg/FR-2024-12-04/pdf/2024-28402.pdf
89 FR 96207, December 4, 2024	<i>Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From Malaysia: Affirmative Preliminary Determination of Sales at Less Than Fair Value, Postponement of Final Determination, and Extension of Provisional Measures</i>	https://www.govinfo.gov/content/pkg/FR-2024-12-04/pdf/2024-28401.pdf
89 FR 96214, December 4, 2024	<i>Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From Thailand: Preliminary Affirmative Determination of Sales at Less-Than-Fair-Value, Affirmative Determination of Critical Circumstances, Postponement of Final</i>	https://www.govinfo.gov/content/pkg/FR-2024-12-04/pdf/2024-28404.pdf

Citation	Title	Link
	<i>Determination, and Extension of Provisional Measures</i>	
89 FR 96219, December 4, 2024	<i>Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules From the Socialist Republic of Vietnam: Preliminary Affirmative Determination of Sales at Less Than Fair Value, Preliminary Affirmative Determination of Critical Circumstances, in Part, and Postponement of Final Determination and Extension of Provisional Measures</i>	https://www.govinfo.gov/content/pkg/FR-2024-12-04/pdf/2024-28403.pdf
89 FR 106578, December 30, 2024	<i>Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From Cambodia, Malaysia, Thailand and Vietnam; Institution of Antidumping and Countervailing Duty Investigations and Scheduling of Preliminary Phase Investigations</i>	https://www.govinfo.gov/content/pkg/FR-2024-12-30/pdf/2024-31088.pdf
90 FR 1191, January 7, 2025	<i>Crystalline Silicon Photovoltaic Products (Solar Panels) From Cambodia, Malaysia, Thailand, and Vietnam; Scheduling of the Final Phase of Countervailing Duty and Antidumping Duty Investigations</i>	https://www.govinfo.gov/content/pkg/FR-2025-01-07/pdf/2025-00001.pdf
90 FR 2023, January 10, 2025	<i>Crystalline Silicon Photovoltaic Products (Solar Panels) From Cambodia, Malaysia, Thailand, and Vietnam; Corrected Notice of Scheduling of the Final Phase of Countervailing Duty and Antidumping Duty Investigations</i>	https://www.govinfo.gov/content/pkg/FR-2025-01-10/pdf/2025-00383.pdf
90 FR 17392, April 25, 2025	<i>Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From Cambodia: Final Affirmative Determination of Sales at Less Than Fair Value</i>	https://www.govinfo.gov/content/pkg/FR-2025-04-25/pdf/2025-07133.pdf
90 FR 17406, April 25, 2025	<i>Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules From Cambodia: Final Affirmative Countervailing Duty Determination</i>	https://www.govinfo.gov/content/pkg/FR-2025-04-25/pdf/2025-07134.pdf

Citation	Title	Link
90 FR 17376, April 25, 2025	<i>Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From Malaysia: Final Affirmative Determination of Sales at Less Than Fair Value</i>	https://www.govinfo.gov/content/pkg/FR-2025-04-25/pdf/2025-07135.pdf
90 FR 17384, April 25, 2025	<i>Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From Malaysia: Final Affirmative Countervailing Duty Determination</i>	https://www.govinfo.gov/content/pkg/FR-2025-04-25/pdf/2025-07136.pdf
90 FR 17395, April 25, 2025	<i>Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From Thailand: Final Affirmative Determination of Sales at Less-Than-Fair-Value and Final Affirmative Determination of Critical Circumstances</i>	https://www.govinfo.gov/content/pkg/FR-2025-04-25/pdf/2025-07137.pdf
90 FR 17380, April 25, 2025	<i>Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From Thailand: Final Affirmative Countervailing Duty Determination and Final Affirmative Determination of Critical Circumstances</i>	https://www.govinfo.gov/content/pkg/FR-2025-04-25/pdf/2025-07138.pdf
90 FR 17388, April 25, 2025	<i>Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From the Socialist Republic of Vietnam: Final Affirmative Determination of Sales at Less Than Fair Value and Final Affirmative Determination of Critical Circumstances, in Part</i>	https://www.govinfo.gov/content/pkg/FR-2025-04-25/pdf/2025-07139.pdf
90 FR 17399, April 25, 2025	<i>Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From the Socialist Republic of Vietnam: Final Affirmative Countervailing Duty Determination and Final Affirmative Critical Circumstances Determination, in Part</i>	https://www.govinfo.gov/content/pkg/FR-2025-04-25/pdf/2025-07140.pdf

APPENDIX B

LIST OF HEARING WITNESSES

CALENDAR OF PUBLIC HEARING

Those listed below appeared in the United States International Trade Commission's hearing:

Subject: Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules from Cambodia, Malaysia, Thailand, and Vietnam

Inv. Nos.: 701-TA-722-725 and 731-TA-1690-1693 (Final)

Date and Time: April 15, 2025 - 9:30 a.m.

Sessions were held in connection with these investigations in the Main Hearing Room (Room 101), 500 E Street, SW., Washington, DC.

STATE GOVERNMENT APPEARANCE:

The Honorable Wendy Dant Chesser (remote), State Representative, House District 71, Indiana

OPENING REMARKS:

In Support of Imposition (**Laura El-Sabaawi**, Wiley Rein LLP)

In Opposition to Imposition (**Jeffrey S. Grimson**, Mowry & Grimson, PLLC)

In Support of the Imposition of the Antidumping and Countervailing Duty Orders::

Wiley Rein LLP
Washington, DC
on behalf of

American Alliance for Solar Manufacturing Trade Committee

Joseph Mendelson, Vice President and Head of Public Policy and Government Relations, Hanwha Q CELLS USA

Scott Moskowitz, Senior Director of Market Strategy and Public Affairs, Hanwha Q CELLS USA

Sam Martens, President, Mission Solar

Matt Card, President and Chief Operating Officer, Suniva

Adam Tesanovich, Co-Founder and Chief Executive Officer, Talon PV

**In Support of the Imposition of the
Antidumping and Countervailing Duty Orders (continued):**

Seth Kaplan, President, International Economic Research LLC

Nathan Smith, Senior Analyst, Capital Trade, Inc.

Timothy Brightbill)
) – OF COUNSEL
Laura El-Sabaawi)

**In Opposition to the Imposition of the
Antidumping and Countervailing Duty Orders:**

Crowell & Moring LLP
Washington, DC
on behalf of

Illuminate USA LLC (“Illuminate”)

Kurt Wagner, Chief Financial Officer, Illuminate USA

Christian Roselund, Senior Policy Analyst, Clean Energy Associates

Alexander H. Schaefer)
Robert L. LaFrankie)
) – OF COUNSEL
Valerie Ellis)
Simeon A. Yerokun)

Hogan Lovells US LLP
Washington, DC
on behalf of

Canadian Solar US Module Manufacturing Corporation (“Canadian Solar”)

Jennifer Aleman-Salazar, Chair-Elect, Mesquite (Texas) Chamber of Commerce

Thomas Koerner, President, Americas, Canadian Solar USA, Inc.

Andrew Williams, Vice President, Policy & Market Development,
Canadian Solar Inc.

Michael Bowen, Senior Counsel, Global Trade, Canadian Solar USA, Inc.

Jonathan T. Stoel)
Michael G. Jacobson)
) – OF COUNSEL
Nicole Ghazarian-Foye)
Nicholas Sparks)

**In Opposition to the Imposition of the
Antidumping and Countervailing Duty Orders (continued):**

Hogan Lovells US LLP
Washington, DC
on behalf of

BYD America LLC (“BYD”)

Gregory M.A. Hawkins)
) – OF COUNSEL
Craig A. Lewis (remote))

Akin Gump Strauss Hauer & Feld LLP
Washington, DC
on behalf of

Solar Energy Industries Association (“SEIA”)

Abigail Ross Hopper, President and Chief Executive Officer, SEIA

Matthew R. Nicely)
) – OF COUNSEL
Daniel M. Witkowski)

Mowry & Grimson, PLLC
Washington, DC
on behalf of

American Clean Power Association

Vanessa Sciarra, Vice President for Trade and International Competitiveness,
American Clean Power Association

Jim Dougan, Partner, ION Economics, LLC

Jerrie Mirga, Director, ION Economics, LLC

Jeffrey S. Grimson)
) – OF COUNSEL
Bryan P. Cenko)

Trade Pacific PLLC
Washington, DC
on behalf of

Trina Solar (U.S.), Inc.; Trina Solar Science & Technology (Thailand) Ltd.
Trina Solar Energy Development Company Limited

Jonathan M. Freed) – OF COUNSEL

**In Opposition to the Imposition of the
Antidumping and Countervailing Duty Orders (continued):**

Alston and Bird LLP
Washington, DC
on behalf of

Runergy Alabama Inc.

Dr. Jusong Wang, Managing Director, Runergy Alabama Inc.

Lian Yang	)	
	)	– OF COUNSEL
Eric Xie	)	

REBUTTAL/CLOSING REMARKS:

In Support of Imposition (**Timothy Brightbill**, Wiley Rein LLP)
In Opposition to Imposition (**Jonathan T. Stoel**, Hogan Lovells US LLP)

APPENDIX C

SUMMARY DATA

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CSPV cells and modules

Table C.1

CSPV cells and modules: Summary data concerning the U.S. market, by item and period

Quantity=kilowatts; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per kilowatt; Period changes=percent--exceptions noted

Item	Reported data			Period change comparisons		
	2022	Calendar year 2023	2024	2022-24	Calendar year 2022-23	2023-24
U.S. consumption quantity:						
Amount	***	***	***	▲ ***	▲ ***	▲ ***
Producers' share (fn1) (fn2):	***	***	***	▲ ***	***	▲ ***
Importers' share (fn1):						
Cambodia	***	***	***	▲ ***	▼ ***	▲ ***
Malaysia	***	***	***	▼ ***	▲ ***	▼ ***
Thailand	***	***	***	▲ ***	▼ ***	▲ ***
Vietnam	***	***	***	▲ ***	▼ ***	▲ ***
Subject sources	***	***	***	▲ ***	▼ ***	▲ ***
Subject sources less Cambodia	***	***	***	▲ ***	▼ ***	▲ ***
Nonsubject sources	***	***	***	▼ ***	▲ ***	▼ ***
Nonsubject sources plus Cambodia	***	***	***	▼ ***	▲ ***	▼ ***
All import sources	***	***	***	▼ ***	***	▼ ***
U.S. consumption value:						
Amount	***	***	***	▲ ***	▲ ***	▼ ***
Producers' share (fn1) (fn2):						
Fully domestic value	***	***	***	▲ ***	***	▲ ***
Value added to imports	***	***	***	▼ ***	▼ ***	▲ ***
Overall value for U.S. producers	***	***	***	▼ ***	▼ ***	▲ ***
Importers' share (fn1):						
Cambodia	***	***	***	▲ ***	▼ ***	▲ ***
Malaysia	***	***	***	▼ ***	▲ ***	▼ ***
Thailand	***	***	***	▲ ***	▼ ***	▲ ***
Vietnam	***	***	***	▲ ***	▼ ***	▲ ***
Subject sources	***	***	***	▲ ***	▼ ***	▲ ***
Subject sources less Cambodia	***	***	***	▲ ***	▼ ***	▲ ***
Nonsubject sources	***	***	***	▼ ***	▲ ***	▼ ***
Nonsubject sources plus Cambodia	***	***	***	▼ ***	▲ ***	▼ ***
All import sources	***	***	***	▲ ***	▲ ***	▼ ***
U.S. importers' U.S. shipments of imports from:						
Cambodia:						
Quantity	***	***	***	▲ ***	▼ ***	▲ ***
Value	***	***	***	▲ ***	▼ ***	▲ ***
Unit value	***	***	***	▼ ***	▲ ***	▼ ***
Ending inventory quantity	***	***	***	▼ ***	▲ ***	▼ ***
Malaysia:						
Quantity	***	***	***	▲ ***	▲ ***	▼ ***
Value	***	***	***	▲ ***	▲ ***	▼ ***
Unit value	***	***	***	▼ ***	▼ ***	▼ ***
Ending inventory quantity	***	***	***	▲ ***	▼ ***	▲ ***
Thailand:						
Quantity	***	***	***	▲ ***	▲ ***	▲ ***
Value	***	***	***	▲ ***	▲ ***	▲ ***
Unit value	***	***	***	▼ ***	▼ ***	▼ ***
Ending inventory quantity	***	***	***	▲ ***	▲ ***	▲ ***

Table continued.

Table C.1 Continued

CSPV cells and modules: Summary data concerning the U.S. market, by item and period

Quantity=kilowatts; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per kilowatt; Period changes=percent--exceptions noted

Item	Reported data			Period change comparisons		
	2022	2023	2024	2022-24	2022-23	2023-24
U.S. importers' U.S. shipments of imports from: Continued						
Vietnam:						
Quantity	***	***	***	▲***	▲***	▲***
Value	***	***	***	▲***	▲***	▲***
Unit value	***	***	***	▼***	▲***	▼***
Ending inventory quantity	***	***	***	▲***	▲***	▼***
Subject sources:						
Quantity	13,810,317	24,081,297	39,397,862	▲185.3	▲74.4	▲63.6
Value	4,987,601	8,462,633	10,683,311	▲114.2	▲69.7	▲26.2
Unit value	\$361	\$351	\$271	▼(24.9)	▼(2.7)	▼(22.8)
Ending inventory quantity	***	***	***	▲***	▲***	▲***
Subject sources less Cambodia:						
Quantity	***	***	***	▲***	▲***	▲***
Value	***	***	***	▲***	▲***	▲***
Unit value	***	***	***	▼***	▼***	▼***
Ending inventory quantity	***	***	***	▲***	▲***	▲***
Nonsubject sources:						
Quantity	***	***	***	▲***	▲***	▼***
Value	***	***	***	▲***	▲***	▼***
Unit value	***	***	***	▼***	▼***	▼***
Ending inventory quantity	***	***	***	▲***	▲***	▼***
Nonsubject sources plus Cambodia:						
Quantity	***	***	***	▲***	▲***	▼***
Value	***	***	***	▲***	▲***	▼***
Unit value	***	***	***	▼***	▼***	▼***
Ending inventory quantity	***	***	***	▲***	▲***	▼***
All import sources:						
Quantity	***	***	***	▲***	▲***	▲***
Value	***	***	***	▲***	▲***	▼***
Unit value	***	***	***	▼***	▼***	▼***
Ending inventory quantity	***	***	***	▲***	▲***	▼***
U.S. producers' (fn3):						
Cells: Practical capacity quantity	***	***	***	▲***	***	▲***
Cells: Production quantity	***	***	***	▲***	***	▲***
Cells: Capacity utilization (fn1)	***	***	***	▲***	***	▲***
Modules: Practical capacity quantity	3,081,158	4,717,119	17,851,661	▲479.4	▲53.1	▲278.4
Modules: Production quantity	***	***	***	▲***	▲***	▲***
Modules: Capacity utilization (fn1)	***	***	***	▼***	▼***	▼***
Modules: U.S. shipments:						
Quantity	***	***	***	▲***	▲***	▲***
Value	***	***	***	▲***	▼***	▲***
Unit value	***	***	***	▼***	▼***	▼***
Ratio to consumption, quantity (fn1)	***	***	***	▲***	▼***	▲***
Ratio to consumption, value (fn1)	***	***	***	▲***	▼***	▲***
Cells and modules: U.S. shipments for use in apparent consumption (fn2):						
Quantity	***	***	***	▲***	***	▲***
Value:						
Fully domestic value	***	***	***	▲***	***	▲***
Value added to imports	***	***	***	▲***	▼***	▲***
Overall value for U.S. producers	***	***	***	▲***	▼***	▲***
Cells and modules: Export shipments:						
Quantity	***	***	***	***	***	***
Value	***	***	***	***	***	***
Unit value	***	***	***	***	***	***

Table continued.

Table C.1 Continued
CSPV cells and modules: Summary data concerning the U.S. market, by item and period

Quantity=kilowatts; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per kilowatt; Period changes=percent--exceptions noted

Item	Reported data			Period change comparisons		
	2022	2023	2024	2022–24	2022–23	2023–24
U.S. producers': Continued						
Cells: Ending inventory quantity	***	***	***	▲***	***	▲***
Cells: Inventories/total shipments (fn1)	***	***	***	▲***	***	▲***
Modules: Ending inventory quantity	***	***	***	▲***	▲***	▲***
Modules: Inventories/total shipments (fn1)	***	***	***	▲***	▲***	▲***
Production workers	***	***	***	▲***	▲***	▲***
Hours worked (1,000s)	***	***	***	▲***	▼***	▲***
Wages paid (\$1,000)	***	***	***	▲***	▼***	▲***
Hourly wages (dollars per hour)	***	***	***	▲***	▼***	▲***
Cells: Productivity (kilowatts per 1,000 hours)	***	***	***	▲***	***	▲***
Modules: Productivity (kilowatts per 1,000 hours)	***	***	***	▲***	▲***	▲***
Cells: Unit labor costs	***	***	***	▲***	***	▲***
Modules: Unit labor costs	***	***	***	▼***	▼***	▼***
Net sales:						
Quantity	***	***	***	▲***	▲***	▲***
Value	***	***	***	▲***	▼***	▲***
Unit value	***	***	***	▼***	▼***	▼***
Cost of goods sold (COGS)	***	***	***	▲***	▼***	▲***
Gross profit or (loss) (fn4)	***	***	***	▼***	▼***	▼***
SG&A expenses	***	***	***	▲***	▲***	▲***
Operating income or (loss) (fn4)	***	***	***	▼***	▼***	▼***
Net income or (loss) (fn4)	***	***	***	▼***	▲***	▼***
Unit COGS	***	***	***	▼***	▼***	▼***
Unit SG&A expenses	***	***	***	▼***	▲***	▼***
Unit operating income or (loss) (fn4)	***	***	***	▼***	▼***	▲***
Unit net income or (loss) (fn4)	***	***	***	▲***	▲***	▲***
COGS/sales (fn1)	***	***	***	▲***	▲***	▲***
Operating income or (loss)/sales (fn1)	***	***	***	▼***	▼***	▼***
Net income or (loss)/sales (fn1)	***	***	***	▼***	▼***	▲***
Capital expenditures	***	***	***	▲***	▲***	▲***
Research and development expenses	***	***	***	▼***	▼***	▲***
Total assets	***	***	***	▲***	▲***	▲***

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2024. 508-compliant tables for these data are contained in parts 3, 4, 6, and 7 of this report.

Note.--Shares and ratios shown as "0.0" percent represent non-zero values less than "0.05" percent (if positive) and greater than "(0.05)" percent (if negative). Zeroes, null values, and undefined calculations are suppressed and shown as "--". Period changes preceded by a "▲" represent an increase, while period changes preceded by a "▼" represent a decrease. Imports in this table are consistent with the body treatment of including importers' U.S. imports under appendix IV as subject imports.

fn1.--Reported data are in percent and period changes are in percentage points.

fn2.--Quantity for U.S. producers' U.S. shipments is near zero as it only reflects domestically produced cells to assemble into modules. Value for U.S. producers' U.S. shipments reflects domestically produced cells to assemble into modules and the incremental value added by U.S. module producers to imported CSPV cells. In measuring consumption and market share this methodology avoids reclassifying and/or double counting merchandise already reported as an import.

fn3.--U.S. producers' data are mainly module production only with small amounts of domestic cell production starting up in 2024.

fn4.--Percent changes only calculated when both comparison values represent profits; The directional change in profitability provided when one or both comparison values represent a loss.

CSPV cells

Table C.2

CSPV cells: Summary data concerning the U.S. market, by item and period

Quantity=kilowatts; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per kilowatt; Period changes=percent--exceptions noted

Item	Reported data			Period change comparisons		
	2022	2023	2024	2022-24	2022-23	2023-24
U.S. consumption quantity:						
Amount	***	***	***	▲ ***	▲ ***	▲ ***
Producers' share (fn1):	—	—	***	▲ ***	—	▲ ***
Importers' share (fn1):						
Cambodia (KH)	***	***	***	▲ ***	▲ ***	▲ ***
Malaysia (MY)	***	***	***	▼ ***	▼ ***	▼ ***
Thailand (TH)	***	***	***	▲ ***	▼ ***	▲ ***
Vietnam (VN)	***	***	***	▼ ***	▼ ***	▼ ***
Subject sources	***	***	***	▼ ***	▼ ***	▼ ***
Subject sources less KH, TH and VN	***	***	***	▼ ***	▼ ***	▼ ***
Nonsubject sources	***	***	***	▲ ***	▲ ***	▲ ***
Nonsubject sources plus KH, TH and VN	***	***	***	▲ ***	▲ ***	▲ ***
All import sources	100.0	100.0	***	▼ ***	—	▼ ***
U.S. consumption value:						
Amount	***	***	***	▲ ***	▼ ***	▲ ***
Producers' share (fn1):	—	—	***	▲ ***	—	▲ ***
Importers' share (fn1):						
Cambodia (KH)	***	***	***	▲ ***	▲ ***	▲ ***
Malaysia (MY)	***	***	***	▼ ***	▼ ***	▼ ***
Thailand (TH)	***	***	***	▲ ***	▼ ***	▲ ***
Vietnam (VN)	***	***	***	▼ ***	▼ ***	▼ ***
Subject sources	***	***	***	▼ ***	▼ ***	▼ ***
Subject sources less KH, TH and VN	***	***	***	▼ ***	▼ ***	▼ ***
Nonsubject sources	***	***	***	▲ ***	▲ ***	▲ ***
Nonsubject sources plus KH, TH and VN	***	***	***	▲ ***	▲ ***	▲ ***
All import sources	100.0	100.0	***	▼ ***	—	▼ ***
U.S. importers' U.S. shipments of imports from:						
Cambodia:						
Quantity	***	***	***	▲ ***	▲ ***	▲ ***
Value	***	***	***	▲ ***	▲ ***	▲ ***
Unit value	***	***	***	▼ ***	▼ ***	▼ ***
Ending inventory quantity	***	***	***	▼ ***	▲ ***	▼ ***
Malaysia:						
Quantity	***	***	***	▲ ***	▼ ***	▲ ***
Value	***	***	***	▼ ***	▼ ***	▲ ***
Unit value	***	***	***	▼ ***	▼ ***	▼ ***
Ending inventory quantity	***	***	***	▲ ***	▲ ***	▲ ***
Thailand:						
Quantity	***	***	***	▲ ***	▼ ***	▲ ***
Value	***	***	***	▲ ***	▼ ***	▲ ***
Unit value	***	***	***	▼ ***	▲ ***	▼ ***
Ending inventory quantity	***	***	***	▲ ***	▲ ***	▲ ***
Vietnam:						
Quantity	***	***	***	▲ ***	▼ ***	▲ ***
Value	***	***	***	▲ ***	▼ ***	▲ ***
Unit value	***	***	***	▼ ***	▼ ***	▼ ***
Ending inventory quantity	***	***	***	▲ ***	▲ ***	▲ ***

Table continued.

Table C.2 Continued

CSPV cells: Summary data concerning the U.S. market, by item and period

Quantity=kilowatts; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per kilowatt; Period changes=percent--exceptions noted

Item	Reported data			Period change comparisons		
	2022	Calendar year 2023	2024	2022–24	Calendar year 2022–23	2023–24
U.S. importers' U.S. shipments of imports from: Continued						
Subject sources:						
Quantity	***	***	***	▲ ***	▼ ***	▲ ***
Value	***	***	***	▲ ***	▼ ***	▲ ***
Unit value	***	***	***	▼ ***	▼ ***	▼ ***
Ending inventory quantity	***	***	***	▲ ***	▲ ***	▲ ***
Subject sources less Cambodia, Thailand and Vietnam:						
Quantity	***	***	***	▲ ***	▼ ***	▲ ***
Value	***	***	***	▼ ***	▼ ***	▲ ***
Unit value	***	***	***	▼ ***	▼ ***	▼ ***
Ending inventory quantity	***	***	***	▲ ***	▲ ***	▲ ***
Nonsubject sources:						
Quantity	***	***	***	▲ ***	▲ ***	▲ ***
Value	***	***	***	▲ ***	▲ ***	▲ ***
Unit value	***	***	***	▼ ***	▼ ***	▲ ***
Ending inventory quantity	***	***	***	▲ ***	▲ ***	▲ ***
Nonsubject sources plus Cambodia, Thailand and Vietnam:						
Quantity	***	***	***	▲ ***	▲ ***	▲ ***
Value	***	***	***	▲ ***	▲ ***	▲ ***
Unit value	***	***	***	▼ ***	▼ ***	▼ ***
Ending inventory quantity	***	***	***	▲ ***	▲ ***	▲ ***
All import sources:						
Quantity	***	***	***	▲ ***	▲ ***	▲ ***
Value	***	***	***	▲ ***	▼ ***	▲ ***
Unit value	***	***	***	▼ ***	▼ ***	▼ ***
Ending inventory quantity	***	***	***	▲ ***	▲ ***	▲ ***
U.S. producers':						
Practical capacity quantity	—	—	***	▲ ***	—	▲ ***
Production quantity	—	—	***	▲ ***	—	▲ ***
Capacity utilization (fn1)	—	—	***	▲ ***	—	▲ ***
U.S. shipments:						
Quantity	—	—	***	▲ ***	—	▲ ***
Value	—	—	***	▲ ***	—	▲ ***
Unit value	—	—	***	▲ ***	—	▲ ***
Export shipments:						
Quantity	—	—	***	***	—	***
Value	—	—	***	***	—	***
Unit value	—	—	***	***	—	***
Ending inventory quantity	—	—	***	▲ ***	—	▲ ***
Inventories/total shipments (fn1)	—	—	***	▲ ***	—	▲ ***
Production workers	—	—	***	▲ ***	—	▲ ***
Hours worked (1,000s)	—	—	***	▲ ***	—	▲ ***
Wages paid (\$1,000)	—	—	***	▲ ***	—	▲ ***
Hourly wages (dollars per hour)	—	—	***	▲ ***	—	▲ ***
Productivity (kilowatts per 1,000 hours)	—	—	***	▲ ***	—	▲ ***
Unit labor costs	—	—	***	▲ ***	—	▲ ***

Table continued.

Table C.2 Continued

CSPV cells: Summary data concerning the U.S. market, by item and period

Quantity=kilowatts; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per kilowatt; Period changes=percent--exceptions noted

Item	Reported data			Period change comparisons		
	2022	2023	2024	2022–24	2022–23	2023–24
U.S. producers': Continued						
Net sales:						
Quantity	—	—	***	▲ ***	—	▲ ***
Value	—	—	***	▲ ***	—	▲ ***
Unit value	—	—	***	▲ ***	—	▲ ***
Cost of goods sold (COGS)	—	—	***	▲ ***	—	▲ ***
Gross profit or (loss) (fn2)	—	—	***	▲ ***	—	▲ ***
SG&A expenses	—	—	***	▲ ***	—	▲ ***
Operating income or (loss) (fn2)	—	—	***	▼ ***	—	▼ ***
Net income or (loss) (fn2)	—	—	***	▼ ***	—	▼ ***
Unit COGS	—	—	***	▲ ***	—	▲ ***
Unit SG&A expenses	—	—	***	▲ ***	—	▲ ***
Unit operating income or (loss) (fn2)	—	—	***	▼ ***	—	▼ ***
Unit net income or (loss) (fn2)	—	—	***	▼ ***	—	▼ ***
COGS/sales (fn1)	—	—	***	▲ ***	—	▲ ***
Operating income or (loss)/sales (fn1)	—	—	***	▼ ***	—	▼ ***
Net income or (loss)/sales (fn1)	—	—	***	▼ ***	—	▼ ***
Capital expenditures	—	—	***	▲ ***	—	▲ ***
Research and development expenses	—	—	***	***	—	***
Total assets	—	—	***	▲ ***	—	▲ ***

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2024. 508-compliant tables for these data are contained in appendix E of this report.

Note.--Shares and ratios shown as "0.0" percent represent non-zero values less than "0.05" percent (if positive) and greater than "(0.05)" percent (if negative). Zeroes, null values, and undefined calculations are suppressed and shown as "—". Period changes preceded by a "▲" represent an increase, while period changes preceded by a "▼" represent a decrease. Imports in this table are consistent with the body treatment of including importers' U.S. imports under appendix IV as subject imports.

fn1.--Reported data are in percent and period changes are in percentage points.

fn2.--Percent changes only calculated when both comparison values represent profits; The directional change in profitability provided when one or both comparison values represent a loss.

CSPV modules

Table C.3

CSPV modules: Summary data concerning the U.S. market, by item and period

Quantity=kilowatts; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per kilowatt; Period changes=percent--exceptions noted

Item	Reported data			Period change comparisons		
	2022	Calendar year 2023	2024	2022–24	Calendar year 2022–23	2023–24
U.S. consumption quantity:						
Amount	***	***	***	▲ ***	▲ ***	▲ ***
Producers' share (fn1):	***	***	***	▲ ***	▼ ***	▲ ***
Importers' share (fn1):						
Cambodia	***	***	***	▲ ***	▼ ***	▲ ***
Malaysia	***	***	***	▼ ***	▲ ***	▼ ***
Thailand	***	***	***	▲ ***	▼ ***	▲ ***
Vietnam	***	***	***	▲ ***	▼ ***	▲ ***
Subject sources	***	***	***	▲ ***	▼ ***	▲ ***
Subject sources less Cambodia	***	***	***	▲ ***	▼ ***	▲ ***
Nonsubject sources	***	***	***	▼ ***	▲ ***	▼ ***
Nonsubject sources plus Cambodia	***	***	***	▼ ***	▲ ***	▼ ***
All import sources	***	***	***	▼ ***	▲ ***	▼ ***
U.S. consumption value:						
Amount	***	***	***	▲ ***	▲ ***	▼ ***
Producers' share (fn1):	***	***	***	▲ ***	▼ ***	▲ ***
Importers' share (fn1):						
Cambodia	***	***	***	▲ ***	▼ ***	▲ ***
Malaysia	***	***	***	▼ ***	▲ ***	▼ ***
Thailand	***	***	***	▲ ***	▼ ***	▲ ***
Vietnam	***	***	***	▲ ***	▼ ***	▲ ***
Subject sources	***	***	***	▲ ***	▼ ***	▲ ***
Subject sources less Cambodia	***	***	***	▲ ***	▲ ***	▲ ***
Nonsubject sources	***	***	***	▼ ***	▲ ***	▼ ***
Nonsubject sources plus Cambodia	***	***	***	▼ ***	▲ ***	▼ ***
All import sources	***	***	***	▼ ***	▲ ***	▼ ***
U.S. importers' U.S. shipments of imports from:						
Cambodia:						
Quantity	***	***	***	▲ ***	▼ ***	▲ ***
Value	***	***	***	▲ ***	▼ ***	▲ ***
Unit value	***	***	***	▼ ***	▲ ***	▼ ***
Ending inventory quantity	***	***	***	▲ ***	***	▲ ***
Malaysia:						
Quantity	***	***	***	▲ ***	▲ ***	▼ ***
Value	***	***	***	▲ ***	▲ ***	▼ ***
Unit value	***	***	***	▼ ***	▼ ***	▼ ***
Ending inventory quantity	***	***	***	▼ ***	▼ ***	▼ ***
Thailand:						
Quantity	***	***	***	▲ ***	▲ ***	▲ ***
Value	***	***	***	▲ ***	▲ ***	▲ ***
Unit value	***	***	***	▼ ***	▼ ***	▼ ***
Ending inventory quantity	***	***	***	▲ ***	▲ ***	▲ ***
Vietnam:						
Quantity	***	***	***	▲ ***	▲ ***	▲ ***
Value	***	***	***	▲ ***	▲ ***	▲ ***
Unit value	***	***	***	▼ ***	▲ ***	▼ ***
Ending inventory quantity	***	***	***	▲ ***	▲ ***	▼ ***

Table continued.

Table C.3 Continued
CSPV modules: Summary data concerning the U.S. market, by item and period

Quantity=kilowatts; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per kilowatt; Period changes=percent--exceptions noted

Item	Reported data			Period change comparisons		
	2022	2023	2024	2022–24	2022–23	2023–24
U.S. importers' U.S. shipments of imports from: Continued						
Subject sources:						
Quantity	***	***	***	▲***	▲***	▲***
Value	***	***	***	▲***	▲***	▲***
Unit value	***	***	***	▼***	▼***	▼***
Ending inventory quantity	***	***	***	▲***	▲***	▼***
Subject sources less Cambodia:						
Quantity	***	***	***	▲***	▲***	▲***
Value	***	***	***	▲***	▲***	▲***
Unit value	***	***	***	▼***	▼***	▼***
Ending inventory quantity	***	***	***	▲***	▲***	▼***
Nonsubject sources:						
Quantity	***	***	***	▲***	▲***	▼***
Value	***	***	***	▼***	▲***	▼***
Unit value	***	***	***	▼***	▼***	▼***
Ending inventory quantity	***	***	***	▼***	▲***	▼***
Nonsubject sources plus Cambodia:						
Quantity	***	***	***	▲***	▲***	▼***
Value	***	***	***	▲***	▲***	▼***
Unit value	***	***	***	▼***	▼***	▼***
Ending inventory quantity	***	***	***	▼***	▲***	▼***
All import sources:						
Quantity	***	***	***	▲***	▲***	▼***
Value	***	***	***	▲***	▲***	▼***
Unit value	***	***	***	▼***	▼***	▼***
Ending inventory quantity	***	***	***	▲***	▲***	▼***
U.S. producers*:						
Practical capacity quantity	***	***	***	▲***	▲***	▲***
Production quantity	***	***	***	▲***	▲***	▲***
Capacity utilization (fn1)	***	***	***	▼***	▼***	▼***
U.S. shipments:						
Quantity	***	***	***	▲***	▲***	▲***
Value	***	***	***	▲***	▼***	▲***
Unit value	***	***	***	▼***	▼***	▼***
Export shipments:						
Quantity	***	***	***	***	***	***
Value	***	***	***	***	***	***
Unit value	***	***	***	***	***	***
Ending inventory quantity	***	***	***	▲***	▲***	▲***
Inventories/total shipments (fn1)	***	***	***	▲***	▲***	▲***
Production workers	***	***	***	▲***	▲***	▲***
Hours worked (1,000s)	***	***	***	▲***	▼***	▲***
Wages paid (\$1,000)	***	***	***	▲***	▼***	▲***
Hourly wages (dollars per hour)	***	***	***	▲***	▼***	▲***
Productivity (kilowatts per 1,000 hours)	***	***	***	▲***	▲***	▲***
Unit labor costs	***	***	***	▼***	▼***	▼***

Table continued.

Table C.3 Continued
CSPV modules: Summary data concerning the U.S. market, by item and period

Quantity=kilowatts; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per kilowatt; Period changes=percent--exceptions noted

Item	Reported data			Period change comparisons		
	2022	2023	2024	2022–24	2022–23	2023–24
U.S. producers': Continued						
Net sales:						
Quantity	***	***	***	▲ ***	▲ ***	▲ ***
Value	***	***	***	▲ ***	▼ ***	▲ ***
Unit value	***	***	***	▼ ***	▼ ***	▼ ***
Cost of goods sold (COGS)	***	***	***	▲ ***	▼ ***	▲ ***
Gross profit or (loss) (fn2)	***	***	***	▼ ***	▼ ***	▼ ***
SG&A expenses	***	***	***	▲ ***	▲ ***	▲ ***
Operating income or (loss) (fn2)	***	***	***	▼ ***	▼ ***	▼ ***
Net income or (loss) (fn2)	***	***	***	▼ ***	▲ ***	▼ ***
Unit COGS	***	***	***	▼ ***	▼ ***	▼ ***
Unit SG&A expenses	***	***	***	▼ ***	▲ ***	▼ ***
Unit operating income or (loss) (fn2)	***	***	***	▼ ***	▼ ***	▲ ***
Unit net income or (loss) (fn2)	***	***	***	▲ ***	▲ ***	▲ ***
COGS/sales (fn1)	***	***	***	▲ ***	▲ ***	▲ ***
Operating income or (loss)/sales (fn1)	***	***	***	▼ ***	▼ ***	▼ ***
Net income or (loss)/sales (fn1)	***	***	***	▲ ***	▼ ***	▲ ***
Capital expenditures	***	***	***	▲ ***	▲ ***	▲ ***
Research and development expenses	***	***	***	▼ ***	▼ ***	▲ ***
Total assets	***	***	***	▲ ***	▲ ***	▲ ***

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2024. 508-compliant tables for these data are contained in appendix F of this report.

Note.--Shares and ratios shown as "0.0" percent represent non-zero values less than "0.05" percent (if positive) and greater than "(0.05)" percent (if negative). Zeroes, null values, and undefined calculations are suppressed and shown as "--". Period changes preceded by a "▲" represent an increase, while period changes preceded by a "▼" represent a decrease. Imports in this table are consistent with the body treatment of including importers' U.S. imports under appendix IV as subject imports.

fn1.--Reported data are in percent and period changes are in percentage points.

fn2.--Percent changes only calculated when both comparison values represent profits; The directional change in profitability provided when one or both comparison values represent a loss.

Alternative imports: CSPV cells and modules

Table C.4

CSPV cells and modules: Alternative market data treating appendix IV entries as nonsubject, by item and period

Quantity=kilowatts; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per kilowatt; Period changes=percent--exceptions noted

Item	Reported data			Period change comparisons		
	2022	Calendar year 2023	2024	2022–24	Calendar year 2022–23	2023–24
U.S. consumption quantity:						
Amount	***	***	***	▲ ***	▲ ***	▲ ***
Producers' share (fn1) (fn2):	***	***	***	▲ ***	***	▲ ***
Importers' share (fn1):						
Cambodia (KH)	***	***	***	▲ ***	▼ ***	▲ ***
Malaysia	***	***	***	▼ ***	▲ ***	▼ ***
Thailand (TH)	***	***	***	▲ ***	▼ ***	▲ ***
Vietnam	***	***	***	▲ ***	▼ ***	▲ ***
Subject sources	***	***	***	▲ ***	▼ ***	▲ ***
Subject sources less KH and TH	***	***	***	▲ ***	▲ ***	▲ ***
Nonsubject sources	***	***	***	▼ ***	▲ ***	▼ ***
Nonsubject sources plus KH and TH	***	***	***	▼ ***	▼ ***	▼ ***
All import sources	***	***	***	▼ ***	***	▼ ***
U.S. consumption value:						
Amount	***	***	***	▲ ***	▲ ***	▼ ***
Producers' share (fn1) (fn2):						
Fully domestic value	***	***	***	▲ ***	***	▲ ***
Value added to imports	***	***	***	▼ ***	▼ ***	▲ ***
Overall value for U.S. producers	***	***	***	▼ ***	▼ ***	▲ ***
Importers' share (fn1):						
Cambodia (KH)	***	***	***	▲ ***	▼ ***	▲ ***
Malaysia	***	***	***	▼ ***	▲ ***	▼ ***
Thailand (TH)	***	***	***	▲ ***	▼ ***	▲ ***
Vietnam	***	***	***	▲ ***	▲ ***	▲ ***
Subject sources	***	***	***	▲ ***	▲ ***	▲ ***
Subject sources less KH and TH	***	***	***	▲ ***	▲ ***	▲ ***
Nonsubject sources	***	***	***	▼ ***	▲ ***	▼ ***
Nonsubject sources plus KH and TH	***	***	***	▼ ***	▼ ***	▼ ***
All import sources	***	***	***	▲ ***	▲ ***	▼ ***
U.S. importers' U.S. shipments of imports from:						
Cambodia:						
Quantity	***	***	***	▲ ***	▼ ***	▲ ***
Value	***	***	***	▲ ***	▼ ***	▲ ***
Unit value	***	***	***	▼ ***	▼ ***	▼ ***
Ending inventory quantity	***	***	***	▼ ***	▲ ***	▼ ***
Malaysia:						
Quantity	***	***	***	▲ ***	▲ ***	▼ ***
Value	***	***	***	▲ ***	▲ ***	▼ ***
Unit value	***	***	***	▼ ***	▼ ***	▼ ***
Ending inventory quantity	***	***	***	▲ ***	▼ ***	▲ ***
Thailand:						
Quantity	***	***	***	▲ ***	▼ ***	▲ ***
Value	***	***	***	▲ ***	▼ ***	▲ ***
Unit value	***	***	***	▼ ***	▼ ***	▼ ***
Ending inventory quantity	***	***	***	▲ ***	▲ ***	▲ ***
Vietnam:						
Quantity	***	***	***	▲ ***	▲ ***	▲ ***
Value	***	***	***	▲ ***	▲ ***	▲ ***
Unit value	***	***	***	▼ ***	▲ ***	▼ ***
Ending inventory quantity	***	***	***	▲ ***	▲ ***	▼ ***

Table continued.

Table C.4 Continued

CSPV cells and modules: Alternative market data treating appendix IV entries as nonsubject, by item and period

Quantity=kilowatts; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per kilowatt; Period changes=percent--exceptions noted

Item	Reported data			Period change comparisons		
	2022	2023	2024	2022–24	2022–23	2023–24
U.S. importers' U.S. shipments of imports from: Continued						
Subject sources:						
Quantity	***	***	***	▲***	▲***	▲***
Value	***	***	***	▲***	▲***	▲***
Unit value	***	***	***	▼***	▼***	▼***
Ending inventory quantity	***	***	***	▲***	▲***	▲***
Subject sources less Cambodia and Thailand:						
Quantity	***	***	***	▲***	▲***	▲***
Value	***	***	***	▲***	▲***	▲***
Unit value	***	***	***	▼***	▲***	▼***
Ending inventory quantity	***	***	***	▲***	▲***	▲***
Nonsubject sources:						
Quantity	***	***	***	▲***	▲***	▼***
Value	***	***	***	▼***	▲***	▼***
Unit value	***	***	***	▼***	▼***	▼***
Ending inventory quantity	***	***	***	▼***	▲***	▼***
Nonsubject sources plus Cambodia and Thailand:						
Quantity	***	***	***	▲***	▲***	▲***
Value	***	***	***	▲***	▲***	▼***
Unit value	***	***	***	▼***	▼***	▼***
Ending inventory quantity	***	***	***	▲***	▲***	▼***
All import sources:						
Quantity	***	***	***	▲***	▲***	▲***
Value	***	***	***	▲***	▲***	▼***
Unit value	***	***	***	▼***	▼***	▼***
Ending inventory quantity	***	***	***	▲***	▲***	▼***
U.S. producers':						
U.S. shipments:						
Quantity	***	***	***	▲***	▲***	▲***
Value	***	***	***	▲***	▼***	▲***
Unit value	***	***	***	▼***	▼***	▼***
Ratio to consumption, quantity (fn1)	***	***	***	▲***	▼***	▲***
Ratio to consumption, value (fn1)	***	***	***	▲***	▼***	▲***
U.S. shipments for use in apparent consumption (fn2):						
Quantity	***	***	***	▲***	***	▲***
Value:						
Fully domestic value	***	***	***	▲***	***	▲***
Value added to imports	***	***	***	▲***	▼***	▲***
Overall value for U.S. producers	***	***	***	▲***	▼***	▲***

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2024. 508-compliant tables for these data are contained in appendix D of this report.

Note.--Shares and ratios shown as "0.0" percent represent non-zero values less than "0.05" percent (if positive) and greater than "(0.05)" percent (if negative). Zeroes, null values, and undefined calculations are suppressed and shown as "—". Period changes preceded by a "▲" represent an increase, while period changes preceded by a "▼" represent a decrease. Imports in this table reclassify importers' U.S. imports under appendix IV as nonsubject imports relative to table C.1.

fn1.--Reported data are in percent and period changes are in percentage points.

fn2.--Quantity for U.S. producers' U.S. shipments is near zero as it only reflects domestically produced cells to assemble into modules. Value for U.S. producers' U.S. shipments reflects domestically produced cells to assemble into modules and the incremental value added by U.S. module producers to imported CSPV cells. In measuring consumption and market share this methodology avoids reclassifying and/or double counting merchandise already reported as an import.

Alternative imports: CSPV cells

Table C.5

CSPV cells: Alternative market data treating appendix IV entries as nonsubject, by item and period

Quantity=kilowatts; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per kilowatt; Period changes=percent--exceptions noted

Item	Reported data			Period change comparisons		
	2022	2023	2024	2022–24	2022–23	2023–24
U.S. consumption quantity:						
Amount	***	***	***	▲ ***	▲ ***	▲ ***
Producers' share (fn1):	***	***	***	▲ ***	***	▲ ***
Importers' share (fn1):						
Cambodia (KH)	***	***	***	▲ ***	▲ ***	▲ ***
Malaysia	***	***	***	▼ ***	▼ ***	▼ ***
Thailand (TH)	***	***	***	▲ ***	▼ ***	▲ ***
Vietnam (VN)	***	***	***	▼ ***	▼ ***	▼ ***
Subject sources	***	***	***	▼ ***	▼ ***	▼ ***
Subject sources less KH, TH, and VN	***	***	***	▼ ***	▼ ***	▼ ***
Nonsubject sources	***	***	***	▲ ***	▲ ***	▲ ***
Nonsubject sources plus KH, TH, and VN	***	***	***	▲ ***	▲ ***	▲ ***
All import sources	***	***	***	▼ ***	***	▼ ***
U.S. consumption value:						
Amount	***	***	***	▲ ***	▼ ***	▲ ***
Producers' share (fn1):	***	***	***	▲ ***	***	▲ ***
Importers' share (fn1):						
Cambodia (KH)	***	***	***	▲ ***	▲ ***	▲ ***
Malaysia	***	***	***	▼ ***	▼ ***	▼ ***
Thailand (TH)	***	***	***	▲ ***	▼ ***	▲ ***
Vietnam (VN)	***	***	***	▼ ***	▼ ***	▼ ***
Subject sources	***	***	***	▼ ***	▼ ***	▼ ***
Subject sources less KH, TH, and VN	***	***	***	▼ ***	▼ ***	▼ ***
Nonsubject sources	***	***	***	▲ ***	▲ ***	▲ ***
Nonsubject sources plus KH, TH, and VN	***	***	***	▲ ***	▲ ***	▲ ***
All import sources	***	***	***	▼ ***	***	▼ ***
U.S. importers' U.S. shipments of imports from:						
Cambodia:						
Quantity	***	***	***	▲ ***	▲ ***	▲ ***
Value	***	***	***	▲ ***	▲ ***	▲ ***
Unit value	***	***	***	▼ ***	▼ ***	▼ ***
Ending inventory quantity	***	***	***	▼ ***	▲ ***	▼ ***
Malaysia:						
Quantity	***	***	***	▲ ***	▼ ***	▲ ***
Value	***	***	***	▼ ***	▼ ***	▲ ***
Unit value	***	***	***	▼ ***	▼ ***	▼ ***
Ending inventory quantity	***	***	***	▲ ***	▲ ***	▲ ***
Thailand:						
Quantity	***	***	***	▲ ***	▼ ***	▲ ***
Value	***	***	***	▲ ***	▼ ***	▲ ***
Unit value	***	***	***	▼ ***	▲ ***	▼ ***
Ending inventory quantity	***	***	***	▲ ***	▲ ***	▲ ***
Vietnam:						
Quantity	***	***	***	▲ ***	▼ ***	▲ ***
Value	***	***	***	▼ ***	▼ ***	▲ ***
Unit value	***	***	***	▼ ***	▼ ***	▼ ***
Ending inventory quantity	***	***	***	▲ ***	▲ ***	▲ ***

Table continued.

Table C.5 Continued

CSPV cells: Alternative market data treating appendix IV entries as nonsubject, by item and period

Quantity=kilowatts; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per kilowatt; Period changes=percent--exceptions noted

Item	Reported data			Period change comparisons		
	2022	2023	2024	2022–24	2022–23	2023–24
U.S. importers' U.S. shipments of imports from: Continued						
Subject sources:						
Quantity	***	***	***	▲ ***	▼ ***	▲ ***
Value	***	***	***	▲ ***	▼ ***	▲ ***
Unit value	***	***	***	▼ ***	▼ ***	▼ ***
Ending inventory quantity	***	***	***	▲ ***	▲ ***	▲ ***
Subject sources less Cambodia, Thailand, and Vietnam:						
Quantity	***	***	***	▲ ***	▼ ***	▲ ***
Value	***	***	***	▼ ***	▼ ***	▲ ***
Unit value	***	***	***	▼ ***	▼ ***	▼ ***
Ending inventory quantity	***	***	***	▲ ***	▲ ***	▲ ***
Nonsubject sources:						
Quantity	***	***	***	▲ ***	▲ ***	▲ ***
Value	***	***	***	▲ ***	▲ ***	▲ ***
Unit value	***	***	***	▼ ***	▼ ***	▲ ***
Ending inventory quantity	***	***	***	▲ ***	▲ ***	▲ ***
Nonsubject sources plus Cambodia, Thailand, and Vietnam:						
Quantity	***	***	***	▲ ***	▲ ***	▲ ***
Value	***	***	***	▲ ***	▲ ***	▲ ***
Unit value	***	***	***	▼ ***	▼ ***	▼ ***
Ending inventory quantity	***	***	***	▲ ***	▲ ***	▲ ***
All import sources:						
Quantity	***	***	***	▲ ***	▲ ***	▲ ***
Value	***	***	***	▲ ***	▼ ***	▲ ***
Unit value	***	***	***	▼ ***	▼ ***	▼ ***
Ending inventory quantity	***	***	***	▲ ***	▲ ***	▲ ***
U.S. producers':						
U.S. shipments:						
Quantity	***	***	***	▲ ***	***	▲ ***
Value	***	***	***	▲ ***	***	▲ ***
Unit value	***	***	***	▲ ***	***	▲ ***

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2024.

Note.--Shares and ratios shown as "0.0" percent represent non-zero values less than "0.05" percent (if positive) and greater than "(0.05)" percent (if negative). Zeroes, null values, and undefined calculations are suppressed and shown as "—". Period changes preceded by a "▲" represent an increase, while period changes preceded by a "▼" represent a decrease. Imports in this table reclassify importers' U.S. imports under appendix IV as nonsubject imports relative to table C.2.

fn1.--Reported data are in percent and period changes are in percentage points.

fn2.--Percent changes only calculated when both comparison values represent profits; The directional change in profitability provided when one or both comparison values represent a loss.

Alternative imports: CSPV modules

Table C.6

CSPV modules: Alternative market data treating appendix IV entries as nonsubject, by item and period

Quantity=kilowatts; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per kilowatt; Period changes=percent--exceptions noted

Item	Reported data			Period change comparisons		
	2022	2023	2024	2022–24	2022–23	2023–24
U.S. consumption quantity:						
Amount	***	***	***	▲ ***	▲ ***	▲ ***
Producers' share (fn1):	***	***	***	▲ ***	▼ ***	▲ ***
Importers' share (fn1):						
Cambodia (KH)	***	***	***	▲ ***	▼ ***	▲ ***
Malaysia	***	***	***	▼ ***	▲ ***	▼ ***
Thailand (TH)	***	***	***	▲ ***	▼ ***	▲ ***
Vietnam	***	***	***	▲ ***	▼ ***	▲ ***
Subject sources	***	***	***	▲ ***	▲ ***	▲ ***
Subject sources less KH and TH	***	***	***	▲ ***	▲ ***	▲ ***
Nonsubject sources	***	***	***	▼ ***	▲ ***	▼ ***
Nonsubject sources plus KH and TH	***	***	***	▼ ***	▼ ***	▼ ***
All import sources	***	***	***	▼ ***	▲ ***	▼ ***
U.S. consumption value:						
Amount	***	***	***	▲ ***	▲ ***	▼ ***
Producers' share (fn1):	***	***	***	▲ ***	▼ ***	▲ ***
Importers' share (fn1):						
Cambodia (KH)	***	***	***	▲ ***	▼ ***	▲ ***
Malaysia	***	***	***	▼ ***	▲ ***	▼ ***
Thailand (TH)	***	***	***	▲ ***	▼ ***	▲ ***
Vietnam	***	***	***	▲ ***	▲ ***	▲ ***
Subject sources	***	***	***	▲ ***	▲ ***	▲ ***
Subject sources less KH and TH	***	***	***	▲ ***	▲ ***	▲ ***
Nonsubject sources	***	***	***	▼ ***	▲ ***	▼ ***
Nonsubject sources plus KH and TH	***	***	***	▼ ***	▼ ***	▼ ***
All import sources	***	***	***	▼ ***	▲ ***	▼ ***
U.S. importers' U.S. shipments of imports from:						
Cambodia:						
Quantity	***	***	***	▲ ***	▼ ***	▲ ***
Value	***	***	***	▲ ***	▼ ***	▲ ***
Unit value	***	***	***	▼ ***	▼ ***	▼ ***
Ending inventory quantity	***	***	***	▲ ***	***	▲ ***
Malaysia:						
Quantity	***	***	***	▲ ***	▲ ***	▼ ***
Value	***	***	***	▲ ***	▲ ***	▼ ***
Unit value	***	***	***	▼ ***	▼ ***	▼ ***
Ending inventory quantity	***	***	***	▼ ***	▼ ***	▼ ***
Thailand:						
Quantity	***	***	***	▲ ***	▼ ***	▲ ***
Value	***	***	***	▲ ***	▼ ***	▲ ***
Unit value	***	***	***	▼ ***	▼ ***	▼ ***
Ending inventory quantity	***	***	***	▲ ***	▲ ***	▲ ***
Vietnam:						
Quantity	***	***	***	▲ ***	▲ ***	▲ ***
Value	***	***	***	▲ ***	▲ ***	▲ ***
Unit value	***	***	***	▼ ***	▲ ***	▼ ***
Ending inventory quantity	***	***	***	▲ ***	▲ ***	▼ ***

Table continued.

Table C.6 Continued

CSPV modules: Alternative market data treating appendix IV entries as nonsubject, by item and period

Quantity=kilowatts; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per kilowatt; Period changes=percent--exceptions noted

Item	Reported data			Period change comparisons		
	2022	2023	2024	2022–24	2022–23	2023–24
U.S. importers' U.S. shipments of imports from: Continued						
Subject sources:						
Quantity	***	***	***	▲ ***	▲ ***	▲ ***
Value	***	***	***	▲ ***	▲ ***	▲ ***
Unit value	***	***	***	▼ ***	▼ ***	▼ ***
Ending inventory quantity	***	***	***	▲ ***	▲ ***	▲ ***
Subject sources less Cambodia and Thailand:						
Quantity	***	***	***	▲ ***	▲ ***	▲ ***
Value	***	***	***	▲ ***	▲ ***	▲ ***
Unit value	***	***	***	▼ ***	▼ ***	▼ ***
Ending inventory quantity	***	***	***	▲ ***	▲ ***	▼ ***
Nonsubject sources:						
Quantity	***	***	***	▲ ***	▲ ***	▼ ***
Value	***	***	***	▼ ***	▲ ***	▼ ***
Unit value	***	***	***	▼ ***	▼ ***	▼ ***
Ending inventory quantity	***	***	***	▼ ***	▲ ***	▼ ***
Nonsubject sources plus Cambodia and Thailand:						
Quantity	***	***	***	▲ ***	▲ ***	▼ ***
Value	***	***	***	▲ ***	▲ ***	▼ ***
Unit value	***	***	***	▼ ***	▼ ***	▼ ***
Ending inventory quantity	***	***	***	▲ ***	▲ ***	▼ ***
All import sources:						
Quantity	***	***	***	▲ ***	▲ ***	▼ ***
Value	***	***	***	▲ ***	▲ ***	▼ ***
Unit value	***	***	***	▼ ***	▼ ***	▼ ***
Ending inventory quantity	***	***	***	▲ ***	▲ ***	▼ ***
U.S. producers':						
U.S. shipments:						
Quantity	***	***	***	▲ ***	▲ ***	▲ ***
Value	***	***	***	▲ ***	▼ ***	▲ ***
Unit value	***	***	***	▼ ***	▼ ***	▼ ***

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2024.

Note.--Shares and ratios shown as "0.0" percent represent non-zero values less than "0.05" percent (if positive) and greater than "(0.05)" percent (if negative). Zeroes, null values, and undefined calculations are suppressed and shown as "--". Period changes preceded by a "▲" represent an increase, while period changes preceded by a "▼" represent a decrease. Imports in this table reclassify importers' U.S. imports under appendix IV as nonsubject imports relative to table C.3.

fn1.--Reported data are in percent and period changes are in percentage points.

fn2.--Percent changes only calculated when both comparison values represent profits; The directional change in profitability provided when one or both comparison values represent a loss.

APPENDIX D

ALTERNATE U.S. IMPORTS

Table D.1 CSPV cells and modules: Alternate U.S. imports appendix IV imports adjustment summary

Quantity in kilowatts; Ratio and share in percent

Source	Measure	2022	2023	2024
Subject sources as presented in Table 4.2	Quantity	***	***	***
Nonsubject sources as presented in Table 4.2	Quantity	***	***	***
All import sources as presented in Table 4.2	Quantity	***	***	***
Subject sources as presented in Table 4.2	Share	***	***	***
Nonsubject sources as presented in Table 4.2	Share	***	***	***
All import sources as presented in Table 4.2	Share	100.0	100.0	100.0
Appendix IV imports reported in supplemental questionnaire	Quantity	***	***	***
Appendix IV imports to unadjusted subject imports	Ratio	***	***	***
Adjusted subject sources (minus appendix IV imports)	Quantity	***	***	***
Adjusted nonsubject sources (plus appendix IV imports)	Quantity	***	***	***
All import sources	Quantity	***	***	***
Adjusted subject sources (minus appendix IV imports)	Share	***	***	***
Adjusted nonsubject sources (plus appendix IV imports)	Share	***	***	***
All import sources	Share	100.0	100.0	100.0

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Table D.2 CSPV cells and modules: Share of U.S. shipments by source, channel of distribution, and period

Share in percent

Source	Channel	2022	2023	2024
United States	Distributors	***	***	***
United States	Module assemblers	***	***	***
United States	Residential installer	***	***	***
United States	Commercial installer	***	***	***
United States	Utilities and developers	***	***	***
Cambodia	Distributors	***	***	***
Cambodia	Module assemblers	***	***	***
Cambodia	Residential installer	***	***	***
Cambodia	Commercial installer	***	***	***
Cambodia	Utilities and developers	***	***	***
Malaysia	Distributors	***	***	***
Malaysia	Module assemblers	***	***	***
Malaysia	Residential installer	***	***	***
Malaysia	Commercial installer	***	***	***
Malaysia	Utilities and developers	***	***	***
Thailand	Distributors	***	***	***
Thailand	Module assemblers	***	***	***
Thailand	Residential installer	***	***	***
Thailand	Commercial installer	***	***	***
Thailand	Utilities and developers	***	***	***
Vietnam	Distributors	***	***	***
Vietnam	Module assemblers	***	***	***
Vietnam	Residential installer	***	***	***
Vietnam	Commercial installer	***	***	***
Vietnam	Utilities and developers	***	***	***

Table continued.

Table D.2 (Continued) CSPV cells and modules: Share of U.S. shipments by source, channel of distribution, and period

Share in percent

Source	Channel	2022	2023	2024
Subject sources	Distributors	***	***	***
Subject sources	Module assemblers	***	***	***
Subject sources	Residential installer	***	***	***
Subject sources	Commercial installer	***	***	***
Subject sources	Utilities and developers	***	***	***
Subject sources less Cambodia and Thailand	Distributors	***	***	***
Subject sources less Cambodia and Thailand	Module assemblers	***	***	***
Subject sources less Cambodia and Thailand	Residential installer	***	***	***
Subject sources less Cambodia and Thailand	Commercial installer	***	***	***
Subject sources less Cambodia and Thailand	Utilities and developers	***	***	***
Nonsubject sources	Distributors	***	***	***
Nonsubject sources	Module assemblers	***	***	***
Nonsubject sources	Residential installer	***	***	***
Nonsubject sources	Commercial installer	***	***	***
Nonsubject sources	Utilities and developers	***	***	***
Nonsubject sources plus Cambodia and Thailand	Distributors	***	***	***
Nonsubject sources plus Cambodia and Thailand	Module assemblers	***	***	***
Nonsubject sources plus Cambodia and Thailand	Residential installer	***	***	***
Nonsubject sources plus Cambodia and Thailand	Commercial installer	***	***	***
Nonsubject sources plus Cambodia and Thailand	Utilities and developers	***	***	***
All imports	Distributors	***	***	***
All imports	Module assemblers	***	***	***
All imports	Residential installer	***	***	***
All imports	Commercial installer	***	***	***
All imports	Utilities and developers	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—".

Table D.3 CSPV cells and modules: U.S. imports, their headquarters, and share of total imports within a given source by firm, 2024

Shares in percent

Firm	Headquarters	Cambodia	Malaysia	Thailand	Vietnam
Acciona	Chicago, IL	***	***	***	***
Astronergy	Pomona, CA	***	***	***	***
Auxin	San Jose, CA	***	***	***	***
Boviet	San Jose, CA	***	***	***	***
BYD	Pasadena, CA	***	***	***	***
Canadian (USA)	Walnut Creek, CA	***	***	***	***
Canadian Module	Mesquite, TX	***	***	***	***
Cantex	Houston, TX	***	***	***	***
First Solar	Tempe, AZ	***	***	***	***
GAF Energy	San Jose, CA	***	***	***	***
Hanwha	Irvine, CA	***	***	***	***
Hanwha CA	Irvine, CA	***	***	***	***
Hanwha Dalton	Dalton, GA	***	***	***	***
Hanwha GA	White, GA	***	***	***	***
Hounen	Chino, CA	***	***	***	***
Hounen Co	Phnom Penh, Kandal	***	***	***	***
Hyundai	Seongnam-Si, Gyeonggi-Do	***	***	***	***
Illuminate	Pataskala, OH	***	***	***	***
Invenergy	Chicago, IL	***	***	***	***
JA Solar	San Jose, CA	***	***	***	***
Jinko CA	Campbell, CA	***	***	***	***
Jinko FL	Jacksonville, FL	***	***	***	***
LONGi	San Ramon, CA	***	***	***	***
Maxeon	San Jose, CA	***	***	***	***
Merlin	San Jose, CA	***	***	***	***
Meyer Burger	Goodyear, AZ	***	***	***	***
New East		***	***	***	***
NextEra	Juno Beach, FL	***	***	***	***
Panasonic	Newark, NJ	***	***	***	***
PowerFilm	Ames, IA	***	***	***	***
REC Americas	San Luis Obispo, CA	***	***	***	***
Recurrent	Austin, TX	***	***	***	***
Risen Solar	Kulim, Kedah Darul Aman	***	***	***	***
Runergy	Huntsville, AL	***	***	***	***
Runergy Trading	City Of Industry, CA	***	***	***	***
Silfab	Burlington, WA	***	***	***	***
Solarmax	Riverside, CA	***	***	***	***
SunTegra	Larchmont, NY	***	***	***	***
Tesla	Austin, CA	***	***	***	***
Trina	Wilmer, TX	***	***	***	***

Table continued.

Table D.3 (Continued) CSPV cells and modules: U.S. imports, their headquarters, and share of total imports within a given source by firm, 2024

Shares in percent

Firm	Headquarters	Cambodia	Malaysia	Thailand	Vietnam
Trina (U.S.)	Fremont, CA	***	***	***	***
Vikram	Massachusetts, MA	***	***	***	***
Waaree Energies	Navsari, GJ	***	***	***	***
Yingli	Malvern, PA	***	***	***	***
ZampTech	Bend, OR	***	***	***	***
Zhongli	Hong Kong	***	***	***	***
All firms	Various	100.0	100.0	100.0	100.0

Table continued.

Table D.3 (Continued) CSPV cells and modules: U.S. imports, their headquarters, and share of total imports within a given source by firm, 2024

Shares in percent

Firm	Headquarters	Subject sources	Nonsubject sources	All import sources
Acciona	Chicago, IL	***	***	***
Astronergy	Pomona, CA	***	***	***
Auxin	San Jose, CA	***	***	***
Boviet	San Jose, CA	***	***	***
BYD	Pasadena, CA	***	***	***
Canadian (USA)	Walnut Creek, CA	***	***	***
Canadian Module	Mesquite, TX	***	***	***
Cantex	Houston, TX	***	***	***
First Solar	Tempe, AZ	***	***	***
GAF Energy	San Jose, CA	***	***	***
Hanwha	Irvine, CA	***	***	***
Hanwha CA	Irvine, CA	***	***	***
Hanwha Dalton	Dalton, GA	***	***	***
Hanwha GA	White, GA	***	***	***
Hounen	Chino, CA	***	***	***
Hounen Co	Phnom Penh, Kandal	***	***	***
Hyundai	Seongnam-Si, Gyeonggi-Do	***	***	***
Illuminate	Pataskala, OH	***	***	***
Invenergy	Chicago, IL	***	***	***
JA Solar	San Jose, CA	***	***	***
Jinko CA	Campbell, CA	***	***	***
Jinko FL	Jacksonville, FL	***	***	***
LONGi	San Ramon, CA	***	***	***
Maxeon	San Jose, CA	***	***	***
Merlin	San Jose, CA	***	***	***
Meyer Burger	Goodyear, AZ	***	***	***
New East		***	***	***
NextEra	Juno Beach, FL	***	***	***
Panasonic	Newark, NJ	***	***	***
PowerFilm	Ames, IA	***	***	***
REC Americas	San Luis Obispo, CA	***	***	***
Recurrent	Austin, TX	***	***	***
Risen Solar	Kulim, Kedah Darul Aman	***	***	***
Runergy	Huntsville, AL	***	***	***
Runergy Trading	City Of Industry, CA	***	***	***
Silfab	Burlington, WA	***	***	***
Solarmax	Riverside, CA	***	***	***
SunTegra	Larchmont, NY	***	***	***
Tesla	Austin, CA	***	***	***
Trina	Wilmer, TX	***	***	***

Table continued.

Table D.3 (Continued) CSPV cells and modules: U.S. imports, their headquarters, and share of total imports within a given source by firm, 2024

Shares in percent

Firm	Headquarters	Subject sources	Nonsubject sources	All import sources
Trina (U.S.)	Fremont, CA	***	***	***
Vikram	Massachusetts, MA	***	***	***
Waaree Energies	Navsari, GJ	***	***	***
Yingli	Malvern, PA	***	***	***
ZampTech	Bend, OR	***	***	***
Zhongli	Hong Kong	***	***	***
All firms	Various	100.0	100.0	100.0

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—".

Table D.4 CSPV cells and modules: U.S. imports, by source and period

Quantity in kilowatts; Value in 1,000 dollars; Unit values in dollars per kilowatt

Source	Measure	2022	2023	2024
Cambodia	Quantity	***	***	***
Malaysia	Quantity	***	***	***
Thailand	Quantity	***	***	***
Vietnam	Quantity	***	***	***
Subject sources	Quantity	***	***	***
Subject sources less Cambodia and Thailand	Quantity	***	***	***
Nonsubject sources	Quantity	***	***	***
Nonsubject sources plus Cambodia and Thailand	Quantity	***	***	***
All import sources	Quantity	***	***	***
Cambodia	Value	***	***	***
Malaysia	Value	***	***	***
Thailand	Value	***	***	***
Vietnam	Value	***	***	***
Subject sources	Value	***	***	***
Subject sources less Cambodia and Thailand	Value	***	***	***
Nonsubject sources	Value	***	***	***
Nonsubject sources plus Cambodia and Thailand	Value	***	***	***
All import sources	Value	***	***	***
Cambodia	Unit value	***	***	***
Malaysia	Unit value	***	***	***
Thailand	Unit value	***	***	***
Vietnam	Unit value	***	***	***
Subject sources	Unit value	***	***	***
Subject sources less Cambodia and Thailand	Unit value	***	***	***
Nonsubject sources	Unit value	***	***	***
Nonsubject sources plus Cambodia and Thailand	Unit value	***	***	***
All import sources	Unit value	***	***	***

Table continued.

Table D.4 (Continued) CSPV cells and modules: U.S. imports, by source and period

Share and ratio in percent; Ratio represents the ratio to U.S. module production

Source	Measure	2022	2023	2024
Cambodia	Share of quantity	***	***	***
Malaysia	Share of quantity	***	***	***
Thailand	Share of quantity	***	***	***
Vietnam	Share of quantity	***	***	***
Subject sources	Share of quantity	***	***	***
Subject sources less Cambodia and Thailand	Share of quantity	***	***	***
Nonsubject sources	Share of quantity	***	***	***
Nonsubject sources plus Cambodia and Thailand	Share of quantity	***	***	***
All import sources	Share of quantity	100.0	100.0	100.0
Cambodia	Share of value	***	***	***
Malaysia	Share of value	***	***	***
Thailand	Share of value	***	***	***
Vietnam	Share of value	***	***	***
Subject sources	Share of value	***	***	***
Subject sources less Cambodia and Thailand	Share of value	***	***	***
Nonsubject sources	Share of value	***	***	***
Nonsubject sources plus Cambodia and Thailand	Share of value	***	***	***
All import sources	Share of value	100.0	100.0	100.0
Cambodia	Ratio	***	***	***
Malaysia	Ratio	***	***	***
Thailand	Ratio	***	***	***
Vietnam	Ratio	***	***	***
Subject sources	Ratio	***	***	***
Subject sources less Cambodia and Thailand	Ratio	***	***	***
Nonsubject sources	Ratio	***	***	***
Nonsubject sources plus Cambodia and Thailand	Ratio	***	***	***
All import sources	Ratio	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Figure D.1 CSPV cells and modules: U.S. import quantities and average unit values, by source and period

* * * * *

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Table D.5 CSPV cells and modules: Changes in U.S. imports, by source and period

Changes (Δ) in percent (%)

Source	Measure	2022 to 2024	2022 to 2023	2023 to 2024
Cambodia	% Δ Quantity	▲ ***	▼ ***	▲ ***
Malaysia	% Δ Quantity	▲ ***	▲ ***	▼ ***
Thailand	% Δ Quantity	▲ ***	▲ ***	▲ ***
Vietnam	% Δ Quantity	▲ ***	▲ ***	▲ ***
Subject sources	% Δ Quantity	▲ ***	▲ ***	▲ ***
Subject sources less Cambodia and Thailand	% Δ Quantity	▲ ***	▲ ***	▲ ***
Nonsubject sources	% Δ Quantity	▲ ***	▲ ***	▼ ***
Nonsubject sources plus Cambodia and Thailand	% Δ Quantity	▲ ***	▲ ***	▲ ***
All import sources	% Δ Quantity	▲ ***	▲ ***	▲ ***
Cambodia	% Δ Value	▲ ***	▼ ***	▲ ***
Malaysia	% Δ Value	▲ ***	▲ ***	▼ ***
Thailand	% Δ Value	▲ ***	▲ ***	▲ ***
Vietnam	% Δ Value	▲ ***	▲ ***	▲ ***
Subject sources	% Δ Value	▲ ***	▲ ***	▲ ***
Subject sources less Cambodia and Thailand	% Δ Value	▲ ***	▲ ***	▼ ***
Nonsubject sources	% Δ Value	▼ ***	▲ ***	▼ ***
Nonsubject sources plus Cambodia and Thailand	% Δ Value	▲ ***	▲ ***	▼ ***
All import sources	% Δ Value	▲ ***	▲ ***	▼ ***
Cambodia	% Δ Unit value	▼ ***	▼ ***	▼ ***
Malaysia	% Δ Unit value	▼ ***	▼ ***	▼ ***
Thailand	% Δ Unit value	▼ ***	▲ ***	▼ ***
Vietnam	% Δ Unit value	▼ ***	▲ ***	▼ ***
Subject sources	% Δ Unit value	▼ ***	▼ ***	▼ ***
Subject sources less Cambodia and Thailand	% Δ Unit value	▼ ***	▼ ***	▼ ***
Nonsubject sources	% Δ Unit value	▼ ***	▼ ***	▼ ***
Nonsubject sources plus Cambodia and Thailand	% Δ Unit value	▼ ***	▼ ***	▼ ***
All import sources	% Δ Unit value	▼ ***	▼ ***	▼ ***

Table continued.

Table D.5 (Continued) CSPV cells and modules: Changes in U.S. imports, by source and periodChanges (Δ) in percentage point (ppt)

Source	Measure	2022 to 2024	2022 to 2023	2023 to 2024
Cambodia	ppt Δ Quantity	▲ ***	▼ ***	▲ ***
Malaysia	ppt Δ Quantity	▼ ***	▲ ***	▼ ***
Thailand	ppt Δ Quantity	▲ ***	▼ ***	▲ ***
Vietnam	ppt Δ Quantity	▲ ***	▼ ***	▲ ***
Subject sources	ppt Δ Quantity	▲ ***	▼ ***	▲ ***
Subject sources less Cambodia and Thailand	ppt Δ Quantity	▲ ***	▲ ***	▲ ***
Nonsubject sources	ppt Δ Quantity	▼ ***	▲ ***	▼ ***
Nonsubject sources plus Cambodia and Thailand	ppt Δ Quantity	▼ ***	▼ ***	▼ ***
All import sources	ppt Δ Quantity	***	***	***
Cambodia	ppt Δ Value	▲ ***	▼ ***	▲ ***
Malaysia	ppt Δ Value	▼ ***	▲ ***	▼ ***
Thailand	ppt Δ Value	▲ ***	▼ ***	▲ ***
Vietnam	ppt Δ Value	▲ ***	▼ ***	▲ ***
Subject sources	ppt Δ Value	▲ ***	▼ ***	▲ ***
Subject sources less Cambodia and Thailand	ppt Δ Value	▲ ***	▲ ***	▲ ***
Nonsubject sources	ppt Δ Value	▼ ***	▲ ***	▼ ***
Nonsubject sources plus Cambodia and Thailand	ppt Δ Value	▼ ***	▼ ***	▼ ***
All import sources	ppt Δ Value	***	***	***
Cambodia	ppt Δ Ratio	▲ ***	▼ ***	▲ ***
Malaysia	ppt Δ Ratio	▼ ***	▲ ***	▼ ***
Thailand	ppt Δ Ratio	▲ ***	▲ ***	▲ ***
Vietnam	ppt Δ Ratio	▼ ***	▲ ***	▼ ***
Subject sources	ppt Δ Ratio	▼ ***	▲ ***	▼ ***
Subject sources less Cambodia and Thailand	ppt Δ Ratio	▼ ***	▲ ***	▼ ***
Nonsubject sources	ppt Δ Ratio	▼ ***	▲ ***	▼ ***
Nonsubject sources plus Cambodia and Thailand	ppt Δ Ratio	▼ ***	▲ ***	▼ ***
All import sources	ppt Δ Ratio	▼ ***	▲ ***	▼ ***

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Note: Shares and ratios shown as “0.0” percent represent non-zero values less than “0.05” percent (if positive) and greater than “(0.05)” percent (if negative). Zeroes, null values, and undefined calculations are suppressed and shown as “—”. Period changes preceded by a “▲” represent an increase, while period changes preceded by a “▼” represent a decrease.

Table D.6 CSPV cells and modules: U.S. imports from nonsubject sources, by source and period

Quantity of kilowatts; value in 1,000 dollars

Source	Measure	2022	2023	2024
Cambodia, circumventing	Quantity	***	***	***
Malaysia, circumventing	Quantity	***	***	***
Thailand, circumventing	Quantity	***	***	***
Vietnam, circumventing	Quantity	***	***	***
Circumventing sources	Quantity	***	***	***
China	Quantity	***	***	***
South Korea	Quantity	***	***	***
All other sources	Quantity	***	***	***
Nonsubject, other than circumventing	Quantity	***	***	***
Nonsubject sources	Quantity	***	***	***
Cambodia, circumventing	Value	***	***	***
Malaysia, circumventing	Value	***	***	***
Thailand, circumventing	Value	***	***	***
Vietnam, circumventing	Value	***	***	***
Circumventing sources	Value	***	***	***
China	Value	***	***	***
South Korea	Value	***	***	***
All other sources	Value	***	***	***
Nonsubject, other than circumventing	Value	***	***	***
Nonsubject sources	Value	***	***	***

Table continued.

Table D.6 (Continued) CSPV cells and modules: U.S. imports from nonsubject sources, by source and period

Quantity of kilowatts; Share in percent

Source	Measure	2022	2023	2024
Cambodia, circumventing	Unit value	***	***	***
Malaysia, circumventing	Unit value	***	***	***
Thailand, circumventing	Unit value	***	***	***
Vietnam, circumventing	Unit value	***	***	***
Circumventing sources	Unit value	***	***	***
China	Unit value	***	***	***
South Korea	Unit value	***	***	***
All other sources	Unit value	***	***	***
Nonsubject, other than circumventing	Unit value	***	***	***
Nonsubject sources	Unit value	***	***	***
Cambodia, circumventing	Share of quantity	***	***	***
Malaysia, circumventing	Share of quantity	***	***	***
Thailand, circumventing	Share of quantity	***	***	***
Vietnam, circumventing	Share of quantity	***	***	***
Circumventing sources	Share of quantity	***	***	***
China	Share of quantity	***	***	***
South Korea	Share of quantity	***	***	***
All other sources	Share of quantity	***	***	***
Nonsubject, other than circumventing	Share of quantity	***	***	***
Nonsubject sources	Share of quantity	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—".

Table D.7 CSPV cells and modules: U.S. imports in the twelve month period preceding the filing of the petition, April 2023 through March 2024

Quantity of kilowatts; Share of quantity in percent

Source of imports	Quantity	Share of quantity
Cambodia	***	***
Malaysia AD	***	***
Malaysia CVD	***	***
Thailand	***	***
Vietnam	***	***
All other sources	***	***
All import sources	***	100.0

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—". Had the proprietary, Census-edited Customs imports records been treated as part of the subject Cambodia category for missing importer ***, Cambodia's share of overall imports from all sources would have been *** percent.

Table D.8 CSPV cells: U.S. imports in the twelve month period preceding the filing of the petition, April 2023 through March 2024

Quantity of kilowatts; Share of quantity in percent

Source of imports	Quantity	Share of quantity
Cambodia	***	***
Malaysia AD	***	***
Malaysia CVD	***	***
Thailand	***	***
Vietnam	***	***
All other sources	***	***
All import sources	***	100.0

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—". Had the proprietary, Census-edited Customs imports records been treated as part of the subject Cambodia category for missing importer ***, Cambodia's share of overall imports from all sources would have been *** percent.

Table D.9 CSPV modules: U.S. imports in the twelve month period preceeding the filing of the petition, April 2023 through March 2024

Quantity of kilowatts; Share of quantity in percent

Source of imports	Quantity	Share of quantity
Cambodia	***	***
Malaysia AD	***	***
Malaysia CVD	***	***
Thailand	***	***
Vietnam	***	***
All other sources	***	***
All import sources	***	100.0

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Note: Had the proprietary, Census-edited Customs imports records been treated as part of the subject Cambodia category for missing importer ***, Cambodia's share of overall imports from all sources would have been *** percent.

Table D.10 CSPV cells and modules: U.S. imports from Cambodia, Thailand, and all sources in various twelve onth periods in the lead up to and after the twelve months immediately prior to the filling of the perition, 2024

Quantity in kilowatts

Twelve month period through to and including	Cambodia quantity	Thailand quantity	Other than Cambodia and Thailand quantity	All import sources quantity	Cambodia share	Thailand share	Other than Cambodia and Thailand share	All import sources share
Jan 2023	***	***	***	***	***	***	***	100.0
Feb 2023	***	***	***	***	***	***	***	100.0
Mar 2023	***	***	***	***	***	***	***	100.0
Apr 2023	***	***	***	***	***	***	***	100.0
May 2023	***	***	***	***	***	***	***	100.0
Jun 2023	***	***	***	***	***	***	***	100.0
Jul 2023	***	***	***	***	***	***	***	100.0
Aug 2023	***	***	***	***	***	***	***	100.0
Sep 2023	***	***	***	***	***	***	***	100.0
Oct 2023	***	***	***	***	***	***	***	100.0
Nov 2023	***	***	***	***	***	***	***	100.0
Dec 2023	***	***	***	***	***	***	***	100.0
Jan 2024	***	***	***	***	***	***	***	100.0
Feb 2024	***	***	***	***	***	***	***	100.0
Mar 2024	***	***	***	***	***	***	***	100.0
Apr 2024	***	***	***	***	***	***	***	100.0
May 2024	***	***	***	***	***	***	***	100.0
Jun 2024	***	***	***	***	***	***	***	100.0
Jul 2024	***	***	***	***	***	***	***	100.0
Aug 2024	***	***	***	***	***	***	***	100.0
Sep 2024	***	***	***	***	***	***	***	100.0
Oct 2024	***	***	***	***	***	***	***	100.0
Nov 2024	***	***	***	***	***	***	***	100.0
Dec 2024	***	***	***	***	***	***	***	100.0

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Figure D.2 CSPV cells and modules: Share of U.S. imports from Cambodia and Thailand out of total imports in the various twelve month periods in the lead up to and after the twelve months immediately prior to the filing of the petition, by period

* * * * *

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Table D.11 CSPV cells and modules: U.S. imports from Thailand subject to final affirmative Commerce critical circumstances determinations in the AD/CVD investigations, by month

Quantity in kilowatts

Month	Relation to petition	Cell quantity	Module quantity	Combined quantity
November 2023	Before	***	***	***
December 2023	Before	***	***	***
January 2024	Before	***	***	***
February 2024	Before	***	***	***
March 2024	Before	***	***	***
April 2024	Before	***	***	***
May 2024	After	***	***	***
June 2024	After	***	***	***
July 2024	After	***	***	***
August 2024	After	***	***	***
September 2024	After	***	***	***
October 2024	After	***	***	***

Table continued.

Table D.11 (Continued) CSPV cells and modules: U.S. imports from Thailand subject to final affirmative Commerce critical circumstances determinations in the AD/CVD investigations, by month

Quantity in kilowatts

Comparison pre-post petition period	Item	Cumulative before period quantity	Cumulative after period quantity	Difference in percent
1 month	Cells	***	***	***
2 months	Cells	***	***	***
3 months	Cells	***	***	***
4 months	Cells	***	***	***
5 months	Cells	***	***	***
6 months	Cells	***	***	***
1 month	Modules	***	***	***
2 months	Modules	***	***	***
3 months	Modules	***	***	***
4 months	Modules	***	***	***
5 months	Modules	***	***	***
6 months	Modules	***	***	***
1 month	Combined	***	***	***
2 months	Combined	***	***	***
3 months	Combined	***	***	***
4 months	Combined	***	***	***
5 months	Combined	***	***	***
6 months	Combined	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Figure D.3 CSPV cells and modules: U.S. imports from Thailand subject to final affirmative Commerce critical circumstances determinations in the AD/CVD investigations, by month

* * * * *

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Note: The Commerce final determination for Thailand AD found critical circumstances exist for imports from all suppliers in Thailand.

Table D.12 CSPV cells and modules: U.S. importers' U.S. inventories of imports from Thailand for analysis in relation to final affirmative Commerce critical circumstances determinations in the AD/CVD investigations, by date

Quantity in kilowatts; Index in percent where April 2024 = 100.0 percent

Date	Cell quantity	Cell index	Module quantity	Module index	Combined quantity	Combined index
April 2024	***	—	***	100.0	***	100.0
May 2024	***	***	***	***	***	***
June 2024	***	***	***	***	***	***
July 2024	***	***	***	***	***	***
August 2024	***	***	***	***	***	***
September 2024	***	***	***	***	***	***
October 2024	***	***	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Note: Shares and ratios shown as “0.0” percent represent non-zero values less than “0.05” percent (if positive) and greater than “(0.05)” percent (if negative). Zeroes, null values, and undefined calculations are suppressed and shown as “—”. The Commerce final determination for Thailand AD found critical circumstances exist for imports from all suppliers in Thailand.

Table D.13 CSPV cells and modules: U.S. imports from Vietnam subject to final affirmative Commerce critical circumstances determination in the AD investigation, by month

Quantity in kilowatts

Month	Relation to petition	Cell quantity	Module quantity	Combined quantity
November 2023	Before	***	***	***
December 2023	Before	***	***	***
January 2024	Before	***	***	***
February 2024	Before	***	***	***
March 2024	Before	***	***	***
April 2024	Before	***	***	***
May 2024	After	***	***	***
June 2024	After	***	***	***
July 2024	After	***	***	***
August 2024	After	***	***	***
September 2024	After	***	***	***
October 2024	After	***	***	***

Table continued.

Table D.13 CSPV cells and modules: U.S. imports from Vietnam subject to final affirmative Commerce critical circumstances determination in the AD investigation, by differing number of months before and after the filing of the petition

Quantity in kilowatts

Comparison pre-post petition period	Item	Cumulative before period quantity	Cumulative after period quantity	Difference in percent
1 month	Cells	***	***	***
2 months	Cells	***	***	***
3 months	Cells	***	***	***
4 months	Cells	***	***	***
5 months	Cells	***	***	***
6 months	Cells	***	***	***
1 month	Modules	***	***	***
2 months	Modules	***	***	***
3 months	Modules	***	***	***
4 months	Modules	***	***	***
5 months	Modules	***	***	***
6 months	Modules	***	***	***
1 month	Combined	***	***	***
2 months	Combined	***	***	***
3 months	Combined	***	***	***
4 months	Combined	***	***	***
5 months	Combined	***	***	***
6 months	Combined	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2024.

Note: Shares and ratios shown as “0.0” percent represent non-zero values less than “0.05” percent (if positive) and greater than “(0.05)” percent (if negative). Zeroes, null values, and undefined calculations are suppressed and shown as “—”. The Commerce final determination for Vietnam AD found critical circumstances exist for imports from all suppliers in Vietnam except Jinko, JA Solar, and all other non-selected separate rate respondents.

Figure D.4 CSPV cells and modules: U.S. imports from Vietnam subject to a final affirmative Commerce critical circumstances determination in the AD investigation, by month

* * * * *

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2024.

Note: The Commerce final determination for Vietnam AD found critical circumstances exist for imports from all suppliers in Vietnam except Jinko, JA Solar, and all other non-selected separate rate respondents.

Table D.14 CSPV cells and modules: U.S. importers' U.S. inventories of imports from Vietnam for analysis in relation to a final affirmative Commerce critical circumstances determination in the AD investigation, by date

Quantity in kilowatts; Index in percent where April 2024 = 100.0 percent

Date	Cell quantity	Cell index	Module quantity	Module index	Combined quantity	Combined index
April 2024	***	—	***	100.0	***	100.0
May 2024	***	***	***	***	***	***
June 2024	***	***	***	***	***	***
July 2024	***	***	***	***	***	***
August 2024	***	***	***	***	***	***
September 2024	***	***	***	***	***	***
October 2024	***	***	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Shares and ratios shown as “0.0” percent represent non-zero values less than “0.05” percent (if positive) and greater than “(0.05)” percent (if negative). Zeroes, null values, and undefined calculations are suppressed and shown as “—”. The Commerce final determination for Vietnam AD found critical circumstances exist for imports from all suppliers in Vietnam except Jinko, JA Solar, and all other non-selected separate rate respondents.

Table D.15 CSPV cells and modules: U.S. imports from Vietnam subject to final affirmative Commerce critical circumstances determination in the CVD investigation, by month

Quantity in kilowatts

Month	Relation to petition	Cell quantity	Module quantity	Combined quantity
November 2023	Before	***	***	***
December 2023	Before	***	***	***
January 2024	Before	***	***	***
February 2024	Before	***	***	***
March 2024	Before	***	***	***
April 2024	Before	***	***	***
May 2024	After	***	***	***
June 2024	After	***	***	***
July 2024	After	***	***	***
August 2024	After	***	***	***
September 2024	After	***	***	***
October 2024	After	***	***	***

Table continued.

Table D.15 (Continued) CSPV cells and modules: U.S. imports from Vietnam subject to final affirmative Commerce critical circumstances determination in the CVD investigation, by differing number of months before and after the filing of the petition

Quantity in kilowatts

Comparison pre-post petition period	Item	Cumulative before period quantity	Cumulative after period quantity	Difference in percent
1 month	Cells	***	***	***
2 months	Cells	***	***	***
3 months	Cells	***	***	***
4 months	Cells	***	***	***
5 months	Cells	***	***	***
6 months	Cells	***	***	***
1 month	Modules	***	***	***
2 months	Modules	***	***	***
3 months	Modules	***	***	***
4 months	Modules	***	***	***
5 months	Modules	***	***	***
6 months	Modules	***	***	***
1 month	Combined	***	***	***
2 months	Combined	***	***	***
3 months	Combined	***	***	***
4 months	Combined	***	***	***
5 months	Combined	***	***	***
6 months	Combined	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2024.

Note: The Commerce final determination for Vietnam CVD found critical circumstances exist for imports from all suppliers in Vietnam except JA Solar.

Figure D.5 CSPV cells and modules: U.S. imports from Vietnam subject to a final affirmative Commerce critical circumstances determination in the CVD investigation, by month

* * * * *

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2024.

Note: The Commerce final determination for Vietnam CVD found critical circumstances exist for imports from all suppliers in Vietnam except JA Solar.

Table D.16 CSPV cells and modules: U.S. importers' U.S. inventories of imports from Vietnam for analysis in relation to a final affirmative Commerce critical circumstances determination in the CVD investigation, by date

Quantity in kilowatts; Index in percent where April 2024 = 100.0 percent

Date	Cell quantity	Cell index	Module quantity	Module index	Combined quantity	Combined index
April 2024	***	—	***	100.0	***	100.0
May 2024	***	***	***	***	***	***
June 2024	***	***	***	***	***	***
July 2024	***	***	***	***	***	***
August 2024	***	***	***	***	***	***
September 2024	***	***	***	***	***	***
October 2024	***	***	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Shares and ratios shown as “0.0” percent represent non-zero values less than “0.05” percent (if positive) and greater than “(0.05)” percent (if negative). Zeroes, null values, and undefined calculations are suppressed and shown as “—”. The Commerce final determination for Vietnam CVD found critical circumstances exist for imports from all suppliers in Vietnam except JA Solar.

Table D.17 CSPV cells and modules: U.S. producers' and U.S. imports' U.S. shipments, by source and by type, 2024

Quantity of kilowatts

Source	Cells: Bifacial	Cells: Non- bifacial	Modules: Non- bifacial using bifacial cells	Modules: Non- bifacial using non- bifacial cells	Modules: Bifacial using bifacial cells	All cells and modules
U.S. producers	***	***	***	***	***	***
Cambodia	***	***	***	***	***	***
Malaysia	***	***	***	***	***	***
Thailand	***	***	***	***	***	***
Vietnam	***	***	***	***	***	***
Subject sources	***	***	***	***	***	***
Subject sources less Cambodia and Thailand	***	***	***	***	***	***
Nonsubject sources	***	***	***	***	***	***
Nonsubject sources plus Cambodia and Thailand	***	***	***	***	***	***
All import sources	***	***	***	***	***	***
All sources	***	***	***	***	***	***

Table continued.

Table D.17 (Continued) CSPV cells and modules: U.S. producers' and U.S. imports' U.S. shipments, by source and by type, 2024

Share across in percent

Source	Cells: Bifacial	Cells: Non- bifacial	Modules: Non-bifacial using bifacial cells	Modules: Non-bifacial using non- bifacial cells	Modules: Bifacial using bifacial cells	All cells and modules
U.S. producers	***	***	***	***	***	100.0
Cambodia	***	***	***	***	***	100.0
Malaysia	***	***	***	***	***	100.0
Thailand	***	***	***	***	***	100.0
Vietnam	***	***	***	***	***	100.0
Subject sources	***	***	***	***	***	100.0
Subject sources less Cambodia and Thailand	***	***	***	***	***	100.0
Nonsubject sources	***	***	***	***	***	100.0
Nonsubject sources plus Cambodia and Thailand	***	***	***	***	***	100.0
All import sources	***	***	***	***	***	100.0
All sources	***	***	***	***	***	100.0

Table continued.

Table D.17 (Continued) CSPV cells and modules: U.S. producers' and U.S. imports' U.S. shipments, by source and by type, 2024

Share down in percent

Source	Cells: Bifacial	Cells: Non- bifacial	Modules: Non-bifacial using bifacial cells	Modules: Non-bifacial using non- bifacial cells	Modules: Bifacial using bifacial cells	All cells and modules
U.S. producers	***	***	***	***	***	***
Cambodia	***	***	***	***	***	***
Malaysia	***	***	***	***	***	***
Thailand	***	***	***	***	***	***
Vietnam	***	***	***	***	***	***
Subject sources	***	***	***	***	***	***
Subject sources less Cambodia and Thailand	***	***	***	***	***	***
Nonsubject sources	***	***	***	***	***	***
Nonsubject sources plus Cambodia and Thailand	***	***	***	***	***	***
All import sources	***	***	***	***	***	***
All sources	100.0	100.0	100.0	100.0	100.0	100.0

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—".

Figure D.6 CSPV cells and modules: U.S. producers' and U.S. importers' U.S. shipments, by source and by type, 2024

* * * * *

Source: Compiled from data submitted in response to Commission questionnaires.

Table D.18 CSPV cells and modules: U.S. imports, by month and source

Quantity in kilowatts

Year	Month	Cambodia	Malaysia	Thailand	Vietnam
2022	January	***	***	***	***
2022	February	***	***	***	***
2022	March	***	***	***	***
2022	April	***	***	***	***
2022	May	***	***	***	***
2022	June	***	***	***	***
2022	July	***	***	***	***
2022	August	***	***	***	***
2022	September	***	***	***	***
2022	October	***	***	***	***
2022	November	***	***	***	***
2022	December	***	***	***	***
2023	January	***	***	***	***
2023	February	***	***	***	***
2023	March	***	***	***	***
2023	April	***	***	***	***
2023	May	***	***	***	***
2023	June	***	***	***	***
2023	July	***	***	***	***
2023	August	***	***	***	***
2023	September	***	***	***	***
2023	October	***	***	***	***
2023	November	***	***	***	***
2023	December	***	***	***	***
2024	January	***	***	***	***
2024	February	***	***	***	***
2024	March	***	***	***	***
2024	April	***	***	***	***
2024	May	***	***	***	***
2024	June	***	***	***	***
2024	July	***	***	***	***
2024	August	***	***	***	***
2024	September	***	***	***	***
2024	October	***	***	***	***
2024	November	***	***	***	***
2024	December	***	***	***	***

Table continued.

Table D.18 (Continued) CSPV cells and modules: U.S. imports, by month and source

Quantity in kilowatts

Year	Month	Subject sources	Subject sources less Cambodia and Thailand	Nonsubject sources	Nonsubject sources plus Cambodia and Thailand	All import sources
2022	January	***	***	***	***	***
2022	February	***	***	***	***	***
2022	March	***	***	***	***	***
2022	April	***	***	***	***	***
2022	May	***	***	***	***	***
2022	June	***	***	***	***	***
2022	July	***	***	***	***	***
2022	August	***	***	***	***	***
2022	September	***	***	***	***	***
2022	October	***	***	***	***	***
2022	November	***	***	***	***	***
2022	December	***	***	***	***	***
2023	January	***	***	***	***	***
2023	February	***	***	***	***	***
2023	March	***	***	***	***	***
2023	April	***	***	***	***	***
2023	May	***	***	***	***	***
2023	June	***	***	***	***	***
2023	July	***	***	***	***	***
2023	August	***	***	***	***	***
2023	September	***	***	***	***	***
2023	October	***	***	***	***	***
2023	November	***	***	***	***	***
2023	December	***	***	***	***	***

Table continued.

Table D.18 (Continued) CSPV cells and modules: U.S. imports, by month and source

Quantity in kilowatts

Year	Month	Subject sources	Subject sources less Cambodia and Thailand	Nonsubject sources	Nonsubject sources plus Cambodia and Thailand	All import sources
2024	January	***	***	***	***	***
2024	February	***	***	***	***	***
2024	March	***	***	***	***	***
2024	April	***	***	***	***	***
2024	May	***	***	***	***	***
2024	June	***	***	***	***	***
2024	July	***	***	***	***	***
2024	August	***	***	***	***	***
2024	September	***	***	***	***	***
2024	October	***	***	***	***	***
2024	November	***	***	***	***	***
2024	December	***	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Note: Zeroes, null values, and undefined calculations are suppressed and shown as “—”.

Figure D.7 CSPV cells and modules: U.S. imports from individual subject sources, by source and by month

* * * * *

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Figure D.8 CSPV cells and modules: U.S. imports from aggregated subject and nonsubject sources, by month

* * * * *

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Table D.19 CSPV cells and modules: Apparent U.S. consumption and market shares based on quantity data, by source and period

Quantity in kilowatts; Shares in percent

Source	Measure	2022	2023	2024
U.S. producers	Quantity	***	***	***
Cambodia	Quantity	***	***	***
Malaysia	Quantity	***	***	***
Thailand	Quantity	***	***	***
Vietnam	Quantity	***	***	***
Subject sources	Quantity	***	***	***
Subject sources less Cambodia and Thailand	Quantity	***	***	***
Circumventing sources	Quantity	***	***	***
South Korea	Quantity	***	***	***
All other sources	Quantity	***	***	***
Nonsubject sources	Quantity	***	***	***
Nonsubject sources plus Cambodia and Thailand	Quantity	***	***	***
All import sources	Quantity	***	***	***
All sources	Quantity	***	***	***
U.S. producers	Share	***	***	***
Cambodia	Share	***	***	***
Malaysia	Share	***	***	***
Thailand	Share	***	***	***
Vietnam	Share	***	***	***
Subject sources	Share	***	***	***
Subject sources less Cambodia and Thailand	Share	***	***	***
Circumventing sources	Share	***	***	***
South Korea	Share	***	***	***
All other sources	Share	***	***	***
Nonsubject sources	Share	***	***	***
Nonsubject sources plus Cambodia and Thailand	Share	***	***	***
All import sources	Share	***	***	***
All sources	Share	100.0	100.0	100.0

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—". Quantity for U.S. producers' U.S. shipments is near zero as domestically produced cells to assemble into modules were small and only present in 2024. In measuring consumption and market share this methodology avoids reclassifying and/or double counting merchandise already reported as an import. Quantity for circumventing sources and South Korea are import quantities reported in the questionnaire, all other sources quantity is calculated by removing these imports from reported U.S. shipments from nonsubject sources.

Figure D.9 CSPV cells and modules: Apparent U.S. consumption based on quantity data, by source and period

* * * * *

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Note: Quantity for U.S. producers' U.S. shipments is near zero as domestically produced cells to assemble into modules were small and only present in 2024. In measuring consumption and market share this methodology avoids reclassifying and/or double counting merchandise already reported as an import.

Table D.20 CSPV cells and modules: Apparent U.S. consumption and market shares based on value data, by source and period

Value in 1,000 dollars; Shares in percent

Source	Measure	2022	2023	2024
U.S. producers: Fully domestic value	Value	***	***	***
U.S. producers: Value added to imports	Value	***	***	***
U.S. producers: Overall value	Value	***	***	***
Cambodia	Value	***	***	***
Malaysia	Value	***	***	***
Thailand	Value	***	***	***
Vietnam	Value	***	***	***
Subject sources	Value	***	***	***
Subject sources less Cambodia and Thailand	Value	***	***	***
Circumventing sources	Value	***	***	***
South Korea	Value	***	***	***
All other sources	Value	***	***	***
Nonsubject sources	Value	***	***	***
Nonsubject sources plus Cambodia and Thailand	Value	***	***	***
All import sources	Value	***	***	***
All sources	Value	***	***	***
U.S. producers: Fully domestic value	Share	***	***	***
U.S. producers: Value added to imports	Share	***	***	***
U.S. producers: Overall value	Share	***	***	***
Cambodia	Share	***	***	***
Malaysia	Share	***	***	***
Thailand	Share	***	***	***
Vietnam	Share	***	***	***
Subject sources	Share	***	***	***
Subject sources less Cambodia and Thailand	Share	***	***	***
Circumventing sources	Share	***	***	***
South Korea	Share	***	***	***
All other sources	Share	***	***	***
Nonsubject sources	Share	***	***	***
Nonsubject sources plus Cambodia and Thailand	Share	***	***	***
All import sources	Share	***	***	***
All sources	Share	100.0	100.0	100.0

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—". Value for U.S. producers' U.S. shipments reflects the incremental value added by U.S. module producers to imported CSPV cells and a small amount of value from domestically manufactured cells in 2024. In measuring consumption and market share this methodology avoids reclassifying and/or double counting merchandise already reported as an import. Value for circumventing sources and South Korea are import values reported in the questionnaire, all other sources value is calculated by removing these imports from reported U.S. shipments from nonsubject sources.

Figure D.10 CPSV cells and modules: Apparent U.S. consumption based on value data, by source and period

* * * * *

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Note: Value for U.S. producers' U.S. shipments reflects the incremental value added by U.S. module producers to imported CSPV cells and a small amount of value from domestically manufactured cells in 2024. In measuring consumption and market share this methodology avoids reclassifying and/or double counting merchandise already reported as an import.

Table D.21 CSPV cells and modules: U.S. imports' inventories and their ratio to select items, by source and period

Quantity in kilowatts; Ratio in percent

Measure	Source	2022	2023	2024
Inventories quantity	Cambodia	***	***	***
Ratio to imports	Cambodia	***	***	***
Ratio to U.S. shipments of imports	Cambodia	***	***	***
Ratio to total shipments of imports	Cambodia	***	***	***
Inventories quantity	Malaysia	***	***	***
Ratio to imports	Malaysia	***	***	***
Ratio to U.S. shipments of imports	Malaysia	***	***	***
Ratio to total shipments of imports	Malaysia	***	***	***
Inventories quantity	Thailand	***	***	***
Ratio to imports	Thailand	***	***	***
Ratio to U.S. shipments of imports	Thailand	***	***	***
Ratio to total shipments of imports	Thailand	***	***	***
Inventories quantity	Vietnam	***	***	***
Ratio to imports	Vietnam	***	***	***
Ratio to U.S. shipments of imports	Vietnam	***	***	***
Ratio to total shipments of imports	Vietnam	***	***	***
Inventories quantity	Subject sources	***	***	***
Ratio to imports	Subject sources	***	***	***
Ratio to U.S. shipments of imports	Subject sources	***	***	***
Ratio to total Shipments of imports	Subject sources	***	***	***
Inventories quantity	Subject sources less Cambodia and Thailand	***	***	***
Ratio to imports	Subject sources less Cambodia and Thailand	***	***	***
Ratio to U.S. shipments of imports	Subject sources less Cambodia and Thailand	***	***	***
Ratio to total Shipments of imports	Subject sources less Cambodia and Thailand	***	***	***
Inventories quantity	Nonsubject sources	***	***	***
Ratio to imports	Nonsubject sources	***	***	***
Ratio to U.S. shipments of imports	Nonsubject sources	***	***	***
Ratio to total shipments of imports	Nonsubject sources	***	***	***

Table continued.

Table D.21 CSPV cells and modules: U.S. imports' inventories and their ratio to select items, by source and period

Quantity in kilowatts; Ratio in percent

Measure	Source	2022	2023	2024
Inventories quantity	Nonsubject sources plus Cambodia and Thailand	***	***	***
Ratio to imports	Nonsubject sources plus Cambodia and Thailand	***	***	***
Ratio to U.S. shipments of imports	Nonsubject sources plus Cambodia and Thailand	***	***	***
Ratio to total shipments of imports	Nonsubject sources plus Cambodia and Thailand	***	***	***
Inventories quantity	All import sources	***	***	***
Ratio to imports	All import sources	***	***	***
Ratio to U.S. shipments of imports	All import sources	***	***	***
Ratio to total shipments of imports	All import sources	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent.

Table D.22 CSPV cells and modules: Arranged imports, by source and by period

Quantity in kilowatts

Source	Q1 2025	Q2 2025	Q3 2025	Q4 2025	Total
Cambodia	***	***	***	***	***
Malaysia	***	***	***	***	***
Thailand	***	***	***	***	***
Vietnam	***	***	***	***	***
Subject sources	***	***	***	***	***
Subject sources less Cambodia and Thailand	***	***	***	***	***
Nonsubject sources	***	***	***	***	***
Nonsubject sources plus Cambodia and Thailand	***	***	***	***	***
All import sources	***	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Table D.23 CSPV cells and modules: *'s U.S. production, U.S. imports from subject sources, and ratio of subject imports to production, by period**

Quantity in kilowatts; Ratios in percent

Item	Measure	2022	2023	2024
U.S. production	Quantity	***	***	***
Imports from ***	Quantity	***	***	***
Imports from *** to U.S. production	Ratio	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Zeroes, null values, and undefined calculations are suppressed and shown as “—”.

Table D.24 CSPV cells and modules: *'s U.S. production, U.S. imports from subject sources, and ratio of subject imports to production, by period**

Quantity in kilowatts; Ratios in percent

Item	Measure	2022	2023	2024
U.S. production	Quantity	***	***	***
Imports from ***	Quantity	***	***	***
Imports from ***	Quantity	***	***	***
Imports from ***	Quantity	***	***	***
Imports from *** to U.S. production	Ratio	***	***	***
Imports from *** to U.S. production	Ratio	***	***	***
Imports from *** to U.S. production	Ratio	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Zeroes, null values, and undefined calculations are suppressed and shown as “—”.

APPENDIX E

CELLS: SPLIT LIKE PRODUCT DATA

Table E.1 CSPV cells: Count of U.S. producers' responses regarding production of CSPV cells since January 1, 2022, by item

Count in number of firms reporting

Item	No	Yes
Trial production commencement	14	2
Commercial production commencement	14	2
Commercial production suspension	14	1
Production prior to January 1, 2021	13	2
Business plan prepared and/or commissioned	11	3

Source: Compiled from data submitted in response to Commission questionnaires.

Table E.2 CSPV cells: U.S. producers' projected future CSPV cells practical capacity, production, by period

Capacity and production in kilowatts; utilization in percent

Measure	2025	2026
Capacity	***	***
Trial production	***	***
Commercial production	***	***
All production	***	***
Capacity utilization	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Table E.3 CPSV cells: Share of U.S. shipments by source, channel of distribution, and period

Share in percent

Source	Channel	2022	2023	2024
United States	Distributors	***	***	***
United States	Module assemblers	***	***	***
United States	Residential installer	***	***	***
United States	Commercial installer	***	***	***
United States	Utilities and developers	***	***	***
Cambodia	Distributors	***	***	***
Cambodia	Module assemblers	***	***	***
Cambodia	Residential installer	***	***	***
Cambodia	Commercial installer	***	***	***
Cambodia	Utilities and developers	***	***	***
Malaysia	Distributors	***	***	***
Malaysia	Module assemblers	***	***	***
Malaysia	Residential installer	***	***	***
Malaysia	Commercial installer	***	***	***
Malaysia	Utilities and developers	***	***	***
Thailand	Distributors	***	***	***
Thailand	Module assemblers	***	***	***
Thailand	Residential installer	***	***	***
Thailand	Commercial installer	***	***	***
Thailand	Utilities and developers	***	***	***
Vietnam	Distributors	***	***	***
Vietnam	Module assemblers	***	***	***
Vietnam	Residential installer	***	***	***
Vietnam	Commercial installer	***	***	***
Vietnam	Utilities and developers	***	***	***

Table continued.

Table E.3 (Continued) CPSV cells: Share of U.S. shipments by source, channel of distribution, and period

Share in percent

Source	Channel	2022	2023	2024
Subject sources	Distributors	***	***	***
Subject sources	Module assemblers	***	***	***
Subject sources	Residential installer	***	***	***
Subject sources	Commercial installer	***	***	***
Subject sources	Utilities and developers	***	***	***
Subject sources less Cambodia, Thailand, and Vietnam	Distributors	***	***	***
Subject sources less Cambodia, Thailand, and Vietnam	Module assemblers	***	***	***
Subject sources less Cambodia, Thailand, and Vietnam	Residential installer	***	***	***
Subject sources less Cambodia, Thailand, and Vietnam	Commercial installer	***	***	***
Subject sources less Cambodia, Thailand, and Vietnam	Utilities and developers	***	***	***
Nonsubject sources	Distributors	***	***	***
Nonsubject sources	Module assemblers	***	***	***
Nonsubject sources	Residential installer	***	***	***
Nonsubject sources	Commercial installer	***	***	***
Nonsubject sources	Utilities and developers	***	***	***
Nonsubject sources plus Cambodia, Thailand, and Vietnam	Distributors	***	***	***
Nonsubject sources plus Cambodia, Thailand, and Vietnam	Module assemblers	***	***	***
Nonsubject sources plus Cambodia, Thailand, and Vietnam	Residential installer	***	***	***
Nonsubject sources plus Cambodia, Thailand, and Vietnam	Commercial installer	***	***	***
Nonsubject sources plus Cambodia, Thailand, and Vietnam	Utilities and developers	***	***	***
All imports	Distributors	***	***	***
All imports	Module assemblers	***	***	***
All imports	Residential installer	***	***	***
All imports	Commercial installer	***	***	***
All imports	Utilities and developers	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—".

Table E.4 CSPV cells: U.S. imports, by source and period

Quantity in kilowatts; Value in 1,000 dollars; Unit values in dollars per kilowatt

Source	Measure	2022	2023	2024
Cambodia	Quantity	***	***	***
Malaysia	Quantity	***	***	***
Thailand	Quantity	***	***	***
Vietnam	Quantity	***	***	***
Subject sources	Quantity	***	***	***
Subject sources less Cambodia, Thailand, and Vietnam	Quantity	***	***	***
Nonsubject sources	Quantity	***	***	***
Nonsubject sources plus Cambodia, Thailand, and Vietnam	Quantity	***	***	***
All import sources	Quantity	***	***	***
Cambodia	Value	***	***	***
Malaysia	Value	***	***	***
Thailand	Value	***	***	***
Vietnam	Value	***	***	***
Subject sources	Value	***	***	***
Subject sources less Cambodia, Thailand, and Vietnam	Value	***	***	***
Nonsubject sources	Value	***	***	***
Nonsubject sources plus Cambodia, Thailand, and Vietnam	Value	***	***	***
All import sources	Value	***	***	***
Cambodia	Unit value	***	***	***
Malaysia	Unit value	***	***	***
Thailand	Unit value	***	***	***
Vietnam	Unit value	***	***	***
Subject sources	Unit value	***	***	***
Subject sources less Cambodia, Thailand, and Vietnam	Unit value	***	***	***
Nonsubject sources	Unit value	***	***	***
Nonsubject sources plus Cambodia, Thailand, and Vietnam	Unit value	***	***	***
All import sources	Unit value	***	***	***

Table continued.

Table E.4 (Continued) CSPV cells: U.S. imports, by source and period

Share and ratio in percent; Ratio represents the ratio to U.S. module production

Source	Measure	2022	2023	2024
Cambodia	Share of quantity	***	***	***
Malaysia	Share of quantity	***	***	***
Thailand	Share of quantity	***	***	***
Vietnam	Share of quantity	***	***	***
Subject sources	Share of quantity	***	***	***
Subject sources less Cambodia, Thailand, and Vietnam	Share of quantity	***	***	***
Nonsubject sources	Share of quantity	***	***	***
Nonsubject sources plus Cambodia, Thailand, and Vietnam	Share of quantity	***	***	***
All import sources	Share of quantity	100.0	100.0	100.0
Cambodia	Share of value	***	***	***
Malaysia	Share of value	***	***	***
Thailand	Share of value	***	***	***
Vietnam	Share of value	***	***	***
Subject sources	Share of value	***	***	***
Subject sources less Cambodia, Thailand, and Vietnam	Share of value	***	***	***
Nonsubject sources	Share of value	***	***	***
Nonsubject sources plus Cambodia, Thailand, and Vietnam	Share of value	***	***	***
All import sources	Share of value	100.0	100.0	100.0
Cambodia	Ratio	***	***	***
Malaysia	Ratio	***	***	***
Thailand	Ratio	***	***	***
Vietnam	Ratio	***	***	***
Subject sources	Ratio	***	***	***
Subject sources less Cambodia, Thailand, and Vietnam	Ratio	***	***	***
Nonsubject sources	Ratio	***	***	***
Nonsubject sources plus Cambodia, Thailand, and Vietnam	Ratio	***	***	***
All import sources	Ratio	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—".

Figure E.1 CPSV cells: U.S. import quantities and average uni values, by source and period

* * * * *

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Table E.5 CPSV cells: Changes in U.S. imports, by source and period

Changes (Δ) in percent (%)

Source	Measure	2022 to 2024	2022 to 2023	2023 to 2024
Cambodia	% Δ Quantity	▲ ***	▲ ***	▲ ***
Malaysia	% Δ Quantity	▲ ***	▲ ***	▲ ***
Thailand	% Δ Quantity	▲ ***	▼ ***	▲ ***
Vietnam	% Δ Quantity	▲ ***	▼ ***	▲ ***
Subject sources	% Δ Quantity	▲ ***	▼ ***	▲ ***
Subject sources less Cambodia, Thailand, and Vietnam	% Δ Quantity	▲ ***	▲ ***	▲ ***
Nonsubject sources	% Δ Quantity	▲ ***	▲ ***	▲ ***
Nonsubject sources plus Cambodia, Thailand, and Vietnam	% Δ Quantity	▲ ***	▲ ***	▲ ***
All import sources	% Δ Quantity	▲ ***	▲ ***	▲ ***
Cambodia	% Δ Value	▲ ***	▲ ***	▲ ***
Malaysia	% Δ Value	▲ ***	▼ ***	▲ ***
Thailand	% Δ Value	▲ ***	▼ ***	▲ ***
Vietnam	% Δ Value	▲ ***	▼ ***	▲ ***
Subject sources	% Δ Value	▲ ***	▼ ***	▲ ***
Subject sources less Cambodia, Thailand, and Vietnam	% Δ Value	▲ ***	▼ ***	▲ ***
Nonsubject sources	% Δ Value	▲ ***	▲ ***	▲ ***
Nonsubject sources plus Cambodia, Thailand, and Vietnam	% Δ Value	▲ ***	▲ ***	▲ ***
All import sources	% Δ Value	▲ ***	▼ ***	▲ ***
Cambodia	% Δ Unit value	▼ ***	▼ ***	▼ ***
Malaysia	% Δ Unit value	▼ ***	▼ ***	▼ ***
Thailand	% Δ Unit value	▼ ***	▼ ***	▼ ***
Vietnam	% Δ Unit value	▼ ***	▼ ***	▼ ***
Subject sources	% Δ Unit value	▼ ***	▼ ***	▼ ***
Subject sources less Cambodia, Thailand, and Vietnam	% Δ Unit value	▼ ***	▼ ***	▼ ***
Nonsubject sources	% Δ Unit value	▼ ***	▼ ***	▲ ***
Nonsubject sources plus Cambodia, Thailand, and Vietnam	% Δ Unit value	▼ ***	▼ ***	▼ ***
All import sources	% Δ Unit value	▼ ***	▼ ***	▼ ***

Table continued.

Table E.5 (Continued) CPSV cells: Changes in U.S. imports, by source and periodChanges (Δ) in percentage point (ppt)

Source	Measure	2022 to 2024	2022 to 2023	2023 to 2024
Cambodia	ppt Δ Quantity	▲ ***	▲ ***	▲ ***
Malaysia	ppt Δ Quantity	▼ ***	▼ ***	▼ ***
Thailand	ppt Δ Quantity	▲ ***	▼ ***	▲ ***
Vietnam	ppt Δ Quantity	▼ ***	▼ ***	▼ ***
Subject sources	ppt Δ Quantity	▼ ***	▼ ***	▼ ***
Subject sources less Cambodia, Thailand, and Vietnam	ppt Δ Quantity	▼ ***	▼ ***	▼ ***
Nonsubject sources	ppt Δ Quantity	▲ ***	▲ ***	▲ ***
Nonsubject sources plus Cambodia, Thailand, and Vietnam	ppt Δ Quantity	▲ ***	▲ ***	▲ ***
All import sources	ppt Δ Quantity	***	***	***
Cambodia	ppt Δ Value	▲ ***	▲ ***	▲ ***
Malaysia	ppt Δ Value	▼ ***	▼ ***	▼ ***
Thailand	ppt Δ Value	▲ ***	▼ ***	▲ ***
Vietnam	ppt Δ Value	▼ ***	▼ ***	▼ ***
Subject sources	ppt Δ Value	▼ ***	▼ ***	▼ ***
Subject sources less Cambodia, Thailand, and Vietnam	ppt Δ Value	▼ ***	▼ ***	▼ ***
Nonsubject sources	ppt Δ Value	▲ ***	▲ ***	▲ ***
Nonsubject sources plus Cambodia, Thailand, and Vietnam	ppt Δ Value	▲ ***	▲ ***	▲ ***
All import sources	ppt Δ Value	***	***	***
Cambodia	ppt Δ Ratio	▲ ***	▲ ***	▲ ***
Malaysia	ppt Δ Ratio	▼ ***	▼ ***	▼ ***
Thailand	ppt Δ Ratio	▲ ***	▼ ***	▲ ***
Vietnam	ppt Δ Ratio	▼ ***	▼ ***	▲ ***
Subject sources	ppt Δ Ratio	▼ ***	▼ ***	▲ ***
Subject sources less Cambodia, Thailand, and Vietnam	ppt Δ Ratio	▼ ***	▼ ***	▼ ***
Nonsubject sources	ppt Δ Ratio	▲ ***	▲ ***	▲ ***
Nonsubject sources plus Cambodia, Thailand, and Vietnam	ppt Δ Ratio	▲ ***	▲ ***	▲ ***
All import sources	ppt Δ Ratio	▲ ***	▲ ***	▲ ***

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Note: Shares and ratios shown as “0.0” percent represent non-zero values less than “0.05” percent (if positive) and greater than “(0.05)” percent (if negative). Zeroes, null values, and undefined calculations are suppressed and shown as “—”. Period changes preceded by a “▲” represent an increase, while period changes preceded by a “▼” represent a decrease.

Table E.6 CSPV cells: U.S. imports from nonsubject sources, by source and period

Quantity in kilowatts; Value in 1,000 dollars

Source	Measure	2022	2023	2024
Cambodia, circumventing	Quantity	***	***	***
Malaysia, circumventing	Quantity	***	***	***
Thailand, circumventing	Quantity	***	***	***
Vietnam, circumventing	Quantity	***	***	***
Circumventing sources	Quantity	***	***	***
China	Quantity	***	***	***
South Korea	Quantity	***	***	***
All other sources	Quantity	***	***	***
Nonsubject, other than circumventing	Quantity	***	***	***
Nonsubject sources	Quantity	***	***	***
Cambodia, circumventing	Value	***	***	***
Malaysia, circumventing	Value	***	***	***
Thailand, circumventing	Value	***	***	***
Vietnam, circumventing	Value	***	***	***
Circumventing sources	Value	***	***	***
China	Value	***	***	***
South Korea	Value	***	***	***
All other sources	Value	***	***	***
Nonsubject, other than circumventing	Value	***	***	***
Nonsubject sources	Value	***	***	***

Table continued.

Table E.6 (Continued) CSPV cells: U.S. imports from nonsubject sources, by source and period

Unit values in dollars per kilowatt; Share in percent

Source	Measure	2022	2023	2024
Cambodia, circumventing	Unit value	***	***	***
Malaysia, circumventing	Unit value	***	***	***
Thailand, circumventing	Unit value	***	***	***
Vietnam, circumventing	Unit value	***	***	***
Circumventing sources	Unit value	***	***	***
China	Unit value	***	***	***
South Korea	Unit value	***	***	***
All other sources	Unit value	***	***	***
Nonsubject, other than circumventing	Unit value	***	***	***
Nonsubject sources	Unit value	***	***	***
Cambodia, circumventing	Share of quantity	***	***	***
Malaysia, circumventing	Share of quantity	***	***	***
Thailand, circumventing	Share of quantity	***	***	***
Vietnam, circumventing	Share of quantity	***	***	***
Circumventing sources	Share of quantity	***	***	***
China	Share of quantity	***	***	***
South Korea	Share of quantity	***	***	***
All other sources	Share of quantity	***	***	***
Nonsubject, other than circumventing	Share of quantity	***	***	***
Nonsubject sources	Share of quantity	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—".

Table E.7 CSPV cells: U.S. imports in the twelve month period preceeding the filing of the petition

Quantity in kilowatts; Share of quantity in percent

Source of imports	Quantity	Share of quantity
Cambodia	***	***
Malaysia AD	***	***
Malaysia CVD	***	***
Thailand	***	***
Vietnam	***	***
All other sources	***	***
All import sources	***	100.0

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent.

Table E.8 CSPV cells: U.S. imports from Cambodia, Malaysia AD, Thailand, and all sources in various twelve month periods in the lead up to and after the twelve months immediately prior to the filing of the petition

Quantity in kilowatts

Twelve month period through to and including	Cambodia quantity	Malaysia AD quantity	Thailand quantity	Other than Cambodia, Malaysia AD, and Thailand quantity	All import sources quantity
Jan 2023	***	***	***	***	***
Feb 2023	***	***	***	***	***
Mar 2023	***	***	***	***	***
Apr 2023	***	***	***	***	***
May 2023	***	***	***	***	***
Jun 2023	***	***	***	***	***
Jul 2023	***	***	***	***	***
Aug 2023	***	***	***	***	***
Sep 2023	***	***	***	***	***
Oct 2023	***	***	***	***	***
Nov 2023	***	***	***	***	***
Dec 2023	***	***	***	***	***
Jan 2024	***	***	***	***	***
Feb 2024	***	***	***	***	***
Mar 2024	***	***	***	***	***
Apr 2024	***	***	***	***	***
May 2024	***	***	***	***	***
Jun 2024	***	***	***	***	***
Jul 2024	***	***	***	***	***
Aug 2024	***	***	***	***	***
Sep 2024	***	***	***	***	***
Oct 2024	***	***	***	***	***
Nov 2024	***	***	***	***	***
Dec 2024	***	***	***	***	***

Table continued.

Table E.8 CSPV cells: U.S. imports from Cambodia, Malaysia AD, Thailand, and all sources in various twelve month periods in the lead up to and after the twelve months immediately prior to the filing of the petition

Share in percent

Twelve month period through to and including	Cambodia share	Malaysia AD share	Thailand share	Other than Cambodia, Malaysia AD, and Thailand share	All import sources share
Jan 2023	***	***	***	***	100.0
Feb 2023	***	***	***	***	100.0
Mar 2023	***	***	***	***	100.0
Apr 2023	***	***	***	***	100.0
May 2023	***	***	***	***	100.0
Jun 2023	***	***	***	***	100.0
Jul 2023	***	***	***	***	100.0
Aug 2023	***	***	***	***	100.0
Sep 2023	***	***	***	***	100.0
Oct 2023	***	***	***	***	100.0
Nov 2023	***	***	***	***	100.0
Dec 2023	***	***	***	***	100.0
Jan 2024	***	***	***	***	100.0
Feb 2024	***	***	***	***	100.0
Mar 2024	***	***	***	***	100.0
Apr 2024	***	***	***	***	100.0
May 2024	***	***	***	***	100.0
Jun 2024	***	***	***	***	100.0
Jul 2024	***	***	***	***	100.0
Aug 2024	***	***	***	***	100.0
Sep 2024	***	***	***	***	100.0
Oct 2024	***	***	***	***	100.0
Nov 2024	***	***	***	***	100.0
Dec 2024	***	***	***	***	100.0

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—".

Figure E.2 CSPV cells: Share of U.S. imports from Cambodia, Malaysia AD, and Thailand out of total imports in the various twelve month periods in the lead up to and after the twelve months immediately prior to the filing of the petition

* * * * *

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Table E.9 CSPV cells: Apparent U.S. consumption and market shares based on quantity data, by source and period

Quantity in kilowatts; Shares in percent

Source	Measure	2022	2023	2024
U.S. producers	Quantity	***	***	***
Cambodia	Quantity	***	***	***
Malaysia	Quantity	***	***	***
Thailand	Quantity	***	***	***
Vietnam	Quantity	***	***	***
Subject sources	Quantity	***	***	***
Subject sources less Cambodia, Thailand, and Vietnam	Quantity	***	***	***
Circumventing sources	Quantity	***	***	***
South Korea	Quantity	***	***	***
All other sources	Quantity	***	***	***
Nonsubject sources	Quantity	***	***	***
Nonsubject sources plus Cambodia, Thailand, and Vietnam	Quantity	***	***	***
All import sources	Quantity	***	***	***
All sources	Quantity	***	***	***
U.S. producers	Share	***	***	***
Cambodia	Share	***	***	***
Malaysia	Share	***	***	***
Thailand	Share	***	***	***
Vietnam	Share	***	***	***
Subject sources	Share	***	***	***
Subject sources less Cambodia, Thailand, and Vietnam	Share	***	***	***
Circumventing sources	Share	***	***	***
South Korea	Share	***	***	***
All other sources	Share	***	***	***
Nonsubject sources	Share	***	***	***
Nonsubject sources plus Cambodia, Thailand, and Vietnam	Share	***	***	***
All import sources	Share	***	***	***
All sources	Share	100.0	100.0	100.0

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—". Quantity for circumventing sources and South Korea are import quantities reported in the questionnaire, all other sources quantity is calculated by removing these imports from reported U.S. shipments from nonsubject sources.

Figure E.3 CSPV cells: Apparent U.S. consumption based on quantity data, by source and period

* * * * *

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Table E.10 CSPV cells: Apparent U.S. consumption and market shares based on value data, by source and period

Value in 1,000 dollars; Shares in percent

Source	Measure	2022	2023	2024
U.S. producers	Value	***	***	***
Cambodia	Value	***	***	***
Malaysia	Value	***	***	***
Thailand	Value	***	***	***
Vietnam	Value	***	***	***
Subject sources	Value	***	***	***
Subject sources less Cambodia, Thailand, and Vietnam	Value	***	***	***
Circumventing sources	Value	***	***	***
South Korea	Value	***	***	***
All other sources	Value	***	***	***
Nonsubject sources	Value	***	***	***
Nonsubject sources plus Cambodia, Thailand, and Vietnam	Value	***	***	***
All import sources	Value	***	***	***
All sources	Value	***	***	***
U.S. producers	Share	***	***	***
Cambodia	Share	***	***	***
Malaysia	Share	***	***	***
Thailand	Share	***	***	***
Vietnam	Share	***	***	***
Subject sources	Share	***	***	***
Subject sources less Cambodia, Thailand, and Vietnam	Share	***	***	***
Circumventing sources	Share	***	***	***
South Korea	Share	***	***	***
All other sources	Share	***	***	***
Nonsubject sources	Share	***	***	***
Nonsubject sources plus Cambodia, Thailand, and Vietnam	Share	***	***	***
All import sources	Share	***	***	***
All sources	Share	100.0	100.0	100.0

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—". Value for circumventing sources and South Korea are import values reported in the questionnaire, all other sources value is calculated by removing these imports from reported U.S. shipments from nonsubject sources.

Figure E.4 CSPV cells: Apparent U.S. consumption based on value data, by source and period

* * * * *

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Table E.11 CSPV cells: U.S. importers' inventories and their ratio to select items, by source and period

Quantity in kilowatts; Ratio in percent

Measure	Source	2022	2023	2024
Inventories quantity	Cambodia	***	***	***
Ratio to imports	Cambodia	***	***	***
Ratio to U.S. shipments of imports	Cambodia	***	***	***
Ratio to total shipments of imports	Cambodia	***	***	***
Inventories quantity	Malaysia	***	***	***
Ratio to imports	Malaysia	***	***	***
Ratio to U.S. shipments of imports	Malaysia	***	***	***
Ratio to total shipments of imports	Malaysia	***	***	***
Inventories quantity	Thailand	***	***	***
Ratio to imports	Thailand	***	***	***
Ratio to U.S. shipments of imports	Thailand	***	***	***
Ratio to total shipments of imports	Thailand	***	***	***
Inventories quantity	Vietnam	***	***	***
Ratio to imports	Vietnam	***	***	***
Ratio to U.S. shipments of imports	Vietnam	***	***	***
Ratio to total shipments of imports	Vietnam	***	***	***
Inventories quantity	Subject sources	***	***	***
Ratio to imports	Subject sources	***	***	***
Ratio to U.S. shipments of imports	Subject sources	***	***	***
Ratio to total shipments of imports	Subject sources	***	***	***
Inventories quantity	Subject sources less Cambodia, Thailand, and Vietnam	***	***	***
Ratio to imports	Subject sources less Cambodia, Thailand, and Vietnam	***	***	***
Ratio to U.S. shipments of imports	Subject sources less Cambodia, Thailand, and Vietnam	***	***	***
Ratio to total shipments of imports	Subject sources less Cambodia, Thailand, and Vietnam	***	***	***
Inventories quantity	Nonsubject sources	***	***	***
Ratio to imports	Nonsubject sources	***	***	***
Ratio to U.S. shipments of imports	Nonsubject sources	***	***	***
Ratio to total shipments of imports	Nonsubject sources	***	***	***
Inventories quantity	Nonsubject sources plus Cambodia, Thailand, and Vietnam	***	***	***

Table continued.

Table E.9 CSPV cells: U.S. importers' inventories and their ratio to select items, by source and period

Quantity in kilowatts; Ratio in percent

Measure	Source	2022	2023	2024
Ratio to imports	Nonsubject sources plus Cambodia, Thailand, and Vietnam	***	***	***
Ratio to U.S. shipments of imports	Nonsubject sources plus Cambodia, Thailand, and Vietnam	***	***	***
Ratio to total shipments of imports	Nonsubject sources plus Cambodia, Thailand, and Vietnam	***	***	***
Inventories quantity	All import sources	***	***	***
Ratio to imports	All import sources	***	***	***
Ratio to U.S. shipments of imports	All import sources	***	***	***
Ratio to total shipments of imports	All import sources	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—".

Table E.10 CSPV cells: Arranged imports, by source and by period

Quantity in kilowatts

Source	Q1 2025	Q2 2025	Q3 2025	Q4 2025	Total
Cambodia	***	***	***	***	***
Malaysia	***	***	***	***	***
Thailand	***	***	***	***	***
Vietnam	***	***	***	***	***
Subject sources	***	***	***	***	***
Subject sources less Cambodia, Thailand, and Vietnam	***	***	***	***	***
Nonsubject sources	***	***	***	***	***
Nonsubject sources plus Cambodia, Thailand, and Vietnam	***	***	***	***	***
All import sources	***	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

APPENDIX F

MODULES: SPLIT LIKE PRODUCT DATA

Table F.1 CPSV modules: Share of U.S. shipments by source, channel of distribution, and period

Share in percent

Source	Channel	2022	2023	2024
United States	Distributors	***	***	***
United States	Module assemblers	***	***	***
United States	Residential installer	***	***	***
United States	Commercial installer	***	***	***
United States	Utilities and developers	***	***	***
Cambodia	Distributors	***	***	***
Cambodia	Module assemblers	***	***	***
Cambodia	Residential installer	***	***	***
Cambodia	Commercial installer	***	***	***
Cambodia	Utilities and developers	***	***	***
Malaysia	Distributors	***	***	***
Malaysia	Module assemblers	***	***	***
Malaysia	Residential installer	***	***	***
Malaysia	Commercial installer	***	***	***
Malaysia	Utilities and developers	***	***	***
Thailand	Distributors	***	***	***
Thailand	Module assemblers	***	***	***
Thailand	Residential installer	***	***	***
Thailand	Commercial installer	***	***	***
Thailand	Utilities and developers	***	***	***
Vietnam	Distributors	***	***	***
Vietnam	Module assemblers	***	***	***
Vietnam	Residential installer	***	***	***
Vietnam	Commercial installer	***	***	***
Vietnam	Utilities and developers	***	***	***

Table continued.

Table F.1 (Continued) CPSV modules: Share of U.S. shipments by source, channel of distribution, and period

Share in percent

Source	Channel	2022	2023	2024
Subject sources	Distributors	***	***	***
Subject sources	Module assemblers	***	***	***
Subject sources	Residential installer	***	***	***
Subject sources	Commercial installer	***	***	***
Subject sources	Utilities and developers	***	***	***
Subject sources less Cambodia	Distributors	***	***	***
Subject sources less Cambodia	Module assemblers	***	***	***
Subject sources less Cambodia	Residential installer	***	***	***
Subject sources less Cambodia	Commercial installer	***	***	***
Subject sources less Cambodia	Utilities and developers	***	***	***
Nonsubject sources	Distributors	***	***	***
Nonsubject sources	Module assemblers	***	***	***
Nonsubject sources	Residential installer	***	***	***
Nonsubject sources	Commercial installer	***	***	***
Nonsubject sources	Utilities and developers	***	***	***
Nonsubject sources plus Cambodia	Distributors	***	***	***
Nonsubject sources plus Cambodia	Module assemblers	***	***	***
Nonsubject sources plus Cambodia	Residential installer	***	***	***
Nonsubject sources plus Cambodia	Commercial installer	***	***	***
Nonsubject sources plus Cambodia	Utilities and developers	***	***	***
All imports	Distributors	***	***	***
All imports	Module assemblers	***	***	***
All imports	Residential installer	***	***	***
All imports	Commercial installer	***	***	***
All imports	Utilities and developers	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—".

Table F.2 CSPV modules: U.S. imports, by source and period

Quantity in kilowatts; Value in 1,000 dollars; Unit values in dollars per kilowatt

Source	Measure	2022	2023	2024
Cambodia	Quantity	***	***	***
Malaysia	Quantity	***	***	***
Thailand	Quantity	***	***	***
Vietnam	Quantity	***	***	***
Subject sources	Quantity	***	***	***
Subject sources less Cambodia	Quantity	***	***	***
Nonsubject sources	Quantity	***	***	***
Nonsubject sources plus Cambodia	Quantity	***	***	***
All import sources	Quantity	***	***	***
Cambodia	Value	***	***	***
Malaysia	Value	***	***	***
Thailand	Value	***	***	***
Vietnam	Value	***	***	***
Subject sources	Value	***	***	***
Subject sources less Cambodia	Value	***	***	***
Nonsubject sources	Value	***	***	***
Nonsubject sources plus Cambodia	Value	***	***	***
All import sources	Value	***	***	***
Cambodia	Unit value	***	***	***
Malaysia	Unit value	***	***	***
Thailand	Unit value	***	***	***
Vietnam	Unit value	***	***	***
Subject sources	Unit value	***	***	***
Subject sources less Cambodia	Unit value	***	***	***
Nonsubject sources	Unit value	***	***	***
Nonsubject sources plus Cambodia	Unit value	***	***	***
All import sources	Unit value	***	***	***

Table continued.

Table F.2 (Continued) CSPV modules: U.S. imports, by source and period

Share and ratio in percent; Ratio represents the ratio to U.S. module production

Source	Measure	2022	2023	2024
Cambodia	Share of quantity	***	***	***
Malaysia	Share of quantity	***	***	***
Thailand	Share of quantity	***	***	***
Vietnam	Share of quantity	***	***	***
Subject sources	Share of quantity	***	***	***
Subject sources less Cambodia	Share of quantity	***	***	***
Nonsubject sources	Share of quantity	***	***	***
Nonsubject sources plus Cambodia	Share of quantity	***	***	***
All import sources	Share of quantity	100.0	100.0	100.0
Cambodia	Share of value	***	***	***
Malaysia	Share of value	***	***	***
Thailand	Share of value	***	***	***
Vietnam	Share of value	***	***	***
Subject sources	Share of value	***	***	***
Subject sources less Cambodia	Share of value	***	***	***
Nonsubject sources	Share of value	***	***	***
Nonsubject sources plus Cambodia	Share of value	***	***	***
All import sources	Share of value	100.0	100.0	100.0
Cambodia	Ratio	***	***	***
Malaysia	Ratio	***	***	***
Thailand	Ratio	***	***	***
Vietnam	Ratio	***	***	***
Subject sources	Ratio	***	***	***
Subject sources less Cambodia	Ratio	***	***	***
Nonsubject sources	Ratio	***	***	***
Nonsubject sources plus Cambodia	Ratio	***	***	***
All import sources	Ratio	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—".

Figure F.1 CPSV modules: U.S. import quantities and average uni values, by source and period

* * * * *

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Table F.3 CPSV modules: Changes in U.S. imports, by source and period

Changes (Δ) in percent (%)

Source	Measure	2022 to 2024	2022 to 2023	2023 to 2024
Cambodia	% Δ Quantity	▲ ***	▼ ***	▲ ***
Malaysia	% Δ Quantity	▲ ***	▲ ***	▼ ***
Thailand	% Δ Quantity	▲ ***	▲ ***	▲ ***
Vietnam	% Δ Quantity	▲ ***	▲ ***	▲ ***
Subject sources	% Δ Quantity	▲ ***	▲ ***	▲ ***
Subject sources less Cambodia	% Δ Quantity	▲ ***	▲ ***	▲ ***
Nonsubject sources	% Δ Quantity	▼ ***	▲ ***	▼ ***
Nonsubject sources plus Cambodia	% Δ Quantity	▲ ***	▲ ***	▼ ***
All import sources	% Δ Quantity	▲ ***	▲ ***	▼ ***
Cambodia	% Δ Value	▲ ***	▼ ***	▲ ***
Malaysia	% Δ Value	▲ ***	▲ ***	▼ ***
Thailand	% Δ Value	▲ ***	▲ ***	▲ ***
Vietnam	% Δ Value	▲ ***	▲ ***	▲ ***
Subject sources	% Δ Value	▲ ***	▲ ***	▲ ***
Subject sources less Cambodia	% Δ Value	▲ ***	▲ ***	▼ ***
Nonsubject sources	% Δ Value	▼ ***	▲ ***	▼ ***
Nonsubject sources plus Cambodia	% Δ Value	▼ ***	▲ ***	▼ ***
All import sources	% Δ Value	▲ ***	▲ ***	▼ ***
Cambodia	% Δ Unit value	▼ ***	▲ ***	▼ ***
Malaysia	% Δ Unit value	▼ ***	▲ ***	▼ ***
Thailand	% Δ Unit value	▼ ***	▲ ***	▼ ***
Vietnam	% Δ Unit value	▼ ***	▲ ***	▼ ***
Subject sources	% Δ Unit value	▼ ***	▲ ***	▼ ***
Subject sources less Cambodia	% Δ Unit value	▼ ***	▲ ***	▼ ***
Nonsubject sources	% Δ Unit value	▼ ***	▼ ***	▼ ***
Nonsubject sources plus Cambodia	% Δ Unit value	▼ ***	▼ ***	▼ ***
All import sources	% Δ Unit value	▼ ***	▼ ***	▼ ***

Table continued.

Table F.3 (Continued) CPSV modules: Changes in U.S. imports, by source and period

Changes (Δ) in percentage point (ppt)

Source	Measure	2022 to 2024	2022 to 2023	2023 to 2024
Cambodia	ppt Δ Quantity	▲ ***	▼ ***	▲ ***
Malaysia	ppt Δ Quantity	▼ ***	▲ ***	▼ ***
Thailand	ppt Δ Quantity	▲ ***	▼ ***	▲ ***
Vietnam	ppt Δ Quantity	▲ ***	▼ ***	▲ ***
Subject sources	ppt Δ Quantity	▲ ***	▼ ***	▲ ***
Subject sources less Cambodia	ppt Δ Quantity	▲ ***	▼ ***	▲ ***
Nonsubject sources	ppt Δ Quantity	▼ ***	▲ ***	▼ ***
Nonsubject sources plus Cambodia	ppt Δ Quantity	▼ ***	▲ ***	▼ ***
All import sources	ppt Δ Quantity	***	***	***
Cambodia	ppt Δ Value	▲ ***	▼ ***	▲ ***
Malaysia	ppt Δ Value	▼ ***	▲ ***	▼ ***
Thailand	ppt Δ Value	▲ ***	▼ ***	▲ ***
Vietnam	ppt Δ Value	▲ ***	▼ ***	▲ ***
Subject sources	ppt Δ Value	▲ ***	▼ ***	▲ ***
Subject sources less Cambodia	ppt Δ Value	▲ ***	▼ ***	▲ ***
Nonsubject sources	ppt Δ Value	▼ ***	▲ ***	▼ ***
Nonsubject sources plus Cambodia	ppt Δ Value	▼ ***	▲ ***	▼ ***
All import sources	ppt Δ Value	***	***	***
Cambodia	ppt Δ Ratio	▼ ***	▼ ***	▲ ***
Malaysia	ppt Δ Ratio	▼ ***	▲ ***	▼ ***
Thailand	ppt Δ Ratio	▼ ***	▲ ***	▼ ***
Vietnam	ppt Δ Ratio	▼ ***	▲ ***	▼ ***
Subject sources	ppt Δ Ratio	▼ ***	▲ ***	▼ ***
Subject sources less Cambodia	ppt Δ Ratio	▼ ***	▲ ***	▼ ***
Nonsubject sources	ppt Δ Ratio	▼ ***	▲ ***	▼ ***
Nonsubject sources plus Cambodia	ppt Δ Ratio	▼ ***	▲ ***	▼ ***
All import sources	ppt Δ Ratio	▼ ***	▲ ***	▼ ***

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Note: Shares and ratios shown as “0.0” percent represent non-zero values less than “0.05” percent (if positive) and greater than “(0.05)” percent (if negative). Zeroes, null values, and undefined calculations are suppressed and shown as “—”. Period changes preceded by a “▲” represent an increase, while period changes preceded by a “▼” represent a decrease.

Table F.4 CSPV modules: U.S. imports from nonsubject sources, by source and period

Quantity in kilowatts; Value in 1,000 dollars

Source	Measure	2022	2023	2024
Cambodia, circumventing	Quantity	***	***	***
Malaysia, circumventing	Quantity	***	***	***
Thailand, circumventing	Quantity	***	***	***
Vietnam, circumventing	Quantity	***	***	***
Circumventing sources	Quantity	***	***	***
China	Quantity	***	***	***
South Korea	Quantity	***	***	***
All other sources	Quantity	***	***	***
Nonsubject, other than circumventing	Quantity	***	***	***
Nonsubject sources	Quantity	***	***	***
Cambodia, circumventing	Value	***	***	***
Malaysia, circumventing	Value	***	***	***
Thailand, circumventing	Value	***	***	***
Vietnam, circumventing	Value	***	***	***
Circumventing sources	Value	***	***	***
China	Value	***	***	***
South Korea	Value	***	***	***
All other sources	Value	***	***	***
Nonsubject, other than circumventing	Value	***	***	***
Nonsubject sources	Value	***	***	***

Table continued.

Table F.4 (Continued) CSPV modules: U.S. imports from nonsubject sources, by source and period

Unit values in dollars per kilowatt; Share in percent

Source	Measure	2022	2023	2024
Cambodia, circumventing	Unit value	***	***	***
Malaysia, circumventing	Unit value	***	***	***
Thailand, circumventing	Unit value	***	***	***
Vietnam, circumventing	Unit value	***	***	***
Circumventing sources	Unit value	***	***	***
China	Unit value	***	***	***
South Korea	Unit value	***	***	***
All other sources	Unit value	***	***	***
Nonsubject, other than circumventing	Unit value	***	***	***
Nonsubject sources	Unit value	***	***	***
Cambodia, circumventing	Share of quantity	***	***	***
Malaysia, circumventing	Share of quantity	***	***	***
Thailand, circumventing	Share of quantity	***	***	***
Vietnam, circumventing	Share of quantity	***	***	***
Circumventing sources	Share of quantity	***	***	***
China	Share of quantity	***	***	***
South Korea	Share of quantity	***	***	***
All other sources	Share of quantity	***	***	***
Nonsubject, other than circumventing	Share of quantity	***	***	***
Nonsubject sources	Share of quantity	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—".

Table F.5 CSPV modules: U.S. imports in the twelve month period preceeding the filing of the petition

Quantity in kilowatts; Share of quantity in percent

Source of imports	Quantity	Share of quantity
Cambodia	***	***
Malaysia AD	***	***
Malaysia CVD	***	***
Thailand	***	***
Vietnam	***	***
All other sources	***	***
All import sources	***	100.0

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent.

Table F.6 CSPV modules: U.S. imports from Cambodia and all sources in various twelve month periods in the lead up to and after the twelve months immediately prior to the filing of the petition

Quantity in kilowatts; Share in percent

Twelve month period through to and including	Cambodia quantity	Other than Cambodia quantity	All import sources quantity	Cambodia share	Other than Cambodia share	All import sources share
Jan 2023	***	***	***	***	***	100.0
Feb 2023	***	***	***	***	***	100.0
Mar 2023	***	***	***	***	***	100.0
Apr 2023	***	***	***	***	***	100.0
May 2023	***	***	***	***	***	100.0
Jun 2023	***	***	***	***	***	100.0
Jul 2023	***	***	***	***	***	100.0
Aug 2023	***	***	***	***	***	100.0
Sep 2023	***	***	***	***	***	100.0
Oct 2023	***	***	***	***	***	100.0
Nov 2023	***	***	***	***	***	100.0
Dec 2023	***	***	***	***	***	100.0
Jan 2024	***	***	***	***	***	100.0
Feb 2024	***	***	***	***	***	100.0
Mar 2024	***	***	***	***	***	100.0
Apr 2024	***	***	***	***	***	100.0
May 2024	***	***	***	***	***	100.0
Jun 2024	***	***	***	***	***	100.0
Jul 2024	***	***	***	***	***	100.0
Aug 2024	***	***	***	***	***	100.0
Sep 2024	***	***	***	***	***	100.0
Oct 2024	***	***	***	***	***	100.0
Nov 2024	***	***	***	***	***	100.0
Dec 2024	***	***	***	***	***	100.0

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Figure F.2 CSPV modules: Share of U.S. imports from Cambodia out of total imports in the various twelve month periods in the lead up to and after the twelve months immediately prior to the filing of the petition

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Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Table F.7 CSPV modules: Apparent U.S. consumption and market shares based on quantity data, by source and period

Quantity in kilowatts; Shares in percent

Source	Measure	2022	2023	2024
U.S. producers	Quantity	***	***	***
Cambodia	Quantity	***	***	***
Malaysia	Quantity	***	***	***
Thailand	Quantity	***	***	***
Vietnam	Quantity	***	***	***
Subject sources	Quantity	***	***	***
Subject sources less Cambodia	Quantity	***	***	***
Circumventing sources	Quantity	***	***	***
South Korea	Quantity	***	***	***
All other sources	Quantity	***	***	***
Nonsubject sources	Quantity	***	***	***
Nonsubject sources plus Cambodia	Quantity	***	***	***
All import sources	Quantity	***	***	***
All sources	Quantity	***	***	***
U.S. producers	Share	***	***	***
Cambodia	Share	***	***	***
Malaysia	Share	***	***	***
Thailand	Share	***	***	***
Vietnam	Share	***	***	***
Subject sources	Share	***	***	***
Subject sources less Cambodia	Share	***	***	***
Circumventing sources	Share	***	***	***
South Korea	Share	***	***	***
All other sources	Share	***	***	***
Nonsubject sources	Share	***	***	***
Nonsubject sources plus Cambodia	Share	***	***	***
All import sources	Share	***	***	***
All sources	Share	100.0	100.0	100.0

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—".

Figure F.3 CSPV modules: Apparent U.S. consumption based on quantity data, by source and period

* * * * *

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Table F.8 CSPV modules: Apparent U.S. consumption and market shares based on value data, by source and period

Value in 1,000 dollars; Shares in percent

Source	Measure	2022	2023	2024
U.S. producers	Value	***	***	***
Cambodia	Value	***	***	***
Malaysia	Value	***	***	***
Thailand	Value	***	***	***
Vietnam	Value	***	***	***
Subject sources	Value	***	***	***
Subject sources less Cambodia	Value	***	***	***
Circumventing sources	Value	***	***	***
South Korea	Value	***	***	***
All other sources	Value	***	***	***
Nonsubject sources	Value	***	***	***
Nonsubject sources plus Cambodia	Value	***	***	***
All import sources	Value	***	***	***
All sources	Value	***	***	***
U.S. producers	Share	***	***	***
Cambodia	Share	***	***	***
Malaysia	Share	***	***	***
Thailand	Share	***	***	***
Vietnam	Share	***	***	***
Subject sources	Share	***	***	***
Subject sources less Cambodia	Share	***	***	***
Circumventing sources	Share	***	***	***
South Korea	Share	***	***	***
All other sources	Share	***	***	***
Nonsubject sources	Share	***	***	***
Nonsubject sources plus Cambodia	Share	***	***	***
All import sources	Share	***	***	***
All sources	Share	100.0	100.0	100.0

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—".

Figure F.4 CSPV modules: Apparent U.S. consumption based on value data, by source and period

* * * * *

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 accessed March 17, 2025.

Table F.9 CSPV modules: U.S. importers' inventories and their ratio to select items, by source and period

Quantity in kilowatts; Ratio in percent

Measure	Source	2022	2023	2024
Inventories quantity	Cambodia	***	***	***
Ratio to imports	Cambodia	***	***	***
Ratio to U.S. shipments of imports	Cambodia	***	***	***
Ratio to total shipments of imports	Cambodia	***	***	***
Inventories quantity	Malaysia	***	***	***
Ratio to imports	Malaysia	***	***	***
Ratio to U.S. shipments of imports	Malaysia	***	***	***
Ratio to total shipments of imports	Malaysia	***	***	***
Inventories quantity	Thailand	***	***	***
Ratio to imports	Thailand	***	***	***
Ratio to U.S. shipments of imports	Thailand	***	***	***
Ratio to total shipments of imports	Thailand	***	***	***
Inventories quantity	Vietnam	***	***	***
Ratio to imports	Vietnam	***	***	***
Ratio to U.S. shipments of imports	Vietnam	***	***	***
Ratio to total shipments of imports	Vietnam	***	***	***
Inventories quantity	Subject sources	***	***	***
Ratio to imports	Subject sources	***	***	***
Ratio to U.S. shipments of imports	Subject sources	***	***	***
Ratio to total shipments of imports	Subject sources	***	***	***
Inventories quantity	Subject sources less Cambodia	***	***	***
Ratio to imports	Subject sources less Cambodia	***	***	***
Ratio to U.S. shipments of imports	Subject sources less Cambodia	***	***	***
Ratio to total shipments of imports	Subject sources less Cambodia	***	***	***
Inventories quantity	Nonsubject sources	***	***	***
Ratio to imports	Nonsubject sources	***	***	***
Ratio to U.S. shipments of imports	Nonsubject sources	***	***	***
Ratio to total shipments of imports	Nonsubject sources	***	***	***
Inventories quantity	Nonsubject sources plus Cambodia	***	***	***
Ratio to imports	Nonsubject sources plus Cambodia	***	***	***
Ratio to U.S. shipments of imports	Nonsubject sources plus Cambodia	***	***	***
Ratio to total shipments of imports	Nonsubject sources plus Cambodia	***	***	***
Inventories quantity	All import sources	***	***	***
Ratio to imports	All import sources	***	***	***
Ratio to U.S. shipments of imports	All import sources	***	***	***
Ratio to total shipments of imports	All import sources	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—".

Table F.10 CSPV modules: Arranged imports, by source and by period

Quantity in kilowatts

Source	Q1 2025	Q2 2025	Q3 2025	Q4 2025	Total
Cambodia	***	***	***	***	***
Malaysia	***	***	***	***	***
Thailand	***	***	***	***	***
Vietnam	***	***	***	***	***
Subject sources	***	***	***	***	***
Subject sources less Cambodia	***	***	***	***	***
Nonsubject sources	***	***	***	***	***
Nonsubject sources plus Cambodia	***	***	***	***	***
All import sources	***	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

APPENDIX G

SOUTH KOREA PRICE DATA

Importers Hanwha, Hanwha CA, and Hyundai reported price data for South Korea for products 1-4. Price and quantity data for imports from South Korea are shown in tables G.1 to G.4 and in figures G.1 to G.4.

In comparing pricing data for imports from South Korea with U.S. producer pricing data, prices for product from South Korea were lower than prices for U.S.-produced product in 23 instances (** kilowatts) and higher in 11 instances (** kilowatts). A summary of price differentials is presented in table G.5.

Table G.1 CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 1, by source and quarter

Price in dollars per kilowatt, quantity in kilowatts

Period	U.S. price	U.S. quantity	South Korea price	South Korea quantity
2022 Q1	***	***	***	***
2022 Q2	***	***	***	***
2022 Q3	***	***	***	***
2022 Q4	***	***	***	***
2023 Q1	***	***	***	***
2023 Q2	***	***	***	***
2023 Q3	***	***	***	***
2023 Q4	***	***	***	***
2024 Q1	***	***	***	***
2024 Q2	***	***	***	***
2024 Q3	***	***	***	***
2024 Q4	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Product 1: Monocrystalline silicon module with front-side area of less than 2.2 square meters and a peak power wattage between 380w and 450w, inclusive, P-max or Wp as measured under Standard Test Conditions (STC), excluding bifacial modules.

Figure G.1 CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 1, by source and quarter

Price of product 1

* * * * *

Volume of product 1

* * * * *

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Product 1: Monocrystalline silicon module with front-side area of less than 2.2 square meters and a peak power wattage between 380w and 450w, inclusive, P-max or Wp as measured under Standard Test Conditions (STC), excluding bifacial modules.

Table G.2 CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 2, by source and quarter

Price in dollars per kilowatt, quantity in kilowatts

Period	U.S. price	U.S. quantity	South Korea price	South Korea quantity
2022 Q1	***	***	***	***
2022 Q2	***	***	***	***
2022 Q3	***	***	***	***
2022 Q4	***	***	***	***
2023 Q1	***	***	***	***
2023 Q2	***	***	***	***
2023 Q3	***	***	***	***
2023 Q4	***	***	***	***
2024 Q1	***	***	***	***
2024 Q2	***	***	***	***
2024 Q3	***	***	***	***
2024 Q4	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Product 2: Monocrystalline silicon module with front-side area of greater than or equal to 2.2 square meters and a peak power wattage between 320w and 440w, inclusive, P-max or Wp as measured under STC, excluding bifacial modules.

Figure G.2 CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 2, by source and quarter

Price of product 2

* * * * *

Volume of product 2

* * * * *

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Product 2: Monocrystalline silicon module with front-side area of greater than or equal to 2.2 square meters and a peak power wattage between 320w and 440w, inclusive, P-max or Wp as measured under STC, excluding bifacial modules.

Table G.3 CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 3, by source and quarter

Price in dollars per kilowatt, quantity in kilowatts

Period	U.S. price	U.S. quantity	South Korea price	South Korea quantity
2022 Q1	***	***	***	***
2022 Q2	***	***	***	***
2022 Q3	***	***	***	***
2022 Q4	***	***	***	***
2023 Q1	***	***	***	***
2023 Q2	***	***	***	***
2023 Q3	***	***	***	***
2023 Q4	***	***	***	***
2024 Q1	***	***	***	***
2024 Q2	***	***	***	***
2024 Q3	***	***	***	***
2024 Q4	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Product 3: Monocrystalline silicon bifacial module that generates power on both sides of the panel with a front-side area of greater than or equal to 1.9 square meters and a peak power wattage between 320w and 450w, inclusive, P-max or Wp as measured under STC.

Figure G.3 CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 3, by source and quarter

Price of product 3

* * * * *

Volume of product 3

* * * * *

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Product 3: Monocrystalline silicon bifacial module that generates power on both sides of the panel with a front-side area of greater than or equal to 1.9 square meters and a peak power wattage between 320w and 450w, inclusive, P-max or Wp as measured under STC.

Table G.4 CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 4, by source and quarter

Price in dollars per kilowatt, quantity in kilowatts

Period	U.S. price	U.S. quantity	South Korea price	South Korea quantity
2022 Q1	***	***	***	***
2022 Q2	***	***	***	***
2022 Q3	***	***	***	***
2022 Q4	***	***	***	***
2023 Q1	***	***	***	***
2023 Q2	***	***	***	***
2023 Q3	***	***	***	***
2023 Q4	***	***	***	***
2024 Q1	***	***	***	***
2024 Q2	***	***	***	***
2024 Q3	***	***	***	***
2024 Q4	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Product 4: Monocrystalline silicon bifacial module that generates power on both sides of the panel with front-side area of greater than or equal to 1.9 square meters and a peak power wattage greater than or equal to 485w, inclusive, P-max or Wp as measured under STC.

Figure G.4 CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 4, by source and quarter

Price of product 4

* * * * *

Volume of product 4

* * * * *

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Product 4: Monocrystalline silicon bifacial module that generates power on both sides of the panel with front-side area of greater than or equal to 1.9 square meters and a peak power wattage greater than or equal to 485w, inclusive, P-max or Wp as measured under STC.

Table G.5 CSPV modules: Summary of higher/(lower) unit values for nonsubject price data, by source

Quantity in kilowatts

Comparison source	Benchmark source	Number of quarters lower	Quantity lower	Number of quarters higher	Quantity higher
South Korea	United States	***	***	***	***
South Korea	Cambodia	***	***	***	***
South Korea	Malaysia	***	***	***	***
South Korea	Thailand	***	***	***	***
South Korea	Vietnam	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

APPENDIX H

ALTERNATE SUBJECT IMPORTS PRICE DATA

U.S. importers were asked to separately report data for imports from Cambodia, Malaysia, Thailand, and Vietnam that were imported under Commerce’s Appendix IV certification and for which they requested the Commission treat as “nonsubject” imports. Importers Astronergy, BYD, Canadian (USA), Trina (U.S.), and Zhongli reported price data for CSPV modules imported under an Appendix IV certification. Price and quantity data for CSPV modules from subject sources, with data for imports under Commerce’s Appendix IV certification removed, are shown in tables H.1 to H.4 and in figures H.1 to H.4. A summary of these price data is shown in table H.5 and price comparisons by product, source, and period are shown in tables H.6 through H.8.

Table H.1 CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 1, and margins of underselling/(overselling), by source and quarter

Quantity in kilowatts; prices in dollars per kilowatt; margins in percent

Period	U.S. price	U.S. quantity	Cambodia price	Cambodia quantity	Cambodia margin	Malaysia price	Malaysia quantity	Malaysia margin
2022 Q1	***	***	***	***	***	***	***	***
2022 Q2	***	***	***	***	***	***	***	***
2022 Q3	***	***	***	***	***	***	***	***
2022 Q4	***	***	***	***	***	***	***	***
2023 Q1	***	***	***	***	***	***	***	***
2023 Q2	***	***	***	***	***	***	***	***
2023 Q3	***	***	***	***	***	***	***	***
2023 Q4	***	***	***	***	***	***	***	***
2024 Q1	***	***	***	***	***	***	***	***
2024 Q2	***	***	***	***	***	***	***	***
2024 Q3	***	***	***	***	***	***	***	***
2024 Q4	***	***	***	***	***	***	***	***

Table continued.

Table H.1 Continued CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 1, and margins of underselling/(overselling), by source and quarter

Quantity in kilowatts; prices in dollars per kilowatt; margins in percent

Period	U.S. price	U.S. quantity	Thailand price	Thailand quantity	Thailand margin	Vietnam price	Vietnam quantity	Vietnam margin
2022 Q1	***	***	***	***	***	***	***	***
2022 Q2	***	***	***	***	***	***	***	***
2022 Q3	***	***	***	***	***	***	***	***
2022 Q4	***	***	***	***	***	***	***	***
2023 Q1	***	***	***	***	***	***	***	***
2023 Q2	***	***	***	***	***	***	***	***
2023 Q3	***	***	***	***	***	***	***	***
2023 Q4	***	***	***	***	***	***	***	***
2024 Q1	***	***	***	***	***	***	***	***
2024 Q2	***	***	***	***	***	***	***	***
2024 Q3	***	***	***	***	***	***	***	***
2024 Q4	***	***	***	***	***	***	***	***

Table continued.

Table H.1 Continued CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 1, and margins of underselling/(overselling), by source and quarter

Quantity in kilowatts; prices in dollars per kilowatt; margins in percent

Period	U.S. price	U.S. quantity	Subject price	Subject quantity	Subject margin
2022 Q1	***	***	***	***	***
2022 Q2	***	***	***	***	***
2022 Q3	***	***	***	***	***
2022 Q4	***	***	***	***	***
2023 Q1	***	***	***	***	***
2023 Q2	***	***	***	***	***
2023 Q3	***	***	***	***	***
2023 Q4	***	***	***	***	***
2024 Q1	***	***	***	***	***
2024 Q2	***	***	***	***	***
2024 Q3	***	***	***	***	***
2024 Q4	***	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Product 1: Monocrystalline silicon module with front-side area of less than 2.2 square meters and a peak power wattage between 380w and 450w, inclusive, P-max or Wp as measured under Standard Test Conditions (STC), excluding bifacial modules.

Figure H.1 CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 1, by source and quarter

Price of product 1

* * * * *

Volume of product 1

* * * * *

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Product 1: Monocrystalline silicon module with front-side area of less than 2.2 square meters and a peak power wattage between 380w and 450w, inclusive, P-max or Wp as measured under Standard Test Conditions (STC), excluding bifacial modules.

Table H.2 CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 2, and margins of underselling/(overselling), by source and quarter

Quantity in kilowatts; prices in dollars per kilowatt; margins in percent

Period	U.S. price	U.S. quantity	Cambodia price	Cambodia quantity	Cambodia margin	Malaysia price	Malaysia quantity	Malaysia margin
2022 Q1	***	***	***	***	***	***	***	***
2022 Q2	***	***	***	***	***	***	***	***
2022 Q3	***	***	***	***	***	***	***	***
2022 Q4	***	***	***	***	***	***	***	***
2023 Q1	***	***	***	***	***	***	***	***
2023 Q2	***	***	***	***	***	***	***	***
2023 Q3	***	***	***	***	***	***	***	***
2023 Q4	***	***	***	***	***	***	***	***
2024 Q1	***	***	***	***	***	***	***	***
2024 Q2	***	***	***	***	***	***	***	***
2024 Q3	***	***	***	***	***	***	***	***
2024 Q4	***	***	***	***	***	***	***	***

Table continued.

Table H.2 Continued CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 2, and margins of underselling/(overselling), by source and quarter

Quantity in kilowatts; prices in dollars per kilowatt; margins in percent

Period	U.S. price	U.S. quantity	Thailand price	Thailand quantity	Thailand margin	Vietnam price	Vietnam quantity	Vietnam margin
2022 Q1	***	***	***	***	***	***	***	***
2022 Q2	***	***	***	***	***	***	***	***
2022 Q3	***	***	***	***	***	***	***	***
2022 Q4	***	***	***	***	***	***	***	***
2023 Q1	***	***	***	***	***	***	***	***
2023 Q2	***	***	***	***	***	***	***	***
2023 Q3	***	***	***	***	***	***	***	***
2023 Q4	***	***	***	***	***	***	***	***
2024 Q1	***	***	***	***	***	***	***	***
2024 Q2	***	***	***	***	***	***	***	***
2024 Q3	***	***	***	***	***	***	***	***
2024 Q4	***	***	***	***	***	***	***	***

Table continued.

Table H.2 Continued CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 2, and margins of underselling/(overselling), by source and quarter

Quantity in kilowatts; prices in dollars per kilowatt; margins in percent

Period	U.S. price	U.S. quantity	Subject price	Subject quantity	Subject margin
2022 Q1	***	***	***	***	***
2022 Q2	***	***	***	***	***
2022 Q3	***	***	***	***	***
2022 Q4	***	***	***	***	***
2023 Q1	***	***	***	***	***
2023 Q2	***	***	***	***	***
2023 Q3	***	***	***	***	***
2023 Q4	***	***	***	***	***
2024 Q1	***	***	***	***	***
2024 Q2	***	***	***	***	***
2024 Q3	***	***	***	***	***
2024 Q4	***	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Product 2: Monocrystalline silicon module with front-side area of greater than or equal to 2.2 square meters and a peak power wattage between 320w and 440w, inclusive, P-max or Wp as measured under STC, excluding bifacial modules.

Figure H.2 CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 2, by source and quarter

Price of product 2

* * * * *

Volume of product 2

* * * * *

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Product 2: Monocrystalline silicon module with front-side area of greater than or equal to 2.2 square meters and a peak power wattage between 320w and 440w, inclusive, P-max or Wp as measured under STC, excluding bifacial modules.

Table H.3 CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 3, and margins of underselling/(overselling), by source and quarter

Quantity in kilowatts; prices in dollars per kilowatt; margins in percent

Period	U.S. price	U.S. quantity	Cambodia price	Cambodia quantity	Cambodia margin	Malaysia price	Malaysia quantity	Malaysia margin
2022 Q1	***	***	***	***	***	***	***	***
2022 Q2	***	***	***	***	***	***	***	***
2022 Q3	***	***	***	***	***	***	***	***
2022 Q4	***	***	***	***	***	***	***	***
2023 Q1	***	***	***	***	***	***	***	***
2023 Q2	***	***	***	***	***	***	***	***
2023 Q3	***	***	***	***	***	***	***	***
2023 Q4	***	***	***	***	***	***	***	***
2024 Q1	***	***	***	***	***	***	***	***
2024 Q2	***	***	***	***	***	***	***	***
2024 Q3	***	***	***	***	***	***	***	***
2024 Q4	***	***	***	***	***	***	***	***

Table continued.

Table H.3 Continued CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 3, and margins of underselling/(overselling), by source and quarter

Quantity in kilowatts; prices in dollars per kilowatt; margins in percent

Period	U.S. price	U.S. quantity	Thailand price	Thailand quantity	Thailand margin	Vietnam price	Vietnam quantity	Vietnam margin
2022 Q1	***	***	***	***	***	***	***	***
2022 Q2	***	***	***	***	***	***	***	***
2022 Q3	***	***	***	***	***	***	***	***
2022 Q4	***	***	***	***	***	***	***	***
2023 Q1	***	***	***	***	***	***	***	***
2023 Q2	***	***	***	***	***	***	***	***
2023 Q3	***	***	***	***	***	***	***	***
2023 Q4	***	***	***	***	***	***	***	***
2024 Q1	***	***	***	***	***	***	***	***
2024 Q2	***	***	***	***	***	***	***	***
2024 Q3	***	***	***	***	***	***	***	***
2024 Q4	***	***	***	***	***	***	***	***

Table continued.

Table H.3 Continued CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 3, and margins of underselling/(overselling), by source and quarter

Quantity in kilowatts; prices in dollars per kilowatt; margins in percent

Period	U.S. price	U.S. quantity	Subject price	Subject quantity	Subject margin
2022 Q1	***	***	***	***	***
2022 Q2	***	***	***	***	***
2022 Q3	***	***	***	***	***
2022 Q4	***	***	***	***	***
2023 Q1	***	***	***	***	***
2023 Q2	***	***	***	***	***
2023 Q3	***	***	***	***	***
2023 Q4	***	***	***	***	***
2024 Q1	***	***	***	***	***
2024 Q2	***	***	***	***	***
2024 Q3	***	***	***	***	***
2024 Q4	***	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Product 3: Monocrystalline silicon bifacial module that generates power on both sides of the panel with a front-side area of greater than or equal to 1.9 square meters and a peak power wattage between 320w and 450w, inclusive, P-max or Wp as measured under STC.

Figure H.3 CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 3, and margins of underselling/(overselling), by source and quarter

Price of product 3

* * * * *

Volume of product 3

* * * * *

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Product 3: Monocrystalline silicon bifacial module that generates power on both sides of the panel with a front-side area of greater than or equal to 1.9 square meters and a peak power wattage between 320w and 450w, inclusive, P-max or Wp as measured under STC.

Table H.4 CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 4, and margins of underselling/(overselling), by source and quarter

Quantity in kilowatts; prices in dollars per kilowatt; margins in percent

Period	U.S. price	U.S. quantity	Cambodia price	Cambodia quantity	Cambodia margin	Malaysia price	Malaysia quantity	Malaysia margin
2022 Q1	***	***	***	***	***	***	***	***
2022 Q2	***	***	***	***	***	***	***	***
2022 Q3	***	***	***	***	***	***	***	***
2022 Q4	***	***	***	***	***	***	***	***
2023 Q1	***	***	***	***	***	***	***	***
2023 Q2	***	***	***	***	***	***	***	***
2023 Q3	***	***	***	***	***	***	***	***
2023 Q4	***	***	***	***	***	***	***	***
2024 Q1	***	***	***	***	***	***	***	***
2024 Q2	***	***	***	***	***	***	***	***
2024 Q3	***	***	***	***	***	***	***	***
2024 Q4	***	***	***	***	***	***	***	***

Table continued.

Table H.4 Continued CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 4, and margins of underselling/(overselling), by source and quarter

Quantity in kilowatts; prices in dollars per kilowatt; margins in percent

Period	U.S. price	U.S. quantity	Thailand price	Thailand quantity	Thailand margin	Vietnam price	Vietnam quantity	Vietnam margin
2022 Q1	***	***	***	***	***	***	***	***
2022 Q2	***	***	***	***	***	***	***	***
2022 Q3	***	***	***	***	***	***	***	***
2022 Q4	***	***	***	***	***	***	***	***
2023 Q1	***	***	***	***	***	***	***	***
2023 Q2	***	***	***	***	***	***	***	***
2023 Q3	***	***	***	***	***	***	***	***
2023 Q4	***	***	***	***	***	***	***	***
2024 Q1	***	***	***	***	***	***	***	***
2024 Q2	***	***	***	***	***	***	***	***
2024 Q3	***	***	***	***	***	***	***	***
2024 Q4	***	***	***	***	***	***	***	***

Table continued.

Table H.4 Continued CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 4, and margins of underselling/(overselling), by source and quarter

Quantity in kilowatts; prices in dollars per kilowatt; margins in percent

Period	U.S. price	U.S. quantity	Subject price	Subject quantity	Subject margin
2022 Q1	***	***	***	***	***
2022 Q2	***	***	***	***	***
2022 Q3	***	***	***	***	***
2022 Q4	***	***	***	***	***
2023 Q1	***	***	***	***	***
2023 Q2	***	***	***	***	***
2023 Q3	***	***	***	***	***
2023 Q4	***	***	***	***	***
2024 Q1	***	***	***	***	***
2024 Q2	***	***	***	***	***
2024 Q3	***	***	***	***	***
2024 Q4	***	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Product 4: Monocrystalline silicon bifacial module that generates power on both sides of the panel with front-side area of greater than or equal to 1.9 square meters and a peak power wattage greater than or equal to 485w, inclusive, P-max or Wp as measured under STC.

Figure H.4 CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 4, by source and quarter

Price of product 4

* * * * *

Volume of product 4

* * * * *

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Product 4: Monocrystalline silicon bifacial module that generates power on both sides of the panel with front-side area of greater than or equal to 1.9 square meters and a peak power wattage greater than or equal to 485w, inclusive, P-max or Wp as measured under STC.

Table H.5 CSPV modules: Summary of price data, by product and source

Prices in dollars per kilowatt; quantity in kilowatts; change in percent

Product	Source	Number of quarters	Quantity	Low price	High price	First quarter price	Last quarter price	Change over period
Product 1	United States	12	***	***	***	***	***	***
Product 1	Cambodia	8	***	***	***	***	***	***
Product 1	Malaysia	12	***	***	***	***	***	***
Product 1	Thailand	8	***	***	***	***	***	***
Product 1	Vietnam	12	***	***	***	***	***	***
Product 2	United States	10	***	***	***	***	***	***
Product 2	Cambodia	—	***	***	***	***	***	***
Product 2	Malaysia	5	***	***	***	***	***	***
Product 2	Thailand	2	***	***	***	***	***	***
Product 2	Vietnam	4	***	***	***	***	***	***
Product 3	United States	12	***	***	***	***	***	***
Product 3	Cambodia	—	***	***	***	***	***	***
Product 3	Malaysia	9	***	***	***	***	***	***
Product 3	Thailand	2	***	***	***	***	***	***
Product 3	Vietnam	11	***	***	***	***	***	***
Product 4	United States	7	***	***	***	***	***	***
Product 4	Cambodia	12	***	***	***	***	***	***
Product 4	Malaysia	11	***	***	***	***	***	***
Product 4	Thailand	11	***	***	***	***	***	***
Product 4	Vietnam	12	***	***	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Zeroes, null values, and undefined calculations are suppressed and shown as “—”. Percent change is the change from the first quarter to the last quarter of the data collection period.

Table H.6 CSPV modules: Instances and quantities of underselling/overselling and the range and average of margins, by product

Quantity in kilowatts; margins in percent

Products	Aggregation	Type	Number of instances	Quantity	Average margin	Min margin	Max margin
Product 1	Subject sources	Underselling	38	***	***	***	***
Product 2	Subject sources	Underselling	8	***	***	***	***
Product 3	Subject sources	Underselling	18	***	***	***	***
Product 4	Subject sources	Underselling	9	***	***	***	***
All products	Subject sources	Underselling	73	***	***	***	***
Product 1	Subject sources	Overselling	2	***	***	***	***
Product 2	Subject sources	Overselling	—	***	***	***	***
Product 3	Subject sources	Overselling	4	***	***	***	***
Product 4	Subject sources	Overselling	19	***	***	***	***
All products	Subject sources	Overselling	25	***	***	***	***
Product 1	Subject sources less Cambodia and Thailand	Underselling	24	***	***	***	***
Product 2	Subject sources less Cambodia and Thailand	Underselling	7	***	***	***	***
Product 3	Subject sources less Cambodia and Thailand	Underselling	16	***	***	***	***
Product 4	Subject sources less Cambodia and Thailand	Underselling	4	***	***	***	***
All products	Subject sources less Cambodia and Thailand	Underselling	51	***	***	***	***
Product 1	Subject sources less Cambodia and Thailand	Overselling	—	***	***	***	***
Product 2	Subject sources less Cambodia and Thailand	Overselling	—	***	***	***	***
Product 3	Subject sources less Cambodia and Thailand	Overselling	4	***	***	***	***
Product 4	Subject sources less Cambodia and Thailand	Overselling	10	***	***	***	***
All products	Subject sources less Cambodia and Thailand	Overselling	14	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Zeroes, null values, and undefined calculations are suppressed and shown as “—”.

Table H.7 CSPV modules: Instances and quantities of underselling/overselling and the range and average of margins, by source

Quantity in kilowatts; margins in percent

Sources	Type	Number of instances	Quantity	Average margin	Min margin	Max margin
Cambodia	Underselling	10	***	***	***	***
Malaysia	Underselling	27	***	***	***	***
Thailand	Underselling	12	***	***	***	***
Vietnam	Underselling	24	***	***	***	***
All subject sources	Underselling	73	***	***	***	***
All subject sources less Cambodia and Thailand	Underselling	51	***	***	***	***
Cambodia	Overselling	5	***	***	***	***
Malaysia	Overselling	6	***	***	***	***
Thailand	Overselling	6	***	***	***	***
Vietnam	Overselling	8	***	***	***	***
All subject sources	Overselling	25	***	***	***	***
All subject sources less Cambodia and Thailand	Overselling	14	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Zeroes, null values, and undefined calculations are suppressed and shown as “—”.

Table H.8 CSPV modules: Instances and quantities of underselling/overselling and the range and average of margins, by period

Quantity in kilowatts; margins in percent

Period	Aggregation	Type	Number of instances	Quantity	Average margin	Min margin	Max margin
2022	Subject sources	Underselling	32	***	***	***	***
2023	Subject sources	Underselling	23	***	***	***	***
2024	Subject sources	Underselling	18	***	***	***	***
All periods	Subject sources	Underselling	73	***	***	***	***
2022	Subject sources	Overselling	3	***	***	***	***
2023	Subject sources	Overselling	5	***	***	***	***
2024	Subject sources	Overselling	17	***	***	***	***
All periods	Subject sources	Overselling	25	***	***	***	***
2022	Subject sources less Cambodia and Thailand	Underselling	21	***	***	***	***
2023	Subject sources less Cambodia and Thailand	Underselling	15	***	***	***	***
2024	Subject sources less Cambodia and Thailand	Underselling	15	***	***	***	***
All periods	Subject sources less Cambodia and Thailand	Underselling	51	***	***	***	***
2022	Subject sources less Cambodia and Thailand	Overselling	1	***	***	***	***
2023	Subject sources less Cambodia and Thailand	Overselling	4	***	***	***	***
2024	Subject sources less Cambodia and Thailand	Overselling	9	***	***	***	***
All periods	Subject sources less Cambodia and Thailand	Overselling	14	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Zeroes, null values, and undefined calculations are suppressed and shown as “—”.

APPENDIX I

ALTERNATE NONSUBJECT PRICE DATA

Price and quantity data for imports from South Korea and imports from Cambodia, Malaysia, Thailand, and Vietnam imported under Commerce’s Appendix IV certification are shown in tables I.1 to I.4 and in figures I.1 to I.4. A summary of these price data is shown in table I.5.

Table I.1 CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 1, by source and quarter

Price in dollars per kilowatt, quantity in kilowatts.

Period	U.S. price	U.S. quantity	Cambodia, appendix IV price	Cambodia, appendix IV quantity	Thailand, appendix IV price	Thailand, appendix IV quantity	Vietnam, appendix IV price	Vietnam, appendix IV quantity
2022 Q1	***	***	***	***	***	***	***	***
2022 Q2	***	***	***	***	***	***	***	***
2022 Q3	***	***	***	***	***	***	***	***
2022 Q4	***	***	***	***	***	***	***	***
2023 Q1	***	***	***	***	***	***	***	***
2023 Q2	***	***	***	***	***	***	***	***
2023 Q3	***	***	***	***	***	***	***	***
2023 Q4	***	***	***	***	***	***	***	***
2024 Q1	***	***	***	***	***	***	***	***
2024 Q2	***	***	***	***	***	***	***	***
2024 Q3	***	***	***	***	***	***	***	***
2024 Q4	***	***	***	***	***	***	***	***

Table continued.

Table I.1 Continued CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 1, by source and quarter

Price in dollars per kilowatt, quantity in kilowatts.

Period	U.S. price	U.S. quantity	Appendix IV sources price	Appendix IV sources quantity	South Korea price	South Korea quantity
2022 Q1	***	***	***	***	***	***
2022 Q2	***	***	***	***	***	***
2022 Q3	***	***	***	***	***	***
2022 Q4	***	***	***	***	***	***
2023 Q1	***	***	***	***	***	***
2023 Q2	***	***	***	***	***	***
2023 Q3	***	***	***	***	***	***
2023 Q4	***	***	***	***	***	***
2024 Q1	***	***	***	***	***	***
2024 Q2	***	***	***	***	***	***
2024 Q3	***	***	***	***	***	***
2024 Q4	***	***	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Product 1: Monocrystalline silicon module with front-side area of less than 2.2 square meters and a peak power wattage between 380w and 450w, inclusive, P-max or Wp as measured under Standard Test Conditions (STC), excluding bifacial modules.

Figure I.1 Product: Weighted-average prices and quantities of domestic and imported product 1, by source and quarter

Price of product 1

* * * * *

Volume of product 1

* * * * *

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Product 1: Monocrystalline silicon module with front-side area of less than 2.2 square meters and a peak power wattage between 380w and 450w, inclusive, P-max or Wp as measured under Standard Test Conditions (STC), excluding bifacial modules.

Table I.2 CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 2, by source and quarter

Price in dollars per kilowatt, quantity in kilowatts.

Period	U.S. price	U.S. quantity	Cambodia, appendix IV price	Cambodia, appendix IV quantity	Thailand, appendix IV price	Thailand, appendix IV quantity	Vietnam, appendix IV price	Vietnam, appendix IV quantity
2022 Q1	***	***	***	***	***	***	***	***
2022 Q2	***	***	***	***	***	***	***	***
2022 Q3	***	***	***	***	***	***	***	***
2022 Q4	***	***	***	***	***	***	***	***
2023 Q1	***	***	***	***	***	***	***	***
2023 Q2	***	***	***	***	***	***	***	***
2023 Q3	***	***	***	***	***	***	***	***
2023 Q4	***	***	***	***	***	***	***	***
2024 Q1	***	***	***	***	***	***	***	***
2024 Q2	***	***	***	***	***	***	***	***
2024 Q3	***	***	***	***	***	***	***	***
2024 Q4	***	***	***	***	***	***	***	***

Table continued.

Table I.2 Continued CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 2, by source and quarter

Price in dollars per kilowatt, quantity in kilowatts.

Period	U.S. price	U.S. quantity	Appendix IV sources price	Appendix IV sources quantity	South Korea price	South Korea quantity
2022 Q1	***	***	***	***	***	***
2022 Q2	***	***	***	***	***	***
2022 Q3	***	***	***	***	***	***
2022 Q4	***	***	***	***	***	***
2023 Q1	***	***	***	***	***	***
2023 Q2	***	***	***	***	***	***
2023 Q3	***	***	***	***	***	***
2023 Q4	***	***	***	***	***	***
2024 Q1	***	***	***	***	***	***
2024 Q2	***	***	***	***	***	***
2024 Q3	***	***	***	***	***	***
2024 Q4	***	***	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Product 2: Monocrystalline silicon module with front-side area of greater than or equal to 2.2 square meters and a peak power wattage between 320w and 440w, inclusive, P-max or Wp as measured under STC, excluding bifacial modules.

Figure I.2 Product: Weighted-average prices and quantities of domestic and imported product 2, by source and quarter

Price of product 2

* * * * *

Volume of product 2

* * * * *

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Product 2: Monocrystalline silicon module with front-side area of greater than or equal to 2.2 square meters and a peak power wattage between 320w and 440w, inclusive, P-max or Wp as measured under STC, excluding bifacial modules.

Table I.3 CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 3, by source and quarter

Price in dollars per kilowatt, quantity in kilowatts.

Period	U.S. price	U.S. quantity	Cambodia, appendix IV price	Cambodia, appendix IV quantity	Thailand, appendix IV price	Thailand, appendix IV quantity	Vietnam, appendix IV price	Vietnam, appendix IV quantity
2022 Q1	***	***	***	***	***	***	***	***
2022 Q2	***	***	***	***	***	***	***	***
2022 Q3	***	***	***	***	***	***	***	***
2022 Q4	***	***	***	***	***	***	***	***
2023 Q1	***	***	***	***	***	***	***	***
2023 Q2	***	***	***	***	***	***	***	***
2023 Q3	***	***	***	***	***	***	***	***
2023 Q4	***	***	***	***	***	***	***	***
2024 Q1	***	***	***	***	***	***	***	***
2024 Q2	***	***	***	***	***	***	***	***
2024 Q3	***	***	***	***	***	***	***	***
2024 Q4	***	***	***	***	***	***	***	***

Table continued.

Table I.3 Continued CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 3, by source and quarter

Price in dollars per kilowatt, quantity in kilowatts.

Period	U.S. price	U.S. quantity	Appendix IV sources price	Appendix IV sources quantity	South Korea price	South Korea quantity
2022 Q1	***	***	***	***	***	***
2022 Q2	***	***	***	***	***	***
2022 Q3	***	***	***	***	***	***
2022 Q4	***	***	***	***	***	***
2023 Q1	***	***	***	***	***	***
2023 Q2	***	***	***	***	***	***
2023 Q3	***	***	***	***	***	***
2023 Q4	***	***	***	***	***	***
2024 Q1	***	***	***	***	***	***
2024 Q2	***	***	***	***	***	***
2024 Q3	***	***	***	***	***	***
2024 Q4	***	***	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Product 3: Monocrystalline silicon bifacial module that generates power on both sides of the panel with a front-side area of greater than or equal to 1.9 square meters and a peak power wattage between 320w and 450w, inclusive, P-max or Wp as measured under STC.

Figure I.3 Product: Weighted-average prices and quantities of domestic and imported product 3, by source and quarter

Price of product 3

* * * * *

Volume of product 3

* * * * *

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Product 3: Monocrystalline silicon bifacial module that generates power on both sides of the panel with a front-side area of greater than or equal to 1.9 square meters and a peak power wattage between 320w and 450w, inclusive, P-max or Wp as measured under STC.

Table I.4 CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 4, by source and quarter

Price in dollars per kilowatt, quantity in kilowatts.

Period	U.S. price	U.S. quantity	Cambodia, appendix IV price	Cambodia, appendix IV quantity	Thailand, appendix IV price	Thailand, appendix IV quantity	Vietnam, appendix IV price	Vietnam, appendix IV quantity
2022 Q1	***	***	***	***	***	***	***	***
2022 Q2	***	***	***	***	***	***	***	***
2022 Q3	***	***	***	***	***	***	***	***
2022 Q4	***	***	***	***	***	***	***	***
2023 Q1	***	***	***	***	***	***	***	***
2023 Q2	***	***	***	***	***	***	***	***
2023 Q3	***	***	***	***	***	***	***	***
2023 Q4	***	***	***	***	***	***	***	***
2024 Q1	***	***	***	***	***	***	***	***
2024 Q2	***	***	***	***	***	***	***	***
2024 Q3	***	***	***	***	***	***	***	***
2024 Q4	***	***	***	***	***	***	***	***

Table continued.

Table I.4 Continued CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 4, by source and quarter

Price in dollars per kilowatt, quantity in kilowatts.

Period	U.S. price	U.S. quantity	Appendix IV sources price	Appendix IV sources quantity	South Korea price	South Korea quantity
2022 Q1	***	***	***	***	***	***
2022 Q2	***	***	***	***	***	***
2022 Q3	***	***	***	***	***	***
2022 Q4	***	***	***	***	***	***
2023 Q1	***	***	***	***	***	***
2023 Q2	***	***	***	***	***	***
2023 Q3	***	***	***	***	***	***
2023 Q4	***	***	***	***	***	***
2024 Q1	***	***	***	***	***	***
2024 Q2	***	***	***	***	***	***
2024 Q3	***	***	***	***	***	***
2024 Q4	***	***	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Product 4: Monocrystalline silicon bifacial module that generates power on both sides of the panel with front-side area of greater than or equal to 1.9 square meters and a peak power wattage greater than or equal to 485w, inclusive, P-max or Wp as measured under STC.

Figure I.4 Product: Weighted-average prices and quantities of domestic and imported product 4, by source and quarter

Price of product 4

* * * * *

Volume of product 4

* * * * *

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Product 4: Monocrystalline silicon bifacial module that generates power on both sides of the panel with front-side area of greater than or equal to 1.9 square meters and a peak power wattage greater than or equal to 485w, inclusive, P-max or Wp as measured under STC.

Table I.5 CSPV modules: Summary of higher/(lower) unit values, by source

Quantity in kilowatts

Comparison source	Benchmark source	Number of quarters lower	Quantity lower	Number of quarters higher	Quantity higher
Cambodia, appendix IV	United States	***	***	***	***
Cambodia, appendix IV	Cambodia	***	***	***	***
Cambodia, appendix IV	Malaysia	***	***	***	***
Cambodia, appendix IV	Thailand	***	***	***	***
Cambodia, appendix IV	Vietnam	***	***	***	***
Thailand, appendix IV	United States	***	***	***	***
Thailand, appendix IV	Cambodia	***	***	***	***
Thailand, appendix IV	Malaysia	***	***	***	***
Thailand, appendix IV	Thailand	***	***	***	***
Thailand, appendix IV	Vietnam	***	***	***	***
Vietnam, appendix IV	United States	***	***	***	***
Vietnam, appendix IV	Cambodia	***	***	***	***
Vietnam, appendix IV	Malaysia	***	***	***	***
Vietnam, appendix IV	Thailand	***	***	***	***
Vietnam, appendix IV	Vietnam	***	***	***	***
Appendix IV sources	United States	***	***	***	***
Appendix IV sources	Cambodia	***	***	***	***
Appendix IV sources	Malaysia	***	***	***	***
Appendix IV sources	Thailand	***	***	***	***
Appendix IV sources	Vietnam	***	***	***	***
South Korea	United States	***	***	***	***
South Korea	Cambodia	***	***	***	***
South Korea	Malaysia	***	***	***	***
South Korea	Thailand	***	***	***	***
South Korea	Vietnam	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

APPENDIX J

FINANCIAL RESULTS OF U.S. CSPV CELL AND MODULE INDUSTRIES

Table J.1 CSPV cells: U.S. producer Suniva's results of operations, by item and period

Quantity in kilowatts; value in 1,000 dollars; ratios in percent

Item	Measure	2022	2023	2024
Total net sales	Quantity	***	***	***
Total net sales	Value	***	***	***
COGS: Raw materials	Value	***	***	***
COGS: Direct labor	Value	***	***	***
COGS: Other factory	Value	***	***	***
COGS: Total	Value	***	***	***
Gross profit or (loss)	Value	***	***	***
SG&A expenses	Value	***	***	***
Operating income or (loss)	Value	***	***	***
Interest expense	Value	***	***	***
All other expenses	Value	***	***	***
45X MPTC/IRA income	Value	***	***	***
All other income	Value	***	***	***
Net income or (loss)	Value	***	***	***
Depreciation/amortization	Value	***	***	***
Cash flow	Value	***	***	***
COGS: Raw materials	Ratio to NS	***	***	***
COGS: Direct labor	Ratio to NS	***	***	***
COGS: Other factory	Ratio to NS	***	***	***
COGS: Total	Ratio to NS	***	***	***
Gross profit	Ratio to NS	***	***	***
SG&A expense	Ratio to NS	***	***	***
Operating income or (loss)	Ratio to NS	***	***	***
Net income or (loss)	Ratio to NS	***	***	***

Table continued.

Table J.1 (Continued) CSPV cells: U.S. producer Suniva's results of operations, by item and period

Shares in percent; unit values in dollars per kilowatt; count in number of firms reporting

Item	Measure	2022	2023	2024
COGS: Raw materials	Share	***	***	***
COGS: Direct labor	Share	***	***	***
COGS: Other factory	Share	***	***	***
COGS: Total	Share	—	—	100.0
Total net sales	Unit value	***	***	***
COGS: Raw materials	Unit value	***	***	***
COGS: Direct labor	Unit value	***	***	***
COGS: Other factory	Unit value	***	***	***
COGS: Total	Unit value	***	***	***
Gross profit or (loss)	Unit value	***	***	***
SG&A expenses	Unit value	***	***	***
Operating income or (loss)	Unit value	***	***	***
Net income or (loss)	Unit value	***	***	***
Operating losses	Count	0	0	***
Net losses	Count	0	0	***
Data	Count	0	0	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Shares represent the share of COGS. Zeroes, null values, and undefined calculations are suppressed and shown as “—”.

Table J.2 CSPV cells: Analysis of U.S. producer Suniva's breakeven point based on its experience in 2024

Quantity in kilowatts; Unit values in dollars per kilowatt

Item	Data
Quantity, actual	***
AUVs, actual	***
Per unit variable operating costs	***
Per unit fixed operating costs	***
Per unit variable and fixed operating costs	***
Total fixed costs	***
Per unit sales AUV minus per unit variable costs	***
Breakeven point based on 2024	Not calculable

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Because Suniva's per unit variable costs exceed its per unit net sales values, there is no breakeven point based on its year-to-date 2024 financial performance.

Table J.3 CSPV modules: U.S. producers' results of operations, by item and period

Quantity in kilowatts; value in 1,000 dollars; ratios in percent

Item	Measure	2022	2023	2024
Total net sales	Quantity	***	***	***
Total net sales	Value	***	***	***
COGS: Raw materials	Value	***	***	***
COGS: Direct labor	Value	***	***	***
COGS: Other factory	Value	***	***	***
COGS: Total	Value	***	***	***
Gross profit or (loss)	Value	***	***	***
SG&A expenses	Value	***	***	***
Operating income or (loss)	Value	***	***	***
Interest expense	Value	***	***	***
All other expenses	Value	***	***	***
45X MPTC/IRA income	Value	***	***	***
All other income	Value	***	***	***
Net income or (loss)	Value	***	***	***
Depreciation/amortization	Value	***	***	***
Cash flow	Value	***	***	***
COGS: Raw materials	Ratio to NS	***	***	***
COGS: Direct labor	Ratio to NS	***	***	***
COGS: Other factory	Ratio to NS	***	***	***
COGS: Total	Ratio to NS	***	***	***
Gross profit	Ratio to NS	***	***	***
SG&A expense	Ratio to NS	***	***	***
Operating income or (loss)	Ratio to NS	***	***	***
Net income or (loss)	Ratio to NS	***	***	***

Table continued.

Table J.3 (Continued) CSPV modules: U.S. producers' results of operations, by item and period

Shares in percent; unit values in dollars per kilowatt; count in number of firms reporting

Item	Measure	2022	2023	2024
COGS: Raw materials	Share	***	***	***
COGS: Direct labor	Share	***	***	***
COGS: Other factory	Share	***	***	***
COGS: Total	Share	100.0	100.0	100.0
Total net sales	Unit value	***	***	***
COGS: Raw materials	Unit value	***	***	***
COGS: Direct labor	Unit value	***	***	***
COGS: Other factory	Unit value	***	***	***
COGS: Total	Unit value	***	***	***
Gross profit or (loss)	Unit value	***	***	***
SG&A expenses	Unit value	***	***	***
Operating income or (loss)	Unit value	***	***	***
Net income or (loss)	Unit value	***	***	***
Operating losses	Count	5	9	13
Net losses	Count	5	7	9
Data	Count	9	10	14

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Shares represent the share of COGS. Zeroes, null values, and undefined calculations are suppressed and shown as “—”.

Table J.4 CSPV modules: Changes in AUVs between comparison periods

Changes in percent

Item	2022–24	2022–23	2023–24
Total net sales	▼ ***	▼ ***	▼ ***
COGS: Raw materials	▼ ***	▼ ***	▼ ***
COGS: Direct labor	▼ ***	▼ ***	▼ ***
COGS: Other factory	▼ ***	▼ ***	▼ ***
COGS: Total	▼ ***	▼ ***	▼ ***

Table continued.

Table J.4 (Continued) CSPV modules: Changes in AUVs between comparison periods

Changes in dollars per kilowatt

Item	2022–24	2022–23	2023–24
Total net sales	▼ ***	▼ ***	▼ ***
COGS: Raw materials	▼ ***	▼ ***	▼ ***
COGS: Direct labor	▼ ***	▼ ***	▼ ***
COGS: Other factory	▼ ***	▼ ***	▼ ***
COGS: Total	▼ ***	▼ ***	▼ ***
Gross profit or (loss)	▼ ***	▼ ***	▼ ***
SG&A expense	▼ ***	▲ ***	▼ ***
Operating income or (loss)	▼ ***	▼ ***	▲ ***
Net income or (loss)	▲ ***	▲ ***	▲ ***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Percentages and unit values shown as “0.0” or “0.00” represent values greater than zero, but less than “0.05” or “0.005,” respectively. Period changes preceded by a “▲” represent an increase, while period changes preceded by a “▼” represent a decrease.

APPENDIX K

SELECTED FINANCIAL RESULTS OF U.S. CSPV MODULE PRODUCERS BASED ON

PRIMARY SOURCE OF CELL INPUTS

Table K.1 CSPV modules: U.S. producers' results of operations based on primary source of cells inputs, by item and period

Quantity in kilowatts; value in 1,000 dollars; ratios in percent

Source of cell inputs	Item	Measure	2022	2023	2024
Primarily subject	Total net sales	Quantity	***	***	***
Primarily subject	Total net sales	Value	***	***	***
Primarily subject	COGS	Value	***	***	***
Primarily subject	Gross income/(loss)	Value	***	***	***
Primarily subject	SG&A expenses	Value	***	***	***
Primarily subject	Operating income/(loss)	Value	***	***	***
Primarily subject	COGS	Ratio	***	***	***
Primarily subject	SG&A expenses	Ratio	***	***	***
Primarily subject	Operating income/(loss)	Ratio	***	***	***
Primarily nonsubject	Total net sales	Quantity	***	***	***
Primarily nonsubject	Total net sales	Value	***	***	***
Primarily nonsubject	COGS	Value	***	***	***
Primarily nonsubject	Gross income/(loss)	Value	***	***	***
Primarily nonsubject	SG&A expenses	Value	***	***	***
Primarily nonsubject	Operating income/(loss)	Value	***	***	***
Primarily nonsubject	COGS	Ratio	***	***	***
Primarily nonsubject	SG&A expenses	Ratio	***	***	***
Primarily nonsubject	Operating income/(loss)	Ratio	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Figure K.1 CSPV modules: U.S. producers' ratio of operating income or (loss) to net sales, by year and primary source of cell inputs

* * * * *

Source: Compiled from data submitted in response to Commission questionnaires.

APPENDIX L

SEMI-FINISHED PRODUCT ANALYSIS

Table L.1 CSPV cells and modules: U.S. producers' narrative responses regarding the semi-finished product analysis comparing CSPV cells to CSPV modules

Factor	Producer name and narrative regarding semi-finished product analysis
Other uses	***
Other uses	***
Other uses	***
Separate market	***
Separate market	***
Separate market	***
Separate market	***
Separate market	***
Separate market	***
Separate market	***

Factor	Producer name and narrative regarding semi-finished product analysis
Separate market	***
Separate market	***
Separate market	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***

Factor	Producer name and narrative regarding semi-finished product analysis
Differences in characteristics	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***

Factor	Producer name and narrative regarding semi-finished product analysis
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***

Source: Compiled from data submitted in response to Commission questionnaires.

Table L.2 CSPV cells and modules: U.S. importers' narrative responses regarding the semi-finished product analysis comparing CSPV cells to CSPV modules

Factor	Importer name and narrative regarding semi-finished product analysis
Other uses	***
Other uses	***
Other uses	***
Other uses	***
Other uses	***
Other uses	***
Other uses	***
Other uses	***
Other uses	***
Separate market	***
Separate market	***
Separate market	***
Separate market	***
Separate market	***
Separate market	***
Separate market	***
Separate market	***
Separate market	***
Separate market	***
Separate market	***

Factor	Producer name and narrative regarding semi-finished product analysis
Separate market	***
Separate market	***
Separate market	***
Separate market	***
Separate market	***
Separate market	***
Separate market	***
Separate market	***
Separate market	***
Separate market	***
Separate market	***
Separate market	***
Separate market	***
Separate market	***
Separate market	***
Separate market	***
Separate market	***
Separate market	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***

Factor	Producer name and narrative regarding semi-finished product analysis
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***

Factor	Producer name and narrative regarding semi-finished product analysis
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***

Factor	Producer name and narrative regarding semi-finished product analysis
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***

Factor	Producer name and narrative regarding semi-finished product analysis
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***

Factor	Producer name and narrative regarding semi-finished product analysis
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***

Factor	Producer name and narrative regarding semi-finished product analysis
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***

Source: Compiled from data submitted in response to Commission questionnaires.

Table L.3 CSPV cells and modules: U.S. purchasers' narrative responses regarding the semi-finished product analysis comparing CSPV cells to CSPV modules

Factor	Purchaser name and narrative regarding semi-finished product analysis
Separate market	***
Separate market	***
Separate market	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***

Factor	Producer name and narrative regarding semi-finished product analysis
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***

Source: Compiled from data submitted in response to Commission questionnaires.

APPENDIX M

**MODULES: U.S. PRODUCERS AND U.S. IMPORTERS U.S. SHIPMENTS IN EACH
CHANNEL**

Table M.1 CSPV modules: U.S. producers' and U.S. importers' U.S. shipments to distributors, by source and period

Quantity in kilowatts; Share and ratio in percent; Ratios are to CSPV modules overall apparent consumption as presented in table F.7

Source	Measure	2022	2023	2024
U.S. producers	Quantity	***	***	***
Cambodia	Quantity	***	***	***
Malaysia	Quantity	***	***	***
Thailand	Quantity	***	***	***
Vietnam	Quantity	***	***	***
Subject sources	Quantity	***	***	***
Subject sources less Cambodia	Quantity	***	***	***
Nonsubject sources	Quantity	***	***	***
Nonsubject sources plus Cambodia	Quantity	***	***	***
All import sources	Quantity	***	***	***
All sources	Quantity	***	***	***
U.S. producers	Share	***	***	***
Cambodia	Share	***	***	***
Malaysia	Share	***	***	***
Thailand	Share	***	***	***
Vietnam	Share	***	***	***
Subject sources	Share	***	***	***
Subject sources less Cambodia	Share	***	***	***
Nonsubject sources	Share	***	***	***
Nonsubject sources plus Cambodia	Share	***	***	***
All import sources	Share	***	***	***
All sources	Share	100.0	100.0	100.0
U.S. producers	Ratio	***	***	***
Cambodia	Ratio	***	***	***
Malaysia	Ratio	***	***	***
Thailand	Ratio	***	***	***
Vietnam	Ratio	***	***	***
Subject sources	Ratio	***	***	***
Subject sources less Cambodia	Ratio	***	***	***
Nonsubject sources	Ratio	***	***	***
Nonsubject sources plus Cambodia	Ratio	***	***	***
All import sources	Ratio	***	***	***
All sources	Ratio	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Data are not available from the proprietary, Census-edit Customs import records used for *** included table F.7 (overall module consumption), which is why the ratios across tables M.1 through M.5 for all sources do not sum to 100.0 percent.

Table M.2 CSPV modules: U.S. producers' and U.S. importers' U.S. shipments to module assemblers, by source and period

Quantity in kilowatts; Share and ratio in percent; Ratios are to CSPV modules overall apparent consumption as presented in table F.7

Source	Measure	2022	2023	2024
U.S. producers	Quantity	***	***	***
Cambodia	Quantity	***	***	***
Malaysia	Quantity	***	***	***
Thailand	Quantity	***	***	***
Vietnam	Quantity	***	***	***
Subject sources	Quantity	***	***	***
Subject sources less Cambodia	Quantity	***	***	***
Nonsubject sources	Quantity	***	***	***
Nonsubject sources plus Cambodia	Quantity	***	***	***
All import sources	Quantity	***	***	***
All sources	Quantity	***	***	***
U.S. producers	Share	***	***	***
Cambodia	Share	***	***	***
Malaysia	Share	***	***	***
Thailand	Share	***	***	***
Vietnam	Share	***	***	***
Subject sources	Share	***	***	***
Subject sources less Cambodia	Share	***	***	***
Nonsubject sources	Share	***	***	***
Nonsubject sources plus Cambodia	Share	***	***	***
All import sources	Share	***	***	***
All sources	Share	100.0	100.0	100.0
U.S. producers	Ratio	***	***	***
Cambodia	Ratio	***	***	***
Malaysia	Ratio	***	***	***
Thailand	Ratio	***	***	***
Vietnam	Ratio	***	***	***
Subject sources	Ratio	***	***	***
Subject sources less Cambodia	Ratio	***	***	***
Nonsubject sources	Ratio	***	***	***
Nonsubject sources plus Cambodia	Ratio	***	***	***
All import sources	Ratio	***	***	***
All sources	Ratio	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—". Data are not available from the proprietary, Census-edit Customs import records used for *** included table F.7 (overall module consumption), which is why the ratios across tables M.1 through M.5 for all sources do not sum to 100.0 percent.

Table M.3 CSPV modules: U.S. producers' and U.S. importers' U.S. shipments to residential installers, by source and period

Quantity in kilowatts; Share and ratio in percent; Ratios are to CSPV modules overall apparent consumption as presented in table F.7

Source	Measure	2022	2023	2024
U.S. producers	Quantity	***	***	***
Cambodia	Quantity	***	***	***
Malaysia	Quantity	***	***	***
Thailand	Quantity	***	***	***
Vietnam	Quantity	***	***	***
Subject sources	Quantity	***	***	***
Subject sources less Cambodia	Quantity	***	***	***
Nonsubject sources	Quantity	***	***	***
Nonsubject sources plus Cambodia	Quantity	***	***	***
All import sources	Quantity	***	***	***
All sources	Quantity	***	***	***
U.S. producers	Share	***	***	***
Cambodia	Share	***	***	***
Malaysia	Share	***	***	***
Thailand	Share	***	***	***
Vietnam	Share	***	***	***
Subject sources	Share	***	***	***
Subject sources less Cambodia	Share	***	***	***
Nonsubject sources	Share	***	***	***
Nonsubject sources plus Cambodia	Share	***	***	***
All import sources	Share	***	***	***
All sources	Share	100.0	100.0	100.0
U.S. producers	Ratio	***	***	***
Cambodia	Ratio	***	***	***
Malaysia	Ratio	***	***	***
Thailand	Ratio	***	***	***
Vietnam	Ratio	***	***	***
Subject sources	Ratio	***	***	***
Subject sources less Cambodia	Ratio	***	***	***
Nonsubject sources	Ratio	***	***	***
Nonsubject sources plus Cambodia	Ratio	***	***	***
All import sources	Ratio	***	***	***
All sources	Ratio	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—". Data are not available from the proprietary, Census-edit Customs import records used for *** included table F.7 (overall module consumption), which is why the ratios across tables M.1 through M.5 for all sources do not sum to 100.0 percent.

Table M.4 CSPV modules: U.S. producers' and U.S. importers' U.S. shipments to commercial installers, by source and period

Quantity in kilowatts; Share and ratio in percent; Ratios are to CSPV modules overall apparent consumption as presented in table F.7

Source	Measure	2022	2023	2024
U.S. producers	Quantity	***	***	***
Cambodia	Quantity	***	***	***
Malaysia	Quantity	***	***	***
Thailand	Quantity	***	***	***
Vietnam	Quantity	***	***	***
Subject sources	Quantity	***	***	***
Subject sources less Cambodia	Quantity	***	***	***
Nonsubject sources	Quantity	***	***	***
Nonsubject sources plus Cambodia	Quantity	***	***	***
All import sources	Quantity	***	***	***
All sources	Quantity	***	***	***
U.S. producers	Share	***	***	***
Cambodia	Share	***	***	***
Malaysia	Share	***	***	***
Thailand	Share	***	***	***
Vietnam	Share	***	***	***
Subject sources	Share	***	***	***
Subject sources less Cambodia	Share	***	***	***
Nonsubject sources	Share	***	***	***
Nonsubject sources plus Cambodia	Share	***	***	***
All import sources	Share	***	***	***
All sources	Share	100.0	100.0	100.0
U.S. producers	Ratio	***	***	***
Cambodia	Ratio	***	***	***
Malaysia	Ratio	***	***	***
Thailand	Ratio	***	***	***
Vietnam	Ratio	***	***	***
Subject sources	Ratio	***	***	***
Subject sources less Cambodia	Ratio	***	***	***
Nonsubject sources	Ratio	***	***	***
Nonsubject sources plus Cambodia	Ratio	***	***	***
All import sources	Ratio	***	***	***
All sources	Ratio	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Zeroes, null values, and undefined calculations are suppressed and shown as “—”. Data are not available from the proprietary, Census-edit Customs import records used for *** included table F.7 (overall module consumption), which is why the ratios across tables M.1 through M.5 for all sources do not sum to 100.0 percent.

Table M.5 CSPV modules: U.S. producers' and U.S. importers' U.S. shipments to utilities and developers, by source and period

Quantity in kilowatts; Share and ratio in percent; Ratios are to CSPV modules overall apparent consumption as presented in table F.7

Source	Measure	2022	2023	2024
U.S. producers	Quantity	***	***	***
Cambodia	Quantity	***	***	***
Malaysia	Quantity	***	***	***
Thailand	Quantity	***	***	***
Vietnam	Quantity	***	***	***
Subject sources	Quantity	***	***	***
Subject sources less Cambodia	Quantity	***	***	***
Nonsubject sources	Quantity	***	***	***
Nonsubject sources plus Cambodia	Quantity	***	***	***
All import sources	Quantity	***	***	***
All sources	Quantity	***	***	***
U.S. producers	Share	***	***	***
Cambodia	Share	***	***	***
Malaysia	Share	***	***	***
Thailand	Share	***	***	***
Vietnam	Share	***	***	***
Subject sources	Share	***	***	***
Subject sources less Cambodia	Share	***	***	***
Nonsubject sources	Share	***	***	***
Nonsubject sources plus Cambodia	Share	***	***	***
All import sources	Share	***	***	***
All sources	Share	100.0	100.0	100.0
U.S. producers	Ratio	***	***	***
Cambodia	Ratio	***	***	***
Malaysia	Ratio	***	***	***
Thailand	Ratio	***	***	***
Vietnam	Ratio	***	***	***
Subject sources	Ratio	***	***	***
Subject sources less Cambodia	Ratio	***	***	***
Nonsubject sources	Ratio	***	***	***
Nonsubject sources plus Cambodia	Ratio	***	***	***
All import sources	Ratio	***	***	***
All sources	Ratio	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Data are not available from the proprietary, Census-edit Customs import records used for *** included table F.7 (overall module consumption), which is why the ratios across tables M.1 through M.5 for all sources do not sum to 100.0 percent.