

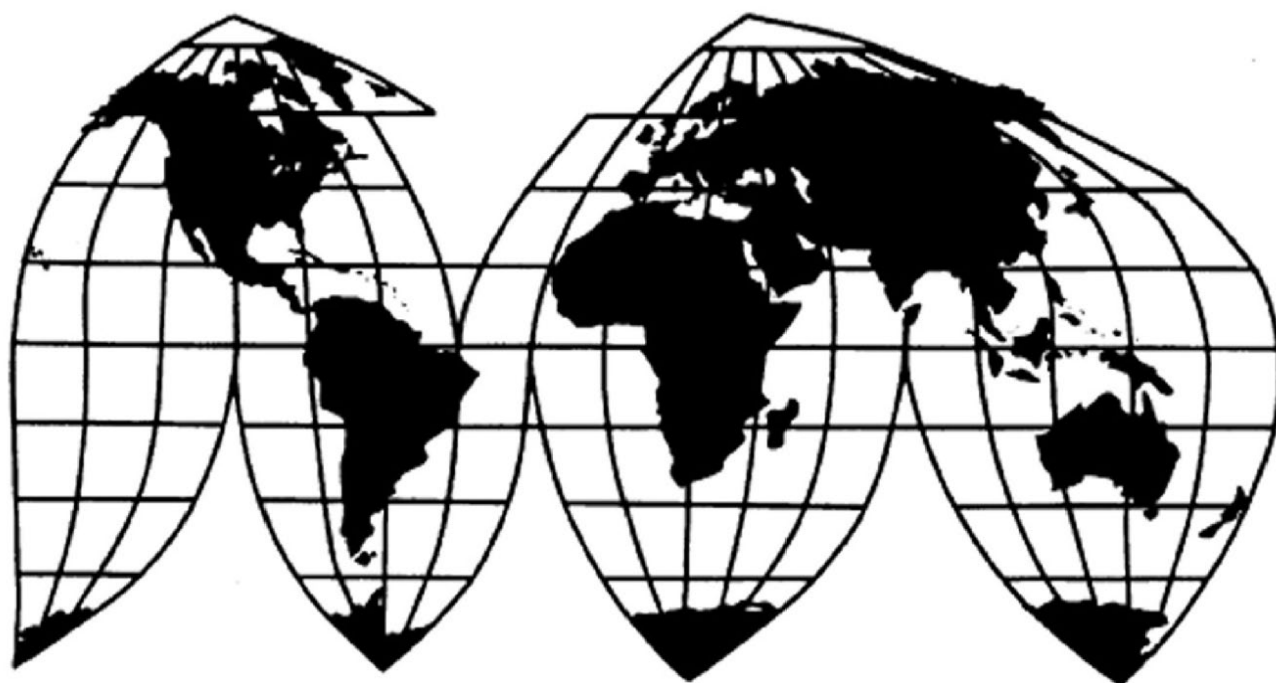
# **Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules from, Cambodia, Malaysia, Thailand, and Vietnam**

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

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**U.S. International Trade Commission**



# U.S. International Trade Commission

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# **U.S. International Trade Commission**

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Note.—Information that would reveal confidential operations of individual concerns may not be published. Such information is identified by brackets in confidential reports and is deleted and replaced with asterisks (\*\*\*) in public reports



## UNITED STATES INTERNATIONAL TRADE COMMISSION

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

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

### DETERMINATIONS

On the basis of the record<sup>1</sup> developed in the subject investigations, the United States International Trade Commission (“Commission”) determines, pursuant to the Tariff Act of 1930 (“the Act”), that there is a reasonable indication 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 Cambodia, Malaysia, Thailand, and Vietnam, provided for in subheadings 8501.71, 8501.72, and 8501.80 and statistical reporting number 8507.20.8010 of the Harmonized Tariff Schedule of the United States, that are alleged to be sold in the United States at less than fair value (“LTFV”) and subsidized by the governments of Malaysia, Thailand, and Vietnam, and that there is a reasonable indication that a U.S. industry is threatened with material injury by reason of imports of CSPV products from Cambodia that are alleged to be subsidized by the government of Cambodia.<sup>2</sup>

### COMMENCEMENT OF FINAL PHASE INVESTIGATIONS

Pursuant to section 207.18 of the Commission’s rules, the Commission also gives notice of the commencement of the final phase of its investigations. The Commission will issue a final phase notice of scheduling, which will be published in the *Federal Register* as provided in § 207.21 of the Commission’s rules, upon notice from the U.S. Department of Commerce (“Commerce”) of affirmative preliminary determinations in the investigations under §§ 703(b) or 733(b) of the Act, or, if the preliminary determinations are negative, upon notice of affirmative final determinations in those investigations under §§ 705(a) or 735(a) of the Act. Parties that filed entries of appearance in the preliminary phase of the investigations need not

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

<sup>2</sup> 89 FR 43809 and 89 FR 43816 (May 20, 2024).

enter a separate appearance for the final phase of the investigations. Any other party may file an entry of appearance for the final phase of the investigations after publication of the final phase notice of scheduling. Industrial users, and, if the merchandise under investigation is sold at the retail level, representative consumer organizations have the right to appear as parties in Commission antidumping and countervailing duty investigations. The Secretary will prepare a public service list containing the names and addresses of all persons, or their representatives, who are parties to the investigations. As provided in section 207.20 of the Commission's rules, the Director of the Office of Investigations will circulate draft questionnaires for the final phase of the investigations to parties to the investigations, placing copies on the Commission's Electronic Document Information System (EDIS, <https://edis.usitc.gov>), for comment.

## **BACKGROUND**

On April 24, 2024, the American Alliance for Solar Manufacturing Trade Committee filed petitions with the Commission and Commerce, alleging that an industry in the United States is materially injured or threatened with material injury by reason of subsidized imports of CSPV products from Cambodia, Malaysia, Thailand, and Vietnam and LTFV imports of CSPV products from Cambodia, Malaysia, Thailand, and Vietnam. Accordingly, effective April 24, 2024, the Commission instituted countervailing duty investigation Nos. 701-TA-722-725 and antidumping duty investigation Nos. 731-TA-1690-1693 (Preliminary).

Notice of the institution of the Commission's investigations and of a public conference 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* of April 30, 2024 (89 FR 34268). The Commission conducted its conference on May 15, 2024. All persons who requested the opportunity were permitted to participate.

## Views of the Commission

Based on the record in the preliminary phase of these investigations, we determine that there is a reasonable indication 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, from Cambodia, Malaysia, Thailand, and Vietnam, that are allegedly sold in the United States at less than fair value and subsidized by the governments of Malaysia, Thailand, and Vietnam. We also determine that there is a reasonable indication that an industry in the United States is threatened with material injury by reason of imports of the subject merchandise from Cambodia that are allegedly subsidized by the government of Cambodia.

### I. The Legal Standard for Preliminary Determinations

The legal standard for preliminary antidumping and countervailing duty determinations requires the Commission to determine, based upon the information available at the time of the preliminary determinations, whether there is a reasonable indication that a domestic industry is materially injured or threatened with material injury, or that the establishment of an industry is materially retarded, by reason of the allegedly unfairly traded imports.<sup>1</sup> In applying this standard, the Commission weighs the evidence before it and determines whether “(1) the record as a whole contains clear and convincing evidence that there is no material injury or threat of such injury; and (2) no likelihood exists that contrary evidence will arise in a final investigation.”<sup>2</sup>

### II. Background

**Parties to the Investigation.** 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

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<sup>1</sup> 19 U.S.C. §§ 1671b(a), 1673b(a) (2000); *see also American Lamb Co. v. United States*, 785 F.2d 994, 1001-04 (Fed. Cir. 1986); *Aristech Chem. Corp. v. United States*, 20 CIT 353, 354-55 (1996). No party argues that the establishment of an industry in the United States is materially retarded by the allegedly unfairly traded imports.

<sup>2</sup> *American Lamb Co.*, 785 F.2d at 1001; *see also Texas Crushed Stone Co. v. United States*, 35 F.3d 1535, 1543 (Fed. Cir. 1994).

not assembled into modules (“CSPV products”).<sup>3</sup> 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.<sup>4</sup> Representatives of Hanwha and Mission Solar, along with representatives of Convalt and Meyer Burger Americas (“Meyer Burger”),<sup>5</sup> appeared at the conference accompanied by counsel. Petitioner submitted a postconference brief.<sup>6</sup>

Several respondent entities participated in these investigations. Illuminate USA (“Illuminate”),<sup>7</sup> Canadian Solar US Module Manufacturing Corporation (“Canadian Solar”),<sup>8</sup> both U.S. producers of CSPV products, and BYD America LLC (“BYD”),<sup>9</sup> a U.S. importer of subject merchandise, appeared at the conference accompanied by counsel and submitted postconference briefs. Trina Solar US Manufacturing Module 1, LLC, a U.S. producer of CSPV products, appeared at the conference accompanied by counsel, and jointly submitted a postconference brief with Trina Solar Science & Technology (Thailand) Ltd., a foreign producer of subject merchandise, and Trina Solar Energy Development Company Limited, a U.S. importer of subject merchandise (collectively, “Trina”).<sup>10</sup> The American Clean Power Association (“ACP”), an industry association, appeared at the conference accompanied by counsel, and jointly submitted a postconference brief with an ACP member firm, Invenergy Solar Equipment Management LLC, a U.S. importer of subject merchandise.<sup>11</sup> NextEra Energy, Inc., a U.S. importer of subject merchandise, appeared at the conference through counsel.

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<sup>3</sup> Petition Volume I, EDIS Doc. 819498-2163476 (Apr. 24, 2024).

<sup>4</sup> See Petitioner’s Response to Supplemental Questions of the U.S. Department of Commerce (“Commerce”), May 7, 2024, at 1. When the petitions were filed, the Committee contained a fourth member, Convalt Energy (“Convalt”), a firm whose representative testified that it intends to begin production of CSPV products later in 2024. Petitions at Exh. I-1; Transcript of May 15, 2024 Staff Conference (“Conference Tr.”), EDIS Doc. 821750 at 34-35 (Achuthan). However, the petitioner amended the petitions to remove Convalt as a member of the Committee. Petitioner’s Amendment to the Petitions, May 9, 2024, at 1.

<sup>5</sup> A Meyer Burger representative testified that the firm produced its first American-made CSPV modules in its Goodyear, Arizona facility the week before the May 15, 2024, Commission staff conference. Conference Tr. at 30-31.

<sup>6</sup> Petitioner’s Postconference Brief, EDIS Doc. 821914 (May 20, 2024).

<sup>7</sup> Illuminate USA’s Postconference Brief, EDIS Doc. 821951 (May 20, 2024).

<sup>8</sup> Canadian Solar’s Postconference Brief, EDIS Doc. 821947 (May 20, 2024).

<sup>9</sup> BYD’s Postconference Brief, EDIS Doc. 821941 (May 20, 2024).

<sup>10</sup> Trina’s Postconference Brief, EDIS Doc. 821941 (May 20, 2024).

<sup>11</sup> ACP’s Postconference Brief, EDIS Doc. 821937 (May 20, 2024).

Several respondent parties that did not appear at the conference submitted postconference briefs. 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”), jointly submitted a postconference brief.<sup>12</sup> Crossroads Solar, a U.S. importer of subject merchandise, submitted a postconference letter.<sup>13</sup> The Solar Energy Industries Association (“SEIA”), an industry association, submitted a postconference brief.<sup>14</sup> Nonparty Runergy Alabama Inc. (“Runergy”) submitted postconference comments.<sup>15</sup>

**Data Coverage.** U.S. industry data are based on the questionnaire responses of 12 firms accounting for a large majority of U.S. production of CSPV modules in 2023.<sup>16</sup> U.S. import data are based on questionnaire responses from 46 U.S. importers, accounting for the majority of total imports in 2023, and representing \*\*\* percent of U.S. imports from Cambodia, \*\*\* percent of U.S. imports from Malaysia, \*\*\* percent of U.S. imports from Thailand, and \*\*\* percent of U.S. imports from Vietnam in 2023 that were reported under HTS subheadings 8541.40.6015, 8541.40.6025, 8541.40.6035, 8541.40.6045, 8541.42.0010 and 8541.43.0010, “basket” categories that also contain out-of-scope merchandise.<sup>17</sup>

The Commission received responses to its questionnaires from 24 foreign producers of subject merchandise: three producers/exporters in Cambodia, accounting for approximately \*\*\* percent of CSPV cell production and \*\*\* CSPV module production in Cambodia in 2023, and whose exports to the United States accounted for \*\*\* imports of subject merchandise from Cambodia in 2023; six producers/exporters in Malaysia, accounting for \*\*\* CSPV cell production and \*\*\* percent of CSPV module production in Malaysia in 2023, and whose exports to the United States accounted for \*\*\* percent of imports of subject merchandise from Malaysia in 2023; four producers/exporters in Thailand, accounting for approximately \*\*\*

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<sup>12</sup> Boviet’s Postconference Brief, EDIS Doc. 821944 (May 20, 2024).

<sup>13</sup> Letter from Crossroads Solar Enterprises, Inc., EDIS Doc. 821517 (May 15, 2024).

<sup>14</sup> SEIA’s Postconference Brief, EDIS Doc. 821940 (May 20, 2024).

<sup>15</sup> Runergy’s Postconference Comments, EDIS Doc. 821954 (May 20, 2024).

<sup>16</sup> Confidential Staff Report, INV-WW-057, EDIS Doc. 822850 (June 3, 2024), as revised by INV-WW-059, EDIS Doc. 823216 (June 7, 2024) (“CR”) and *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 Pub. 5517 (June 2024) (“PR”) at I-4, III-1. The Commission also received usable questionnaire responses from three firms, \*\*\*, that intend to start domestic production in 2024. CR/PR at I-4, n.7. Thus, the report presents data covering the twelve U.S. producers with reported production during 2021-2023, as well as narrative responses from fifteen U.S. producers, including the three U.S. producers with 2024 production plans. CR/PR at III-1 n.2. Financial data on the U.S. industry are based on the questionnaire response from 11 firms. CR/PR at VI-1.

<sup>17</sup> CR/PR at I-4, IV-1. As discussed below, import data used for calculating negligibility were also adjusted by Commission staff using proprietary, Census-adjusted Customs records. CR/PR at Table IV-5.

percent of CSPV cell production and \*\*\* percent of CSPV module production in Thailand in 2023, and whose exports to the United States accounted for \*\*\* imports of subject merchandise from Thailand in 2023; and 11 producers/exporters in Vietnam, accounting for \*\*\* CSPV cell and module production in 2023, and whose exports to the United States accounted for \*\*\* percent of imports of subject merchandise from Vietnam in 2023.<sup>18</sup>

### III. Domestic Like Product

In determining whether there is a reasonable indication that an industry in the United States is materially injured or threatened with material injury by reason of imports of the subject merchandise, the Commission first defines the “domestic like product” and the “industry.”<sup>19</sup> 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.”<sup>20</sup> 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.”<sup>21</sup>

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.<sup>22</sup> 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.”<sup>23</sup> The Commission then defines the domestic like product

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<sup>18</sup> CR/PR at VII-3. The exports to the United States of these 24 firms accounted for \*\*\* percent of total imports of subject merchandise in 2023. *Id.*

<sup>19</sup> 19 U.S.C. § 1677(4)(A).

<sup>20</sup> 19 U.S.C. § 1677(4)(A).

<sup>21</sup> 19 U.S.C. § 1677(10).

<sup>22</sup> 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).

<sup>23</sup> *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).

in light of the imported articles Commerce has identified.<sup>24</sup> 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 uses” on a case-by-case basis.<sup>25</sup> No single factor is dispositive, and the Commission may consider other factors it deems relevant based on the facts of a particular investigation.<sup>26</sup> The Commission looks for clear dividing lines among possible like products and disregards minor variations.<sup>27</sup> The Commission may, where appropriate, include domestic articles in the domestic like product in addition to those described in the scope.<sup>28</sup>

In its notice of initiation, Commerce defined the imported merchandise within the scope of these investigations as follows:

The merchandise covered by these investigations is crystalline silicon photovoltaic cells, and modules, laminates, and panels, consisting of crystalline silicon photovoltaic cells, whether or not partially or fully assembled into other

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<sup>24</sup> *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).

<sup>25</sup> See, e.g., *Cleo Inc. v. United States*, 501 F.3d 1291, 1299 (Fed. Cir. 2007); *NEC Corp. v. Dep’t 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).

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

<sup>27</sup> See, e.g., *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.”).

<sup>28</sup> See, e.g., *Pure Magnesium from China and Israel*, Inv. Nos. 701-TA-403 and 731-TA-895-96 (Final), USITC Pub. 3467 at 8 n.34 (Nov. 2001); *Torrington*, 747 F. Supp. at 748-49 (holding that the Commission is not legally required to limit the domestic like product to the product advocated by the petitioner, co-extensive with the scope).

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 mm<sup>2</sup> 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 mm<sup>2</sup> to 33,782 mm<sup>2</sup> 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 cm<sup>2</sup> 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 cm<sup>2</sup> 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 (cm<sup>2</sup>) 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 cm<sup>2</sup> 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 (cm<sup>2</sup>) per panel; (C) include a keep-out area of approximately 1,200 cm<sup>2</sup> 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.

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).

Merchandise covered by the investigations is currently classified in the Harmonized Tariff System of the United States (HTSUS) under subheadings 8541.42.0010 and 8541.43.0010. Imports of the subject merchandise may enter under HTSUS subheadings 8501.71.0000, 8501.72.1000, 8501.72.2000, 8501.72.3000, 8501.72.9000, 8501.80.1000, 8501.80.2000, 8501.80.3000, 8501.80.9000, 8507.20.8010, 8507.20.8031, 8507.20.8041, 8507.20.8061, and 8507.20.8091. These HTSUS subheadings are provided for convenience and customs purposes; the written description of the scope of the investigations is dispositive.<sup>29</sup>

#### **A. Comparison to Scopes in Prior CSPV Investigations**

Commerce issued antidumping and countervailing duty orders on imports of CSPV products from China in 2012 (hereinafter, the “CSPV I orders”), following affirmative final determinations by Commerce and the Commission.<sup>30</sup> In the first reviews, after Commerce and the Commission issued affirmative determinations, Commerce issued a notice continuing the CSPV I orders in 2019.<sup>31</sup> On February 1, 2024, the Commission instituted the second five-year

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<sup>29</sup> *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*, 89 Fed. Reg. 43809, 43815-43816 (May 20, 2024) (“AD Initiation Notice”); *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*, 89 Fed. Reg. 43816, 43821 (May 20, 2024) (“CVD Initiation Notice”). The scopes of the antidumping and countervailing duty investigations are identical.

<sup>30</sup> 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 (Dec. 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 (Dec. 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).

<sup>31</sup> *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From the People's Republic of China: Continuation of Countervailing Duty Order*, 84 Fed. Reg. 10299 (March 20, 2019); *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From the People's* (Continued...)

reviews of the CSPV I orders, and on May 6, 2024, the Commission determined to conduct expedited reviews of these orders.<sup>32</sup>

The first five paragraphs of the current scope are identical in substance to the first five paragraphs in the scope of the original CSPV I orders. The sixth paragraph in the current scope was not in the scope of the original CSPV I orders, but was in the scope of the 2019 notices of continuation of the CSPV I orders after the first reviews of those orders. The two paragraphs in the current scope just prior to the final paragraph that lists the relevant HTSUS subheadings are new. The first of these, providing the rules of origin for the scope, states that modules, laminates, and panels produced in a third country from cells produced in a subject country are covered by the investigations, but modules, laminates, and panels produced in a subject country from cells produced in a third country are not covered by the investigations. The second of these paragraphs relates to Commerce's anticircumvention proceeding, described below.

Following the filing of a circumvention petition by Auxin Solar Inc. ("Auxin"), Commerce initiated an investigation on April 1, 2022, to determine whether imports of solar products completed in Cambodia, Malaysia, Thailand, or Vietnam using parts and components from China were circumventing the CSPV I orders. Commerce's Federal Register notice stated that it was directing U.S. Customs and Border Protection ("CBP") to apply the cash deposit rate to imports from these countries that would be applicable if the products were determined to be covered by the scope of the CSPV I orders on China.<sup>33</sup>

On June 6, 2022, before Commerce made a preliminary determination in the proceeding, President Biden issued a proclamation declaring an emergency and authorizing the Secretary of Commerce to take action to permit, for up to 24 months, imports of CSPV products from Cambodia, Malaysia, Thailand, and Vietnam to be free of any antidumping or

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*Republic of China: Continuation of Antidumping Duty Order*, 84 Fed. Reg. 10300 (Mar. 20, 2019); *Crystalline Silicon Photovoltaic Cells and Modules from China*, Inv. Nos. 701-TA-481 and 731-TA-1190 (Review), USITC Pub. 4874 (Mar. 2019).

<sup>32</sup> *Crystalline Silicon Photovoltaic Cells and Modules from China; Institution of Five-Year Reviews*, 89 Fed. Reg. 6550 (Feb. 1, 2024); see Explanation of Commission Determination on Adequacy (EDIS Doc. No. 822189).

<sup>33</sup> *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).

countervailing duties from the anticircumvention proceeding (the “tariff holiday”).<sup>34</sup> In September 2022, the Department of Commerce issued a final rule specifying procedures to implement this proclamation, which directed CBP to discontinue the collection of cash deposits that had begun on initiation of the circumvention proceeding.<sup>35</sup> Commerce continued its circumvention proceeding, and issued preliminary determinations on December 8, 2022.<sup>36</sup>

Effective August 23, 2023, Commerce made final affirmative determinations of circumvention with respect to imports from Cambodia, Malaysia, Thailand, and Vietnam.<sup>37</sup> Commerce’s Federal Register notice for its final determinations provided that it would not require cash deposits for entries subject to the circumvention proceeding for the duration of the emergency declared by President Biden, so long as those imports occurred on or before the end of the emergency period and the imports were assembled into U.S. solar energy products within 180 days thereafter. Commerce also provided a certification mechanism for firms to demonstrate that particular merchandise was not subject to the circumvention requirements.<sup>38</sup>

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<sup>34</sup> *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).

<sup>35</sup> *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).

<sup>36</sup> 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 CSPV I orders on 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, 75227 (Dec. 8, 2022); see also Department of Commerce Memorandum from James Maeder to Lisa W. Wang, December 1, 2022, *Antidumping and Countervailing Duty Orders on Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, from the People’s Republic of China: Preliminary Decision Memorandum for the Circumvention Inquiry With Respect to the Kingdom of Cambodia*, at 46-48 (EDIS Doc. No. 823105).

<sup>37</sup> *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).

<sup>38</sup> *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, 57421-57423 (Aug. 23, 2023). 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 (Continued...)

The two-year tariff holiday ended as scheduled on June 6, 2024, and producers that had been found to be circumventing the CSPV I orders on China are thereafter subject to duties under those orders.<sup>39</sup>

In its final circumvention determinations, Commerce stated that its circumvention inquiries covered (1) with respect to cells, CSPV cells within the scope of the underlying CSPV I orders that were produced in Cambodia, Malaysia, Thailand, and Vietnam from wafers produced in China, and (2) with respect to CSPV modules, laminates, and panels, imports from Cambodia, Malaysia and Thailand, and Vietnam from wafers produced in China where more than two of the following six components in the module, laminate, or panel were produced in China: (1) silver paste; (2) aluminum frames; (3) glass; (4) backsheets; (5) ethylene vinyl acetate sheets; and (6) junction boxes. Commerce stated that if the “wafer-plus-three” requirement listed above was not satisfied, then the modules were not subject to the circumvention inquiry, even if they contained cells produced in one of the subject countries from wafers produced in China.<sup>40</sup>

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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 by importers or exporters of circumventing merchandise to indicate compliance with the terms of the tariff holiday proclamation. *Id.* at 57425-57433.

<sup>39</sup> White House Fact Sheet, May 16, 2024 (EDIS Doc. No. 823129).

<sup>40</sup> See *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 (Aug. 23, 2023); *Antidumping and Countervailing Duty Orders on Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, from the People’s Republic of China: Issues and Decision Memorandum for the Circumvention Inquiry With Respect to the Kingdom of Cambodia*, at 104-112 (EDIS Document No. 823133) (“Cambodia Circumvention Final Decision Memo”). In its final determination, Commerce found that five companies were circumventing the CSPV I 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. Commerce stated that individual investigated companies New East Solar (Cambodia) and Vina Solar (Vietnam) had refused to participate in verification, and thus were subject to use of adverse facts available, as were firms that failed to timely respond to Commerce’s questionnaire. Department of Commerce Press Release, “Department of Commerce Issues Final Determination of Circumvention Inquiries of Solar Cells and Modules from China,” August 18, 2023 (EDIS Document No. 823103); *Antidumping and Countervailing Duty Orders on Crystalline Silicon Photovoltaic Cells, Whether or Not* (Continued...)

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 determination that they were circumventing the CSPV I orders on China. Thus, the non-circumventing imports from the four subject countries are subject to these investigations, but the circumventing imports are not.

In the Commission’s U.S. importer questionnaire in these investigations, rather than requesting importers to characterize their imports from the four subject countries as “circumventing” or “not circumventing,” the Commission asked them to report imports subject to the circumvention determination using Commerce’s definition in its final determination of the merchandise covered by its circumvention inquiry. Thus, the questionnaire specified that the following imports should be reported as coming from “all other sources” rather than from any of the subject countries: (1) imports of CSPV cells meeting the scope description that were produced in Cambodia, Malaysia, Thailand, and/or Vietnam from wafers produced in China; and (2) imports of CSPV modules consisting of CSPV cells that were produced in Cambodia, Malaysia, Thailand, and/or Vietnam from wafers produced in China and where more than two of the following components in the module were produced in China: (a) silver paste; (b) aluminum frames; (c) glass; (d) backsheets; (e) ethylene vinyl acetate sheets; and/or (f) junction boxes.<sup>41</sup>

## **B. 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. There are four main market segments: residential, non-residential, and utility on-grid applications, and off-grid applications.<sup>42</sup> Off-grid solar products are excluded from the scope of these investigations.

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*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); see also Cambodia Circumvention Final Decision Memo at 46-48.

<sup>41</sup> See Blank U.S. Importer Questionnaire at Page 10 (EDIS Doc. No. 819860).

<sup>42</sup> CR/PR at I-13 and I-21.

CSPV cells use either monocrystalline or multicrystalline silicon to convert sunlight to electricity and may be fully square or slightly rounded.<sup>43</sup> 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.<sup>44</sup> 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.<sup>45</sup>

CSPV modules consist of CSPV cells that are soldered together, placed on a matrix, and laminated.<sup>46</sup> The laminate is then typically framed in aluminum and attached to one or more junction boxes.<sup>47</sup> CSPV modules can be used in both ground-mounted and rooftop mounted systems, both on and off the electrical grid. 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.<sup>48</sup> The most common on-grid CSPV modules have 60 cells (or 120 half-cut cells) or 72 cells (or 144 half-cut cells).<sup>49</sup>

Out-of-scope thin-film solar modules are manufactured by depositing thin layers of photovoltaic semiconductor materials, usually cadmium telluride and copperindium-(gallium)-diselenide, onto a backing material like stainless steel, glass, or plastic. Thin-film modules

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<sup>43</sup> CR/PR at I-13. 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 I-19. Conversion efficiency is the percent of sunlight that is converted to electricity. CR/PR at I-19, n.2. The record in these investigations shows that producers have shifted away from manufacturing multicrystalline cells and \*\*\* percent of commercial shipments during the POI were monocrystalline cells. CR/PR at VII-32.

Monocrystalline and multicrystalline cells commonly use Passive Emitter Rear Contact (“PERC”) or other heterojunction technologies, such as Passivated Emitter Totally Diffused (“PERT”) and Passivated Emitter Rear Locally Diffused (“PERL”). CR/PR at I-15. Monocrystalline cells can either be p-type or n-type, with n-type CSPV cells typically being more expensive to produce, but also having higher conversion efficiencies. CR/PR at I-20.

<sup>44</sup> CR/PR at I-14. Wafers are produced in common sizes, ranging from 156 to 210 mm in side length. See CR/PR at Table I-3.

<sup>45</sup> CR/PR at I-15.

<sup>46</sup> CR/PR at I-29.

<sup>47</sup> CR/PR at I-21.

<sup>48</sup> Some domestic producers of CSPV products have reported that monofacial and bifacial modules have reached cost parity. CR/PR at I-18. At the staff conference, witnesses from domestic producers testified that producing bifacial cells is similar in cost to producing monofacial cells and that some producers have begun sourcing bifacial cells for use in monofacial modules. See Conf. Tr. at 122-23 (Martens); Conf. Tr. 233-34 (Wagner).

<sup>49</sup> CR/PR at I-22. Half-cut cells result in lower cell current, which reduces power losses and increases cell efficiency and overall module output. CR/PR at I-20.



historically have had lower production costs than CSPV modules but also have lower conversion efficiencies.<sup>50</sup>

### C. Arguments of the Parties

*Petitioner's Argument.* Petitioner argues that the Commission should apply its semi-finished products analysis and define a single domestic like product, consisting of CSPV cells and modules, coextensive with the scope of these investigations.<sup>51</sup> It asserts that in prior proceedings involving similar products, the Commission has defined CSPV cells and downstream CSPV modules as a single domestic like product.<sup>52</sup> Petitioner argues that there have been no changes to the product or market that would warrant a different result in these investigations.

*Respondents' Argument.* Canadian Solar and Illuminate USA urge the Commission to define CSPV cells and CSPV modules as separate domestic like products.<sup>53</sup> Using the Commission's semi-finished like product analysis, Illuminate and Canadian Solar argue that CSPV cells have different end uses, markets, functions, and values as compared to CSPV modules, and that the assembly of CSPV cells into modules is a complex process that requires substantial investment.<sup>54</sup> Canadian Solar also argues that even if the Commission applies the traditional six-factor analysis, it should define two separate domestic like products.<sup>55</sup>

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<sup>50</sup> CR/PR at I-29-I-30.

<sup>51</sup> Petitioner's Postconference Brief at 3. Petitioner also argues that the Commission should find that out-of-scope thin film solar modules are not within the domestic like product for these investigations. No respondent party has argued that the Commission should define the domestic like product to include thin-film solar modules.

<sup>52</sup> Petitioner's Postconference Brief, Responses to Staff Questions at 2. *See Crystalline Silicon Photovoltaic Cells and Modules from China*, Inv. Nos. 701-TA-481 and 731-TA-1190 (Final), USITC Pub. 4360 (Nov. 2012) ("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, 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, USITC Pub. 5112 (Aug. 2020) (Review) at 8-9.

<sup>53</sup> Canadian Solar's Postconference Brief, Responses to Staff Questions at 3-4. ACP supports Illuminate's argument that the Commission should define two domestic like products. ACP's Postconference Brief at 15.

<sup>54</sup> Canadian Solar's Postconference Brief at 9; Illuminate Postconference Brief at 14.

<sup>55</sup> Canadian Solar's Postconference Brief, Responses to Staff Questions at 10, n.40.

#### D. Analysis and Conclusion

As an initial matter, only those articles domestically produced may be defined as a separate domestic like product, and there was no domestic production of CSPV cells during the 2021 to 2023 period of investigation (“POI”).<sup>56</sup> 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.<sup>57</sup>

No party has identified a domestically produced product which is most similar to imported CSPV cells. Based on the record in these preliminary phase investigations, we find that the domestically produced article most similar to imported CSPV cells to be domestically produced CSPV modules. CSPV modules possess characteristics and uses most similar to those of imported CSPV cells in that both are produced from polysilicon wafers and are used in CSPV systems to convert sunlight into usable electricity.<sup>58</sup> Based on the following analysis, we define a single domestic like product consisting of all domestically produced CSPV products within the scope of the investigations, which at present consist of CSPV modules.

*Physical Characteristics and Uses.* All CSPV modules are assembled groups of CSPV cells that are connected and laminated and covered with glass or other materials to protect the cells and facilitate electricity generation.<sup>59</sup> CSPV modules have a junction box that can be connected to other modules, an inverter, or in the case of off-grid modules, a battery and charge controller.<sup>60</sup> CSPV modules can be used in the off-grid market segment, or in the three on-grid market segments (residential, nonresidential, and utility).<sup>61</sup> CSPV modules differ based on size, whether they are monofacial or bifacial, and on the technology of the cells used to assemble the modules.<sup>62</sup> The most common on-grid CSPV modules have 60 cells or 72 cells.<sup>63</sup>

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<sup>56</sup> See CR/PR at I-3.

<sup>57</sup> 19 U.S.C. § 1677(10); see *Mattresses from Cambodia, China, Indonesia, Malaysia, Serbia, Thailand, Turkey, and Vietnam*, Inv. Nos. 701-TA-645 and 731-TA-1495-1501 (Final), USITC Pub. 5191 (May 2021) at 12; *Large Residential Washers from China*, Inv. No. 731-TA-1306 (Preliminary), USITC Pub. 4591 (Feb. 2016) at 10.

<sup>58</sup> CR/PR at I-13.

<sup>59</sup> CR/PR at I-20-I-21.

<sup>60</sup> CR/PR at I-21.

<sup>61</sup> CR/PR at I-21.

<sup>62</sup> CR/PR at I-17, I-19-I-20.

*Manufacturing Facilities, Production Processes and Employees.* Although the extent of automation and labor involved in the module assembly process varies depending on the company, the record shows that all domestically produced CSPV modules undergo a similar assembly process.<sup>64</sup> CSPV module assembly consists of CSPV cells that are soldered together, placed on a matrix, and laminated.<sup>65</sup> The laminate is then typically framed in aluminum and attached to one or more junction boxes.<sup>66</sup> The record also indicates that certain domestic producers manufacture multiple types of CSPV modules in the same manufacturing facilities using the same production processes and employees.<sup>67</sup>

*Channels of Distribution.* The record indicates that domestic producers sold CSPV modules mainly to distributors and installers, but also to utility customers.<sup>68</sup> Industry witness testimony and exhibits submitted with parties' postconference briefs indicate that larger 72-cell bifacial modules are primarily sold in the utility segment,<sup>69</sup> and smaller 60-cell monofacial panels are primarily sold in the residential segment.<sup>70</sup> In 2023, \*\*\* percent of U.S. producers' shipments were 60-cell modules, \*\*\* percent were 72-cell modules, and \*\*\* percent were "other" sizes.<sup>71</sup> Some domestic producers report that bifacial modules are sold in all three segments of the on-grid market.<sup>72</sup>

*Interchangeability.* CSPV modules vary in their interchangeability depending on size, whether they are monofacial or bifacial, and by the junction technology of the cells assembled into the module.<sup>73</sup> The utility segment generally requires the larger 72-cell, bifacial modules because they can capture sunlight on both sides of the module and have greater power

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<sup>63</sup> CR/PR at I-22.

<sup>64</sup> See CR/PR at I-29.

<sup>65</sup> CR/PR at I-29.

<sup>66</sup> CR/PR at I-21.

<sup>67</sup> See Conference Tr. at 89 (Martens) ("\*\*\*he changeover period from . . . a utility to a residential module, it would be a matter of hours to shift a production line over.").

<sup>68</sup> CR/PR at II-3.

<sup>69</sup> See Conference Tr. at 236 (Wagner); see also U.S. Department of Energy, "Solar Futures Study" (Sept. 2021) at 124 (attached to ACP's Postconference Brief as Exhibit 22).

<sup>70</sup> See Conference Tr. at 75 (Martens).

<sup>71</sup> CR/PR at Table IV-6.

<sup>72</sup> See Conference Tr. at 74 (Moskowitz); 88-89 (Martens).

<sup>73</sup> Industry witnesses testified that all CSPV cells are bifacial. See Conference Tr. at 75 (Martens), 234 (Wagner). Thus, producers use bifacial cells to assemble both monofacial and bifacial panels. See Conference Tr. at 234 (Wagner).

generation capability.<sup>74</sup> The residential utility segment generally requires smaller, 60-cell, monofacial modules because of high conversion efficiency and because they are better for use on rooftops.<sup>75</sup> However, the record indicates that bifacial modules are interchangeable with monofacial modules in residential applications.<sup>76</sup>

*Producer and Customer Perceptions.* The record shows that some market participants view modules sold in the utility segment as different than modules sold in the residential segment.<sup>77</sup> However, industry witnesses also testified that all CSPV modules are functionally the same, with variations in size and bifaciality.<sup>78</sup> Thus, the record in these preliminary investigations generally indicates that CSPV modules, whether 60-cell or 72-cell, and monofacial or bifacial, belong to a family of products.

*Price.* The pricing data for the preliminary phase of these investigations are based on four pricing products, all of which are CSPV modules.<sup>79</sup> Two of the pricing products are monofacial modules and two are bifacial modules.<sup>80</sup> These data show that domestically produced modules vary in price depending on wattage, and whether they are bifacial and monofacial modules, but fall within a similar range.<sup>81</sup> Monofacial modules tend to have lower production costs, and thus lower prices,<sup>82</sup> although some industry witnesses testified that

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<sup>74</sup> See ACP's Postconference Brief at 24; see Conference Tr. at 231 (Nelson). ACP argues that 60-cell modules and monofacial modules used in the residential and commercial segments are not interchangeable with 72-cell modules and bifacial modules used primarily in the utility segment. ACP's Postconference Brief at 24-26.

<sup>75</sup> See Conference Tr. at 75 (Martens), at 234-35 (Wagner); ACP's Postconference Brief at 24.

<sup>76</sup> See Conference Tr. at 74 (Moskowitz) ("We see the use of bifacial panels, though, on all market segments now, including the residential market, which is outside of its use case as a result of that exclusion.").

<sup>77</sup> See Conference Tr. at 231; see also ACP's Public Witness Testimony, EDIS Doc. 821394 (May 14, 2024), at 3.

<sup>78</sup> See Conference Tr. at 88 (Moskowitz) ("There's very little to differentiate a panel that is sold between one segment and the other. They are technologically the same. The only difference would be either whether that panel is monofacial or bifacial, which just depends on does it have aluminum or a clear back sheet or glass and the size of the panel.").

<sup>79</sup> CR/PR at V-9.

<sup>80</sup> CR/PR at V-9.

<sup>81</sup> CR/PR at Tables V-6-V-9, Figure I-6.

<sup>82</sup> See CR/PR at Figure I-6. In 2019, the National Renewable Energy Laboratory reported variations in the manufacturing costs of modules based on whether they are monofacial or bifacial, and on the type of cell used in the module. See *id.* Manufacturing costs were generally lower for monofacial modules with PERC cells, and higher for bifacial modules with PERT or PERL cells. *Id.*

monofacial modules and bifacial modules are moving towards or have already reached cost parity.<sup>83</sup>

*Conclusion.*<sup>84</sup> The record in the preliminary phase of these investigations indicates that all domestically produced CSPV modules have similar physical characteristics and end uses, and are often produced in the same manufacturing facilities using the same production processes and employees. The principal difference between 60-cell modules and 72-cell modules are the number of cells installed in the arrays, and the smaller size and cost of 60-cell modules make them preferred for residential installations while the larger size of 72-cell modules make them preferred by utilities. Similarly, monofacial modules are preferred in residential installations while bifacial modules are preferred in utility installations. Nevertheless, there is some overlap between these types of modules in terms of channels of distribution, producer and customer perceptions, interchangeability, and price. Based on the preponderance of similarities between the different types of domestically produced CSPV modules in terms of the six like product factors, we define a single domestic like product consisting of all domestically produced CSPV products within the scope of the investigations, which at present consist of CSPV modules.<sup>85</sup>

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<sup>83</sup> See CR/PR at I-18, Figure I-6; see Conference Tr. at 123 (Martens), 233-34 (Wagner).

<sup>84</sup> No party has argued that the definition of the domestic like product should include out-of-scope thin film solar products and the Commission has previously not included them in the domestic like product. See *CSPV II*, USITC Pub. 4519 at 12, n.12. The record indicates 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. See CR/PR at I-29-I-30.

Similarly, no party has argued that the definition of the domestic like product should include out-of-scope off-grid CSPV modules. While off-grid CSPV modules are made from the same raw materials as on-grid modules, the record indicates that there are significant differences in their end uses, interchangeability, consumer and producer perceptions, and price when compared to on-grid CSPV modules. See CR/PR at I-23, D-5, D-12. For these reasons, we do not define the domestic like product to include thin-film solar products or off-grid CSPV modules.

<sup>85</sup> We intend to revisit our definition of the domestic like product in any final phase investigations. We note that one of 15 responding U.S. module producers, \*\*\*, indicates that it plans to produce CSPV cells in 2024 and at least 11 companies have announced plans to build CSPV cell facilities in the United States. CR/PR at Table III-4; CR/PR at VI-2. Responding producers also project that there will be \*\*\* kW of domestic cell capacity, and \*\*\* kW of commercial domestic cell production, by the end of 2024. CR/PR at Table F-2. We note that in any final phase of the investigations, parties wishing to raise domestic like product arguments should address any data collection issues in their comments on the draft questionnaires. 19 C.F.R. § 207.20(b)

#### IV. Domestic Industry<sup>86</sup>

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.”<sup>87</sup> 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 the issue of whether appropriate circumstances exist to exclude any domestic producers 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.<sup>88</sup> Exclusion of such a producer is within the Commission’s discretion based upon the facts presented in each investigation.<sup>89</sup>

Because there was no U.S. production of CSPV cells during the POI, U.S. producers of CSPV modules had to import and/or purchase foreign-produced CSPV cells for domestic module

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<sup>86</sup> In prior cases involving similar products, the Commission has considered whether domestic CSPV module assemblers engage in sufficient production-related activities to include them in the domestic industry as domestic producers of the domestic like product. *See CSPV II*, USITC Pub. 4519 at 16. There currently is no domestic production of CSPV cells; thus, all U.S. producers are CSPV module assemblers that use imported cells. No party has argued that module assemblers should not be included in the domestic industry in these investigations.

<sup>87</sup> 19 U.S.C. § 1677(4)(A).

<sup>88</sup> *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).

<sup>89</sup> 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
- (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), *aff’d*, 839 F.3d 1377 (Fed. Cir. 2018); *see also Torrington Co. v. United States*, 790 F. Supp. at 1168.

assembly.<sup>90</sup> The record shows that there are several U.S. producers 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.<sup>91</sup> Neither petitioner nor respondents allege that appropriate circumstances exist to exclude any party from the domestic industry.<sup>92</sup>

\*\*\*, \*\*\*, \*\*\*, and \*\*\* are subject to possible exclusion under the related parties provision because they imported subject merchandise during the POI.<sup>93</sup>

\*\*\*, \*\*\*, and \*\*\*, may be subject to possible exclusion under the related parties provision because they imported subject merchandise during the POI and because of their relationships with importers or exporters of subject merchandise.<sup>94</sup> \*\*\* and \*\*\* may be subject to possible exclusion because of they are related to importers of subject merchandise. Although it is unclear in many cases whether these domestic producers are sufficiently controlled by their subject affiliates to qualify as related parties based on the current record, we nevertheless consider whether appropriate circumstances exist for their exclusion in the event that they qualify as related parties and find that none do.

\*\*\*. \*\*\* accounted for \*\*\* percent of U.S. production of CSPV modules in 2023. It \*\*\*. \*\*\* imported subject merchandise (cells only) from \*\*\* in 2021 and 2023. The ratio of its

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<sup>90</sup> CR/PR at III-24.

<sup>91</sup> CR/PR at III-23.

<sup>92</sup> Petitioner's Postconference Brief at 4; Canadian Solar's Postconference Brief, Responses to Staff Questions at 25.

<sup>93</sup> CR/PR at III-6, Table III-13, Table III-17, Table III-17, Table III-19. \*\*\* may be subject to possible exclusion under the related parties provision because it purchased \*\*\* KW of subject imports from Cambodia and \*\*\* KW of subject imports from Thailand in 2023. *Id.* at Table III-22. \*\*\* did not report the importers from which it made these purchases. *Id.* A domestic producer that does not itself import subject merchandise or does not share a corporate affiliation with an importer may nonetheless be deemed a related party if it controls a purchaser of large volumes of imports. See SAA at 858. The Commission has found such control to exist when, for example, the domestic producer was responsible for a predominant proportion of an importer's imports and the importer's purchases were substantial. See, e.g., *Iron Construction Castings from Brazil, Canada, and China*, Inv. Nos. 701-TA-248, 731-TA-262-263, 265 (Fourth Review), USITC Pub. 4655 (Dec. 2016) at 11; *Chlorinated Isocyanurates from China and Spain*, Inv. Nos. 731-TA-1082-1083 (Second Review), USITC Pub. 4646 (Nov. 2016) at 12. The record in these preliminary investigations does not indicate that such a control situation exists; as indicated below, we will revisit our analysis of the domestic industry in light of the record in any final phase of the investigations.

We also note that \*\*\* is related to \*\*\*. However, in their questionnaire responses \*\*\*. See \*\*\*. Similarly, \*\*\*. See \*\*\*. Because \*\*\*, they do not qualify for exclusion as related parties.

<sup>94</sup> See CR/PR at Table III-2.

subject imports to its domestic production was \*\*\* in 2021, and \*\*\* percent in 2023.<sup>95</sup> \*\*\* states that \*\*\*. \*\*\* reported capital expenditures of \$\*\*\* in 2021, \$\*\*\* in 2022, and \$\*\*\* in 2023.<sup>96</sup>

Given that \*\*\* imported subject imported cells \*\*\* and its capital expenditures \*\*\* during the POI, it appears that its interest lies primarily in domestic production. There also is no information in the record indicating that \*\*\* inclusion in the domestic industry would mask injury. In light of this, and the absence of any contrary argument, we find that appropriate circumstances do not exist to exclude \*\*\* from the domestic industry.

\*\*\*.<sup>97</sup> \*\*\* is subject to the related party provision both because it imported subject merchandise from \*\*\* (both cells and modules) throughout the POI and because it is related to an importer and exporter of subject merchandise. \*\*\* accounted for \*\*\* percent of U.S. production of CSPV modules and was the \*\*\* U.S. producer in 2023.<sup>98</sup> \*\*\* and \*\*\*.<sup>99</sup> The ratio of its affiliated subject importer's and \*\*\* subject imports combined, to \*\*\* domestic production was \*\*\* percent in 2021, \*\*\* percent in 2022, and \*\*\* percent in 2023.<sup>100</sup> \*\*\* stated that \*\*\*."<sup>101</sup> \*\*\* stated that \*\*\* and that it \*\*\*" \*\*\*.<sup>102</sup> It reported capital expenditures of \$\*\*\* in 2021, \$\*\*\* in 2022, and \$\*\*\* in 2023.<sup>103</sup>

Given that \*\*\* ratio of subject imports to domestic production declined irregularly during the POI, its status as the \*\*\* U.S. producer and a petitioner, and its substantial investments in future domestic production of CSPV products, its primary interest appears to be in domestic production. Furthermore, its primary reason for importing subject merchandise \*\*\* and there is no information in the record that \*\*\* inclusion in the data would mask

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<sup>95</sup> CR/PR at Table III-13. \*\*\* domestic production was \*\*\* kW in 2021, \*\*\* in 2022, and \*\*\* kW in 2023. Its imports from \*\*\* were \*\*\* kW in 2021, and \*\*\* kW in 2023. It did not report imports from subject sources in 2022. *Id.*

<sup>96</sup> CR/PR at Table VI-5.

<sup>97</sup> \*\*\*. *See* CR/PR at Table III-2; *see also* \*\*\*.

<sup>98</sup> CR/PR at Table III-1.

<sup>99</sup> CR/PR at Table III-1.

<sup>100</sup> CR/PR at Table III-14. \*\*\* domestic production was \*\*\* kW in 2021, \*\*\* kW in 2022, and \*\*\* kW in 2023. Its subject imports from \*\*\* were \*\*\* kW in 2021, \*\*\* kW in 2022, and \*\*\* kW in 2023. *Id.* We note that the ratio of its subject imports of modules to its domestic production fell sharply over the POI, from \*\*\* percent in 2021 to \*\*\* percent in 2022 and \*\*\* percent in 2023. Derived from CR/PR at Table III-14 and G-7.

<sup>101</sup> CR/PR at Table III-21.

<sup>102</sup> CR/PR at Table III-6.

<sup>103</sup> CR/PR at Table VI-5.



injury.<sup>104</sup> The record at this preliminary phase also does not indicate that \*\*\* affiliation with \*\*\* shielded it from subject import competition such that its inclusion in the domestic industry would mask injury. In light of this, and the absence of any contrary argument, we find that appropriate circumstances do not exist to exclude \*\*\* from the domestic industry.

\*\*\*. \*\*\* is subject to the related party provision because it is related to an importer of subject merchandise (of modules only).<sup>105</sup> \*\*\* accounted for \*\*\* percent of U.S. production of CSPV modules in 2023.<sup>106</sup> It \*\*\*.<sup>107</sup> The ratio of the affiliated importer's subject imports to \*\*\* domestic production was \*\*\* percent.<sup>108</sup> \*\*\* indicates that it purchased imported subject merchandise because there \*\*\*<sup>109</sup> \*\*\* reports \*\*\*. It reported capital expenditures of \$\*\*\* in 2023.<sup>110</sup>

While the ratio of affiliated imports to \*\*\*'s domestic production was high, \*\*\*.<sup>111</sup> The record also indicates that \*\*\* made a substantial capital investment in its new CSPV module plant. The information in the record at the preliminary phase of these investigations does not indicate that \*\*\* affiliation with \*\*\* shields it from subject import competition such that its inclusion in the domestic industry would mask injury. The record does not otherwise indicate that \*\*\* inclusion would mask injury to the domestic industry. For these reasons, and in the absence of any contrary argument, we find that appropriate circumstances do not exist to exclude \*\*\* from the domestic industry.

\*\*\*. \*\*\* is subject to the related party provision because it imported subject merchandise during the POI and because it is related to an importer and exporter of subject merchandise.<sup>112</sup> \*\*\* did not produce CSPV cells or modules in 2023 and \*\*\*.<sup>113</sup> \*\*\* 2024 at a factory in \*\*\*.<sup>114</sup>

Although capital expenditure data is not available, \*\*\* investment in a domestic CSPV modules production facility during the POI, which commenced production in \*\*\* 2024,

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<sup>104</sup> Staff noted that many of the trends in the domestic industry's trade, employment, and financial indicators are driven by \*\*\*. See CR/PR at III-17, III-30, and VI-2.

<sup>105</sup> \*\*\* is related to \*\*\* CR/PR at Table III-2, III-15.

<sup>106</sup> CR/PR at Table III-1.

<sup>107</sup> CR/PR at Table III-1.

<sup>108</sup> CR/PR at Table III-15. \*\*\* domestic production was \*\*\* kW in 2023. Its affiliated importer's subject imports from \*\*\* were \*\*\* kW in 2023. *Id.*

<sup>109</sup> CR/PR at Table III-21.

<sup>110</sup> CR/PR at Table VI-5.

<sup>111</sup> \*\*\*.

<sup>112</sup> \*\*\* is related to \*\*\*. \*\*\* is also \*\*\* related to \*\*\*. CR/PR at Table III-2; *see also* \*\*\*.

<sup>113</sup> CR/PR at Table III-1.

<sup>114</sup> CR/PR at Table III-6.

indicates that its primary interest is in domestic production. The record in this preliminary phase of the investigations does not indicate that \*\*\* affiliations with an importer and an exporter of subject merchandise shields it from the effects of subject imports such that its inclusion in the domestic industry would mask injury. Furthermore, because \*\*\* reported no trade or financial data, but only narrative responses,<sup>115</sup> its inclusion in the domestic industry will not impact the domestic industry data. Given this, and the absence of any contrary argument, we find that appropriate circumstances do not exist to exclude \*\*\* from the domestic industry.

\*\*\*. \*\*\* is subject to the related party provision because it imported subject merchandise during the POI and is related to an exporter of subject merchandise.<sup>116</sup> \*\*\* accounted for \*\*\* percent of U.S. production of CSPV modules in 2023.<sup>117</sup> It was the \*\*\* U.S. producer in 2023 and it \*\*\*.<sup>118</sup> \*\*\* imported subject merchandise from \*\*\* (modules) in 2022 and 2023, and from \*\*\* (cells and modules) in 2023. The ratio of its subject imports to U.S. production was \*\*\* percent in 2022 and \*\*\* percent in 2023.<sup>119</sup> \*\*\* indicates that \*\*\*.<sup>120</sup> \*\*\* announced that \*\*\*.<sup>121</sup> It reported capital expenditures \*\*\*, of \$\*\*\* in 2021, \$\*\*\* in 2022, and \$\*\*\* in 2023.<sup>122</sup>

Although \*\*\* ratio of subject imports to domestic production was high and increasing and it \*\*\*, it imported subject cells to support its domestic production of modules and made substantial capital investments in domestic module production, suggesting that its primary interest is in domestic production. Furthermore, the record in this preliminary phase of the investigations does not indicate that \*\*\* affiliation with an exporter of subject merchandise shields it from the effects of subject imports such that its inclusion in the domestic industry would mask injury. Nor is there any information in the record indicating that \*\*\* inclusion in the domestic industry would mask injury. In light of this, and the absence of any contrary

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<sup>115</sup> Some of \*\*\* employment data are referenced in a note in a table in the staff report. See CR/PR at Table III-23.

<sup>116</sup> \*\*\* and is thus related to: \*\*\*. CR/PR at Table III-2.

\*\*\*. See \*\*\*. Thus, for purposes of our analysis, we treat \*\*\*.

<sup>117</sup> CR/PR at Table III-1.

<sup>118</sup> CR/PR at Table III-1.

<sup>119</sup> CR/PR at Table III-16. \*\*\* domestic production was \*\*\* kW in 2021, \*\*\* kW in 2022, and \*\*\* kW in 2023. Its imports from subject sources were \*\*\* kW in 2022 and \*\*\* kW in 2023. *Id.* We note that the ratio of its subject module imports to domestic production was \*\*\* percent in 2022 and \*\*\* percent in 2023.

<sup>120</sup> CR/PR at Table II-21.

<sup>121</sup> CR/PR at Table III-6.

<sup>122</sup> CR/PR at Table VI-5, Table VI-6.

argument, we find that appropriate circumstances do not exist to exclude \*\*\* from the domestic industry.

\*\*\*. \*\*\*.<sup>123</sup> It \*\*\*. \*\*\* domestic production was \*\*\* kW in 2021, \*\*\* kW in 2022, and \*\*\* in 2023. Its subject imports from subject sources were \*\*\* kW in 2021, \*\*\* kW in 2022, and \*\*\* kW in 2023.<sup>124</sup> \*\*\* imported subject merchandise (all modules except for minimal cell imports from \*\*\* in 2021 and 2022) from \*\*\* in 2023, and from \*\*\* and \*\*\* in 2022 and 2023.<sup>125</sup> The ratio of its subject imports to U.S. production was \*\*\* percent in 2021 and \*\*\* percent in 2022.<sup>126</sup>

Although \*\*\* ceased domestic production after 2022 to become an importer, the record does not indicate that its inclusion in the domestic industry would mask injury.<sup>127</sup> Considering this, its very small size, and the fact that no party supports its exclusion from the domestic

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<sup>123</sup> CR/PR at Table III-1; Table III-6.

<sup>124</sup> CR/PR at Table III-17.

<sup>125</sup> CR/PR at Table III-17.

<sup>126</sup> CR/PR at Table III-17.

<sup>127</sup> Commissioner Kearns notes that, even if a U.S. producer's current primary interest is not in domestic production, that alone is not dispositive in the Commission's related party analysis, for example, when the record shows the related party is not shielded from subject import competition and its exclusion from the industry would mask the effects of subject imports on the industry. *See, e.g., Large Residential Washers from Korea and Mexico*, Inv. Nos. 701-TA-488 and 731-TA-1199-1200 (Final) USITC Pub. 4378 (Feb. 2013) at 12-13 ("that {firm's} current interest is not in domestic production is an insufficient basis by itself to warrant exclusion as a related party in these investigations"); *LG Electronics, Inc. v. U.S. Intern. Trade Comm'n*, 26 F. Supp. 3d 1338, 1344-47 (Ct. Int'l Trade 2014) (affirming Commission decision not to exclude domestic producer, over respondents' objection, when the firm did not appear to benefit from subject imports and exclusion would mask declines in domestic industry during the POI); *see also See Certain Tissue Paper from China*, Inv. No. 731-TA-1070B (Final), USITC Pub. 3758 (Mar. 2005) at 11-12 ("[E]xclusion may not be warranted simply because a large producer (that was also a related party) has shifted to become a substantial importer of such merchandise during the period of investigation. A significant factor is whether the firm's domestic production operations significantly benefitted financially from its relationship to subject imports or from its import activities. Such benefits create the sort of data distorting effect that the exercise of discretion to exclude under the related party provision seeks to overcome."). The legislative history of the related party provision in the Trade Agreements Act of 1979 emphasizes that a producer should be excluded when it is shielded from the effects of the subject imports: "where a U.S. producer is related to a foreign exporter and the foreign exporter directs his exports to the United States so as not to compete with his related U.S. producer, this should be a case where the ITC would not consider the related U.S. producer to be a part of the domestic industry." S. Rep. No. 96-249, at 83 (1979) (emphasis added). The Statement of Administrative Action (SAA) to the Uruguay Round Agreements Act likewise explains that the purpose of the related party provision is "to reduce any distortion in industry data caused by the inclusion in the domestic industry of a related producer who is being shielded from the effects of the subject imports." SAA at 858.

industry, we find that appropriate circumstances do not exist to exclude \*\*\* from the domestic industry.

\*\*\* accounted for \*\*\* percent of U.S. production of modules in 2023.<sup>128</sup> It was the \*\*\* U.S. producer and it \*\*\*.<sup>129</sup> \*\*\* imported subject merchandise (all cells) from \*\*\* in 2021 and from \*\*\* in 2021 and 2022.<sup>130</sup> \*\*\*. The ratio of its subject imports to U.S. production was \*\*\* percent in 2021 and \*\*\* percent in 2022.<sup>131</sup> \*\*\* indicates that “\*\*\*”.<sup>132</sup> It reported capital expenditures of \$\*\*\* in 2021, \$\*\*\* in 2022, and \$\*\*\* in 2023.<sup>133</sup>

Although its ratio of subject imports to U.S. production was high, \*\*\* imported CSPV cells \*\*\*.<sup>134</sup> Furthermore, given that \*\*\* was the \*\*\* U.S. producer in 2023 and made \*\*\*, its primary interest would appear to be in domestic production. There also is no information in the record indicating that \*\*\* inclusion in the domestic industry would mask injury. In light of this, and the absence of any contrary argument, we find that appropriate circumstances do not exist to exclude \*\*\* from the domestic industry.

\*\*\*. \*\*\* accounted for \*\*\* percent of U.S. production in 2023, having produced modules in \*\*\* during the POI, and \*\*\*.<sup>135</sup> \*\*\* imported subject merchandise (all cells) from \*\*\* in 2021. Its ratio of subject imports to U.S. production was \*\*\* percent in 2021.<sup>136</sup> \*\*\* states that \*\*\*. It further indicates that \*\*\*.<sup>137</sup>

Given that \*\*\*, its primary interest appears to be in domestic production. There is also no information in the record indicating that \*\*\* inclusion in the domestic industry would mask injury. Considering this, and the absence of any contrary argument, find that appropriate circumstances do not exist to exclude \*\*\* from the domestic industry.

\*\*\*. \*\*\* is a related party because it is related to a U.S. importer of subject merchandise \*\*\*.<sup>138</sup> \*\*\* and \*\*\*.<sup>139</sup> \*\*\* affiliated importer imported subject merchandise

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<sup>128</sup> CR/PR at Table III-1.

<sup>129</sup> CR/PR at Table III-1.

<sup>130</sup> CR/PR at Table III-18.

<sup>131</sup> CR/PR at Table III-18. \*\*\* domestic production was \*\*\* kW in 2021, \*\*\* kW in 2022, and \*\*\* kW in 2023. Its imports from subject sources were \*\*\* kW in 2021 and \*\*\* kW in 2022. *Id.*

<sup>132</sup> CR/PR at Table III-21.

<sup>133</sup> CR/PR at Table VI-5. \*\*\* indicated that its capital expenditures were for \*\*\*. CR/PR at Table VI-6.

<sup>134</sup> CR/PR at Table III-21.

<sup>135</sup> CR/PR at Table III-1.

<sup>136</sup> CR/PR at Table III-19. \*\*\* domestic production was \*\*\* kW in 2021, \*\*\* kW in 2022, and \*\*\* kW in 2023. Its subject imports from \*\*\* were \*\*\* kW in 2021. *Id.*

<sup>137</sup> CR/PR at Table III-21.

<sup>138</sup> \*\*\* is related to \*\*\* an importer of subject merchandise \*\*\*. CR/PR at Table III-2.

(cells and modules) from \*\*\* throughout the POI.<sup>140</sup> The ratio of the affiliated importer's subject imports to \*\*\* domestic production was \*\*\* percent in 2021. \*\*\* after 2021. Its affiliated importer \*\*\* shifted entirely to importing subject merchandise from \*\*\*.<sup>141</sup> \*\*\* reports that \*\*\*.”<sup>142</sup>

During the time that \*\*\* produced domestically, there is no indication that its inclusion in the domestic industry would mask injury. The record also does not indicate that its affiliation with a subject importer shielded it from subject import competition such that its inclusion in the domestic industry would mask injury. Given this, and in the absence of any contrary argument, we find that appropriate circumstances do not exist to exclude \*\*\* from the domestic industry.

In sum, consistent with our definition of the domestic like product, we define the domestic industry to include all domestic producers of CSPV products.<sup>143</sup>

## V. Negligible Imports

Pursuant to Section 771(24) of the Tariff Act, imports from a subject country of merchandise corresponding to a domestic like product that account for less than 3 percent of all such merchandise imported into the United States during the most recent 12 months for which data are available preceding the filing of the petition shall be deemed negligible.<sup>144</sup>

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

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(...Continued)

<sup>139</sup> CR/PR at Table III-1.

<sup>140</sup> *See generally* \*\*\*; *see also* \*\*\*, EDIS Doc. 821654, at II-16.

<sup>141</sup> CR/PR at Table III-20; Table III-21. \*\*\* domestic production was \*\*\* kW in 2021. Its affiliated importer's subject imports from \*\*\* were \*\*\* kW in 2021, \*\*\* KW in 2022, and \*\*\* kW in 2023. CR/PR at Table III-20. It reported \*\*\*, along with another U.S. producer \*\*\*, but staff note that “[g]iven \*\*\* sales accounted for \*\*\* percent of net sales quantity and value from 2021 to 2023, these tolling arrangements have minimal impact of aggregated financial data.” CR/PR at VI-3, n.11.

<sup>142</sup> CR/PR at III-27.

<sup>143</sup> In any final phase investigations, we will further investigate how to define the domestic industry in light of the record in those investigations.

<sup>144</sup> 19 U.S.C. §§ 1671b(a), 1673b(a), 1677(24)(A)(i), 1677(24)(B); *see also* 15 C.F.R. § 2013.1 (developing countries for purposes of 19 U.S.C. § 1677(36)).

all such merchandise imported into the United States.<sup>145</sup> 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.<sup>146</sup>

Additionally, even if subject imports are found to be negligible for purposes of present material injury, they shall not be treated as negligible for purposes of a threat analysis should the Commission determine that there is a potential that subject imports from the country concerned will imminently account for more than 3 percent (4 percent for developing countries in CVD investigations) of all such merchandise imported into the United States.<sup>147</sup> The Commission also assesses whether there is a potential that the aggregate volumes of subject imports from all countries with currently negligible imports will imminently exceed 7 percent of all such merchandise imported in the United States.<sup>148</sup>

To assess the potential for imports to imminently surpass the negligibility for purposes of a threat analysis, the Commission typically has examined the share of total imports, especially toward the latter part of the POI, production capacity, capacity utilization, and inventories.<sup>149</sup>

#### **A. Arguments of the Parties**

*Petitioner's Argument.* Petitioner argues that imports from each subject source exceed, or will imminently exceed, the negligibility threshold. With respect to subject imports from Cambodia, 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 injury analysis, there is evidence indicating that they will exceed the three percent threshold in the

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<sup>145</sup> 19 U.S.C. § 1677(24)(A)(ii).

<sup>146</sup> 19 U.S.C. § 1677(24)(B). 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 limit. *See Designations of Developing Countries and Least-Developed Countries Under the Countervailing Duty Law*, 85 Fed. Reg. 7613 (Feb. 10, 2020).

<sup>147</sup> 19 U.S.C. § 1677(24)(A)(iv).

<sup>148</sup> 19 U.S.C. § 1677(24)(A)(iv).

<sup>149</sup> *See Certain Steel Concrete Reinforcing Bars from Belarus, China, Korea, Latvia, and Moldova*, Inv. Nos. 731-873-874 and 877-879 (Final), USITC Pub. 3440 (July 2001); *Certain Stainless Steel Butt-Weld Pipe Fittings from Germany*, Inv. No. 731-TA-864 (Final), USITC Pub. 3372 (November 2000); *Certain Cold-Rolled Steel Products from Argentina, Brazil, China, Indonesia, Japan, Russia, Slovakia, South Africa, Taiwan, Thailand, Turkey, and Venezuela*, Inv. Nos. 701-TA-33-396 and 731-TA-829-840 (Prelim), USITC Pub. 3214 (July 1999).

antidumping duty investigations, and four percent threshold for developing countries in the countervailing duty investigations.

Petitioner argues that the Commission should use official import statistics to calculate negligibility because there are discrepancies and omissions in the importer questionnaire responses for subject countries. Petitioner asserts that the Commission is missing data from NE Solar, one of the largest importers of CSPV cells and modules from Cambodia in Commerce's circumvention proceedings.<sup>150</sup> Petitioner also questions the accuracy of some importers' questionnaire responses in how they reported imports covered by the circumvention orders.<sup>151</sup> Petitioner contends that several subject importers have argued to the Commission that most or all of their imports were circumventing the CSPV I orders during the POI and are thus nonsubject imports in these investigations, but are arguing in appeals to the Court of International Trade (CIT) that they were not circumventing the orders. Petitioner asserts that if the CIT agrees with those importers that they were not circumventing the orders, substantial volumes of imports currently reported as nonsubject imports would become subject imports in these investigations, including in the negligibility period.<sup>152</sup>

*Respondents' Argument.* 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 asserts that the Commission should use questionnaire response data from Cambodian importers for the numerator and official import statistics for the denominator in its calculations.<sup>153</sup> BYD argues that Petitioner improperly included nonsubject imports in the numerator of their negligibility calculation because it relied on official import statistics that do not account for the scope's exclusion of products subject to the CSPV I

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<sup>150</sup> Petitioner's Postconference Brief at 6-7. Petitioner notes that Commerce made preliminary findings that NE Solar was not circumventing the CSPV I orders and thus argues that NE Solar's imports would be subject imports for these investigations. Petitioner acknowledges that all of NE Solar's imports were found to be circumventing in Commerce's final circumvention findings, but it argues that was because NE Solar declined to permit verification, and not because of known facts regarding its production process. Petitioner asserts that "there is no record evidence that NE's solar imports from Cambodia would have been out-of-scope under the questionnaire instructions." *Id.* at 7-8.

<sup>151</sup> Petitioner's Postconference Brief at 6.

<sup>152</sup> Petitioner's Postconference Brief at 11.

<sup>153</sup> BYD's Postconference Brief at 9-10. BYD estimated that questionnaire data covered \*\*\* percent of total imports from Cambodia. *Id.*

orders.<sup>154</sup> BYD notes that NE Solar did not submit a questionnaire response but argues that the Commission must treat its imports as nonsubject.<sup>155</sup>

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.<sup>156</sup> It acknowledges that the Commission usually uses a timeframe of one to two years to determine imminence, but argues that the Commission should use a shorter timeframe of less than one year in this case because the solar industry is fast-moving and subject to quick technological changes.<sup>157</sup> BYD argues that subject imports from Cambodia did not exceed the negligibility threshold at any point during the POI, and that factor weighs in favor of finding that subject imports from Cambodia are unlikely to imminently exceed the negligibility threshold.<sup>158</sup>

Canadian Solar and Trina argue that imports from Thailand are negligible because most are out-of-scope due to being covered by Commerce's anti-circumvention orders.<sup>159</sup> They argue that the Commission should use official import statistics for the denominator and adjust them with data from the questionnaire responses to calculate the numerator for subject imports from Thailand.<sup>160</sup> Canadian Solar also argues that available data show that imports from Thailand will not imminently account for more than three percent of imports of subject merchandise.<sup>161</sup>

## **B. Analysis and Conclusion**

We first consider what data to use for calculating import shares for purpose of our negligibility analysis. As to calculating the total volume of imports for the denominator, we find that official import statistics offer the best information available. Petitioner's counsel indicated

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<sup>154</sup> BYD's Postconference Brief at 6-7.

<sup>155</sup> BYD asserts that because NE Solar was assigned "adverse facts available" during Commerce's circumvention proceedings, it was precluded from participating in Commerce's certification process and the legal effect is that any of NE Solar's imports during the relevant period are deemed to be circumventing the CSPV I orders. BYD's Postconference Brief at 11.

<sup>156</sup> BYD's Postconference Brief at 15 and, Responses to Staff Questions at 2.

<sup>157</sup> BYD's Postconference Brief, Responses to Staff Questions at 1-2.

<sup>158</sup> BYD's Postconference Brief at 15 and, Responses to Staff Questions at 2.

<sup>159</sup> Canadian Solar's Postconference Brief at 16; Trina's Postconference Brief at 5-6. Canadian Solar, however, acknowledges that it disagrees with Commerce's circumvention findings and has appealed in a case pending before the Court of International Trade. *Id.* at 39, n.111.

<sup>160</sup> Canadian Solar's Postconference Brief at 18; Trina's Postconference Brief at 5-6.

<sup>161</sup> Canadian Solar also argues that the Commission should use a shorter timeframe than the typical one-to-two-year timeframe because the solar industry is fast-moving and subject to rapid technological changes. Canadian Solar's Postconference Brief at 20-21.



at the conference that the primary HTS codes are specific to CSPV cells and modules.<sup>162</sup> Respondent Canadian Solar disagrees with using official import statistics for each country's numerators, but agrees that "Census data are likely to be the best available evidence for calculating the denominator of total imports."<sup>163</sup>

The official import statistics, however, include imports covered by the CSPV I orders, which are outside the scope of these investigations and, therefore, overstate the volume of subject imports for the numerator with respect to each subject country.<sup>164</sup> We find that questionnaire data, as supplemented with data from proprietary, Census-edited Customs records, are the best information available on the record in the preliminary phase of these investigations for purposes of calculating the volume of subject imports from each subject country for the numerator in our negligibility calculations. Specifically, these are the only data on the record that allow for the removal of imports of CSPV products subject to the CSPV I orders, and thus nonsubject for purposes of these investigations, from the imports of CSPV products from each subject country. Furthermore, importer questionnaire responses covered a substantial volume of imports of CSPV products from each country, including \*\*\* percent of imports from Cambodia, \*\*\* percent of imports from Malaysia, \*\*\* percent of imports from Thailand, and \*\*\* percent of imports from Vietnam.<sup>165</sup>

For Cambodia, the Commission is missing the questionnaire data for a significant volume of imports because NE Solar, one of the largest importers of CSPV products from Cambodia, did not submit a questionnaire response. Staff used \*\*\*.<sup>166</sup>

We recognize that Commerce made a final affirmative finding as to NE Solar in the circumvention proceedings, and that some share of the imports of CSPV products from NE Solar based on Census-edited Customs records would be subject to the CSPV I orders and hence nonsubject imports for purposes of these investigations.<sup>167</sup> Because NE Solar failed to complete an importer questionnaire response reporting the share of its imports subject to the

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<sup>162</sup> See Conference Tr. at 50 (El-Sabaawi).

<sup>163</sup> Canadian Solar's Postconference Brief at 18.

<sup>164</sup> See CR/PR at Table IV-8 ("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.").

<sup>165</sup> CR/PR at IV-1. Questionnaire responses account for \*\*\* percent of official U.S. import statistics. *Id.* at IV-1, n.3.

<sup>166</sup> CR/PR at Table IV-5, Note. Questionnaire coverage for subject imports from Thailand was also relatively low. However, even the available data show that Thailand is above the negligibility thresholds, as discussed below.

<sup>167</sup> Cambodia Circumvention Final Decision Memo, EDIS Doc. 832133 at 46-48.

CSPV I orders, however, we find that the best information available in these preliminary phase investigations concerning the volume of subject imports from Cambodia by NE Solar is the data from Census-edited, Customs records.<sup>168</sup> We intend to revisit this issue in any final phase of the investigations.<sup>169</sup>

During the most recent 12-month period preceding the filing of the petitions in these investigations (April 2023 through March 2024), based on data compiled from questionnaire responses and from proprietary Census-edited Customs records, subject imports from Cambodia accounted for \*\*\* percent of total CSPV product imports, subject imports from Malaysia accounted for \*\*\* percent of total CSPV product imports, subject imports from Thailand accounted for \*\*\* percent of total CSPV product imports, and subject imports from Vietnam accounted for \*\*\* percent of total CSPV product imports.<sup>170</sup>

Because imports from Cambodia subject to the antidumping duty investigation, and imports from Malaysia, Thailand, and Vietnam subject to the antidumping and countervailing duty investigations, exceed the three percent negligibility threshold, we find that imports from each of these countries are not negligible for the relevant antidumping and countervailing duty investigations. Because imports from Cambodia subject to the countervailing duty investigation are below the four percent negligibility threshold for developing countries, we find that such imports are negligible for purposes of the Commission's analysis of present material injury in that investigation.

We next consider whether subject imports from Cambodia have the potential to imminently exceed the four percent negligibility threshold for purposes of determining threat of material injury in the countervailing duty investigation. The record in the preliminary phase of these investigations does not provide clear and convincing evidence that there is not a potential for subject imports from Cambodia to imminently exceed the negligibility threshold.<sup>171</sup>

First, as discussed above, subject imports from Cambodia accounted for \*\*\* percent of total imports during the April 2023 through March 2024 period, which approaches the four

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<sup>168</sup> 19 U.S.C. § 1677e(a).

<sup>169</sup> In their comments on the draft final phase questionnaires, we invite the parties to comment on how the Commission should obtain data for the negligibility period of April 2023 to March 2024 that would best enable the exclusion of imports from Cambodia, Malaysia, Thailand, and Vietnam that are subject to the CSPV I orders from the volume of subject imports from each country.

<sup>170</sup> CR/PR at Table IV-5.

<sup>171</sup> See *American Lamb Co.*, 785 F.2d at 1001, *Co-Steel Raritan, Inc. v. United States*, 357 F.3d 1294 (Fed. Cir. 2004).

percent negligibility threshold.<sup>172</sup> Moreover, the volume of arranged subject imports from Cambodia for 2024 accounts for \*\*\* percent of total arranged imports.<sup>173</sup> Additionally, the record indicates that the Cambodian solar industry substantially increased its capacity during the POI, and also possessed substantial excess capacity and inventories of CSPV products with which it could significantly increase exports of CSPV products to the United States.<sup>174</sup> The Cambodian industry's excess capacity for modules in 2023 was equivalent to almost \*\*\* percent of apparent U.S. consumption of modules that year, and its practical capacity for modules is projected to \*\*\* in 2024.<sup>175</sup> The Cambodian industry is also highly focused on exports to the United States; all of its shipments of CSPV modules were exported to the United States during POI, and it projects it will export over half its future module shipments to the United States.<sup>176</sup>

Furthermore, at the conference, there was witness testimony that foreign solar producers can shift supply chains in response to changes in trade remedies.<sup>177</sup> The expiration of the “tariff holiday,” as discussed in section I, creates an immediate incentive for foreign producers to adjust supply chains and for U.S. importers to increase their imports of subject merchandise from the four subject countries, including Cambodia.<sup>178</sup>

For the above reasons, based on the record in the preliminary phase of these investigations, we find that the record does not contain clear and convincing evidence that subject imports from Cambodia will not imminently account for more than four percent of total imports of CSPV products. Accordingly, we find that there is a potential that imports of CSPV

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<sup>172</sup> CR/PR at Table IV-5.

<sup>173</sup> CR/PR at Table VII-22. Arranged imports from Cambodia accounted for \*\*\* percent of total arranged imports from January to March 2024, \*\*\* percent of total arranged imports from April to June 2024, and are projected to account for \*\*\* percent of arranged imports from July to September 2024 and \*\*\* percent of arranged imports from October to December 2024. *Id.* We note that the data for arranged imports from Cambodia were compiled from importer questionnaire responses, and thus, may be understated as NE Solar, an importer of significant volumes of CSPV products from Cambodia, did not provide a questionnaire response.

<sup>174</sup> See CR/PR at II-8. The Cambodian industry's CSPV module capacity increased from \*\*\* kW in 2021 to \*\*\* kW in 2023, while its capacity utilization increased from \*\*\* percent to only \*\*\* percent during the same period. The Cambodian industry's CSPV cell capacity increased from \*\*\* kW in 2021 to \*\*\* kW in 2023, while its capacity utilization increased only from \*\*\* percent to only \*\*\* percent in the same period. CR/PR at Table II-4.

<sup>175</sup> Derived from CR/PR at Tables VII-16 and C-3.

<sup>176</sup> CR/PR at Table VII-17.

<sup>177</sup> See Conference Tr. at 8, (Brightbill), 26-27 (Martens).

<sup>178</sup> We note that additional changes in U.S. trade remedies may be in effect by the time of any final phase of these investigations. The Administration also announced that it intends to increase Section 301 duties on CSPV products from China from 25 percent up to 50 percent.

products from Cambodia subject to the countervailing duty investigation will imminently account for more than four percent of total imports and that such imports are therefore not negligible for purposes of our threat analysis in the preliminary phase of these investigations.<sup>179</sup>

## VI. Cumulation

For purposes of evaluating the volume and effects for a determination of reasonable indication 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:

- (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.<sup>180</sup>

While no single factor is necessarily determinative, and the list of factors is not exclusive, 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.<sup>181</sup> Only a “reasonable overlap” of competition is required.<sup>182</sup>

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<sup>179</sup> We intend to revisit our negligibility analysis of subject imports in any final phase of these investigations.

<sup>180</sup> See *Certain Cast-Iron Pipe Fittings from Brazil, the Republic of Korea, and Taiwan*, Inv. Nos. 731-TA-278-80 (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).

<sup>181</sup> See, e.g., *Wieland Werke, AG v. United States*, 718 F. Supp. 50 (Ct. Int’l Trade 1989).

<sup>182</sup> 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- (Continued...)

## A. Arguments of the Parties

*Petitioner's Argument.* Petitioner argues that cumulation is mandatory in these investigations. Petitioner asserts that the petitions for all four countries were filed on the same day, that none of the statutory exceptions to cumulation apply, and that there is a reasonable overlap in competition between and among subject imports from Cambodia, Malaysia, Vietnam, and Thailand and the domestic like product.<sup>183</sup>

*Respondents' Arguments.* Other than BYD and Canadian Solar arguing that subject imports from Cambodia and Thailand are negligible, no respondent party challenged cumulation for purposes of the Commission's present material injury analysis. As explained in Section VIII.A., BYD argues that the Commission should not cumulate subject imports from Cambodia for its threat analysis.

## B. Analysis and Conclusion

As discussed above, we have found that imports from Cambodia subject to the countervailing duty investigation are negligible for purposes of present material injury, and therefore ineligible for cumulation. However, imports from Cambodia subject to the antidumping duty investigation, which are the same as those subject to the countervailing duty investigation, are not negligible for purposes of present material injury and thus eligible for cumulation with imports from Malaysia, Thailand, and Vietnam subject to the antidumping and countervailing duty investigations for purposes of analyzing present material injury.<sup>184</sup> The

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316, Vol. I at 848 (1994) (*citing Fundicao Tupy*, 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.").

<sup>183</sup> Petitioner's Postconference Brief, Responses to Staff Questions at 7-10.

<sup>184</sup> We observe that subject imports from Cambodia, Malaysia, Thailand, and Vietnam are alleged to be both dumped and subsidized. As previously discussed, subject imports from Cambodia are above the negligibility threshold for the antidumping duty investigation but below the negligibility threshold for developing countries in the countervailing duty investigation. Consequently, cumulating imports from all subject sources in these investigations will involve "cross-cumulating" dumped imports with subsidized imports. We have previously explained why we are continuing our longstanding practice of cross-cumulating. *See Gas Powered Pressure Washers from Vietnam*, Inv. No. 731-TA-1598 (Final), USITC Pub. 5465 at 21 n.117 (Oct. 2023); *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); *Circular Welded Carbon-Quality Steel Pipe from India, Oman, the United Arab Emirates, and* (Continued...)

initial statutory requirement for cumulation is satisfied because petitioner filed the antidumping and countervailing duty petitions with respect to all subject countries on the same day, April 24, 2024.<sup>185</sup> As discussed below, we find that there is a reasonable overlap of competition between subject imports from Cambodia, Malaysia, Thailand, and Vietnam and between subject imports from each source and the domestic like product.

*Fungibility.* The record indicates that domestically produced CSPV products and imports from each subject country are generally fungible. Most responding U.S. producers reported that subject imports from each subject country were always interchangeable with each other as well as with the domestic like product.<sup>186</sup> Most responding 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.<sup>187</sup>

There were some differences in the composition of U.S. shipments by the domestic industry and importers of subject merchandise, in terms of the three module size categories (60-cell, 72-cell, and “other size” modules), with the domestic industry's U.S. shipments consisting primarily of 60-cell modules and the importers' U.S. shipments consisting primarily of 72-cell modules.<sup>188</sup> Nevertheless, a substantial proportion of the domestic industry's shipments consisted of 72-cell modules, which overlapped with U.S. shipments of subject imports, and the industry's U.S. shipments also overlapped with subject imports from each source with respect to “other” size modules.

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*Vietnam*, Inv. Nos. 701-TA-482 to 484 (Final), USITC Pub. 4362 at 12 n.59 (Dec. 2012); *Softwood Lumber from Canada*, Inv. Nos. 701-TA-414 and 731-TA-928 (Final), USITC Pub. 3509 at 29-31 (May 2009). Here, the volumes of imports from each country that are alleged to be dumped and subsidized are identical.

<sup>185</sup> See Petition, Vol. 1.

<sup>186</sup> See CR/PR at Table II-9.

<sup>187</sup> CR/PR at Table II-10.

<sup>188</sup> CR/PR at Table IV-6. In 2023, \*\*\* percent of U.S. producers' U.S. shipments consisted of 60-cell modules, \*\*\* percent consisted of 72-cell modules, and \*\*\* percent consisted of other size modules. In that same period, \*\*\* U.S. importers' U.S. shipments of subject imports from Cambodia consisted of 60-cell modules, \*\*\* percent consisted of 72-cell modules, and \*\*\* percent consisted of other size modules; \*\*\* percent of U.S. importers' U.S. shipments of subject imports from Malaysia consisted of 60-cell modules, \*\*\* percent consisted of 72-cell modules, and \*\*\* percent consisted of other size modules; \*\*\* U.S. importers' U.S. shipments of subject imports from Thailand consisted of 60-cell modules, \*\*\* percent consisted of 72-cell modules, and \*\*\* percent consisted of other size modules; and \*\*\* percent of U.S. importers' U.S. shipments of subject imports from Vietnam consisted of 60-cell modules, \*\*\* percent consisted of 72-cell modules, and \*\*\* percent consisted of other size modules. CR/PR at Table IV-6.

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 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.<sup>189</sup> The responses of U.S. importers were more mixed, but with a majority still reporting that non-price differences are sometimes or never significant between the domestic like product and subject imports from each of the four subject countries.<sup>190</sup> Thus, the record indicates that there is a sufficient degree of fungibility between subject imports and the domestic like product for purposes of cumulation.

*Channels of Distribution.* The record shows that while domestic producers mainly sold to distributors and installers from 2021 to 2023,<sup>191</sup> domestic producers and importers of subject merchandise from each country substantially overlapped in their sales to utilities in 2021 and 2023.<sup>192</sup>

Specifically, U.S. shipments to utilities accounted for \*\*\* percent of domestic producers' U.S. shipments in 2021, \*\*\* percent in 2022, and \*\*\* percent in 2023.<sup>193</sup> Importers sold CSPV products from Cambodia \*\*\* to distributors in 2021, but made \*\*\* percent of their shipments to utilities in 2022 and \*\*\* percent of their shipments to utilities in 2023.<sup>194</sup> Importers made substantial shares of their shipments of CSPV products from Malaysia to utilities from 2021 to 2023, accounting for \*\*\* percent of their shipments in 2021, \*\*\* percent in 2022, and \*\*\* percent in 2023. Importers sold CSPV products from Thailand \*\*\* to utilities from 2021 to 2023, with shipments to utilities accounting for \*\*\* percent of shipments in 2021, \*\*\* percent in 2022, and \*\*\* percent in 2023. Importers made substantial shares of their shipments of CSPV products from Vietnam to utilities from 2021 to 2023, accounting for \*\*\* percent of their shipments in 2021, \*\*\* percent in 2022, and \*\*\* percent in 2023.<sup>195</sup>

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<sup>189</sup> CR/PR at Table II-11.

<sup>190</sup> CR/PR at Table II-12.

<sup>191</sup> The share of domestic producers' U.S. shipments that went to distributors was \*\*\* percent in 2021, \*\*\* percent in 2022, and \*\*\* percent in 2023. The share of domestic producers' shipments that went to installers was \*\*\* percent in 2021, \*\*\* percent in 2022, and \*\*\* percent in 2023. CR/PR at Table K-1.

<sup>192</sup> See CR/PR at II-3.

<sup>193</sup> CR/PR at Table II-2.

<sup>194</sup> CR/PR at Table II-2.

<sup>195</sup> CR/PR at Table II-2. Importers from Vietnam sold the largest share of shipments to assemblers in 2021 (\*\*\* percent). *Id.*

*Geographic Overlap.* U.S. producers and importers of subject merchandise eligible for cumulation from each country reported selling CSPV products to all regions of the contiguous United States, as well as to “other U.S. markets,” which includes Alaska, Hawaii, Puerto Rico, and the U.S. Virgin Islands.<sup>196</sup> Official import statistics indicate that subject imports from each country entered the United States through ports located in all four regions.<sup>197</sup>

*Simultaneous Presence in Market.* The domestic like product was present in the U.S. market throughout the POI.<sup>198</sup> Imports from each of the subject sources were simultaneously present in the U.S. market throughout the period of investigation.<sup>199</sup>

*Conclusion.* The record in the preliminary phase of the investigations indicates that imports from Cambodia subject to the antidumping duty investigation, and imports Malaysia, Thailand, and Vietnam subject to the antidumping and countervailing duty investigations, are generally fungible with the domestic like product and each other. The record also indicates that subject imports from each country and the domestic like product overlapped in terms of channels of distribution during the POI, with respect to sales to utilities. The record further indicates that imports from each of the subject countries and the domestic like product were sold in overlapping geographic markets and simultaneously present in the U.S. market throughout the POI. Because there appears to be a reasonable overlap of competition between and among imports from each subject country and the domestic like product, we cumulate imports from Cambodia subject to the antidumping duty investigation and imports from Malaysia, Thailand, and Vietnam subject to the antidumping and countervailing duty investigations for purposes of our present material injury analysis.

## **VII. Reasonable Indication of Material Injury by Reason of Subject Imports**

### **A. Legal Standard**

In the preliminary phase of antidumping and countervailing duty investigations, the Commission determines whether there is a reasonable indication that an industry in the United

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<sup>196</sup> CR/PR at Table II-3.

<sup>197</sup> CR/PR at IV-13. The largest share of CSPV cells and modules from Cambodia (35.5 percent), Thailand (31.8 percent) and nonsubject sources (40.4 percent) entered the United States through ports in the West. The largest share of CSPV cells and modules from Malaysia (44.7 percent) entered the United States through ports in the East. The largest share of CSPV cells and modules from Vietnam (39.4 percent) entered the United States through ports in the South. See CR/PR at Table IV-7.

<sup>198</sup> CR/PR at Tables V-6 to V-9.

<sup>199</sup> CR/PR at Table IV-8.



States is materially injured or threatened with material injury by reason of the imports under investigation.<sup>200</sup> 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.<sup>201</sup> The statute defines “material injury” as “harm which is not inconsequential, immaterial, or unimportant.”<sup>202</sup> In assessing whether there is a reasonable indication that 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.<sup>203</sup> 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.”<sup>204</sup>

Although the statute requires the Commission to determine whether there is a reasonable indication that the domestic industry is “materially injured or threatened with material injury by reason of” unfairly traded imports,<sup>205</sup> 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.<sup>206</sup> 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 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.<sup>207</sup>

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<sup>200</sup> 19 U.S.C. §§ 1671b(a), 1673b(a).

<sup>201</sup> 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).

<sup>202</sup> 19 U.S.C. § 1677(7)(A).

<sup>203</sup> 19 U.S.C. § 1677(7)(C)(iii).

<sup>204</sup> 19 U.S.C. § 1677(7)(C)(iii).

<sup>205</sup> 19 U.S.C. §§ 1671b(a), 1673b(a).

<sup>206</sup> *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).

<sup>207</sup> 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 (Continued...)”

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.<sup>208</sup> In performing its examination, however, the Commission need not isolate the injury caused by other factors from injury caused by unfairly traded imports.<sup>209</sup> Nor does 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,

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(...Continued)

“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).

<sup>208</sup> 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.

<sup>209</sup> 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 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.”).

such as nonsubject imports, which may be contributing to overall injury to an industry.<sup>210</sup> It is clear that the existence of injury caused by other factors does not compel a negative determination.<sup>211</sup>

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.”<sup>212</sup> 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.”<sup>213</sup> The Federal Circuit has examined and affirmed various Commission methodologies and has disavowed “rigid adherence to a specific formula.”<sup>214</sup>

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 evidence standard.<sup>215</sup> Congress has delegated this factual finding to the Commission because of the agency’s institutional expertise in resolving injury issues.<sup>216</sup>

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<sup>210</sup> S. Rep. 96-249 at 74-75; H.R. Rep. 96-317 at 47.

<sup>211</sup> 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.”).

<sup>212</sup> *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 *Swiff-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*.

<sup>213</sup> *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.

<sup>214</sup> *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.”).

<sup>215</sup> We provide in our discussion below a full analysis of other factors alleged to have caused any material injury experienced by the domestic industry.

<sup>216</sup> *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.”).

## **B. Conditions of Competition and the Business Cycle**

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

### **1. Demand Conditions**

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. 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.<sup>217</sup> Over the POI, solar-generated electricity's share of U.S. net electricity generation increased from 2.8 percent in 2021 to 3.4 percent in 2022 and 3.9 percent in 2023.<sup>218</sup>

Most domestic producers and U.S. importers reported that demand for CSPV products increased during the POI.<sup>219</sup> Nine of 14 U.S. producers and 22 of 44 U.S. importers reported that the U.S. market for CSPV products is subject to business cycles.<sup>220</sup> Responding U.S. producers and importers reported that there are seasonal trends due to weather, with some firms indicating that solar installations decline in the winter and increase in the summer.<sup>221</sup> The availability of government incentives was also a significant demand condition during the POI. Most domestic producers and U.S. importers reported that there has been an increase in government programs on federal, state, and local levels to incentivize the use of CSPV products, with responding firms most commonly citing the tax incentives associated with the federal Inflation Reduction Act ("IRA").<sup>222</sup> The IRA, enacted August 16, 2022, updated and extended

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<sup>217</sup> CR/PR at II-11. Some parties report that renewable sources of electricity have reached grid parity with traditional nonrenewable sources in some regions of the United States. *See* Conference Tr. at 90-91 (Moskowitz); *see also* ACP's Postconference Brief at 4, n.7.

<sup>218</sup> CR/PR at II-11.

<sup>219</sup> *See* CR/PR at Table II-6.

<sup>220</sup> CR/PR at II-14.

<sup>221</sup> CR/PR at II-14.

<sup>222</sup> CR/PR at II-15, Table II-7.

the Investment Tax Credit (“ITC”) and the Production Tax Credit (“PTC”), two of the major federal policies that promote solar energy.<sup>223</sup>

In December 2022, the California Public Utilities Commission approved an order requiring the state’s utilities to use net billing for solar installations. Effective April 2023, new interconnection agreements were required to use the new net billing policy (known as NEM 3.0), which reduced metering compensation rates for new California solar customers.<sup>224</sup> Several firms reported that the new regulations in California lessened incentives to deploy solar power for residences, leading to price declines and increased inventories in the residential market for CSPV products.<sup>225</sup>

During the period of investigation, apparent U.S. consumption of CSPV cells and modules increased from \*\*\* kW in 2021 to \*\*\* kW in 2022 and \*\*\* kW in 2023, for an overall increase of \*\*\* percent.<sup>226</sup> Apparent U.S. consumption of CSPV modules increased from \*\*\* kW in 2021 to \*\*\* kW in 2022 and \*\*\* kW in 2023, for an overall increase of \*\*\* percent.<sup>227</sup>

## 2. Supply Conditions

The domestic industry was the smallest source of supply of CSPV modules to the U.S. market in each year of POI. The industry’s share of apparent U.S. consumption of CSPV modules by quantity decreased \*\*\* percent between 2021 and 2023, declining from \*\*\* percent in 2021 to \*\*\* percent in 2022 and \*\*\* percent in 2023.<sup>228</sup> The domestic industry was also the smallest source of supply to the overall U.S. market for CSPV cells and modules. Its share of apparent U.S. consumption of CSPV cells and modules by value declined overall by \*\*\*

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<sup>223</sup> CR/PR at III-6. The IRA increased the ITC 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 megawatt in size. *Id.*

<sup>224</sup> See ACP’s Postconference Brief at 22-23 and Exhs. 3, 20. California reportedly accounted for one-third of U.S. residential solar photovoltaic capacity installed in 2022. U.S. Department of Energy National Renewable Energy Laboratory, Winter 2024 Solar Industry Update, January 25, 2024, at 12-14 (EDIS Doc. No. 823376).

<sup>225</sup> CR/PR at II-1. Representatives of both petitioner and respondents testified that the new regulatory policy in California had adverse effects on the residential solar market in California. Conference Tr. at 88 (Moskowitz), 197 (Nicely).

<sup>226</sup> CR/PR at Table IV-9; CR/PR at C-1.

<sup>227</sup> CR/PR at Table C-3, Table K-5.

<sup>228</sup> CR/PR at Table C-3, Table K-5.

percentage points from 2021 to 2023, increasing from \*\*\* percent in 2021 to \*\*\* percent in 2022 before declining to \*\*\* percent in 2023.<sup>229</sup>

There were several changes to the domestic industry during the period of investigation. In 2021, domestic producer Sunenergy California closed its plant and filed for bankruptcy, and in 2022, domestic producer LG Electronics closed its 550 MW CSPV module facility in Alabama.<sup>230</sup> Domestic producers \*\*\* domestic module production during the POI.<sup>231</sup> Domestic producers Solar4America, Hanwha, and Heliene all expanded domestic facilities and added module production capacity.<sup>232</sup> Domestic producers Canadian Solar, GAF Energy, Illuminate USA, NanoPV, Crossroads Solar, and Silfab Solar each opened domestic module facilities and began commercial operations.<sup>233</sup> The domestic industry's practical capacity for CSPV modules increased by \*\*\* percent over the period of investigation,<sup>234</sup> from \*\*\* kW in 2021 to \*\*\* kW in 2022 and \*\*\* kW in 2023.<sup>235</sup> Numerous domestic producers announced future plans to expand or build module production facilities with production to start between 2024 to 2026.<sup>236</sup> Several domestic producers also announced plans to build domestic cell production facilities with some producers planning to start production in late 2024.<sup>237</sup>

Cumulated subject imports were the second largest source of supply of CSPV modules to the U.S. market, and gained market share during the period of investigation. Cumulated subject imports' share of apparent U.S. consumption of CSPV modules by quantity increased \*\*\* percentage points between 2021 and 2023, from \*\*\* percent in 2021 to \*\*\* percent in 2022 and \*\*\* percent in 2023.<sup>238</sup> Cumulated subject imports were also the second largest source of supply to the U.S. market for CSPV cells and modules. Their share of apparent U.S.

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<sup>229</sup> CR/PR at Table C-1. Because there was no domestic cell production, the data for U.S. producers' share of apparent U.S. consumption of CSPV cells and modules are based on U.S. producers' value added to imports of cells through the production of modules in the United States.

<sup>230</sup> CR/PR at Table III-3.

<sup>231</sup> CR/PR at III-17.

<sup>232</sup> CR/PR at Table III-3.

<sup>233</sup> CR/PR at Table III-3.

<sup>234</sup> CR/PR at III-14.

<sup>235</sup> CR/PR at Table III-7. The domestic industry's installed capacity for CSPV modules also increased during the POI by \*\*\* percent, increasing from \*\*\* kW in 201 to \*\*\* kW in 2022 and \*\*\* in 2023. CR/PR at Table III-7.

<sup>236</sup> CR/PR at Table III-5.

<sup>237</sup> CR/PR at Table III-4.

<sup>238</sup> CR/PR at Table C-3.

consumption of CSPV cells and modules increased by value \*\*\* from 2021 to 2023, from \*\*\* percent in 2021 to \*\*\* percent in 2022 and \*\*\* percent in 2023.<sup>239</sup>

Nonsubject imports were the largest source of supply of CSPV modules to the U.S. market, although they decreased throughout the period of investigation. Nonsubject imports' share of apparent U.S. consumption of CSPV modules by quantity declined by \*\*\* percentage points from 2021 to 2023, from \*\*\* percent in 2021 to \*\*\* percent in 2022 and \*\*\* percent in 2023. Nonsubject imports were also the largest source of supply for the total U.S. market for CSPV cells and modules throughout the POI, although their share of apparent U.S. consumption by value decreased by \*\*\* percentage points, from \*\*\* in 2021, to \*\*\* percent in 2022, and \*\*\* percent in 2023.<sup>240</sup>

Three fourths (9 of 12) of U.S. producers and two-thirds (28 of 42) of responding importers reported that they had not experienced supply constraints since the beginning of the POI. Firms reporting supply constraints attributed them to factors such as COVID-19 supply chain disruptions, high costs of transportation delays resulting in lost customers, and the need to import CSPV cells to produce modules in the United States.<sup>241</sup>

### **3. Substitutability and Other Conditions**

Based on the record in the preliminary phase of these investigations, we find that there is a moderate-to-high degree of substitutability between domestically produced CSPV modules and subject imports. The majority of domestic producers and U.S. imports reported that the domestic like product and imports of CSPV products from each subject country are always or frequently interchangeable.<sup>242</sup> Factors reducing substitutability include differences in lead times between domestic and subject sources. Some firms also reported differences in testing requirements, proprietary features, and quality.<sup>243</sup>

The record in the preliminary phase of these investigations also indicates that price is an important factor in purchasing decisions. A majority of purchasers responding to the lost sales/lost revenue survey identified price, availability/supply, and quality as among their main purchasing factors, with all purchasers listing price as among the top three factors they

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<sup>239</sup> CR/PR at Table C-1.

<sup>240</sup> CR/PR at Table IV-10, Table C-1.

<sup>241</sup> CR/PR at II-10.

<sup>242</sup> CR/PR at II-10, Tables II-9-II-10.

<sup>243</sup> CR/PR at II-18.

consider.<sup>244</sup> Most domestic producers reported that factors other than price are never significant while importers' responses regarding the significance of factors other than price were mixed, although a majority of importers reported that differences other than price are sometimes or never significant.<sup>245</sup>

Domestic producers reported that \*\*\* percent of their commercial shipments were from inventories, with lead times averaging \*\*\* days.<sup>246</sup> The remaining \*\*\* percent of their commercial shipments were produced-to-order, with lead times averaging \*\*\* days.<sup>247</sup> U.S. importers reported that \*\*\* percent of their commercial shipments were produced-to-order, with lead times averaging \*\*\* days.<sup>248</sup> U.S. importers sold \*\*\* percent of their commercial shipments from U.S. inventories, with an average lead time of \*\*\* days.<sup>249</sup> U.S. importers reported that \*\*\* percent of their commercial shipments were from foreign inventories, with lead times averaging \*\*\* days.<sup>250</sup>

U.S. producers reported that \*\*\* percent of their sales of CSPV products were made through short-term contracts in 2023.<sup>251</sup> Most U.S. importers reported selling imports of CSPV products under short-term or long-term contracts.<sup>252</sup> Responding U.S. importers reported that \*\*\* percent of their sales of CSPV products from subject sources were on the basis of short-term contracts.<sup>253</sup>

The main raw material for CSPV cells is polysilicon, which is used to make the ingots and wafers that are processed into cells. CSPV cells are then assembled, along with other components, including solar glass, aluminum frames, junction boxes, and backsheets, into CSPV modules.<sup>254</sup> Raw materials as a share of the domestic industry's total cost of goods sold

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<sup>244</sup> CR/PR at II-17.

<sup>245</sup> CR/PR at II-19-II-20. Seven U.S. producers reported that differences other than price were sometimes or never significant in responses for each country comparison, and two U.S. producers reported that differences in price were always or frequently significant in each country comparison. See CR/PR at Table II-11. There was more variation by country comparison in U.S. importers' responses, but a majority in each comparison reported that differences other than price were sometimes or never significant. CR/PR at Tables II-11-12.

<sup>246</sup> CR/PR at II-17.

<sup>247</sup> CR/PR at II-17.

<sup>248</sup> CR/PR at II-17-II-18.

<sup>249</sup> CR/PR at II-18.

<sup>250</sup> CR/PR at II-18.

<sup>251</sup> CR/PR at Table V-5. Hanwha, \*\*\*, reported that \*\*\* percent of its sales of CSPV producers were through short-term contracts. *Id.* at V-7.

<sup>252</sup> CR/PR at Table V-5.

<sup>253</sup> CR/PR at V-8, Table V-5.

<sup>254</sup> CR/PR at V-1.



("COGS") fluctuated within a narrow band during the POI, increasing from \*\*\* percent in 2021 to \*\*\* percent in 2022 before declining to \*\*\* percent in 2023, but represented the largest share of total COGS throughout the POI.<sup>255</sup>

As previously discussed, there have been antidumping and countervailing duties on imports of CSPV products from China since the CSPV I orders were imposed in 2012.<sup>256</sup> These orders were continued in 2019 after affirmative determinations in five-year reviews by Commerce and the Commission.<sup>257</sup> 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.<sup>258</sup> Following the expiration of the two-year tariff holiday on June 6, 2024, imports from these countries found to be circumventing the CSPV I orders will now be subject to duties under the CSPV I orders on China.<sup>259</sup>

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 was imposed on imports of CSPV products from Taiwan.<sup>260</sup> These orders were continued in

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<sup>255</sup> CR/PR at Table VI-1.

<sup>256</sup> 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).

<sup>257</sup> *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From the People's Republic of China: Continuation of Countervailing Duty Order*, 84 Fed. Reg. 10299 (March 20, 2019); *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From the People's Republic of China: Continuation of Antidumping Duty Order*, 84 Fed. Reg. 10300 (March 20, 2019); *Crystalline Silicon Photovoltaic Cells and Modules from China*, Inv. Nos. 701-TA-481 and 731-TA-1190 (Review), USITC Pub. 4874 (March 2019). The Commission is now conducting its second five-year reviews of these orders, and has determined to expedite those reviews. *Crystalline Silicon Photovoltaic Cells and Modules from China; Institution of Five-Year Reviews*, 89 Fed. Reg. 6550 (February 1, 2024); see Explanation of Commission Determination on Adequacy (EDIS Document No. 822189).

<sup>258</sup> *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).

<sup>259</sup> See White House Fact Sheet, May 16, 2024 (EDIS Document No. 823129).

<sup>260</sup> *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* (Continued...)

2020 after affirmative determinations in five-year reviews by Commerce and the Commission.<sup>261</sup>

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.<sup>262</sup> On May 28, 2024, the Office of the U.S. Trade Representative (USTR) published a notice requesting public comments on a proposed modification to the Section 301 measure to increase the duties on imports of CSPV products from China from 25 percent to 50 percent, which is proposed to be effective August 1, 2024. The same USTR notice also proposed temporary exclusions from Section 301 duties for imports from China of 19 products used as solar manufacturing equipment; these temporary exclusions are proposed to be effective the date of the notice (May 28, 2024) through May 31, 2025.<sup>263</sup>

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.<sup>264</sup> 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,

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*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.

<sup>261</sup> *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).

<sup>262</sup> CR/PR at I-12.

<sup>263</sup> CR/PR at I-12; Request for Comments on Proposed Modifications and Machinery Exclusion Process in Four-Year Review of Actions Taken in the Section 301 Investigation: China's Acts, Policies, and Practices Related to Technology Transfer, Intellectual Property, and Innovation, 89 Fed. Reg. 46252 (May 28, 2024).

<sup>264</sup> 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).

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.<sup>265</sup>

On May 16, 2024, the Administration announced its plan to imminently remove the exclusion of imports of bifacial modules from the Section 201 safeguard measure, stating that this exclusion had undercut the effectiveness of the safeguard measure, although there have been no further reported actions on this exclusion as of June 6, 2024.<sup>266</sup> The Administration further announced that it would monitor the level of imported solar cells used to make panels in the United States, and if imports of CSPV cells approach the current 5 gigawatt quota level in the tariff-rate quota in the Section 201 safeguard measure, it would work to raise the quota level to ensure that domestic module manufacturing continues to grow.<sup>267</sup>

### **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.”<sup>268</sup>

The volume of cumulated subject imports of CSPV modules increased by \*\*\* percent during the period of investigation, from \*\*\* kW in 2021 to \*\*\* kW in 2022 and \*\*\* kW in 2023.<sup>269</sup> Cumulated subject imports’ share of apparent U.S. consumption of CSPV modules increased by \*\*\* percentage points during the period of investigation, from \*\*\* percent in 2021 to \*\*\* percent in 2022 and \*\*\* percent in 2023.<sup>270</sup>

Cumulated subject imports of CSPV cells and modules, by quantity, increased \*\*\* percent during the POI, from \*\*\* kW in 2021, to \*\*\* kW in 2022, and \*\*\* kW in 2023.<sup>271</sup> Cumulated subject imports’ share of apparent U.S. consumption of CSPV cells and modules, by

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<sup>265</sup> 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).

<sup>266</sup> White House Fact Sheet, May 16, 2024 (EDIS Doc. No. 823129). Imports of bifacial panels have been excluded from the safeguard measure since November 16, 2021, the date of a decision by the Court of International Trade, and were expressly excluded from the measure as extended by the President in his proclamation of February 4, 2022. See *Presidential Proclamation 10339 of February 4, 2022*, at paragraphs 6, 9(c), 87 Fed. Reg. 7357 (Feb. 9, 2022).

<sup>267</sup> White House Fact Sheet, May 16, 2024 (EDIS Doc. No. 823129).

<sup>268</sup> 19 U.S.C. § 1677(7)(C)(i).

<sup>269</sup> Derived from CR/PR at Table K-2.

<sup>270</sup> CR/PR at Table C-3.

<sup>271</sup> CR/PR at Tables IV-2-IV-3.

quantity, increased by \*\*\* percent during the POI, from \*\*\* percent in 2021, to \*\*\* percent in 2022, to \*\*\* percent in 2023.<sup>272</sup>

The ratio of subject imports of CSPV modules to U.S. production increased substantially during the period of investigation, from \*\*\* percent in 2021 to \*\*\* percent in 2022 and \*\*\* percent in 2023.<sup>273</sup>

Based on the record in the preliminary phase of these investigations, we find that the volume of subject imports and the increase in that volume are significant, both in absolute terms and relative to U.S. consumption and production.

#### **D. Price Effects of the Subject Imports**

Section 771(7)(C)(ii) of the Tariff Act provides that, in evaluating the price effects of 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.<sup>274</sup>

As discussed in section VII.B.3 above, we have found that there is a moderate-to-high degree of substitutability between the domestic like product and subject imports and that price is an important factor in purchasing decisions.<sup>275</sup>

We have examined pricing data and purchasers' response to the lost sales/lost revenue survey in our underselling analysis. With respect to pricing data, the Commission requested U.S. producers and importers to provide quarterly data for the total quantity and f.o.b. value of the four CSPV module products shipped to unrelated U.S. customers during January 2021 through December 2023.<sup>276</sup> Seven U.S. producers and 15 importers provided usable pricing

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<sup>272</sup> CR/PR at IV-21, Tables IV-9, C-1. Cumulated subject imports' share of apparent U.S. consumption of CSPV cells and modules, by value, increased by \*\*\* percent during the POI, increasing from \*\*\* percent in 2021, to \*\*\* percent in 2022, to \*\*\* percent in 2023. CR/PR at Tables IV-10, C-1.

<sup>273</sup> CR/PR at Table K-2. The ratio of subject imports of CSPV cells and modules to U.S. production also increased substantially over the POI, from \*\*\* percent in 2021 to \*\*\* percent in 2022 and \*\*\* percent in 2023. CR/PR at Table IV-2.

<sup>274</sup> 19 U.S.C. § 1677(7)(C)(ii).

<sup>275</sup> See Section VII.B.3, *supra*.

<sup>276</sup> CR/PR at V-9. The four pricing products were as follows:  
(Continued...)

data for sales of the four pricing products, although not all firms reported pricing for all products for all quarters.<sup>277</sup> Pricing data reported by these firms accounted for approximately \*\*\* percent of reported domestic producers' U.S. shipments of CSPV products, \*\*\* percent of reported U.S. shipments of subject imports from Cambodia, \*\*\* percent of reported U.S. shipments of subject imports from Malaysia, \*\*\* percent of reported U.S. shipments of subject imports from Thailand, and \*\*\* percent of reported U.S. shipments of subject imports from Vietnam in 2023.<sup>278</sup>

The pricing data show that subject imports undersold the domestic like product in 86 of 105 quarterly comparisons, or 81.9 percent of the comparisons, at margins ranging from \*\*\* to \*\*\* percent, and averaging \*\*\* percent.<sup>279</sup> Subject imports oversold the domestic like product in the remaining 19 instances, 18.1 percent of the comparisons, at margins ranging from \*\*\* to \*\*\* percent, and averaging \*\*\* percent.<sup>280</sup>

There were \*\*\* kW of reported subject import sales in quarters with underselling, 78.4 percent of total reported subject import pricing sales volume, compared to \*\*\* kW in quarters with overselling, 21.5 percent of total reported import sales volume.<sup>281</sup> Thus, the pricing data show that subject imports predominantly undersold the domestic like product in terms of both quarterly comparisons and reported sales volume during the POI.

We have also considered U.S. purchasers' responses concerning lost sales. Of six responding purchasers, five reported purchasing subject imports instead of U.S. produced

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(...Continued)

**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. *Id.*

<sup>277</sup> CR/PR at V-10.

<sup>278</sup> CR/PR at V-10.

<sup>279</sup> CR/PR at V-22.

<sup>280</sup> CR/PR at Table V-13.

<sup>281</sup> CR/PR at Table V-15. The volume of reported subject import sales in quarterly comparisons in which there was underselling was \*\*\* kW out of \*\*\* kW in 2021, \*\*\* kW in out of \*\*\* kW in 2022, and \*\*\* kW out of \*\*\* kW in 2023. CR/PR at Table V-15.

product, and all five reported that subject imports were priced lower than the domestic product.<sup>282</sup> Two reported purchasing subject imports instead of the domestic like product primarily due to the imports' lower price, including one reporting that the volume of subject imports purchased instead of the domestic like product primarily due to price was \*\*\* kW.<sup>283</sup>

Based on the moderate-to-high degree of substitutability between subject imports and the domestic like product, the importance of price in purchasing decisions, the predominant underselling by subject imports in terms of both quarterly comparisons and reported sales volume, and the lost sales information, we find that subject import underselling was significant during the period of investigation. As discussed further below, this underselling caused a shift in market share from the domestic industry to subject imports in the U.S. market for CSPV modules.<sup>284</sup>

We have also considered price trends during period of investigation. Between the first and last quarters for which data are available, domestic prices increased by \*\*\* percent for product 1 but decreased by \*\*\* percent for product 2, \*\*\* percent for product \*\*\*, and \*\*\* percent for product 4.<sup>285</sup> Although domestic prices fluctuated or increased during the 2021-2022 period, depending on the product,<sup>286</sup> they generally declined from the first quarter to the fourth quarter of 2023 for all pricing products despite the substantial increase in U.S. apparent consumption in 2023, as subject imports undersold the domestic like product in 80.7 percent of quarterly comparisons corresponding to 72.1 percent of reported subject import sales volume in that year.<sup>287</sup> Although the domestic industry's unit total COGS declined by \$\*\*\* per kW (\*\*\*) percent) from 2022 to 2023, the decline in the industry's unit net sales value was much greater, \$\*\*\* per kW (\*\*\*) percent).<sup>288</sup> Based on the foregoing, as well as the moderate-to-high degree of substitutability and the importance of price in purchasing decisions, we find for preliminary

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<sup>282</sup> CR/PR at V-26.

<sup>283</sup> CR/PR at Table V-19.

<sup>284</sup> See CR/PR at Table C-3.

<sup>285</sup> CR/PR at V-10.

<sup>286</sup> See CR/PR at Tables V-6 to V-9.

<sup>287</sup> Domestic prices for all four pricing products decreased in each quarter of 2023, with the exception of one quarter for pricing product 3. Domestic prices per kilowatt for product 1 were: \$\*\*\* in Q1, \$\*\*\* in Q2, \$\*\*\* in Q3 and \$\*\*\* in Q4. CR/PR at Table V-6. Domestic prices per kilowatt for product 2 were: \$\*\*\* in Q1, \$\*\*\* in Q2, \$\*\*\* in Q3 and \$\*\*\* in Q4. CR/PR at Table V-7. Domestic prices per kilowatt for product 3 were: \$\*\*\* in Q1, \$\*\*\* in Q2, \$\*\*\* in Q3 and \$\*\*\* in Q4. CR/PR at Table V-8. Domestic prices per kilowatt for product 4 were: \$\*\*\* in Q1, \$\*\*\* in Q2, \$\*\*\* in Q3 and \$\*\*\* in Q4. CR/PR at Table V-6.

<sup>288</sup> CR/PR at Table VI-2.

phase purposes that subject imports depressed prices for the domestic like product to a significant degree.

We have also considered whether cumulated subject imports prevented price increases for domestically produced CSPV modules which otherwise would have occurred to a significant degree. The domestic industry's ratio of COGS to net sales increased by \*\*\* percentage points between 2021 and 2023. The ratio decreased from \*\*\* percent in 2021 to \*\*\* percent in 2022, and then increased to \*\*\* percent in 2023.<sup>289</sup> As apparent U.S. consumption of CSPV modules increased by \*\*\* percent, the domestic industry's net sales unit value declined irregularly by \$\*\*\* per kW (\*\*\* percent) from 2021 to 2023 while its unit COGS increased irregularly by \$\*\*\* per kW (\*\*\* percent) over the same period.<sup>290 291</sup>

Based on the record in the preliminary phase of the investigations, we find that cumulated subject imports significantly undersold the domestic like product, causing a shift in market share from the domestic industry to cumulated subject imports and depressing prices of the domestic like product to a significant degree. Therefore, we find that cumulated subject imports had significant price effects.

#### **E. Impact of the Subject Imports<sup>292</sup>**

Section 771(7)(C)(iii) of the Tariff Act provides that the Commission, in examining the impact of the subject imports on the domestic industry, "shall evaluate all relevant economic factors which have a bearing on the state of the industry." 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 debt, research and development, and factors affecting domestic prices.

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<sup>289</sup> CR/PR at Table C-3.

<sup>290</sup> CR/PR at Table C-3. From 2021 to 2022, the domestic industry's net sales unit value increased by \$\*\*\* per kW (\*\*\* percent), while unit COGS increased by \$\*\*\* per kW (\*\*\* percent). From 2022 to 2023, net sales unit value declined by \$\*\*\* per kW (\*\*\* percent), while unit COGS declined by \$\*\*\* per kW (\*\*\* percent). *Id.* at Table VI-2.

<sup>291</sup> The Commission intends to further investigate in any final phase of these investigations whether cumulated subject imports prevented price increases which otherwise would have occurred, based on conditions of competition in the market including the substantial increase in demand during the POI.

<sup>292</sup> Commerce initiated the antidumping duty investigations based on estimated dumping margins of 125.37 percent for Cambodia, 81.22 percent for Malaysia, 70.36 percent for Thailand, and 271.28 percent for Vietnam. AD Initiation Notice at 43812.

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.”<sup>293</sup>

Although the domestic industry’s trade and employment indicators improved during the POI, these improvements were less than would have been expected in light of the \*\*\* percent increase in apparent U.S. consumption of CSPV modules. The domestic industry’s financial indicators either declined or remained weak during the POI as increasing volumes of low-priced subject imports captured market share from the domestic industry and depressed domestic prices to a significant degree.

The domestic industry’s installed capacity increased by \*\*\* percent during the POI, from \*\*\* kilowatts in 2021 to \*\*\* kilowatts in 2022 and \*\*\* kilowatts in 2023.<sup>294</sup> The domestic industry’s practical capacity increased by \*\*\* percent during the POI, from \*\*\* kilowatts in 2021 to \*\*\* kilowatts in 2022, and \*\*\* kilowatts in 2023.<sup>295</sup> The domestic industry’s production quantity increased by \*\*\* percent during the POI, from \*\*\* kilowatts in 2021 to \*\*\* kilowatts in 2022 and \*\*\* kilowatts in 2023.<sup>296</sup> The industry’s practical capacity utilization declined irregularly by \*\*\* percentage points during the POI, rising from \*\*\* percent in 2021 to \*\*\* percent in 2022, and then falling to \*\*\* percent in 2023.<sup>297</sup>

The industry’s number of production and related workers (“PRWs”) increased by \*\*\* percent during the POI, from \*\*\* PRWs in 2021 to \*\*\* PRWs in 2022 and \*\*\* PRWs in 2023.<sup>298</sup> Hours worked rose by \*\*\* percent, from \*\*\* hours in 2021 to \*\*\* hours in 2022 and \*\*\* hours in 2023.<sup>299</sup> Wages paid increased by \*\*\* percent, from \$\*\*\* in 2021 to \$\*\*\* in 2022 and \$\*\*\* in 2023.<sup>300</sup> Productivity increased by \*\*\* percent, from \*\*\* kilowatts per 1,000 hours in 2021 to \*\*\* kilowatts per 1,000 hours in 2022 and \*\*\* kilowatts per 1,000 hours in 2023.<sup>301</sup>

The domestic industry’s U.S. shipments increased by \*\*\* percent during the POI, from \*\*\* kilowatts in 2021 to \*\*\* kilowatts in 2022 and \*\*\* kilowatts in 2023.<sup>302</sup>

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<sup>293</sup> 19 U.S.C. § 1677(7)(C)(iii). This provision was amended by the Trade Preferences Extension Act of 2015, Pub. L. 114-27.

<sup>294</sup> CR/PR at Table III-7.

<sup>295</sup> CR/PR at Tables III-7, C-3.

<sup>296</sup> CR/PR at Tables III-7, C-3.

<sup>297</sup> CR/PR at Tables III-7, C-3.

<sup>298</sup> CR/PR at Tables III-23, C-3.

<sup>299</sup> CR/PR at Tables III-23, C-3.

<sup>300</sup> CR/PR at Tables III-23, C-3.

<sup>301</sup> CR/PR at Tables III-23, C-3.

<sup>302</sup> CR/PR at Tables III-10, C-3.



The domestic industry's market share for CSPV modules declined by \*\*\* percentage points during the POI, from \*\*\* percent in 2021 to \*\*\* percent in 2022 and \*\*\* percent in 2023.<sup>303</sup> The domestic industry's market share for CSPV cells and modules, by value, declined irregularly by \*\*\* percentage points, rising from \*\*\* percent in 2021 to \*\*\* percent in 2022, and then falling to \*\*\* percent in 2023.<sup>304</sup>

The domestic industry's end-of-period inventories increased by \*\*\* percent during the POI, from \*\*\* kilowatts in 2021 to \*\*\* kilowatts in 2022 and \*\*\* kilowatts in 2023.<sup>305</sup> Its end-of-period inventories as a share of total shipments increased irregularly by \*\*\* percentage points, decreasing from \*\*\* percent in 2021 to \*\*\* percent in 2022, and then increasing to \*\*\* percent in 2023.<sup>306</sup>

The industry's net sales value increased by \*\*\* percent during the POI, rising from \$\*\*\* in 2021 to \$\*\*\* in 2022 before declining to \$\*\*\* in 2023.<sup>307</sup> The industry's gross profit improved from \*\*\* in 2021 to \$\*\*\* in 2022, and then declined to \*\*\* in 2023.<sup>308</sup> The industry's operating income worsened from \$\*\*\* in 2021 to \$\*\*\* in 2022 and \$\*\*\* in 2023.<sup>309</sup> The industry's ratio of operating income to net sales declined irregularly, improving from \*\*\* percent in 2021 to \*\*\* percent in 2022, and then declining to \*\*\* percent in 2023.<sup>310</sup> The industry's net income improved irregularly but \*\*\*, declining from \$\*\*\* in 2021 to \$\*\*\* in 2022, and then improving to \$\*\*\* in 2023.<sup>311</sup> The industry's net income margin improved but \*\*\* during the POI from \*\*\* percent in 2021, \*\*\* percent in 2022 and \*\*\* percent in 2023.<sup>312</sup>

The domestic industry's capital expenditures increased by \*\*\* percent during the POI, rising from \$\*\*\* in 2021 to \$\*\*\* in 2022 and \$\*\*\* in 2023, as three new producers started module production and existing producers expanded their module production and capacity.<sup>313</sup> The domestic industry's research and development expenses increased irregularly by \*\*\* percent, rising from \$\*\*\* in 2021 to \$\*\*\* in 2022, and then falling to \$\*\*\* in 2023.<sup>314</sup> The industry's total net assets increased by \*\*\* percent, rising from \$\*\*\* in 2021 to \$\*\*\* in 2022

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<sup>303</sup> CR/PR at Tables K-5, C-3.

<sup>304</sup> CR/PR at Table C-3.

<sup>305</sup> CR/PR at Tables III-12, C-3.

<sup>306</sup> CR/PR at Tables III-12, C-3.

<sup>307</sup> CR/PR at Tables VI-1, C-3.

<sup>308</sup> CR/PR at Tables VI-1, C-1.

<sup>309</sup> CR/PR at Tables VI-1, C-3.

<sup>310</sup> CR/PR at Tables VI-1, C-3.

<sup>311</sup> CR/PR at Tables VI-1, C-3.

<sup>312</sup> CR/PR at Tables VI-1, C-3.

<sup>313</sup> CR/PR at VI-22, Tables VI-5, C-3.

<sup>314</sup> CR/PR at Tables VI-7, C-3.

and \$\*\*\* in 2023.<sup>315</sup> The industry's return on assets declined irregularly; it was\*\*\* percent in 2021, \*\*\* percent in 2022 and \*\*\* percent in 2023.<sup>316</sup>

Based on the record in the preliminary phase of these investigations, we find that cumulated subject imports prevented the domestic industry from fully capitalizing on the \*\*\* percent increase in apparent U.S. consumption from 2021 to 2023. Subject import volume increased significantly during the POI, driven by significant underselling, resulting in a market share shift from the domestic industry to cumulated subject imports.<sup>317</sup> Cumulated subject imports also depressed domestic prices to a significant degree from 2022 to 2023. As a consequence, the domestic industry's production, U.S. shipments, and employment-related indicators all increased by less than would have been expected in light of the substantial increase in apparent U.S. consumption of CSPV modules and the industry's operating losses worsened in absolute terms and as share of net sales and net income \*\*\*.<sup>318</sup>

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<sup>315</sup> CR/PR at Tables VI-9, C-3.

<sup>316</sup> CR/PR at Table VI-10.

<sup>317</sup> Despite apparent U.S. consumption of CSPV modules increasing by \*\*\* percent from 2021 to 2023 and the domestic industry's practical capacity increasing by \*\*\* percent, domestic production only increased by \*\*\* percent. As a result, the industry's practical capacity utilization rate declined from \*\*\* percent in 2021 to \*\*\* percent in 2023. CR/PR at Table C-3. The domestic industry therefore could have supplied more of the market than it did, but for the increase in cumulated subject imports.

<sup>318</sup> Several respondents argue that the recent plant openings and expansions of existing facilities by the domestic industry, spurred by the incentives provided by the IRA, demonstrate that the domestic industry is not materially injured. See ACP's Postconference Brief at 35-38; Illuminate's Postconference Brief at 3-10. ACP contends because the IRA went into effect in 2022, its effects only began to be observed during the POI in 2023. It further argues that the IRA's manufacturing production credits encourage domestic producers to keep producing in order to receive the credit, even where marginal revenue may be below marginal cost. ACP asserts that these conditions create the appearance of financial losses when the domestic industry is actually profiting from the production credits. Relatedly, ACP argues that several domestic producers have recently made substantial investments in their production operations. ACP asserts that these start-up costs make the domestic industry's financial condition look worse than it is, given that start-up costs will be absorbed over time as production increases. We observe that to the extent the IRA is affecting domestic producers' financial performance, that would not negate the adverse impact of subject imports on the domestic industry caused by subject imports gaining market share at the expense of the domestic industry and depressing domestic producer prices. In any event, we intend to further investigate the influence of government incentives on the domestic industry's performance in any final phase of these investigations.

The parties disagree regarding the effect of Hanwha's engineering, procurement and construction ("EPC") services. Hanwha has U.S. affiliates that sell CSPV modules that have been produced by Hanwha at its facility in Dalton Georgia and also offer customers EPC services. See Conference Tr. at 77 (Connolly). ACP argues that utility-scale customers are reluctant to purchase modules from Hanwha because Hanwha requires some purchasers buy EPC services as a part of the module sale. ACP Postconference Brief at 18. Similarly, Canadian Solar argues that Hanwha's lost sales (Continued...)

We have considered whether there are other factors that may have had an impact on the domestic industry during the POI to ensure that we are not attributing injury from other factors to subject imports. As discussed in Section VII.B.1 above, nonsubject imports accounted for the largest share of apparent U.S. consumption but that share declined throughout the POI, as subject imports' share of apparent U.S. consumption increased. Thus, the domestic industry lost market share only to subject imports. The average unit value ("AUV") of nonsubject imports was \*\*\* than cumulated subject imports' AUV in 2022 and \*\*\* in 2023.<sup>319</sup> We find that nonsubject imports cannot explain the material injury that we have attributed to cumulated subject imports.<sup>320</sup>

Several respondents argued that the domestic industry's lagging performance during the POI resulted from its focus on the residential segment of the CSPV products market, in which demand and prices have allegedly declined because of changes in California state regulatory policies, rather than the utilities segment of the market, which allegedly accounted for most demand growth.<sup>321</sup> SEIA argues that the strong performance by First Solar, a U.S. producer of out of scope thin-film products, in the utility scale segment of the market while competing with subject imports indicates that the domestic industry's adverse performance trends are attributable to factors other than subject imports.<sup>322</sup> In response, petitioner asserts that domestic producers have supplied modules across all market segments and experienced

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(...Continued)

may be attributable to customers' unwillingness to purchase modules bundled with EPC services, rather than the effects of subject imports. Canadian Solar's Postconference Brief at 34-35. According to petitioner, Hanwha's affiliates encourage their customers to purchase EPC services along with CSPV modules produced by Hanwha, and prefer that their customers purchase both, but do not require their customers to purchase EPC services in order to purchase CSPV modules produced by Hanwha. Petitioner's Postconference Brief, Response to Staff Questions, at 53-54. We intend to investigate this issue further in any final phase of these investigations.

<sup>319</sup> See CR/PR at Table C-3.

<sup>320</sup> Respondents argue that domestic producer Hanwha imports significant volumes of CSPV cells from its nonsubject affiliate in South Korea and its subject affiliate in Malaysia. Respondents assert that nonsubject imports from South Korea are priced lower than subject imports, and therefore account for any material injury. See Canadian Solar's Postconference Brief at 1-3 and Response to Staff Questions at 23-24, 34-35; SEIA's Postconference Brief at 1-2, 8-9; ACP's Postconference Brief at 1-2; Illuminate's Postconference Brief at 1-3. We intend to further investigate the effects of nonsubject imports, including those by Hanwha, in any final phase of the investigations.

<sup>321</sup> ACP's Postconference Brief at 22; SEIA's Postconference Brief at 11-12.

<sup>322</sup> SEIA's Postconference Brief at 9-10. ACP asserts that the domestic industry does not have the scalability or bankability to supply CSPV products to large utility customers. ACP's Postconference Brief at 22.

worsening performance in the utility market segment due to subject imports.<sup>323</sup> The record indicates that the domestic industry's share of apparent U.S. consumption in the utility segment declined irregularly from \*\*\* percent in 2021 to \*\*\* percent in 2023,<sup>324</sup> while cumulated subject imports' market share increased from \*\*\* percent in 2021 to \*\*\* percent in 2023.<sup>325</sup> Both the domestic industry and cumulated subject imports increased their shares of apparent U.S. consumption in the installer segment.<sup>326</sup> In any final phase of the investigations, we intend to further investigate how the domestic industry's alleged focus on the installer segment relative to the utility segment influenced its performance.

ACP argues that subject imports of cells are inherently non-injurious to the domestic industry, given the absence of current U.S. cell production and the corresponding need for U.S. module producers to import the cells they require, and that the Commission should therefore disregard subject imports of cells in its material injury analysis. Because cells are within the scope of the investigations, however, we may not ignore them in our analysis of the impact of subject imports on the domestic industry.<sup>327</sup> As discussed above, when considering only the module segment of the market, subject imports undersold the domestic modules and took market share from the domestic industry during the POI. Furthermore, while we recognize that the domestic industry was dependent on imported cells during the POI, several firms have invested in the construction of domestic cell production facilities, including some that are scheduled to commence production imminently.<sup>328</sup> In any final phase of the investigations, we intend to further investigate how the importation of cells may impact our material injury analysis.

In sum, based on the record in the preliminary phase of these investigations, we determine that there is a reasonable indication that an industry in the United States is materially injured by reason of cumulated subject imports.

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<sup>323</sup> Petitioner's Postconference Brief at 9.

<sup>324</sup> CR/PR at Table L-4. We note that U.S. producers increased their share of total shipments to the utility segment from 2022 to 2023. *Id.*

<sup>325</sup> CR/PR at Table L-4.

<sup>326</sup> CR/PR at Table L-3. Subject imports' share of the market for CSPV modules to installers went from \*\*\* percent in 2021, to \*\*\* percent in 2022, and \*\*\* percent in 2023. CR/PR at Table L-3. U.S. producers' share went from \*\*\* percent in 2021 to \*\*\* in 2022 and \*\*\* percent in 2023. CR/PR at Table L-3.

<sup>327</sup> See 19 U.S.C. § 1677(7); 19 U.S.C. § 1677(25).

<sup>328</sup> CR/PR at Table III-4.

## VIII. 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.”<sup>329</sup> 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.<sup>330</sup> In making our determination, we consider all statutory threat factors that are relevant to these investigations.<sup>331</sup>

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<sup>329</sup> 19 U.S.C. § 1677(7)(F)(ii).

<sup>330</sup> 19 U.S.C. § 1677(7)(F)(ii).

<sup>331</sup> 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

(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.<sup>332</sup>

Petitioner argues that the Commission should exercise its discretion to cumulate imports from all subject sources, including Cambodia, for purposes of any threat analysis, reiterating its assertion that the statutory factors supporting cumulation for present material injury are met in this case.<sup>333</sup>

BYD argues that the Commission should not exercise its discretion to cumulate subject imports from Cambodia. BYD argues that NE Solar is investing in U.S. production in a solar module factor in Arizona, spurred by the IRA, and expects to begin production late in the second quarter of 2024.<sup>334</sup> BYD asserts that the Commission has previously exercised its discretion not to cumulate imports from subject countries when foreign producers make significant investments in U.S. production.<sup>335</sup>

As discussed above in Section VI.B., the petitions for these investigations were filed on the same day, and there is a reasonable overlap of competition between and among imports from Cambodia subject to the antidumping duty investigation, subject imports from Malaysia, Thailand, and Vietnam, and the domestic like product. Imports from Cambodia subject to the countervailing duty investigation are the same as those subject to the antidumping duty investigation and there is no information in the record to suggest that the reasonable overlap

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(...Continued)

(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).

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 these investigations.

<sup>332</sup> 19 U.S.C. § 1677(7)(H).

<sup>333</sup> Petitioner’s Postconference Brief at 37.

<sup>334</sup> BYD’s Postconference Brief at 15.

<sup>335</sup> BYD’s Postconference Brief at 16 (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)).

of competition between and among imports from all subject sources and the domestic like product will not continue into the imminent future.

The record indicates that subject imports from Cambodia are generally fungible with subject imports from other sources and the domestic like product.<sup>336</sup> During the POI, subject imports from Cambodia overlapped with subject imports from other sources and the domestic like product in terms of channels of distribution and geographic markets, and were simultaneously present in the U.S. market with them.<sup>337</sup> Based on this information, we find that the reasonable overlap of competition between and among subject imports from Cambodia subject to the antidumping and countervailing duty investigations, subject imports from other sources, and the domestic like product is likely to continue into the imminent future.

Although BYD argues that NE Solar intends to begin domestic production of CSPV modules, the record in the preliminary phase of these investigations does not indicate that such production would cause subject imports from Cambodia to compete under different conditions of competition than imports from other subject sources in the U.S. market in the imminent future. Producers in other subject countries have similarly announced investments in the production of CSPV products in the United States.<sup>338</sup> Thus, for purposes of our preliminary determinations, we do not find differences in likely conditions of competition sufficient to warrant considering subject imports from Cambodia separately for purposes of our threat analysis. We therefore exercise our discretion to cumulate subject imports from Cambodia, Malaysia, Thailand, and Vietnam for our analysis of whether there is a reasonable indication of a threat of material injury to the domestic industry by reason of imports from Cambodia subject to the countervailing duty investigation.

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<sup>336</sup> CR/PR at Tables II-8, II-9.

<sup>337</sup> CR/PR at II-3.

<sup>338</sup> Boviet, a subject producer from Vietnam, on April 26, 2024 announced plans to invest \$294 million in a CSPV cell and module production facility in North Carolina. Boviet expects to begin module production in the first quarter of 2025. Boviet's Postconference Brief at 2. Runergy, which is affiliated with a subject producer in Thailand and a U.S. importer of subject merchandise from Thailand, states that it has invested over \$\*\*\* in a CSPV module production facility in Alabama. Runergy's Postconference Brief at 2. Runergy expects to begin shipping domestically produced modules in the summer of 2024. See *id.* at Exhibit A (Declaration of Erika Huber, Runergy Alabama, Inc.).

## C. Analysis of Threat of Material Injury Factors

### 1. Nature of the Alleged Subsidies

The Department of Commerce initiated its countervailing duty investigations on CSPV products from Cambodia, Malaysia, Thailand, and Vietnam with respect to 13 alleged programs by the government of Cambodia, 19 alleged programs by the government of Thailand, and 31 alleged programs by the government of Vietnam.<sup>339</sup>

Commerce initiated the countervailing duty investigation on CSPV products from Cambodia with respect to six alleged tax programs, three alleged duty exemptions programs, three alleged lending programs, and one alleged transnational subsidy program. Commerce identified one alleged program as contingent on export, the alleged transnational subsidy program regarding China (“Policy Lending from Chinese Banks for Belt and Road Initiative (BRI) Capacity Cooperation Projects”).<sup>340</sup>

Commerce initiated the countervailing duty investigation on CSPV products from Malaysia with respect to three alleged grant programs, nine alleged tax programs, two alleged lending programs, two alleged programs regarding provision of goods or services for less than adequate remuneration (LTAR), and two alleged transnational subsidies programs. Commerce identified two alleged transnational subsidy programs as contingent upon export, both of which appear to involve alleged transnational subsidies from China: “Policy Lending from Chinese Banks for Belt and Road Initiative (BRI) Capacity Cooperation Projects” and “Cross-Border Provision of Chinese-Origin Polysilicon for LTAR.” Commerce also stated that eligibility to receive benefits from one alleged tax program was contingent upon export performance:

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<sup>339</sup> *Certain Paper Shopping Bags From India and the People’s Republic of China: Initiation of Countervailing Duty Investigations*, 88 Fed. Reg. 41380, 41382 (June 26, 2023).

<sup>340</sup> Enforcement and Compliance Office of AD/CVD Operations, Countervailing Duty Investigation Initiation Checklist, *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules, from Cambodia*, May 14, 2014, at 6-13 (EDIS Doc. No. 822546). Commerce initiated with respect to Cambodia as to one alleged transnational subsidy program but declined to do so as to another alleged transnational program. *Id.* at 12-13, 15. The petitions were filed on April 24, 2024, the effective date of new Commerce regulations in which it repealed a previous Commerce regulation on transnational subsidies to clarify that “when appropriate, Commerce will investigate and countervail transnational subsidies (i.e., subsidies provided by a government or public entity in one country that benefit producers or exporters in another country).” *Regulations Improving and Strengthening the Enforcement of Trade Remedies Through the Administration of the Antidumping and Countervailing Duty Laws*, 89 Fed. Reg. 20766, 20826 (March 25, 2024).



“Exemption on Import Duties and Sales Taxes for Imported Raw Materials, Spare Parts/Accessories, and Machinery.”<sup>341</sup>

Commerce initiated the countervailing duty investigation on CSPV products from Thailand with respect to nine alleged tax programs and duty exemptions, eight alleged lending programs, and two programs regarding provision of goods or services for less than adequate remuneration (LTAR). Commerce identified two alleged subsidy programs as contingent upon export, both of which appear to involve alleged transnational subsidies from China: an alleged lending program (“Policy Lending from Chinese Banks for Belt and Road Initiative (BRI) Capacity Cooperation Projects”) and an alleged program regarding provision of goods or services for LTAR (“Cross-Border Provision of Chinese Origin Polysilicon for LTAR”).<sup>342</sup>

Commerce initiated the countervailing duty investigation on CSPV products from Vietnam with respect to 13 alleged tax programs, eight alleged lending programs, six alleged land programs, two alleged grant programs, and two alleged programs regarding provision of inputs and services for less than adequate remuneration. Commerce identified two alleged subsidy programs as contingent or possibly contingent upon export, both of which appear to involve alleged transnational subsidies from China: an alleged lending program (“Policy Lending from Chinese Banks for Belt and Road Initiative (BRI) Capacity Cooperation Projects”) and an alleged program regarding provision of goods or services for LTAR (“Cross-Border Provision of Chinese Origin Polysilicon for LTAR”).<sup>343</sup>

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<sup>341</sup> Enforcement and Compliance Office of AD/CVD Operations, Countervailing Duty Investigation Initiation Checklist, *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules, from Malaysia*, May 14, 2014, at 6-16 (EDIS Doc. No. 822909). Commerce initiated with respect to Malaysia as to three alleged transnational subsidy programs but declined to do so as to another alleged transnational program. *Id.* at 14-17.

<sup>342</sup> Enforcement and Compliance Office of AD/CVD Operations, Countervailing Duty Investigation Initiation Checklist, *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules, from Thailand*, May 14, 2014, at 6-18 (EDIS Doc. No. 822548). Commerce initiated with respect to Thailand as to two alleged transnational subsidy programs but declined to do so as to another alleged transnational program. *Id.* at 15-20.

<sup>343</sup> Enforcement and Compliance Office of AD/CVD Operations, Countervailing Duty Investigation Initiation Checklist, *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules, from Vietnam*, May 14, 2014, at 6-20 (EDIS Doc. No. 822549). Commerce initiated with respect to Vietnam as to two alleged transnational subsidy programs but declined to do so as to another alleged transnational subsidy program. *Id.* at 14-16, 20-22.

## 2. Likely Volume

As discussed in section VII.C above, we have found that the volume of subject imports from Cambodia, Malaysia, Thailand, and Vietnam, on a cumulated basis, was significant and increased significantly during the period of investigation, in absolute terms and relative to U.S. consumption and production. During the POI, the volume of cumulated subject imports increased in quantity \*\*\*.<sup>344</sup> Cumulated subject imports' share of apparent U.S. consumption of CSPV modules \*\*\* during the POI.<sup>345</sup> We find that the significant increase in cumulated subject import volume observed during the period of investigation is likely to continue in the imminent future absent relief.

The record in the preliminary phase of these investigations indicates that cumulated subject producers have the ability and the incentive to increase their exports to the United States in the imminent future.<sup>346</sup> Reported capacity and production of the cumulated subject industries of both CSPV cells and CSPV modules increased \*\*\* over the POI, and are projected to increase in 2024 before declining in 2025 to a level still well above that in 2023.<sup>347</sup> The

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<sup>344</sup> The volume of cumulated subject imports of CSPV cells and modules by quantity increased from \*\*\* kilowatts in 2021 to \*\*\* kilowatts in 2022 and \*\*\* kilowatts in 2023. CR/PR at Table IV-2. The volume of cumulated subject imports of CSPV cells and modules by value increased from \$\*\*\* in 2021 to \$\*\*\* kilowatts in 2022 and \$\*\*\* in 2023. *Id.*

<sup>345</sup> The share of apparent U.S. consumption by quantity of cumulated subject imports of CSPV cells and modules increased from \*\*\* percent in 2021 to \*\*\* percent in 2022 and \*\*\* percent in 2023. CR/PR at Table IV-9. The share of apparent U.S. consumption by value of cumulated subject imports of CSPV cells and modules increased from \*\*\* percent in 2021 to \*\*\* percent in 2022 and \*\*\* percent in 2023. *Id.* at Table IV-10.

<sup>346</sup> We note that questionnaire responses account for an estimated \*\*\* percent of cell production and \*\*\* module production of CSPV products in Cambodia; \*\*\* cell production and \*\*\* percent of module production of CSPV products in Malaysia; \*\*\* percent of cell production and \*\*\* percent of module production of CSPV products in Thailand; and \*\*\* cell and module production of CSPV products in Vietnam in 2023. CR/PR at VII-3.

<sup>347</sup> Reported cell capacity of the cumulated subject industries increased from \*\*\* kilowatts in 2021 to \*\*\* kilowatts in 2022 and \*\*\* kilowatts in 2023; it is projected to be \*\*\* kilowatts in 2024 and lower, at \*\*\* kilowatts, in 2025. CR/PR at Table VII-12. The reported production of cells by the cumulated subject industries increased from \*\*\* kilowatts in 2021 to \*\*\* kilowatts in 2022 and \*\*\* kilowatts in 2023; it is projected to be \*\*\* kilowatts in 2024 and lower, at \*\*\* kilowatts, in 2025. *Id.* The reported capacity utilization rate of the cumulated subject industries for cell production increased from \*\*\* percent in 2021 to \*\*\* percent in 2022 and \*\*\* percent in 2023; it is projected to be \*\*\* percent in 2024 and lower, at \*\*\* percent, in 2025. *Id.*

Reported module capacity of the cumulated subject industries increased from \*\*\* kilowatts in 2021 to \*\*\* kilowatts in 2022 and \*\*\* kilowatts in 2023; it is projected to be \*\*\* kilowatts in 2024 and lower, at \*\*\* kilowatts, in 2025. *Id.* (Continued...)

unused capacity in the subject industries for production of CSPV cells increased during the POI, while the unused capacity for production of CSPV modules declined.<sup>348</sup> Nevertheless, the unused capacity of the cumulated subject industries for production of CSPV modules was \*\*\* the practical capacity of the domestic industry for CSPV modules in 2023, even after a \*\*\* percent increase in that practical capacity during the POI, and equivalent to \*\*\* percent of apparent U.S. consumption of CSPV modules that year.<sup>349</sup>

End-of-period inventories of both CSPV cells and modules held by subject producers increased \*\*\* between 2021 and 2023.<sup>350</sup> End-of-period inventories of CSPV cells and modules by held U.S. importers increased \*\*\* between 2021 and 2023.<sup>351</sup> Moreover, importers

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(...Continued)

lower, at \*\*\* kilowatts, in 2025. CR/PR at Table VII-15. The reported production of modules by the cumulated subject industries increased from \*\*\* kilowatts in 2021 to \*\*\* kilowatts in 2022 and \*\*\* kilowatts in 2023; it is projected to be \*\*\* kilowatts in 2024 and lower, at \*\*\* kilowatts, in 2025. *Id.* The reported capacity utilization rate of the cumulated subject industries for CSPV module production increased from \*\*\* percent in 2021 to \*\*\* percent in 2022 and \*\*\* percent in 2023; it is projected to be \*\*\* percent in 2024 and lower, at \*\*\* percent, in 2025. *Id.*

<sup>348</sup> Unused cell capacity of the cumulated subject industries increased from \*\*\* kilowatts in 2021 to \*\*\* kilowatts in 2022 and \*\*\* kilowatts in 2023; it is projected to be \*\*\* kilowatts in 2024 and lower, at \*\*\* kilowatts, in 2025. Derived from CR/PR at Table VII-12.

Unused module capacity of the cumulated subject industries increased from \*\*\* kilowatts in 2021 to \*\*\* kilowatts in 2022, and then fell to \*\*\* kilowatts in 2023; it is projected to be \*\*\* kilowatts in 2024 and higher, at \*\*\* kilowatts, in 2025. Derived from CR/PR at Table VII-12.

<sup>349</sup> CR/PR at III-14, derived from CR/PR at Tables III-7, VII-10, C-3, The practical capacity of the domestic industry for production of modules increased from \*\*\* kilowatts in 2021 to \*\*\* kilowatts in 2022 and \*\*\* kilowatts in 2023. CR/PR at Table III-7.

<sup>350</sup> End-of-period inventories of CSPV cells by subject producers increased from \*\*\* kilowatts in 2021 to \*\*\* kilowatts in 2022 and \*\*\* kilowatts in 2023; they are projected to be \*\*\* kilowatts in 2024 and \*\*\* kilowatts in 2025. CR/PR at Table VII-12. Subject producers of CSPV cells had inventories equivalent to \*\*\* percent of production of CSPV cells in 2021, \*\*\* percent in 2022, and \*\*\* percent in 2023; their projected inventories are equivalent to \*\*\* percent of projected production of CSPV cells in 2024 and \*\*\* percent in 2025. *Id.*

End-of-period inventories of CSPV modules by subject producers increased from \*\*\* kilowatts in 2021 to \*\*\* kilowatts in 2022 and \*\*\* kilowatts in 2023; they are projected to be \*\*\* kilowatts in 2024 and \*\*\* kilowatts in 2025. CR/PR at Table VII-15. Subject producers of CSPV modules had inventories equivalent to \*\*\* percent of production of CSPV modules in 2021, \*\*\* percent in 2022, and \*\*\* percent in 2023. Their projected inventories are equivalent to \*\*\* percent of projected production of CSPV modules in 2024 and \*\*\* percent in 2025. *Id.*

<sup>351</sup> U.S. importers' inventories of subject merchandise of CSPV cells and modules from all subject sources increased from \*\*\* kilowatts in 2021 to \*\*\* kilowatts in 2022 and \*\*\* kilowatts in 2023. CR/PR at Table VII-21. The ratio of U.S. importers' inventories of subject merchandise to U.S. shipments of subject imports was \*\*\* percent in 2021, \*\*\* percent in 2022, and \*\*\* percent in 2023. *Id.*

(Continued...)

reported substantial quantities of arranged imports of CSPV cells and modules from subject sources for January through December 2024, totaling \*\*\* kilowatts.<sup>352</sup>

Cumulated subject producers also have the incentive to increase exports to the United States in the imminent future, given their export orientation and increasing reliance on the U.S. market during the period of investigation. The cumulated subject industries are highly export oriented with respect to CSPV modules, with export shipments accounting for over \*\*\* percent of total shipments during the POI, and this \*\*\* level of export orientation is expected to continue in 2024 and 2025. The cumulated subject industries are less export oriented with respect to CSPV cells, although they do have a substantial degree of export orientation.<sup>353</sup> In addition, the cumulated subject industries are highly oriented towards the U.S. market with respect to exports of CSPV modules, with the United States accounting for a \*\*\* of their export shipments in every year of the POI, and this orientation towards the U.S. market is projected to continue in 2024 and 2025. By contrast, the cumulated subject industries are not oriented towards the U.S. market with respect to exports of CSPV cells, with the U.S. market accounting for a \*\*\* percentage of their total exports shipments throughout the POI, although this percentage is projected to be \*\*\* in 2024 and 2025.<sup>354</sup>

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(...Continued)

The available data do not suggest that U.S. producers and subject producers have the ability to shift production from CSPV modules to alternate products. \*\*\* U.S. producers, and \*\*\* subject suppliers, reported the ability to shift production. CR/PR at II-4.

<sup>352</sup> CR/PR at Table VII-22.

<sup>353</sup> Total export shipments of cells accounted for \*\*\* percent of total shipments of cells by subject producers in 2021, \*\*\* percent in 2022, and \*\*\* percent in 2023; they are projected to account for \*\*\* percent of total shipments of cells in 2022 and \*\*\* percent of total shipments of cells in 2023. CR/PR at Table VII-12.

Total export shipments of modules accounted for \*\*\* percent of total shipments of modules by subject producers in 2021, \*\*\* percent in 2022, and \*\*\* percent in 2023. They are projected to account for \*\*\* percent of total shipments of modules in 2022 and \*\*\* percent of total shipments of modules in 2023. CR/PR at Table VII-15.

<sup>354</sup> Exports of cells to the United States accounted for \*\*\* percent of total shipments of cells by subject producers in 2021, \*\*\* percent in 2022, and \*\*\* percent in 2023. Exports to the United States are projected to account for \*\*\* percent of total shipments of cells by subject producers in 2022 and \*\*\* percent in 2023. CR/PR at Table VII-12. Exports of cells to all other markets accounted for \*\*\* percent of total shipments of CSPV cells by subject producers in 2021, \*\*\* percent in 2022, and \*\*\* percent in 2023. Exports to all other markets are projected to account for \*\*\* percent of total shipments of CSPV cells by subject producers in 2024 and \*\*\* percent in 2025. *Id.*

Exports of modules to the United States accounted for \*\*\* percent of total shipments of modules by subject producers in 2021, \*\*\* percent in 2022, and \*\*\* percent in 2023; they are projected to account for \*\*\* percent of total shipments of CSPV modules by subject producers in 2024 and lower, at \*\*\* percent, in 2023. CR/PR at Table VII-15. Exports of modules to all other markets accounted for (Continued...)

In light of the significant increase in cumulated subject import volume and market share during the period of investigation; the large and increasing capacity of the cumulated subject producers, including substantial excess capacity, and the cumulated subject producers' export orientation and increasing dependence on the U.S. market, we find that there is the likelihood of substantially increased subject import volumes in the imminent future in the absence of relief.

### **3. Likely Price Effects**

As addressed 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 an important factor in purchasing decisions. Additionally, as addressed in Section VII.D.3, we have found that imports from Cambodia subject to the antidumping duty investigations, and subject imports from Malaysia, Thailand, and Vietnam, on a cumulated basis, undersold the domestic like product to a significant degree, causing a shift in market share from the domestic industry to those subject imports and depressing prices for the domestic like product to a significant degree.<sup>355</sup>

In the absence of any evidence that the pattern of subject import underselling is likely to change, we find that cumulated subject imports are likely to continue to significantly undersell the domestic like product in the imminent future. Given the moderate-to-high degree of substitutability between subject imports and the domestic like product and the importance of price to purchasers, we find that the significant subject import underselling that is likely would increase demand for further imports in the imminent future, thereby contributing to an additional shift in market share from the domestic industry to subject imports, and/or resulting in subject imports entering at prices that are likely to have a significant depressing effect on domestic prices.

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(...Continued)

\*\*\* percent of total shipments of modules by subject producers in 2021, \*\*\* percent in 2022, and \*\*\* percent in 2023; they are projected to account for \*\*\* percent of total shipments of modules by subject producers in 2024 and \*\*\* percent in 2025. *Id.*

<sup>355</sup> CR/PR at Table C-3.

#### 4. Likely Impact

As discussed in Section VII.E. above, based on the record in the preliminary phase of these investigations, we have found that the significant and increasing volume of imports from Cambodia subject to the countervailing duty investigation, and subject imports from Malaysia, Thailand, and Vietnam, on a cumulated basis, significantly undersold the domestic like product, took sales and market share from the domestic industry, and depressed domestic prices to a significant degree, preventing the domestic industry from fully capitalizing on the substantial increase in apparent U.S. consumption and causing the industry's operating losses to worsen and net income to \*\*\*. Given the reasonable indication that the domestic industry is materially injured by reason of subject imports from Cambodia, Malaysia, Thailand, and Vietnam, and the weaker than expected performance and worsening operating losses experienced by the domestic industry during the period of investigation, as discussed above, we find that the domestic industry is in a vulnerable condition.

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 cumulated subject imports would likely have a significant impact on the domestic industry in the imminent future, in the absence of relief. Specifically, the likely increased volumes of low-priced 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.<sup>356</sup>

We have also considered whether factors other than subject imports threaten to injure the domestic industry. As discussed in Section VII.B.2, nonsubject imports accounted for the largest share of apparent U.S. consumption but that share decreased in each year of the period of investigation, as subject imports' share of apparent U.S. consumption increased. There is no information on the record that nonsubject imports would change the impact subject imports are likely to have on the domestic industry in the imminent future.

We are unpersuaded by respondents' 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 modules. Although subject producers did supply the domestic

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<sup>356</sup> CR/PR at Table VI-12. \*\*\*. *Id.*

industry with CSPV cells, the record in these preliminary investigations shows that subject producers focused more on shipping CSPV modules to the United States than on supplying the domestic industry with CSPV cells during the POI. Exports of CSPV cells to the United States accounted for a \*\*\* of cumulated subject producers' shipments of CSPV cells during the POI, accounting for \*\*\* percent in 2021, \*\*\* percent in 2022, and \*\*\* percent in 2023.<sup>357</sup> The share of subject producers' home market shipments of cells increased irregularly during the POI, from \*\*\* percent in 2021, to \*\*\* percent in 2022, and to \*\*\* percent in 2023.<sup>358</sup> By contrast, exports of CSPV modules to the United States accounted for the \*\*\* of cumulated subject producers' total shipments of CSPV modules during the POI, accounting for \*\*\* percent in 2021, \*\*\* percent in 2022, and \*\*\* percent in 2023.<sup>359</sup> The share of subject producers' home market shipments of CSPV modules remained \*\*\* throughout the POI, at \*\*\* percent in 2021, \*\*\* percent in 2022, and \*\*\* percent in 2023.<sup>360</sup> Thus, the domestic industry's need for imported cells would not prevent increasing volumes of low-priced cumulated subject imported modules from having a significant impact on the domestic industry in the imminent future absent relief.

In sum, based on the record in the preliminary phase of these investigations, we determine that there is a reasonable indication that an industry in the United States is threatened with material injury by reason of imports of CSPV products from Cambodia subject to the countervailing duty investigation.

## **IX. Conclusion**

For the reasons stated above, we determine that there is a reasonable indication that an industry in the United States is materially injured by reason of subject imports of CSPV cells and modules from Cambodia, Malaysia, Thailand, and Vietnam that are allegedly sold in the United States at less than fair value and subsidized by the governments of Malaysia, Thailand, and Vietnam. We also determine that there is a reasonable indication that an industry in the United States is threatened with material injury by reason of imports of the subject merchandise from Cambodia that are allegedly subsidized by the government of Cambodia.

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<sup>357</sup> CR/PR at Table VII-12.

<sup>358</sup> CR/PR at Table VII-12.

<sup>359</sup> CR/PR at Table VII-15.

<sup>360</sup> CR/PR at Table VII-15.





# Part I: 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”),<sup>1</sup> from Cambodia, Malaysia, Thailand, and Vietnam. Table I-1 presents information relating to the background of these investigations.<sup>2 3</sup>

**Table I-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 15, 2024	Commission’s conference
May 20, 2024	Commerce’s notice of initiation (89 FR 43809 and 89 FR 43816, May 20, 2024)
June 7, 2024	Commission’s vote
June 10, 2024	Commission’s determinations
June 17, 2024	Commission’s views

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

<sup>2</sup> Pertinent Federal Register notices are referenced in appendix A, and may be found at the Commission’s website ([www.usitc.gov](http://www.usitc.gov)).

<sup>3</sup> A list of witnesses appearing at the conference is presented in appendix B of this report.

## 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--<sup>4</sup>

*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.*

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

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

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

*(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 I of this report presents information on the subject merchandise, alleged subsidy/dumping margins, and domestic like product. Part II of this report presents information on conditions of competition and other relevant economic factors. Part III presents information on the condition of the U.S. industry, including data on capacity, production, shipments, inventories, and employment. Parts IV and V present the volume of subject imports and pricing of domestic and imported products, respectively. Part VI presents information on the financial experience of U.S. producers. Part VII 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 are used to create CSPV modules which are used to absorb sunlight and produce electricity. The United States does not currently produce CSPV cells. The leading U.S. producer of modules is Hanwha Q Cells USA, Inc. ("Hanwha"), while leading producers of CSPV cells and modules outside the United States include Hounen Solar Inc Co., Ltd ("Hounen Cambodia") of Cambodia; Jinko Solar Technology Sdn. Bhd. ("Jinko Tech Malaysia") of Malaysia; Canadian Solar Manufacturing (Thailand) Co., Ltd. ("Canadian Solar Thailand") of Thailand; and Boviet Solar Technology Co., Ltd ("Boviet Vietnam") of Vietnam. The leading U.S. importers of CSPV cells and modules from Cambodia and Thailand is Waaree Energies Limited ("Waaree"), while the leading importer of CSPV cells and modules from Malaysia is Jinko Solar (U.S.) Industries Inc. ("Jinko FL") and the leading importer of CSPV cells and modules from Vietnam is JA Solar USA Inc. ("JA Solar"). Leading importers of product from nonsubject countries (primarily China) include BYD America LLC ("BYD") Canadian Solar (USA) Inc. ("Canadian Solar CA") and Trina Solar (U.S.) Inc. ("Trina"). U.S. purchasers of CSPV modules include energy, procurement, and construction contractors and residential installers; leading purchasers of

modules include \*\*\*, \*\*\*, and \*\*\*.<sup>6</sup>

Apparent U.S. consumption of CSPV cells and modules totaled approximately \*\*\* megawatts (\$\*\*\*) in 2023. Currently, thirteen firms are known to produce CSPV modules in the United States and an additional two firms are reported to begin production in 2024. No firm in the United States was known during the period of investigation to produce CSPV cells. U.S. producers' value added to CSPV cells through module assembly was \$\*\*\* in 2023 and accounted for \*\*\* percent of apparent U.S. consumption by value. U.S. imports from subject sources totaled \*\*\* megawatts (\$\*\*\*) in 2023 and accounted for \*\*\* percent of apparent U.S. consumption by quantity and \*\*\* percent by value. U.S. imports from nonsubject sources totaled \*\*\* megawatts (\$\*\*\*) in 2023 and accounted for \*\*\* percent of apparent U.S. consumption by quantity and \*\*\* percent by value.

## Summary data and data sources

A summary of data collected in these investigations is presented in appendix C, table C-1. Except as noted, U.S. industry data are based on questionnaire responses of twelve firms that accounted for a large majority of U.S. production of CSPV modules during 2023.<sup>7</sup> U.S. imports are based on questionnaire responses from 46 firms that accounted for the majority of imports of CSPV cells and modules in 2023.

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<sup>6</sup> No responding purchasers reported purchasing CSPV cells during 2021 through 2023.

<sup>7</sup> Data throughout the report includes data for these twelve U.S. producers with reported production during 2021-23. Narrative responses include data for fifteen U.S. producers including three U.S. producers \*\*\* with 2024 production plans.

## 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 I-2.<sup>8</sup>

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<sup>8</sup> 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–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 I-2****CSPV cells and modules: Previous and related Commission proceedings and current status**

<b>Date</b>	<b>Number</b>	<b>Country</b>	<b>ITC original determination</b>	<b>Current status</b>
2011	701-481	China	Affirmative	Order currently under second review
2011	731-1190	China	Affirmative	Order currently under second review
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 alleged subsidies and sales at LTFV**

### **Alleged subsidies**

On May 20, 2024, Commerce published a notice in the Federal Register of the initiation of its countervailing duty investigation on CSPV cells and modules from Cambodia, Malaysia, Thailand, and Vietnam.<sup>9</sup>

### **Alleged sales at LTFV**

On May 20, 2024, Commerce published a notice in the Federal Register of the initiation of its antidumping duty investigations on CSPV cells and modules from Cambodia and Malaysia, Thailand and Vietnam.<sup>10</sup> Commerce has initiated antidumping duty investigations based on estimated dumping margins of 125.37 percent for CSPV cells and modules from Cambodia, 81.22 percent for CSPV cells and modules from Malaysia, 70.36 percent for CSPV cells and modules from Thailand, and 271.28 percent for CSPV cells and modules from Vietnam.

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<sup>9</sup> For further information on the alleged subsidy programs see Commerce's notice of initiation and related CVD Initiation Checklist. 89 FR 43816, May 20, 2024.

<sup>10</sup> 89 FR 43809, May 20, 2024.

## The subject merchandise

### Commerce's scope

In the current proceeding, Commerce has defined the scope as follows:<sup>11</sup>

*The merchandise covered by these investigations is 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 mm<sup>2</sup> 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*

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<sup>11</sup> 89 FR 43816, May 20, 2024.



*the investigations are panels with surface area from 3,450 mm<sup>2</sup> to 33,782 mm<sup>2</sup> 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 cm<sup>2</sup> 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 cm<sup>2</sup> 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 (cm<sup>2</sup>) 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 twoport 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 cm<sup>2</sup> 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 (cm<sup>2</sup>) per panel; (C) include a keep-out area of approximately 1,200 cm<sup>2</sup> 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.*

*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, 77FR 7,017 (December 7, 2012).<sup>12</sup>*

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<sup>12</sup> 89 FR 43816, May 20, 2024.

## Tariff treatment

Based upon the scope set forth by Commerce, information available to the Commission indicates that the merchandise subject to these investigations are currently provided for in 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”). The general rate of duty is “free.”<sup>13</sup>

Under subheading 9903.45.22, imports of cells in excess of the prescribed tariff-rate quota of aggregate shipments of 5 gigawatts are subject to a general duty rate of 14.25 percent ad valorem (unless the product of an exempt country); under subheading 9903.45.25 all covered modules from nonexempt countries are dutiable at 14.25 percent ad valorem.

These articles may also be imported as parts or subassemblies of goods provided for in HTS subheadings 8507.71, 8501.72 and 8501.80 and statistical reporting number 8507.20.8010.<sup>14</sup> Goods classified in subheadings 8501.72.20 and 8501.72.90 have a general duty rate of 2.0 percent ad valorem; goods classified in subheading 8501.80.90 have a general duty rate of 2.4 percent ad valorem; goods classified in subheading 8501.71.00, 8501.72.10, 8507.72.30, 8501.80.10, 8501.80.20, and 8501.80.30 have a general duty rate of 2.5 percent ad valorem; and goods classified in subheading 8507.20.80 have a general duty rate of 3.5 percent ad valorem. Decisions on the tariff classification and treatment of imported articles are within the authority of U.S. Customs and Border Protection.

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<sup>13</sup>Prior to January 26, 2022, CSPV cells and modules entered under HTS statistical reporting numbers 8541.40.6015 and 8541.40.6025, effective July 1, 2018. Prior to July 1, 2018, CSPV cells and modules entered under HTS statistical reporting numbers 8541.40.6020 and 8541.40.6030, effective January 1, 2001. USITC, *Harmonized Tariff Schedule (2022) Basic Edition*, January 2022; USITC, *Harmonized Tariff Schedule (2024) Revision 1*, January 2024.

<sup>14</sup> 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.

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.<sup>15</sup> On May 14, 2024, President Biden announced an increase on the tariff rate on solar cells originating in China from 25 percent to 50 percent in 2024.<sup>16</sup> On May 22, 2024, at the direction of the President, the U.S. Trade Representative issued a formal proposal in the Federal Register notice to increase tariffs on solar cells originating from China and to exclude certain solar manufacturing equipment.<sup>17</sup>

On April 1, 2022, Commerce initiated an inquiry into whether Chinese-manufactured CSPV cells and modules circumvented U.S. antidumping and countervailing duty orders.<sup>18</sup> 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.<sup>19</sup> However, pursuant to the Presidential Proclamation on June 6, 2022, duties will not be collected on imports of CSPV products from these four countries until June 2024.<sup>20</sup>

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<sup>15</sup> 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, HTS (2024) Revision 1, U.S. Notes, pp. 99-III-24–99-III-26, 99-III-301, January 2024.

<sup>16</sup> Actions by the United States to the Statutory 4-Year Review of the Section 301 Investigation of China's Act, Policies, and Practices Related to Technology Transfer, Intellectual Property, and Innovation, 89 Fed. Reg. 44541, 44541-43 (May 20, 2024); White House, "Fact Sheet: President Biden Takes Action to Protect American Workers and Businesses from China's Unfair Trade Practices," May 14, 2024, <https://www.whitehouse.gov/briefing-room/statements-releases/2024/05/14/fact-sheet-president-biden-takes-action-to-protect-american-workers-and-businesses-from-chinas-unfair-trade-practices/>, retrieved May 23, 2024.

<sup>17</sup> The Fed. Reg. notice established a 30-day period for public comment on these modifications. Request for Comments on Proposed Modifications and Machinery Exclusions Process in Four-Year Review of Actions Taken in the Section 301 Investigation: China's Acts, Policies, and Practices Related to Technology Transfer, Intellectual Property, and Innovation, 89 Fed. Reg. 46252, 46252-93 (May 28, 2024).

<sup>18</sup> Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From the People's Republic of China: Initiation of Circumvention Inquiry on the Antidumping Duty and Countervailing Duty Orders, 87 Fed. Reg. 19071, 19071-72 (April 1, 2022).

<sup>19</sup> 88 Fed. Reg. 57419, 57419-33 (August 23, 2023).

<sup>20</sup> 87 Fed. Reg. 56868, 56868-87 (September 16, 2022).

## The product

### Description and applications<sup>21</sup>

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 (“pseudo square”) (figure I-1).

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<sup>21</sup> Unless otherwise noted, this information is based on USITC, *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-13–I-22.

**Figure I-1**  
**CSPV cells**



Source: International Energy Agency website, <https://www.iea.org/reports/solar-pv-global-supply-chains>, accessed May 24, 2024.

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 table I-3.

**Table I-3**  
**CSPV cells: Examples of wafer sizes used in monocrystalline cell production**

Wafer	Side length in mm
M0	156
M2	156.75
G1	158.75
M4	161.70
M6	166
M10	200
M12	210

Source: Novergy, "Significance of Increasing Size of Mono-Crystalline Wafers in Modules," <https://www.novergysolar.com/significance-increasing-size-mono-crystalline-wafers-modules/>, accessed May 24, 2024.

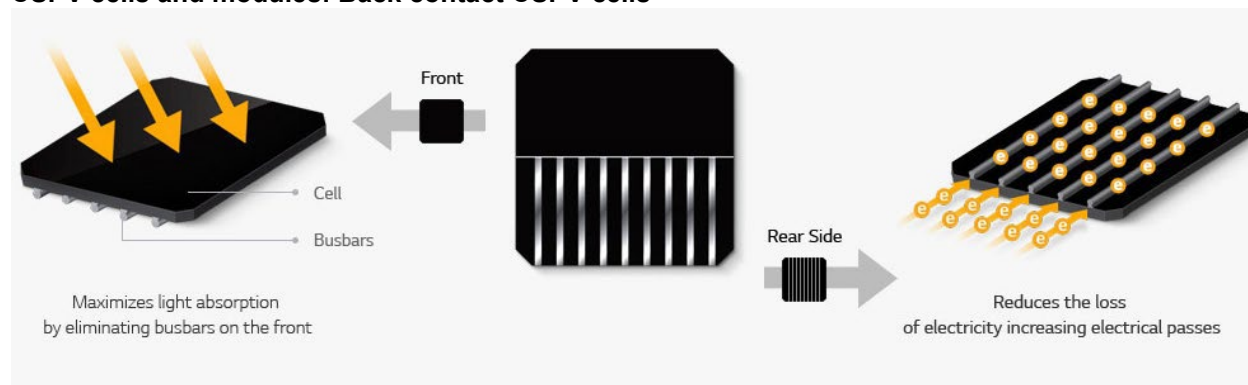
CSPV cells have a positive layer, a negative layer, and a positive-negative junction (p/n junction). Electricity is generated when sunlight strikes the CSPV cell, knocking electrons loose that flow onto thin metal "fingers" that run across the CSPV cell and conduct electricity to the busbars.<sup>22</sup> The number of busbars in cells varies, and has increased over time as more busbars

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<sup>22</sup> 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.

improve efficiency and power output. Further, some cells contain no busbars (“busbarless”), 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 I-2). This provides several advantages such as reduced shading, improved cell interconnection, and better aesthetics.

**Figure I-2**  
**CSPV cells and modules: Back contact CSPV cells**



Source: Solar Analytica website, <https://solaranalytica.com/lg-neon-r-report/>, accessed May 24, 2024.

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 I-3). 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.<sup>23</sup>

<sup>23</sup> For a summary of different CSPV cell technologies and their efficiency and bifaciality levels, see Liang, Tian Shen, Pravettoni, Mauro, Deline, Christopher A., Stein, Joshua S., Kopecek, Radovan, Singh, Jai Prakash, Luo, Wei, Wang, Yan, Aberle, Armin G., and Khoo, Yong Shen. 2018. "A Review of Crystalline Silicon Bifacial Photovoltaic Performance Characterisation and Simulation". United States. <https://www.osti.gov/servlets/purl/1494282>. Accessed May 1, 2024.

**Figure I-3**  
**CSPV cells and modules: Monofacial and bifacial cell design**



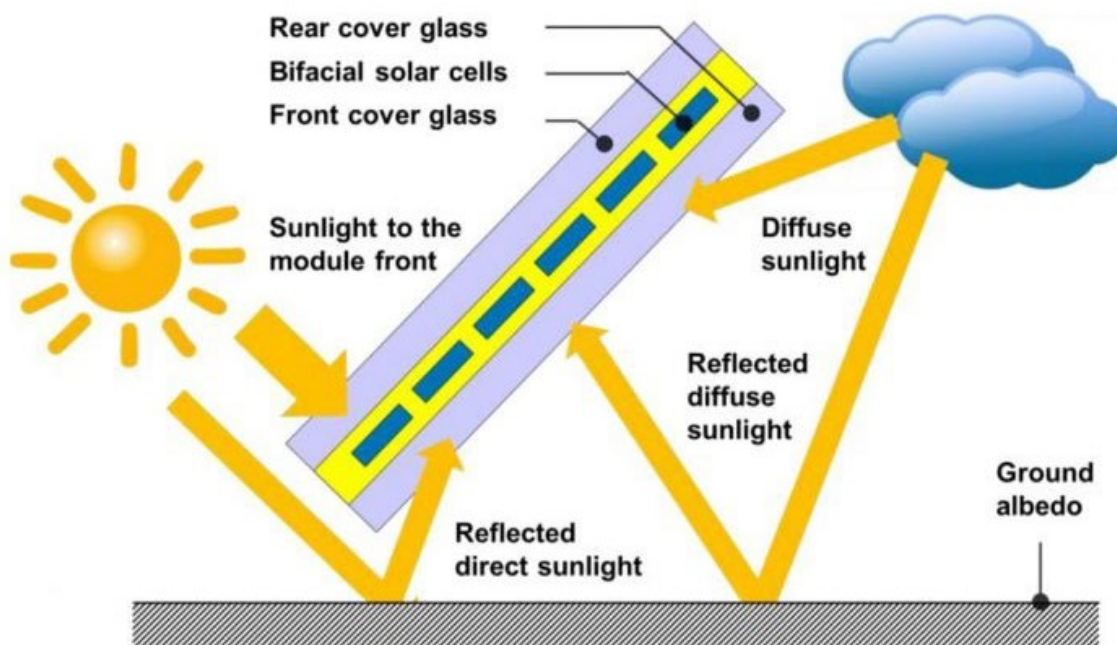
Source: LG Electronics Inc., “Bifacial Design Guide,” 2017, [https://www.lg.com/global/business/download/resources/solar/Bifacial\\_design\\_guide\\_Full\\_ver.pdf](https://www.lg.com/global/business/download/resources/solar/Bifacial_design_guide_Full_ver.pdf), accessed May 1, 2024.

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 I-4).



**Figure I-4**

**CSPV cells and modules: Bifacial photovoltaic modules absorb sunlight on both sides of the module**



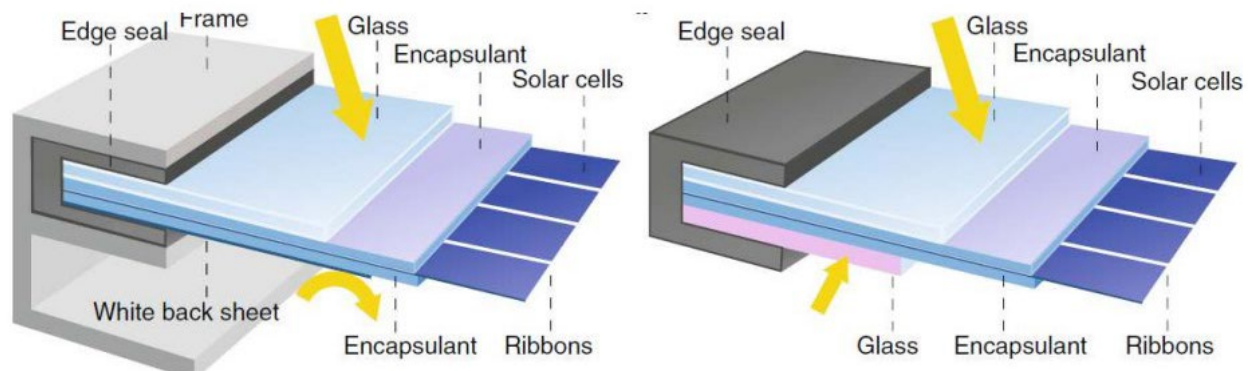
Source: Glazer, Becca and Kevin Mayer, "Bifacial or Bust? Engineering Solar Financings of the Future," April 4, 2019, Sol Source, <https://www.solsystems.com/blog/2019/04/04/bifacial-or-bust-engineeringsolar-financings-of-the-future/>, accessed December 20, 2023.

Figure I-5 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.<sup>24</sup>

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<sup>24</sup> Liang, Tian Shen, Pravettoni, Mauro, Deline, Christopher A., Stein, Joshua S., Kopecek, Radovan, Singh, Jai Prakash, Luo, Wei, Wang, Yan, Aberle, Armin G., and Khoo, Yong Shen. 2018. "A Review of Crystalline Silicon Bifacial Photovoltaic Performance Characterisation and Simulation". United States. <https://www.osti.gov/servlets/purl/1494282>. Accessed May 1, 2024.

**Figure I-5**  
**CSPV cells and modules: Assembly of a monofacial module (left) and bifacial module (right)**

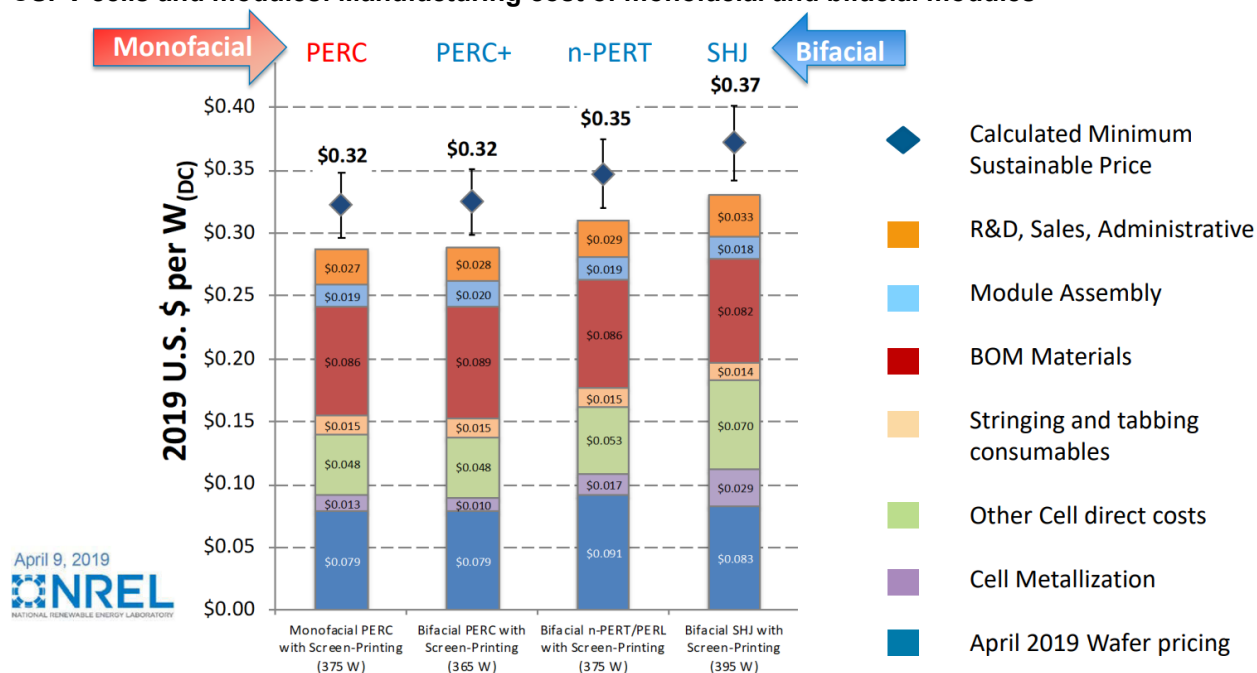


Source: IEA PVPS, Bifacial Photovoltaic Modules and Systems: Experience and Results from International Research and Pilot Applications 2021, IEA-PVPS T13-14:2021, p. 28 [https://ieapvps.org/wp-content/uploads/2021/04/IEA-PVPS-T13-14\\_2021-Bifacial-Photovoltaic-Modules-and-Systems-report.pdf](https://ieapvps.org/wp-content/uploads/2021/04/IEA-PVPS-T13-14_2021-Bifacial-Photovoltaic-Modules-and-Systems-report.pdf), accessed October 23, 2023.

As monofacial and bifacial modules have moved closer to cost parity (figure I-6), 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.<sup>25</sup>

<sup>25</sup> Domestic producers of CSPV products reported that monofacial and bifacial modules have already reached cost parity. 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. See Conference transcript, pp. 122-123 (Martens), pp. 233-234 (Wagner).

**Figure I-6**  
**CSPV cells and modules: Manufacturing cost of monofacial and bifacial modules**



Source: National Renewable Energy Laboratory, Bifacial PV System Performance: Separating Fact from Fiction, p. 6 <https://www.nrel.gov/docs/fy19osti/74090.pdf>, accessed May 13, 2024.

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.<sup>26</sup>

<sup>26</sup> Conversion efficiency is the percent of sunlight that is converted to electricity.

Monocrystalline and multicrystalline cells commonly use PERC and related technologies.<sup>27</sup> 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 (figure I-X). 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 module output. Some products use shingling, paving, and other low or zero gap technologies to reduce the distance between cells.

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<sup>27</sup> Related technologies include Passivated Emitter Rear Totally Diffused (“PERT”) and Passivated Emitter Rear Locally Diffused (“PERL”).

## **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 I-7).<sup>28</sup> 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.<sup>29</sup> 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).

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<sup>28</sup> Some CSPV modules do not use a frame, which reduces costs. These modules typically use glass as the rear layer to ensure mechanical stability.

<sup>29</sup> 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 I-7**  
**CSPV products: CSPV module with half-cut cells**



Source: Solar Power World website, “Hanwha Q CELLS’ newest half-cell module will launch in USA later this year,” <https://www.solarpowerworldonline.com/2019/04/hanwha-q-cells-newest-half-cell-module-will-launch-in-usa-later-this-year/>, accessed December 19, 2023.

The most common on-grid CSPV modules have 60 cells (or 120 half cut cells) or 72 cells (or 144 half cut cells). Common sizes of 72 cell solar modules, depending on the size of the wafer, are shown in table I-4.

**Table I-4**  
**CSPV modules: Typical 72 cell module area by wafer size, 2020**

Wafer	Wafer side length in mm	Module area, square meters
M0	156	1.94
M2	156.75	2.00
G1	158.75	2.05
M4	161.7 or 161.75	2.11
M6	166	2.24
M10	182	2.56
M12/G12 (60 cell modules)	210	2.40

Source: Chunduri, Shravan K. and Michael Schmela, *500W+ Solar Modules, 2020 Edition*, Taiyang News, p. 10, <http://taiyangnews.info/reports/500w-solar-modules-2020/>, accessed December 19, 2023.

In addition to standard size CSPV modules, CSPV cells can be used in building-integrated PV (“BIPV modules” or “BIPV products”). BIPV products are materials integrated into the building envelope, such as the façade or roof, containing CSPV cells. These building integrated materials 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 processes<sup>30</sup>**

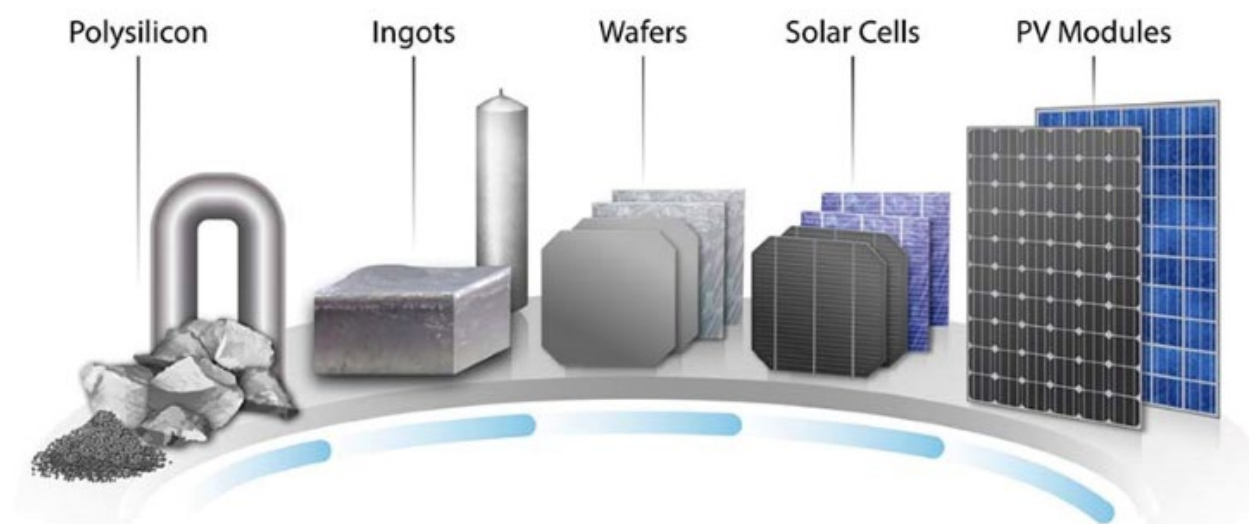
There are five principal stages involved in the manufacture of CSPV products. First, polysilicon is refined, then it is formed into ingots, which are sliced into wafers, converted to CSPV cells, and assembled into the finished product, modules (figure I-8). These are discrete production steps that may 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.

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<sup>30</sup> Unless otherwise noted, this information and additional details can be found in the second monitoring publication, pp. I-25–I-32.



**Figure I-8**  
**CSPV production process**



Source: Lees, Edward and Fugmann, Ulrik, “What you need to know about polysilicon and its role in solar modules,” <https://viewpoint.bnpparibas-am.com/what-you-need-to-know-about-polysilicon-and-its-role-in-solar-modules/>, accessed May 13, 2024.

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

### **Silicon refining**

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 accounts for approximately 98 percent of total global polysilicon production, and fluidized bed reactor (“FBR”) technology, which accounts for most of the remaining market.<sup>31</sup>

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.

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<sup>31</sup> IEA PVPS, *Trends in Photovoltaic Applications 2022*, IEA-PVPS T1-43:2022, p. 45, [https://iea-pvps.org/wp-content/uploads/2023/02/PVPS\\_Trend\\_Report\\_2022.pdf](https://iea-pvps.org/wp-content/uploads/2023/02/PVPS_Trend_Report_2022.pdf), retrieved May 28, 2024.



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.

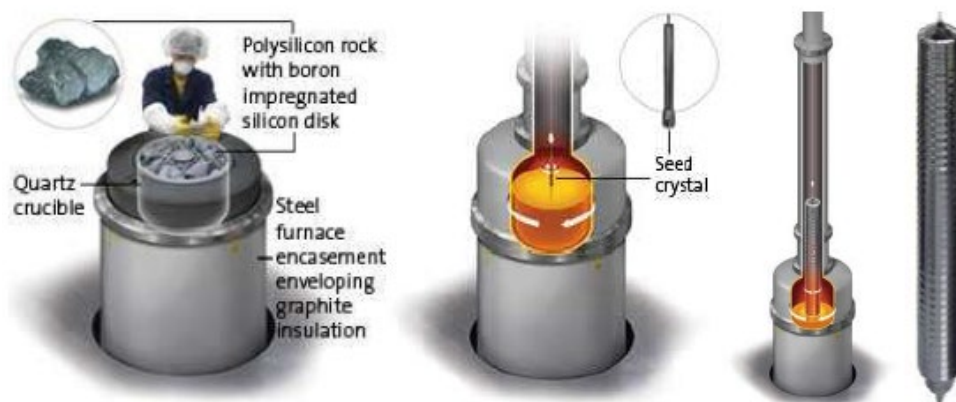
### **Ingots and wafers for monocrystalline cells**

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 I-9). 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 I-10). The remaining portion of the crystal (or ingot) is cut 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 I-9**

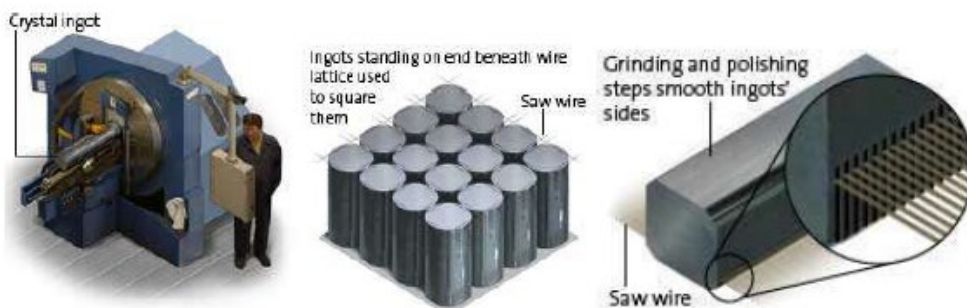
**Czochralski process, crucible loading/charging (left), seed crystal (second from left), crystal growing (second from right), and finished crystal (right)**



Source: SolarWorld Website, <https://www.solarworld-usa.com/solar-101/making-solar-panels>, Jan 22, 2015.

**Figure I-10**

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



Source: SolarWorld Website, <https://www.solarworld-usa.com/solar-101/making-solar-panels>, Jan 22, 2015.

### **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.<sup>32</sup> CSPV cell production is capital intensive and requires

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<sup>32</sup> The cell manufacturing process varies by company and technology.

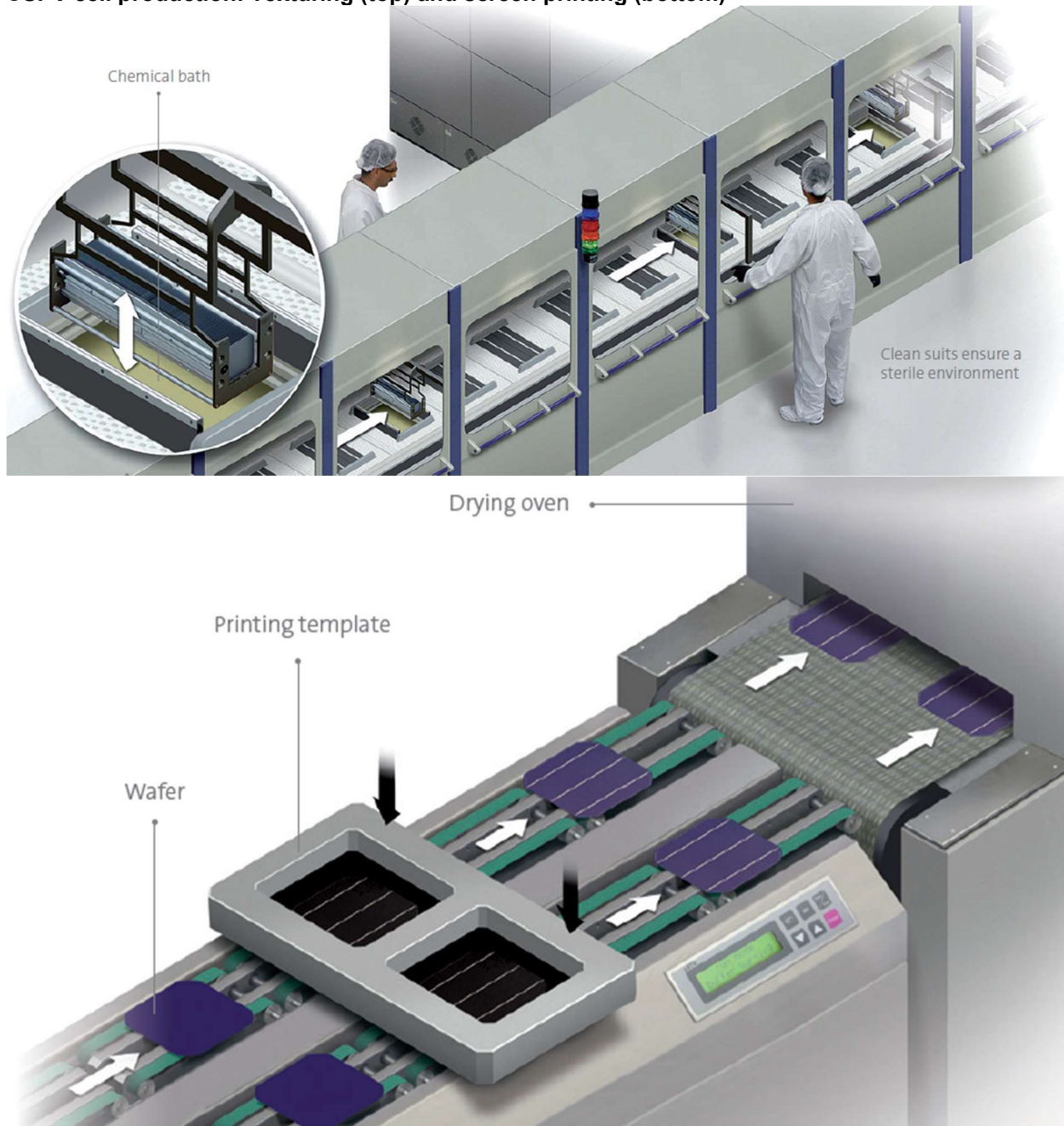
a skilled workforce. Some firms use a highly automated manufacturing process, while others mix automation and manual labor in their production processes. The main steps in CSPV cell production are as follows:<sup>33</sup>

- **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 I-11).

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<sup>33</sup> This section will discuss the general manufacturing process. There may be additional steps for certain technologies.

**Figure I-11**  
**CSPV cell production: Texturing (top) and screen printing (bottom)**



Source: SolarWorld, "Energy for You and Me" brochure, pp. 12–13.

- **Diffusion:** In the next step, “phosphorus is diffused into a thin layer of the wafer surface. The molecular-level impregnation occurs as the wafer surface is exposed to phosphorus gas at a high heat, a step that gives the surface a negative potential electrical orientation. The combination of that layer and the boron-doped layer below creates a positive-negative, or p/n, junction—a critical partition in the functioning of a PV cell.”<sup>34</sup>
- **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.

### 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.

### Out-of-scope thin-film modules<sup>35</sup>

Thin-film cells are manufactured by depositing very thin layers of PV semiconductor materials onto a backing material like stainless steel, glass, or plastic. Thin-film materials that

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<sup>34</sup> SolarWorld, “Energy for You and Me” brochure, <https://www.akamaienergyhawaii.com/dimages/17118/solar-101-eng-solar-photovoltaic.pdf>, p. 12, accessed April 29, 2024.

<sup>35</sup> Unless otherwise noted, this information and additional details can be found in the second monitoring publication, p. I-34.

are typically used in manufacturing for commercial purposes include cadmium telluride (CdTe) and copperindium-(gallium)-diselenide (CIGS and CIS). Historically, thin-film modules have had lower conversion efficiencies than CSPV modules, but this has changed in recent years.<sup>36</sup> Thin-film modules may also be less costly to produce than CSPV modules, as the manufacturing of thin-film modules typically requires fewer manufacturing steps and demands less energy than the production of CSPV modules.

U.S. installations of thin-film modules in the utility segment, the largest market segment for thin-film products, decreased from 5.3 GW in 2021 to 4.8 GW in 2022. Installations of CdTe thin-film modules, decreased from 4.9 GW in 2021 to 4.7 GW in 2022 (table I-5). Other technologies accounted for a much smaller share of the utility market.<sup>37</sup> Thin-film modules are installed in residential and nonresidential applications, but account for only a small share of the market.

**Table I-5**  
**U.S. thin-film utility installations, by technology and period**

Quantity in megawatts

Technology	2021	2022	2023
Cadmium telluride	4,945	4,692	n/a
Copper indium (gallium) selenide	0	125	n/a
Amorphous silicon	0	0	n/a
Other	345	28	n/a
Total	5,290	4,845	n/a

Source: U.S. Department of Energy, Energy Information Administration, 2022 Form EIA-860 – Schedule 3, ‘Solar Technology Data’ (Operable Units Only), September 19, 2023, <https://www.eia.gov/electricity/data/eia860/>, retrieved May 2, 2024.

Note: The “other” category is other thin-film products in the data set and is not further defined.

From 2021 to 2022, the share of global production of thin-film silicon technologies decreased from 3.4 percent to 2.5 percent. In 2022, global production of thin-film PV modules was approximately 9.5 GW (up from 8.2 GW in 2021), of which around 9.0 GW were CdTe PV modules

<sup>36</sup> Conversion efficiency for thin-film modules averages around 17 percent (CIGS and CIS) and 19 percent (CdTe), while some CSPV modules average above 40 percent. IEA PVPS, *Trends in Photovoltaic Applications 2023*, IEA-PVPS T1-43:2023, pp. 5-6 [https://iea-pvps.org/wp-content/uploads/2023/10/PVPS\\_Trends\\_Report\\_2023\\_WEB.pdf](https://iea-pvps.org/wp-content/uploads/2023/10/PVPS_Trends_Report_2023_WEB.pdf), retrieved May 2, 2024.

<sup>37</sup> U.S. Department of Energy, Energy Information Administration, 2022 Form EIA-860 – Schedule 3, ‘Solar Technology Data’ (Operable Units Only), September 19, 2023, <https://www.eia.gov/electricity/data/eia860/>, retrieved May 28, 2024.

produced by First Solar.<sup>38</sup> First Solar has manufacturing locations in the United States, India, Malaysia, and Vietnam.<sup>39</sup> As of 2023, First Solar’s manufacturing capacity in the United States was approximately 6.3 GW, with plans to add approximately 7.9 GW of capacity by 2026.<sup>40</sup>

## Domestic like product issues

The petitioners contends that the Commission should define a single domestic like product, coextensive with the scope of the investigation to include CSPV cells and CSPV modules.<sup>41</sup> The petitioner also argues that out-of-scope thin film solar modules should not be included within the domestic like product of these investigations.<sup>42</sup> Respondents Canadian Solar and Illuminate argue that the Commission should find that CSPV cells and CSPV modules are two separate domestic like products.<sup>43</sup> Respondents American Clean Power Association, Boviet, Runergy Alabama, the Solar Energy Industries Association, and Trina Solar did not comment on the domestic like product in their postconference briefs.

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<sup>38</sup> IEA PVPS, *Trends in Photovoltaic Applications 2022*, IEA-PVPS T1-43:2022, p. 49, [https://iea-pvps.org/wp-content/uploads/2023/02/PVPS\\_Trend\\_Report\\_2022.pdf](https://iea-pvps.org/wp-content/uploads/2023/02/PVPS_Trend_Report_2022.pdf), retrieved May 28, 2024; IEA PVPS, *Trends in Photovoltaic Applications 2023*, IEA-PVPS T1-43:2023, pp. 52-53 [https://iea-pvps.org/wp-content/uploads/2023/10/PVPS\\_Trends\\_Report\\_2023\\_WEB.pdf](https://iea-pvps.org/wp-content/uploads/2023/10/PVPS_Trends_Report_2023_WEB.pdf), retrieved May 2, 2024

<sup>39</sup> First Solar, *Annual Report 2023*, p. 4, [https://s202.g4cdn.com/499595574/files/doc\\_financials/2023/ar/first-solar-web-pdf-2023-annual-report.pdf](https://s202.g4cdn.com/499595574/files/doc_financials/2023/ar/first-solar-web-pdf-2023-annual-report.pdf), retrieved May 3, 2024.

<sup>40</sup> First Solar, “American Solar: First Solar to Invest up to \$1.1 Billion in Fifth US Manufacturing Facility, Adding 3.5 GW of Nameplate Capacity in 2026,” July 27, 2023, <https://investor.firstsolar.com/news/news-details/2023/American-Solar-First-Solar-to-Invest-up-to-1.1-Billion-in-Fifth-US-Manufacturing-Facility-Adding-3.5-GW-of-Nameplate-Capacity-in-2026/default.aspx>, retrieved May 3, 2024.

<sup>41</sup> Petitioner’s postconference brief, p. 3.

<sup>42</sup> Petitioner’s postconference brief, p. 3.

<sup>43</sup> Respondent Canadian Solar’s postconference brief, p. 9; and Respondent Illuminate’s postconference brief, p. 10.

## Intermediate products

The domestic like product proposed by petitioners includes the intermediate or unfinished products (CSPV cells) as well as downstream products (CSPV modules).<sup>44</sup> Under the semifinished products analysis, respondents Canadian Solar and Illuminate argue that CSPV cells and CSPV modules should be defined to be two separate domestic like products.<sup>45</sup> The following presents information on these products relating to the Commission's semi-finished like product analysis. Factor comparison responses of U.S. producers and importers regarding differences and similarities between the intermediate and downstream products are presented in table I-6, while detailed narratives provided by U.S. producers and importers on these five factors are provided in appendix D.

**Table I-6**  
**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	11	1
U.S. producers	Separate market	4	8
U.S. producers	Differences in characteristics	2	10
U.S. producers	Differences in costs	1	11
U.S. producers	Transformation intensive	2	10
U.S. importers	Other uses	32	6
U.S. importers	Separate market	17	21
U.S. importers	Differences in characteristics	9	29
U.S. importers	Differences in costs	5	33
U.S. importers	Transformation intensive	11	26

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Industry responses to questions concerning the Commission's semi-finished product analysis are presented in Appendix D.

<sup>44</sup> Petitioner's postconference brief, p. 3.

<sup>45</sup> Respondent Canadian Solar's postconference brief, pp. 12-13; and Respondent Illuminate's postconference brief, p. 13.



## Part II: Conditions of competition in the U.S. market

### U.S. market characteristics

There are three primary on-grid market segments for CSPV products – utility, nonresidential (commercial), and residential.<sup>1</sup> These segments account for the vast majority of CSPV modules sold in the United States.<sup>2</sup> Modules vary in size, nominal power output, and efficiency, and output efficiency which continues to improve year after year, including since January 1, 2021. The current solar market is characterized by numerous regulatory policies and overlapping incentives and supply chain disruptions, including the COVID-19 pandemic; the Withhold Release Order Uyghur Forced Labor Prevention Act (WRO/UFLPA); the section 301, section 232, and AD/CVD tariffs on certain inputs; the IRA; AD/CVD duties and section 201 safeguard measures on the cells and modules; the DOC's anti-circumvention inquiry; and the imminent removal of the exemption of bifacial products from the section 201 safeguard measure.<sup>3</sup>

Overall, demand for CSPV cells and modules continues to grow in the United States as well as around the world, and domestic and global production have increased since January 1, 2021 to meet this demand. Demand for solar energy is expected to grow by \*\*\*<sup>4</sup>, and demand in the utility market segment is expected to account for the largest growth of the three market segments.<sup>5</sup> Annual U.S. solar photovoltaic installed capacity is reported to have increased by \*\*\* percent between 2021 and 2023, and growth in the utility photovoltaic segment increased by \*\*\* percent.<sup>6</sup> Overall, apparent U.S. consumption of CSPV products by quantity in 2023 was \*\*\* percent higher than in 2021, with an increase of \*\*\* percent occurring between 2022 and 2023.

Twelve of 14 responding U.S. producers and 30 of 43 responding importers indicated that the market was subject to distinctive conditions of competition. Specifically, U.S. producers

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<sup>1</sup> The vast majority of CSPV cells are used in the production of CSPV modules.

<sup>2</sup> Petitioner asserts that manufacturers can switch between these market segments, while respondent American Clean Power Association (ACP) asserts that the domestic industry focused its production activities on products for residential and commercial sectors, which are not suitable for use in large-scale utility applications, and that the domestic industry would not be able to meet current demand even if it shifted its entire production to utility-scale products today. Petitioner's postconference brief, response to staff questions, pp. 28-29 and conference transcript, p. 171 (Sciarra).

<sup>3</sup> For more on these measures, please see Part I.

<sup>4</sup> ACP's postconference brief, response to staff questions, p. 2 and Attachment 3, ACP's *Clean Power Annual Market Report 2023*, p. 64.

<sup>5</sup> Petitioner's postconference brief, response to staff questions, p. 28.

<sup>6</sup> The Solar Energy Industries' Association's (SEIA's) postconference brief, p. 2.

and importers indicated seasonality due to weather, with firms citing greater activities in summer months, a slowdown in winter due to weather, and a rush to complete projects in the last quarter of the year. Firms also cited stronger demand due to incentives to promote solar installations, and the changes in the business cycle related to the benchmark interest rate. One firm, \*\*\*, cited technology advancements in CSPV cell efficiency, namely the shift from p-type MonoPERC to n-type HJT and TopCon cells, leading to a price decrease of MonoPERC. Importer \*\*\* reported that when there is a shortage of supply and capacity, many manufacturers quickly increase capacity, after which the price rapidly declines.

## Impact of section 301 tariffs

U.S. producers and importers were asked to report the impact of section 301 tariffs on overall demand, supply, prices, or raw material costs (table II-1). Most U.S. producers and importers reported that 301 tariffs had an impact on the market for CSPV products, although 2 U.S. producers and 8 importers said that they did not know, and 2 importers said that 301 tariffs did not have an impact. Several importers reported that section 301 tariffs increased import costs, led to price increases for CSPV products in the U.S. market, and increased the costs of key production machinery and inputs for U.S. module manufacturers, such as glass and junction boxes. One importer reported that the costs associated with section 301 tariffs widens its gap in competitiveness with producers and importers that are not subject to these equipment tariffs.

**Table II-1**  
**CSPV cells and modules: Count of firms' responses regarding whether there was an impact of section 301 tariffs, by firm type**

Firm type	Yes	No	Don't Know
U.S. producers	11	0	2
Importers	34	2	8

Source: Compiled from data submitted in response to Commission questionnaires.

## Channels of distribution

U.S. producers sold mainly to distributors and installers, while importers sold predominately to utilities in 2022 and 2023, as shown in table II-2. U.S. producers sold the \*\*\* of their CSPV products to distributors in 2021-23. Importers of CSPV products from Cambodia switched from selling \*\*\* in 2021, to selling \*\*\* in 2022-23. Importers of CSPV products from Malaysia sold the largest share to utilities in 2021, to assemblers in 2022, and then again to utilities in 2023. Importers of CSPV products from Thailand sold \*\*\* to utilities, and importers sold the largest share of their CSPV products from Vietnam to \*\*\* in 2021 before selling mainly to utilities in 2022 and 2023.

**Table II-2****CSPV cells and modules: Share of U.S. shipments by source, channel of distribution, and period**

Shares in percent

Source	Channel	2021	2022	2023
United States	Assemblers	***	***	***
United States	Distributors	***	***	***
United States	Installers	***	***	***
United States	Utilities	***	***	***
Cambodia	Assemblers	***	***	***
Cambodia	Distributors	***	***	***
Cambodia	Installers	***	***	***
Cambodia	Utilities	***	***	***
Malaysia	Assemblers	***	***	***
Malaysia	Distributors	***	***	***
Malaysia	Installers	***	***	***
Malaysia	Utilities	***	***	***
Thailand	Assemblers	***	***	***
Thailand	Distributors	***	***	***
Thailand	Installers	***	***	***
Thailand	Utilities	***	***	***
Vietnam	Assemblers	***	***	***
Vietnam	Distributors	***	***	***
Vietnam	Installers	***	***	***
Vietnam	Utilities	***	***	***
Subject	Assemblers	***	***	***
Subject	Distributors	***	***	***
Subject	Installers	***	***	***
Subject	Utilities	***	***	***
Nonsubject	Assemblers	***	***	***
Nonsubject	Distributors	***	***	***
Nonsubject	Installers	***	***	***
Nonsubject	Utilities	***	***	***
All imports	Assemblers	***	***	***
All imports	Distributors	***	***	***
All imports	Installers	***	***	***
All imports	Utilities	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

## Geographic distribution

U.S. producers and importers reported selling CSPV products to all regions in the contiguous United States (table II-3). For U.S. producers, 10.9 percent of sales were within 100 miles of their production facility, 58.6 percent were between 101 and 1,000 miles, and 30.5 percent were over 1,000 miles. Importers sold 5.1 percent within 100 miles of their U.S. point of shipment, 73.4 percent between 101 and 1,000 miles, and 21.5 percent over 1,000 miles.

**Table II-3**  
**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
Northeast	9	5	6	6	11	22
Midwest	10	5	7	7	10	19
Southeast	9	5	7	8	11	22
Central Southwest	9	6	8	8	12	25
Mountain	9	5	8	8	11	23
Pacific Coast	10	5	7	8	14	26
Other	7	2	3	5	8	13
All regions (except Other)	8	3	6	6	9	18
Reporting firms	12	8	8	9	16	29

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Other U.S. markets include AK, HI, PR, and VI.

## Supply and demand considerations

### U.S. supply

Table II-4 provides a summary of the supply factors regarding CSPV products from U.S. producers and from subject countries. Producers of CSPV products increased their capacity substantially between 2021 and 2023; there is \*\*\* CSPV cell production in the United States.

**Table II-4**

**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; count in number of firms reporting.

Product type / Factor	Measure	United States	Cambodia	Malaysia
Cells: Capacity 2021	Quantity	***	***	***
Cells: Capacity 2023	Quantity	***	***	***
Cells: Capacity utilization 2021	Ratio	***	***	***
Cells: Capacity utilization 2023	Ratio	***	***	***
Cells: Inventories to total shipments 2021	Ratio	***	***	***
Cells: Inventories to total shipments 2023	Ratio	***	***	***
Cells: Home market shipments 2023	Share	***	***	***
Cells: Non-US export market shipments 2023	Share	***	***	***

Table continued.

**Table II-4--Continued**

**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; count in number of firms reporting.

Product type / Factor	Measure	Thailand	Vietnam	Subject suppliers
Cells: Capacity 2021	Quantity	***	***	***
Cells: Capacity 2023	Quantity	***	***	***
Cells: Capacity utilization 2021	Ratio	***	***	***
Cells: Capacity utilization 2023	Ratio	***	***	***
Cells: Inventories to total shipments 2021	Ratio	***	***	***
Cells: Inventories to total shipments 2023	Ratio	***	***	***
Cells: Home market shipments 2023	Share	***	***	***
Cells: Non-US export market shipments 2023	Share	***	***	***

Table continued on next page.

**Table II-4--Continued****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; count in number of firms reporting.

Product type / Factor	Measure	United States	Cambodia	Malaysia
Modules: Capacity 2021	Quantity	***	***	***
Modules: Capacity 2023	Quantity	***	***	***
Modules: Capacity utilization 2021	Ratio	***	***	***
Modules: Capacity utilization 2023	Ratio	***	***	***
Modules: Inventories to total shipments 2021	Ratio	***	***	***
Modules: Inventories to total shipments 2023	Ratio	***	***	***
Modules: Home market shipments 2023	Share	***	***	***
Modules: Non-US export market shipments 2023	Share	***	***	***
Ability to shift production	Count	***	***	***

Table continued.

**Table II-4--Continued****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; count in number of firms reporting.

Product type / Factor	Measure	Thailand	Vietnam	Subject suppliers
Modules: Capacity 2021	Quantity	***	***	***
Modules: Capacity 2023	Quantity	***	***	***
Modules: Capacity utilization 2021	Ratio	***	***	***
Modules: Capacity utilization 2023	Ratio	***	***	***
Modules: Inventories to total shipments 2021	Ratio	***	***	***
Modules: Inventories to total shipments 2023	Ratio	***	***	***
Modules: Home market shipments 2023	Share	***	***	***
Modules: Non-US export market shipments 2023	Share	***	***	***
Ability to shift production	Count	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Responding U.S. producers accounted for more than 75 percent of U.S. production of CSPV products in 2023. Responding foreign producer/exporter firms accounted for all known U.S. imports of CSPV products from Cambodia, more than half of imports from Malaysia, all known U.S. imports of CSPV products from Thailand, and more than half of imports from Vietnam during 2023. 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 Part VII, "Subject countries".

## **Domestic production**

There is currently no U.S. production of CSPV cells.<sup>7</sup> Moreover, plans to produce CSPV cells in the United States mainly involve vertical integration, for which firms will produce modules using proprietary or licensed cells.<sup>8</sup> Based on available information, U.S. producers of CSPV modules have the ability to respond to changes in demand with moderate changes in the quantity of shipments of U.S.-produced CSPV modules to the U.S. market.<sup>9</sup> The main contributing factors to this degree of responsiveness of supply are growing capacity and availability of unused capacity and inventories. Factors mitigating responsiveness of supply include the inability to shift shipments from alternate markets or inventories and limited ability to shift to or from alternate products.

Domestic module capacity increased by \*\*\* percent between 2021 and 2023, while production increased by \*\*\* percent, leading capacity utilization to decrease by \*\*\* percentage points. All but one firm reported that they were not able to switch production to other products. This producer, \*\*\*, reported that some of the equipment is also used for production of \*\*\*.

## **Subject imports from Cambodia**

Based on available information, producers of CSPV products from Cambodia have the ability to respond to changes in demand with large changes in the quantity of shipments of CSPV products to the U.S. market. The main contributing factors to this degree of responsiveness of supply are the availability of unused capacity and inventories.

Cambodian CSPV cell capacity increased by \*\*\* percent between 2021 and 2023, while module capacity increased by \*\*\* percent. Cambodian CSPV cell production more than tripled, and module production nearly tripled between 2021 and 2023. CSPV cell capacity utilization increased by \*\*\* percent, while CSPV module capacity utilization decreased by \*\*\* percentage points. Cambodian producers did not identify other principal export markets.

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<sup>7</sup> Conference transcript, pp. 10-11 (Schaefer) and 49-56 (Acuthan, Brightbill, Connolly, Johnson, and Moskowitz). Suniva is expected to produce CSPV cells domestically \*\*\*. Conference transcript, pp. 50-51 (Moskowitz) and Petitioner's postconference brief, p. 16. However, \*\*\*. ACP's postconference brief, p. 4.

<sup>8</sup> Conference transcript, pp. 93-94 (Johnson and Moskowitz), 204-206, and 218 (Williams).

<sup>9</sup> There is currently no domestic production of CSPV cells in the United States.



### **Subject imports from Malaysia**

Based on available information, producers of CSPV products from Malaysia have the ability to respond to changes in demand with large changes in the quantity of shipments of CSPV products to the U.S. market. The main contributing factors to this degree of responsiveness of supply are large and growing capacity, availability of unused capacity and inventories, and ability to shift shipments from alternate markets or inventories. Factors that may limit this degree of responsiveness include growing global demand for CSPV products.

Malaysian CSPV cell capacity increased by \*\*\* percent between 2021 and 2023, while production nearly doubled, leading to a capacity utilization increase of \*\*\* percentage points. Malaysian CSPV module capacity increased by \*\*\* percent, while production increased by \*\*\* percent, leading to a capacity utilization increase of \*\*\* percentage points. Foreign producers in Malaysia cited Asia Pacific, China, Hong Kong, India, Southeast Asia, and Turkey as major export markets for CSPV cells, and cited Canada, China, Europe, and India as principal export markets for CSPV modules. Malaysian foreign producers did not identify other products that responding foreign producers reportedly can produce on the same equipment as CSPV products.

### **Subject imports from Thailand**

Based on available information, producers of CSPV products from Thailand have the ability to respond to changes in demand with large changes in the quantity of shipments of CSPV cells to the U.S. market. The main contributing factors to this degree of responsiveness of supply are the availability of unused capacity. Factors mitigating responsiveness of supply include limited availability of unused inventories, inability to shift shipments from alternate markets or inventories, and inability to shift production to or from alternate products.

Thai CSPV cell capacity increased by \*\*\* percent between 2021 and 2023, while module capacity increased by \*\*\* percent. CSPV cell production nearly doubled between 2021 and 2023, leading to a capacity utilization increase of \*\*\* percentage points, while module production \*\*\*, leading to a capacity utilization increase of \*\*\* percentage points. Foreign producers of CSPV cells in Thailand identified China and Vietnam as major export markets, and identified Brazil, Canada, China, and Taiwan as major export markets for CSPV modules. Thai foreign producers did not identify other products that responding foreign producers reportedly can produce on the same equipment as CSPV products.

## **Subject imports from Vietnam**

Based on available information, producers of CSPV products from Vietnam have the ability to respond to changes in demand with large changes in the quantity of shipments of CSPV products to the U.S. market. The main contributing factors to this degree of responsiveness of supply are large and growing capacity, availability of unused capacity and inventories, and ability to shift shipments from alternate markets or inventories. Factors that may limit this degree of responsiveness include growing global demand for CSPV products.

Vietnamese CSPV cell capacity increased by more than double during 2021-23 and production increased by more than sevenfold, leading to a capacity utilization increase of \*\*\* percentage points between 2021 and 2023. Module capacity also increased by more than double during 2021-23, while production increased by nearly tenfold, leading to a capacity utilization increase of \*\*\* percentage points. Firms identified China and India (cited by 3 firms each), Turkey (2 firms), Canada, Hong Kong, Taiwan, and Thailand (cited by 1 firm each) as principal export markets for CSPV cells.<sup>10</sup> Vietnamese producers identified India and Taiwan (cited by 3 firms each), Africa, China, Hong Kong, Japan, Middle East, Pakistan, Philippines, and Turkey (cited by 1 firm each) as principal export markets for CSPV modules. No responding foreign producers identified products that can be produced on the same equipment as CSPV products.

## **Imports from nonsubject sources**

Nonsubject imports accounted for \*\*\* percent of total U.S. imports by quantity in 2023. The largest source of nonsubject imports during January 2021 – December 2023 was South Korea.

## **Supply constraints**

Three-fourths (9 of 12) of U.S. producers and two-thirds (28 of 42) of responding importers reported that they had not experienced supply constraints since January 1, 2021.

Of the firms reporting supply constraints, two U.S. producers identified COVID-19 supply chain disruptions. Domestic producers also cited high cost of transportation delays resulting in lost customers, the need to import CSPV cells in order to produce CSPV modules in the United States, and the availability of polysilicon, wafers, and cells as supply constraints.

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<sup>10</sup> One firm cited Vietnam as a principal export market.

## 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.<sup>11</sup>

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 II-5, solar energy grew from 2.8 percent to 3.9 percent of utility-scale electricity generation between 2021 and 2023. The share of utility-scale solar generated energy increased year-over year, with its 2023 peak increasing by 54.9 percent compared to 2021 levels.<sup>12 13</sup>

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 its end-use products.

**Table II-5**  
**CSPV modules: Share of net electricity generation in the United States, by type and year**

Electricity generation type	2021	2022	2023
Natural gas	38.4	39.9	43.1
Coal	21.9	19.7	16.2
Nuclear	19.0	18.2	18.6
Wind	9.2	10.3	10.2
Solar	2.8	3.4	3.9
All other	8.7	8.6	8.0
All electricity generation types	100.0	100.0	100.0

Source: U.S. EIA, <http://www.eia.gov/electricity/data/browser/>, retrieved May 27, 2024.

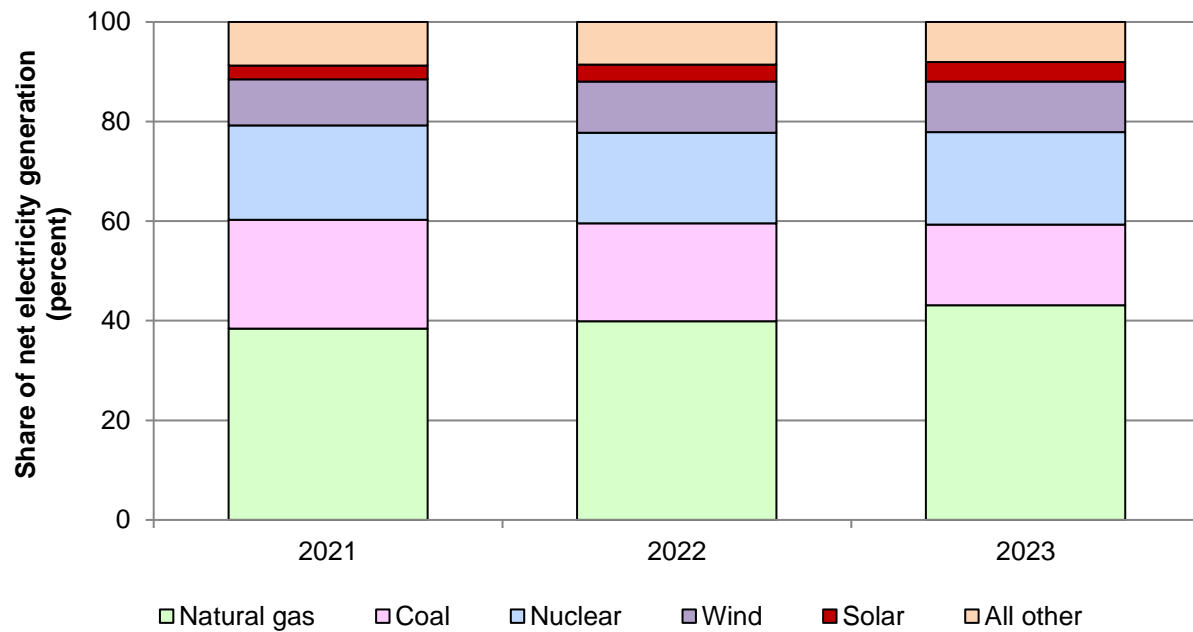
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<sup>11</sup> Crystalline Silicon Photovoltaic Cells Whether or Not Partially or Fully Assembled Into Other Products: Monitoring Developments in the Domestic Industry, Investigation No. TA-201-075 (Second Monitoring), USITC Publication 5494, February 2024, p. II-12.

<sup>12</sup> U.S. Energy Information Administration website, *U.S. utility-scale electricity generation by source, amount, and share of total in 2023*, <https://www.eia.gov/tools/faqs/faq.php?id=427&t=3>, retrieved May 23, 2024.

<sup>13</sup> In 2016, natural gas replaced coal as the largest source of electricity. In general, coal and natural gas production follow seasonal trends, with peak production times occurring during warmer months and lower production during colder months. U.S. Energy Information Administration website, <http://www.eia.gov/electricity/data/browser/>, retrieved May 23, 2024.

**Figure II-1**  
**CSPV modules: Share of net electricity generation in the United States, by type and year, 2023**



Source: U.S. EIA, <http://www.eia.gov/electricity/data/browser/>, retrieved May 27, 2024.

## End uses and cost share

Reported end uses for CSPV cells include resale for assembly into modules, while reported end uses for CSPV modules include off-grid applications sold outside traditional solar markets, oil field pumps, PV storage, and solar pumps.

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 comprise approximately one-third of the cost of a finished module.<sup>14</sup> U.S. producers' reported cost shares for CSPV cells used for modules ranged between 20 percent and 80 percent, with responses concentrated between 20 and 40 percent.<sup>15</sup>

- U.S. producers' reported cost shares for CSPV modules used for residential systems ranged from 13 percent to 92 percent;
- U.S. producers' reported cost shares for modules used for commercial systems ranged from 15 to 92 percent;<sup>16</sup>
- U.S. producers' reported cost shares for CSPV modules used for utility applications ranged from 19 percent to 45 percent;<sup>17</sup>
- U.S. importers' reported cost shares for CSPV cells used for modules ranged from 28 percent to 80 percent.<sup>18</sup> Two firms reported that the cost share was 80 percent and three firms reported that the cost share was 60 percent;<sup>19</sup>
- U.S. importers' reported cost shares for CSPV modules used for residential systems ranged from 10 percent to 95 percent, with two firms reporting a 95 percent cost share and one firm reporting a 92 percent cost share;<sup>20</sup>
- U.S. importers' reported cost shares for CSPV modules used for commercial systems ranged from 5 percent to 60 percent, with all but two responding importers reporting cost shares 60 percent or less.<sup>21</sup>

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<sup>14</sup> Conference transcript, pp. 204-205 (Wagner).

<sup>15</sup> U.S. producer/importer \*\*\* reported a cost share of 100 percent.

<sup>16</sup> U.S. producer/importer \*\*\* reported a cost share of 100 percent.

<sup>17</sup> U.S. producer/importer \*\*\* reported a cost share of 100 percent.

<sup>18</sup> U.S. importers \*\*\* reported cost shares of 100 percent.

<sup>19</sup> The two firms reporting an 80 percent cost share were \*\*\* and two of the three firms reporting a 60 percent cost share were \*\*\*.

<sup>20</sup> U.S. importer \*\*\* reported a cost share of 100 percent.

<sup>21</sup> Importers \*\*\* reported cost shares of 100 percent.

- Reported cost shares for CSPV modules used for utility systems ranged from 19 percent to 60 percent, with 2 firms reporting a 30 percent cost share.<sup>22</sup>

### Business cycles

Nine of 14 U.S. producers and 24 of 44 importers indicated that the market was subject to business cycles. Specifically, responding U.S. producers and importers cited seasonal trends due to weather, with some firms specifying that winter weather slows down installations and that summer months are more active. Two U.S. producers/importers reported a surge in demand for closing projects by the end of the year, while another reported stronger market demand due to incentives to promote solar installation in the United States. One U.S. producer/importer, \*\*\*, reported that the changes in supply and demand found in traditional business cycles affect manufacturers' production plans and sales strategies. It also reported that the prices for raw materials for CSPV products are influenced by business cycles, political stability, and natural disasters.

### Demand trends

Most U.S. producers and importers reported that U.S. and foreign demand for CSPV products steadily increased since January 1, 2021 (table II-6). One U.S. producer, \*\*\*, reported that demand seems to be increasing in the remote power and battery maintenance markets. Firms cited green energy and federal incentives (such as the Inflation Reduction Act) as contributing to steady increases in demand. One firm reported that solar is continuously the fastest growing source of new energy in the utility sector. Another, \*\*\*, reported that products required for the U.S. market are too costly to compete in other markets.

**Table II-6**  
**CSPV cells and modules: Count of firms' responses regarding overall domestic and foreign demand, by firm type**

Count in number of firms reporting

Market	Firm type	Steadily Increase	Fluctuate Up	No change	Fluctuate Down	Steadily Decrease
Domestic demand	U.S. producers	11	2	0	0	1
Domestic demand	Importers	30	11	1	2	1
Foreign demand	U.S. producers	8	2	0	0	0
Foreign demand	Importers	26	8	1	0	0

Source: Compiled from data submitted in response to Commission questionnaires.

<sup>22</sup> Importers \*\*\* reported 100 percent cost shares.

## Changes in government incentives

Various government incentive programs and regulations exist to incentivize use of CSPV products on a federal, state, and local level. These incentives include federal and state tax credits, Solar Renewable Energy Certificates (SREC); and accelerated depreciation, loan guarantees, and state-based incentives, among others. Firms were asked if there have been any changes in the level or availability of government incentives for CSPV products since January 1, 2021 and to describe the principal incentive programs whose change has affected the CSPV market. As shown in table II-7, most responding firms (including 12 of 14 responding U.S. producers and 35 of 44 responding importers) reported that there have been changes in government incentives since January 1, 2021, and almost all of these firms reported an increase or expansion of incentives.

**Table II-7**  
**CSPV cells and modules: Count of firms' responses regarding whether there have been any changes in the level or availability of government incentives since January 1, 2021, by firm type**

Count in number of firms reporting

<b>Firm type</b>	<b>No</b>	<b>Yes</b>
U.S. producers	2	12
Importers	9	35

Source: Compiled from data submitted in response to Commission questionnaires.

Note: For U.S. producers and importers narratives responses regarding changes in government incentives, see Appendix E, tables E-1 and E-2.

By far, the most commonly cited change was the passage of the IRA in August 2022 and the extension of tax credits contained therein. As discussed in part I, the IRA included an extension of the federal income tax credit for ten years (until 2032) and increased the credit to 30 percent with additional measures for domestic content. An importer also cited IRA provisions for Homeowner Investment Tax Credit. It also included several other incentives, including some designed to benefit domestic producers. Some of the other incentives noted by domestic producers included an Advanced Energy Project Credit, Advanced Manufacturing Production Tax Credit, Production Tax Credit, Clean Electricity Production Credit, and Clean Electricity Investment Tax Credit. Some firms also indicated that many states and cities have announced new or updated programs and incentives designed to spur solar demand, including renewable portfolio standards, net energy metering, renewable energy certificates, the PACE (Property Assessed Clean Energy) program, Solar Rebate Program, state-based tax exemption programs, Community Choice Aggregation (CCA), and state-specific programs such as Sun PV Incentive Program (New York), Renewable Generation Requirement (Texas), Title 24

(California's new home rooftop mandate), a 40 percent renewables target by 2030 in Illinois, and the adoption of 100 percent renewables targets in many major cities. Firms \*\*\* reported that an update on California's net metering regulations to NEM 3.0 lessened existing incentives to deploy residential solar in California, which led to increased inventories and price declines in the residential market for CSPV products. Importer \*\*\* added that the expiration of NEM 2.0 in 2023 slowed down PV penetration rates as homeowners now receive fewer export credits for overproduction, and that the breakeven time for an average PV system in California has only moderately increased, helped by regular aggressive utility rate increases.

### **Substitute products**

Most responding U.S. producers (9 of 11) and importers (29 of 40) reported that there were no substitutes for CSPV products. Firms identified other types of thin film modules in utility scale applications as a substitute, with one firm reporting that usually these market segments and specific applications don't overlap. Producer/importer \*\*\* identified amorphous silicon solar and CIGS solar as substitutes for battery maintenance. Importer \*\*\* identified \*\*\* as a substitute, but reported that \*\*\*.

### **Substitutability issues**

This section assesses the degree to which U.S.-produced CSPV modules and imports of CSPV modules from subject countries can be substituted for one another by examining the importance of certain purchasing factors and the comparability of CSPV modules from domestic and imported sources based on those factors. Based on available data, staff believes that there is a moderate-to-high degree of substitutability between domestically produced CSPV modules and CSPV modules imported from subject sources.<sup>23</sup> Factors contributing to this level of substitutability include interchangeability between domestic and subject sources. Factors

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<sup>23</sup> The degree of substitution between domestic and imported CSPV 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 modules to the CSPV modules imported from subject countries (or vice versa) when prices change. The degree of substitution may include such factors as relative prices (discounts/rebates), 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.).



reducing substitutability include different lead times from domestic and subject sources and significant factors other than price that firms consider.

## Factors affecting purchasing decisions

Purchasers responding to lost sales lost revenue allegations<sup>24</sup> were asked to identify the main purchasing factors their firm considered in their purchasing decisions for CSPV products. The major purchasing factors identified by firms include price, availability/supply, and quality. Other factors cited by purchasers include bankability/investor confidence, degree of vertical integration, logistics, modern slavery considerations, module technology, regulatory risks, supply chain risks, technology compatibility with equipment, and warranties.

As shown in table II-8, the most often cited top three factors firms consider in their purchasing decisions for CSPV products were price (cited by 6 purchasers) and quality and availability/supply (3 purchasers each). Price was the most frequently cited first-most important factor (cited by 3 firms), followed by availability/supply (2 firms); price and availability/supply were the most frequently reported second-most important factor (1 purchaser each); and price and quality were the most frequently reported third-most important factors (2 purchasers each).

**Table II-8**  
**CSPV cells and modules: Count of ranking of factors used in purchasing decisions as reported by U.S. purchasers, by factor**

Count in number of firms reporting

Factor	First	Second	Third	Total
Price / Cost	3	1	2	6
Quality	1	0	2	3
Availability / Supply	2	1	1	3
All other factors	0	4	1	NA

Source: Compiled from data submitted in response to Commission questionnaires.

## Lead times

U.S. producers and importers primarily sell CSPV products produced-to-order. U.S. producers reported that \*\*\* percent of their commercial shipments were from U.S. inventories, with lead times averaging \*\*\* days. The remaining \*\*\* percent of their commercial shipments were produced-to-order, with lead times averaging \*\*\* days. U.S. importers reported that \*\*\* of their commercial shipments were produced-to-order, with

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<sup>24</sup> This information is compiled from responses by purchasers identified by Petitioners to the lost sales lost revenue allegations. See Part V for additional information.

lead times averaging \*\*\* days.<sup>25</sup> U.S. importers sold \*\*\* percent of their commercial shipments from U.S. inventories, with an average lead time of \*\*\* days. US. importers reported that \*\*\* percent of their commercial shipments were from foreign inventories, with lead times averaging \*\*\* days.

### **Comparison of U.S.-produced and imported CSPV products**

In order to determine whether U.S.-produced CSPV products can generally be used in the same applications as imports from Cambodia, Malaysia, Thailand, and Vietnam, U.S. producers and importers were asked whether the products can always, frequently, sometimes, or never be used interchangeably. As shown in tables II-9 to II-10, most responding U.S. producers and importers reported that CSPV products were always or frequently interchangeable across all sources. One U.S. producer reported that financing requirements and third-party testing requirements limit interchangeability, while another reported that solar module performance affects interchangeability. Two U.S. producers reported firm-specific factors limiting interchangeability \*\*\*. Other factors limiting interchangeability include customer demands for modules (availability, bifaciality, color, efficiency, format, and size).

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<sup>25</sup> U.S. importer \*\*\* reported that its lead time for CSPV produced-to-order was \*\*\* days in 2023.

**Table II-9**

**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	7	1	2	1
United States vs. Malaysia	7	1	2	1
United States vs. Thailand	7	1	3	1
United States vs. Vietnam	7	1	2	1
Cambodia vs. Malaysia	6	2	2	0
Cambodia vs. Thailand	6	2	2	0
Cambodia vs. Vietnam	6	2	2	0
Malaysia vs. Thailand	6	2	2	0
Malaysia vs. Vietnam	6	2	2	0
Thailand vs. Vietnam	6	2	2	0
United States vs. Other	7	1	2	1
Cambodia vs. Other	6	2	2	0
Malaysia vs. Other	6	2	2	0
Thailand vs. Other	6	2	2	0
Vietnam vs. Other	6	2	2	0

Source: Compiled from data submitted in response to Commission questionnaires.

**Table II-10**

**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	15	5	6	1
United States vs. Malaysia	15	5	5	1
United States vs. Thailand	14	6	7	1
United States vs. Vietnam	15	5	9	2
Cambodia vs. Malaysia	13	6	5	0
Cambodia vs. Thailand	13	7	5	0
Cambodia vs. Vietnam	13	6	6	1
Malaysia vs. Thailand	13	8	4	0
Malaysia vs. Vietnam	13	7	4	1
Thailand vs. Vietnam	14	6	4	1
United States vs. Other	14	5	6	2
Cambodia vs. Other	13	5	6	1
Malaysia vs. Other	13	6	5	1
Thailand vs. Other	13	6	5	1
Vietnam vs. Other	13	6	5	1

Source: Compiled from data submitted in response to Commission questionnaires.

In addition, U.S. producers and importers were asked to assess how often differences other than price were significant in sales of CSPV products from the United States, subject, or nonsubject countries. As seen in table II-11, most U.S. producers reported that differences

other than price were sometimes or never significant. As shown in table II-12, while importers' responses were mixed, the majority reported that differences other than price were sometimes or never significant.

Firms cited applicable import duties, availability, customer relationships, end use applications, product range, quality, reliability, service, technical support, transport charges for importation of raw material, and transportation networks as differences other than price. \*\*\* reported that availability was a non-price factor, adding that there is no CSPV cell production in the United States or merchant markets for cells, and that all planned production will be self-consumed. It also added that the factories being built in the United States will now have competitive technology compared to technology in Southeast Asian countries. Importer \*\*\* reported that UFLPA reviews at the border create "significant delays" during the importation process which may delay the release of a shipment typically between 14 and 90 days, which it reports significantly disadvantages imports from China and solar cell and module imports regardless of the country of origin, creating a strong preference for cells and modules produced in the United States. One U.S. producer, \*\*\*, reported that it only purchases \*\*\* CSPV cells due to the specific technology, and that it does not \*\*\*. Similarly, importer \*\*\* reported that its product was unique among imported modules because \*\*\*.

**Table II-11**

**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**

<b>Country pair</b>	<b>Always</b>	<b>Frequently</b>	<b>Sometimes</b>	<b>Never</b>
United States vs. Cambodia	1	1	3	4
United States vs. Malaysia	1	1	3	4
United States vs. Thailand	1	2	3	4
United States vs. Vietnam	1	1	3	4
Cambodia vs. Malaysia	1	1	3	4
Cambodia vs. Thailand	1	1	3	4
Cambodia vs. Vietnam	1	1	3	4
Malaysia vs. Thailand	1	1	3	4
Malaysia vs. Vietnam	1	1	3	4
Thailand vs. Vietnam	1	1	3	4
United States vs. Other	1	1	3	3
Cambodia vs. Other	1	1	3	4
Malaysia vs. Other	1	1	3	4
Thailand vs. Other	1	1	3	4
Vietnam vs. Other	1	1	3	4

Source: Compiled from data submitted in response to Commission questionnaires.

**Table II-12**

**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**

<b>Country pair</b>	<b>Always</b>	<b>Frequently</b>	<b>Sometimes</b>	<b>Never</b>
United States vs. Cambodia	6	3	7	7
United States vs. Malaysia	6	2	7	7
United States vs. Thailand	5	5	7	7
United States vs. Vietnam	8	4	8	7
Cambodia vs. Malaysia	4	2	7	9
Cambodia vs. Thailand	4	3	7	8
Cambodia vs. Vietnam	6	4	7	9
Malaysia vs. Thailand	4	3	7	8
Malaysia vs. Vietnam	5	4	7	9
Thailand vs. Vietnam	5	4	7	9
United States vs. Other	5	2	10	7
Cambodia vs. Other	4	3	8	7
Malaysia vs. Other	5	3	8	7
Thailand vs. Other	4	3	8	7
Vietnam vs. Other	5	3	8	7

Source: Compiled from data submitted in response to Commission questionnaires.



## **Part III: 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 were presented in Part I of this report and information on the volume and pricing of imports of the subject merchandise is presented in Part IV and Part V. Information on the other factors specified is presented in this section and/or Part VI and (except as noted) is based on the questionnaire responses of 15 firms that accounted for the vast majority of U.S. production of CSPV modules during 2023.

### **U.S. producers**

The Commission issued a U.S. producer questionnaire to 24 firms based on information contained in the petition. Fifteen firms provided usable data on their operations.<sup>1</sup> Table III-1 lists U.S. producers of CSPV modules, their production locations, positions on the petition, and shares of total production.<sup>2</sup>

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<sup>1</sup> \*\*\*, \*\*\* U.S. producer questionnaire response, section II-8.

<sup>2</sup> The United States does not currently have any producers of CSPV cells. Data throughout the report includes data for these twelve U.S. producers with reported production during 2021-23. Narrative responses include data for fifteen U.S. producers including three U.S. producers \*\*\* with 2024 production plans.

**Table III-1**

**CSPV modules: U.S. producers, their positions on the petition, production locations, and shares of reported production, 2023**

Shares in percent

<b>Firm</b>	<b>Position on petition</b>	<b>Production location(s)</b>	<b>Share of production</b>
Auxin	***	San Jose, CA	***
Canadian Solar	***	Mesquite, TX	***
GAF Energy	***	San Jose, CA Georgetown, TX	***
Hanwha	Petitioner	Dalton, GA Cartersville, GA	***
Hounen	***	Orangeburg, SC	***
Illuminate	***	Pataskala, OH	***
Jinko	***	Jacksonville, FL	***
Merlin	***	San Jose, CA	***
Mission	Petitioner	San Antonio, TX	***
PowerFilm	***	Ames, IA	***
Runergy	***	Huntsville, AL	***
Silfab	***	Bellingham WA Burlington WA	***
Solar4america	***	McClellan Park, CA	***
SunPower	***	Hillsboro, OR	***
Trina	***	Wilmer, TX	***
All firms	Various	Various	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 "---". \*\*\*.

Table III-2 presents information on U.S. producers' ownership, related and/or affiliated firms.



**Table III-2**  
**CSPV modules: U.S. producers' ownership, related and/or affiliated firms**

[illegible]

Table continued.

**Table III-2 Continued**

**CSPV modules: U.S. producers' ownership, related and/or affiliated firms**

<b>Reporting firm</b>	<b>Relationship type and related firm</b>	<b>Details of relationship</b>
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***

Table continued.

**Table III-2 Continued**

**CSPV modules: U.S. producers' ownership, related and/or affiliated firms**

<b>Reporting firm</b>	<b>Relationship type and related firm</b>	<b>Details of relationship</b>
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

As indicated in table III-2, eight U.S. producers are related to foreign producers of the subject merchandise and nine are related to U.S. importers of the subject merchandise. In addition, as discussed in greater detail below, eight U.S. producers directly import the subject merchandise and one purchases the subject merchandise from U.S. importers.

Tables III-3 through III-5 present events in the U.S. industry since January 1, 2021. While there were multiple plant openings since the beginning of 2021, many 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 megawatt in size.<sup>3</sup> 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.<sup>4</sup>

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<sup>3</sup> After January 1, 2025, the ITC and PTC will be replaced with the Clean Electricity Investment Tax Credit and the Clean Energy Production Tax Credit, 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. The Clean Energy Production Tax Credit will be available to electricity generation facilities that come into service after December 31, 2024 and whose greenhouse gas emissions rate is not greater than zero. Solar project owners are generally not eligible to claim both the ITC and PTC; however, they could claim different credits for co-located systems, like solar and storage. Under the IRA, apprenticeship requirements include a labor hours requirement, a ratio requirement, and a participation requirement. U.S. Department of Energy, “Federal Tax Credits for Businesses,” last updated August 2023, <https://www.energy.gov/eere/solar/federal-solar-tax-credits-businesses>, retrieved May 13, 2024; United States Environmental Protection Agency (EPA), “Summary of Inflation Reduction Act provisions related to renewable energy,” last updated October 25, 2023, <https://www.epa.gov/green-power-markets/summary-inflation-reduction-act-provisions-related-renewable-energy>, retrieved May 13, 2024; Congressional Research Service (CRS), “Recent Developments in the Federal Multipronged Approach to Solar and Wind Energy,” October 3, 2023 <https://crsreports.congress.gov/product/pdf/LSB/LSB11054>, retrieved May 13, 2024; U.S. Department of Labor, “Inflation Reduction Act Apprenticeship Resources,” <https://www.apprenticeship.gov/inflation-reduction-act-apprenticeship-resources>, retrieved May 13, 2024.

<sup>4</sup> For additional discussion of the Inflation Reduction Act and other U.S. policies, see the second monitoring publication, pp. I-71–I-81.

**Table III-3**  
**CSPV cells and modules: Important U.S. industry events since 2021**

Item	Firm	Event
Plant Closure	LG Electronics	LG closed its 550 MW facility producing modules in Huntsville, Alabama in June 2022.
Plant Closure	Sunenergy California	Sunenergy California filed for bankruptcy in 2021.
Plant Expansion	Solar4America	Solar4America expanded its plant in Sacramento, California to produce up to 2.4 GW of modules in 2023.
Plant Expansion	Q Cells	In October 2023, Hanwha Q Cells added 2.0 GW of module capacity, bringing its total capacity to 5.1 GW.
Plant Expansion	Heliene	Heliene installed an additional line (Heliene 2) to produce modules with a capacity of 500 MW in 2023. Heliene also doubled its Heliene 1 module capacity to 300 MW.
Plant Expansion	Q Cells	In 2022, Hanwha Q Cells expanded its module production capacity by 1.4 GW.
Plant Opening	Sirius PV USA (Elin)	Operating under the name Sirius PV USA, Elin began CSPV module manufacturing in April 2024 in Waller County, Texas. This manufacturing facility has a production capacity of 1GW, with the plan to ramp up production to 2 GW within 18 months. Sirius PV USA will produce bifacial PERC-based modules with a range from 410 to 580 watts, and plans to transition to TOPCon technology starting in July 2024.
Plant Opening	Illuminate USA	Illuminate USA began commercial operations in February 2024. Chinese panel maker Longi Solar and U.S. solar project developer Invenergy agreed to jointly construct a 5 GW solar panel factory in Pataskala, Ohio, via a newly founded company, Illuminate USA. The factory will make single and bifacial solar modules.
Plant Opening	First Solar	First Solar began production at its third thin-film module manufacturing facility in Ohio, with an annual capacity of 3.3 GW.
Plant Opening	Canadian Solar	In June 2023, Canadian Solar announced its plan to build a module manufacturing plant in Mesquite, Texas, with an annual output of 5 GW. This facility began commercial production in late 2023. This is Canadian Solar's first United States manufacturing facility.
Plant Opening	NanoPV	NanoPV opened a plant in Americus, Georgia in 2022 producing modules.

Table Continued.

**Table III-3 Continued****CSPV cells and modules: Important U.S. industry events since 2021**

Item	Firm	Event
Item	Firm	Event
Plant Opening	Crossroads Solar	Crossroads Solar opened a 12 MW plant in South Bend, Indiana in September 2021.
Plant Opening	Silfab Solar	Silfab Solar opened a facility producing modules in Burlington, Washington in 2021, doubling its U.S. manufacturing capacity to 800 MW.
Plant Opening	GAF Energy	GAF Energy opened a facility producing modules in San Jose, California in 2021.

Source: This table is based on publicly available information.

Table III-4 presents planned U.S. CSPV cell production facilities that have been publicly announced. According to Clean Energy Associates (“CEA”), a clean energy advisory company, public announcements of U.S. cell capacity additions total 84 GW, of which CEA expects 33 GW to be operational by 2027.

**Table III-4****CSPV cells: New U.S. CSPV cell production facilities announced**

n.a.= not available

Company	State	Planned start of production	Notes
Canadian Solar	IN	Late 2025	State-of-the-art solar photovoltaic cell manufacturing plant in Jeffersonville, Indiana with an annual output of 5 GW, equivalent to approximately 20,000 high-power modules per day. Cells produced at this facility will be used at the announced 5 GW module assembly plant in Mesquite, Texas.
Convalt	NY	2025	Factory #2. Producing ingots, wafers, cells and modules in one integrated factory. Will produce Tier 1 panels for residential, commercial & industrial, and utility-scale solar projects. Annual capacity will be 10,000 MW. Expected to begin construction in June 2024 and production in May 2025.
Enel	OK	Late 2024	Facility for both bifacial PV modules and cells. Construction is planned to begin in the fall of 2023 with the first panel produced and available to the market by the end of 2024. Expected to reach 3 GW annual capacity in 2025, with the possibility of a future expansion to 6 GW.
First Solar	LA	2026	Will be First Solar’s fifth fully vertically integrated manufacturing facility in the United States. Expected to grow the company’s nameplate manufacturing capacity by 3.5 GW.
Heliene	MN	2025	Plans to produce 1 GW of solar modules and 1.5 GW of cells in a new facility in Minnesota. Driven by the IRA, the plan is for the new factory to begin producing modules in 2024 and cells in 2025.

Table Continued.

**Table III-4 Continued**  
**CSPV cells: New U.S. CSPV cell production facilities announced**

Company	State	Planned start of production	Notes
Maxeon Solar	NM	2025	3GW facility for both solar modules and cells. Subject to a successful financial close under the DOE Title 17 Clean Energy Financing Program.
Meyer Burger	CO	Q4 2024	With an initial capacity of 2 GW of solar cells per year, the new plant will exclusively supply Meyer Burger's solar module production in Goodyear, Arizona.
Q Cells	GA	Late 2024	In addition to its existing two solar module assembly facilities in Dalton, Georgia, the company will build a new factory in the state that will manufacture 3.3 GW of silicon ingots, wafers, cells, and more finished panels.
Silfab Solar	SC	2024	Anticipated to be fully operational in 2024 with an initial annual capability of 1 GW cell production and an additional 1.2 GW of PV solar module assembly.
Solar4America	n.a.	Late 2024	n.a.
VSK Energy	n.a.	2025	Plans for vertically integrated manufacturing facility in southern U.S. Annual production capacity of 4 GW for cells, ingots, and wafers.

Note: This table is based on publicly available information. Information on changes in production capacity at existing plants is not included.

Several additional investments in U.S. CSPV module manufacturing have been announced or are under consideration (table III-5). Industry experts estimate that over 150 GW in additional module capacity by 2027 have been announced thus far, but expect less than half of announced investments to be online by 2027.<sup>5</sup>

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<sup>5</sup> PV Tech, "PV module procurement – US factory announcements add to complexity," December 7, 2023, <https://www.pv-tech.org/pv-module-procurement-us-factory-announcements-add-to-complexity/>.

**Table III-5**  
**CSPV modules: New CSPV module production facilities announced**

n.a.= not available

Company	State	Planned start of production	Notes
Adion Solar	GA	2024	Will initially have a 500-MW annual capacity with room to grow to 1 GW. Plans to manufacture mono- and bifacial solar panels, all focused on the commercial market and potentially the utility-scale market.
Bila Solar	IN	2024	Will produce 1 GW of glassless, frameless solar modules per year.
Convallt	ME	2024	Convallt's Factory #0. Establishing one solar module production line with a maximum annual capacity of 638 MW. This location will produce Tier 1 panels for residential, commercial & industrial, and utility-scale solar projects. Construction scheduled to begin October 2023 and commercial operations are scheduled to begin in 2024.
Convallt	NY	Q3 2024	Factory #1. Acquired SunPower Corporation's solar module factory in April 2021. Will produce Tier 1 panels for residential, commercial & industrial and utility scale solar projects, expected to start production in Q3 of 2024.
Convallt	NY	2025	Factory #2. Producing ingots, wafers, cells and modules in one integrated factory. Will produce Tier 1 panels for residential, commercial & industrial, and utility-scale solar projects. Annual capacity will be 10,000 MW. Expected to begin construction in June 2024 and production in May 2025.
Enel	OK	Late 2024	Facility for both bifacial PV modules and cells. Construction is planned to begin in the fall of 2023 with the first panel produced and available to the market by the end of 2024. Expected to reach 3 GW annual capacity in 2025, with the possibility of a future expansion to 6 GW.
First Solar	AL	2025	Expected to be commissioned in 2025, with a planned annual capacity of 3.5 GW
First Solar	LA	2026	Will be First Solar's fifth fully vertically integrated manufacturing facility in the United States. Expected to grow the company's nameplate manufacturing capacity by 3.5 GW.
Heliene	MN	2024	Plans to produce 1 GW of solar modules and 1.5 GW of cells in a new facility in Minnesota. Driven by the Inflation Reduction Act, the plan is for the new factory to begin producing modules in 2024 and cells in 2025.
Hounen	SC	2024	U.S. division of Zhejiang Haoneng Optoelectric Co., has announced plans for its first U.S. solar module manufacturing facility in South Carolina, a 1GW factory representing US\$33 million in investment.
JA Solar	AZ	2024	Will produce PV modules for commercial and residential rooftop applications, as well as for utility-scale solar power plants deployment with annual production capacity of 2 GW once it is fully functional.
Maxeon Solar	NM	2025	3 GW facility for both solar modules and cells. Subject to a successful financial close under the DOE Title 17 Clean Energy Financing Program.

Table Continued.



**Table III-5 Continued**

**CSPV modules: New CSPV module production facilities announced**

<b>Company</b>	<b>State</b>	<b>Planned start of production</b>	<b>Notes</b>
Meyer Burger	AZ	2024	Module facility in Goodyear, Arizona under construction since 2021. Plans to have cells supplied by its own cell production facility in Colorado.
Mitrex	n.a.	n.a.	2.5 GW solar panel factory. Will make a mix of building-integrated PV products and traditional solar panels.
Navitas Solar	n.a.	n.a.	Will be built at an undisclosed location in the U.S. Midwest with an initial capacity of 1.2 GW. Will be scaled to 10 GW capacity within a few years.
Hanwha Q Cells	GA	Late 2024	In addition to its existing two solar module assembly facilities in Dalton, Georgia, the company will build a new factory in the state that will manufacture 3.3 GW of silicon ingots, wafers, cells and more finished panels.
SEG Solar	TX	2024	Plans to produce 2 GW of solar modules based on n-type TOPCon cell technology. Plans to supply the utility, commercial and residential markets.
Silfab Solar	SC	2024	Anticipated to be operational at the end of 2024 with an initial annual capability of 1 GW cell production and an additional 1.2 GW of PV solar module assembly.
Trina Solar	TX	2024	Plan to start production by the end of 2024. New-build construction when completed the facility will produce 5 GW of modules and source polysilicon from the United States and Europe.
VSK Energy	CO	2024	Plans for vertically integrated manufacturing facility. Module production will be located in Colorado with an initial capacity of 2 GW and expansion of up to 4 GW.
Waaree Energies	TX	2024	Waaree's 3GW CSPV module manufacturing facility in Brookshire, Texas is under construction and is expected to start production by the end of 2024, with a goal of scaling to 5GW of module manufacturing capacity by 2027.

Note: This table is based on publicly available information.

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 modules since 2021. Thirteen of fifteen producers indicated in their questionnaires that they had experienced such changes.

Table III-6 presents the changes identified by these producers.

**Table III-6****CSPV modules: U.S. producers' reported changes in operations, since January 1, 2021**

<b>Item</b>	<b>Firm name and narrative response on changes in operations</b>
Plant openings	***
Plant openings	***
Plant openings	***
Plant openings	***
Plant openings	***
Plant openings	***
Plant openings	***
Plant openings	***
Plant closings	***
Plant closings	***
Prolonged shutdowns	***
Prolonged shutdowns	***
Prolonged shutdowns	***

Table continued.

**Table III-6 Continued**

**CSPV cells: U.S. producers' reported changes in operations, since January 1, 2021**

<b>Item</b>	<b>Firm name and narrative response on changes in operations</b>
Production curtailments	***
Production curtailments	***
Production curtailments	***
Production curtailments	***
Relocations	***
Expansions	***
Expansions	***
Expansions	***
Expansions	***
Expansions	***
Expansions	***
Expansions	***
Acquisitions	***
Other	***

Source: Compiled from data submitted in response to Commission questionnaires.

## U.S. production, capacity, and capacity utilization

Table III-7 presents U.S. producers' installed and practical capacity and production on the same equipment. During 2021-23 U.S. producers' installed overall capacity and practical overall capacity increased by \*\*\* percent and by \*\*\* percent, respectively. No U.S. producer reported producing products other than CSPV modules on the same equipment and machinery. 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 2021-23.

**Table III-7**

**CSPV modules: U.S. producers' installed and practical capacity and production on the same equipment as in-scope production, by period**

Capacity and production in kilowatts; utilization in percent

Item	Measure	2021	2022	2023
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.

Table III-8 presents U.S. producers' reported narratives regarding practical capacity constraints.

**Table III-8**  
**CSPV modules: U.S. producers' reported capacity constraints since January 1, 2021**

<b>Item</b>	<b>Firm name and narrative response on constraints to practical overall capacity</b>
Production bottlenecks	***
Production bottlenecks	***
Production bottlenecks	***
Existing labor force	***
Existing labor force	***
Existing labor force	***

Table continued.

**Table III-8 Continued**

**CSPV modules: U.S. producers' reported capacity constraints since January 1, 2021**

<b>Item</b>	<b>Firm name and narrative response on constraints to practical overall capacity</b>
Existing labor force	***
Existing labor force	***
Existing labor force	***
Supply of material inputs	***
Supply of material inputs	***
Supply of material inputs	***
Supply of material inputs	***
Supply of material inputs	***
Storage capacity	***
Logistics/transportation	***
Logistics/transportation	***
Logistics/transportation	***
Logistics/transportation	***
Logistics/transportation	***
Other constraints	***
Other constraints	***
Other constraints	***
Other constraints	***
Other constraints	***
Other constraints	***

Source: Compiled from data submitted in response to Commission questionnaires.

Table III-9 and figure III-1 present U.S. producers' production, capacity, and capacity utilization. During 2021-23, U.S. producers' capacity utilization fluctuated and overall decreased by \*\*\* percentage points. As new firms began CSPV module production, their initial production was low relative to capacity and caused capacity utilization to be lowest in 2023. Despite \*\*\* shutting CSPV module production at the end of the period, production increased annually and by over \*\*\* percent from 2021 to 2023. Overall, industry trends were driven by \*\*\* capacity and production increases as the company accounted for over \*\*\* percent of CSPV production throughout the period for which data were collected. \*\*\* share of capacity and production was higher in 2023 than in 2021.

**Table III-9**  
**CSPV modules: U.S. producers' output, by firm and period**

**Practical capacity**

Capacity in kilowatts

Firm	2021	2022	2023
Auxin	***	***	***
Canadian Solar	***	***	***
GAF Energy	***	***	***
Hanwha	***	***	***
Hounen	***	***	***
Jinko	***	***	***
Merlin	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Silfab	***	***	***
Solar4america	***	***	***
SunPower	***	***	***
All firms	***	***	***

Table continued.

**Table III-9 Continued**  
**CSPV modules: U.S. producers' output, by firm and period**

**Production**

Production in kilowatts

<b>Firm</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>
Auxin	***	***	***
Canadian Solar	***	***	***
GAF Energy	***	***	***
Hanwha	***	***	***
Hounen	***	***	***
Jinko	***	***	***
Merlin	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Silfab	***	***	***
Solar4america	***	***	***
SunPower	***	***	***
All firms	***	***	***

Table continued.

**Table III-9 Continued**  
**CSPV modules: U.S. producers' output, by firm and period**

**Capacity utilization**

Capacity utilization in percent

<b>Firm</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>
Auxin	***	***	***
Canadian Solar	***	***	***
GAF Energy	***	***	***
Hanwha	***	***	***
Hounen	***	***	***
Jinko	***	***	***
Merlin	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Silfab	***	***	***
Solar4america	***	***	***
SunPower	***	***	***
All firms	***	***	***

Note: Capacity utilization ratio represents the ratio of the U.S. producer's production to its production capacity.

Table continued.



**Table III-9 Continued**  
**CSPV modules: U.S. producers' output, by firm and period**

**Share of production**

Share in percent

<b>Firm</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>
Auxin	***	***	***
Canadian Solar	***	***	***
GAF Energy	***	***	***
Hanwha	***	***	***
Hounen	***	***	***
Jinko	***	***	***
Merlin	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Silfab	***	***	***
Solar4america	***	***	***
SunPower	***	***	***
All firms	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 III-1**  
**CSPV modules: U.S. producers' output, by period**

\* \* \* \* \*

Source: Compiled from data submitted in response to Commission questionnaires.

### **Alternative products**

U.S. producers did not report the production of other products on the same equipment and machinery used to produce CSPV modules.

## U.S. producers' U.S. shipments and exports

Table III-10 presents U.S. producers' U.S. shipments, export shipments, and total shipments. During 2021-23, U.S. producers' U.S. shipments of CSPV modules increased overall by \*\*\* percent, in terms of quantity, and by \*\*\* percent, in terms of value. Export shipments were \*\*\* by quantity and by value.

**Table III-10**  
**CSPV modules: U.S. producers' shipments, by destination and period**

Quantity in kilowatts; value in 1,000 dollars; unit value in dollars per kilowatts; shares in percent

Item	Measure	2021	2022	2023
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: 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 III-11 presents U.S. producers' U.S. shipments by type. During 2021-23, 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 increased while transfers to related firms decreased. 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 2021. During 2022-23, 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. No U.S. producer reported internal consumption and \*\*\* firms reported transfer to related firms.

**Table III-11**  
**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	2021	2022	2023
Commercial U.S. shipments	Quantity	***	***	***
Transfers to related firms	Quantity	***	***	***
U.S. shipments	Quantity	***	***	***
Commercial U.S. shipments	Value	***	***	***
Transfers to related firms	Value	***	***	***
U.S. shipments	Value	***	***	***
Commercial U.S. shipments	Unit value	***	***	***
Transfers to related firms	Unit value	***	***	***
U.S. shipments	Unit value	***	***	***
Commercial U.S. shipments	Share of quantity	***	***	***
Transfers to related firms	Share of quantity	***	***	***
U.S. shipments	Share of quantity	100.0	100.0	100.0
Commercial U.S. shipments	Share of value	***	***	***
Transfers to related firms	Share of value	***	***	***
U.S. shipments	Share of value	100.0	100.0	100.0

Source: Compiled from data submitted in response to Commission questionnaires.

## U.S. producers' inventories

Table III-12 presents U.S. producers' end-of-period inventories and the ratio of these inventories to U.S. producers' production, U.S. shipments, and total shipments. \*\*\* reported end-of-period inventories during the period for which data were collected. U.S. producers' end-of-period inventories increased by \*\*\* percent during 2021-23, with the majority of the increase taking place from 2022 to 2023. Of the \*\*\* firms that reported end-of-period inventories, \*\*\* U.S. producers' end-of-period inventories increased during 2021-23. During 2021-23, U.S. producers' end-of-period inventories as a ratio to U.S. production, U.S. shipments, and total shipments were lowest in 2022 and overall increased, with the three ratios ending \*\*\* percentage points, \*\*\* percentage points, and \*\*\* percentage points, respectively, higher in 2023 compared to 2021.

**Table III-12**

**CSPV modules: U.S. producers' inventories and their ratio to select items, by period**

Quantity in kilowatts; ratio in percent

Item	2021	2022	2023
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.

## U.S. producers' imports from subject sources

Currently there is no U.S. production of CSPV cells. To assemble CSPV modules, U.S. producers import and/or purchase foreign produced CSPV cells. Eight firms reported imports of CSPV cells or modules from subject sources during the period for which data were collected. U.S. producers' imports of subject CSPV cells and modules are presented in tables III-13 through III-20. U.S. producers' reasons for importing are presented in table III-21. Additional information regarding U.S. producers' imports is presented in appendix G.

**Table III-13**

**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	2021	2022	2023
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: 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 "---". For more details about U.S. producers' imports see business models in Appendix G.

**Table III-14**

**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	2021	2022	2023
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: For more details about U.S. producers' imports see business models in Appendix G.

**Table III-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	2021	2022	2023
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: 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 "---". For more details about U.S. producers' imports see business models in Appendix G.

**Table III-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	2021	2022	2023
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: 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 "---". For more details about U.S. producers' imports see business models in Appendix G.

**Table III-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	2021	2022	2023
U.S. production	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	***	***	***

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 "---". For more details about U.S. producers' imports see business models in Appendix G.

**Table III-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	2021	2022	2023
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: 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 "---". For more details about U.S. producers' imports see business models in Appendix G.



**Table III-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	2021	2022	2023
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: 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 "---". For more details about U.S. producers' imports see business models in Appendix G.

**Table III-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	2021	2022	2023
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: 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 "---". For more details about U.S. producers' imports see business models in Appendix G.

**Table III-21****CSPV cells and modules: U.S. producers' reasons for importing**

<b>Item</b>	<b>Narrative response on reasons for importing</b>
***'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. producer's purchases of imports from subject sources are presented in table III-22.

**Table III-22**

**CSPV cells and modules: \*\*\*'s purchases of imports from subject sources, by source, importer of record, and period**

Quantity in kilowatts; ratio in percent

Item	Measure	2021	2022	2023
U.S. production	Quantity	***	***	***
Purchases of U.S. imports from ***	Quantity	***	***	***
Purchases of U.S. imports from ***	Quantity	***	***	***
Purchases of U.S. imports from ***	Quantity	***	***	***
Producer's purchases from *** to U.S. production	Ratio	***	***	***
Producer's purchases from *** to U.S. production	Ratio	***	***	***
Producer's purchases from *** to U.S. production	Ratio	***	***	***
Overall imports from ***	Quantity	***	***	***
Producer's purchases to overall imports from ***	Ratio	***	***	***
Overall imports from ***	Quantity	***	***	***
Producer's purchases to overall imports from ***	Ratio	***	***	***
Overall imports from ***	Quantity	***	***	***
Producer's purchases to overall imports from ***	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 "--". \*\*\*'s U.S. producer questionnaire response, section II-17.

## U.S. employment, wages, and productivity

Table III-23 shows U.S. producers' employment-related data. During 2021-23, the number of production related workers ("PRWs") increased annually and overall by \*\*\* percent. During 2021-23, total hours worked, wages paid, hourly wages, and productivity increased annually and overall by \*\*\* percent, by \*\*\* percent, by \*\*\* percent, and by \*\*\* percent, respectively. During 2021-23, hours worked per PRW and unit labor costs decreased annually and overall by \*\*\* percent and by \*\*\* percent, respectively. As the largest producer of CSPV modules in the United States, \*\*\*. \*\*\* number of PRWs increased by \*\*\* percent and accounted for nearly \*\*\* of all PRWs during the period for which data were collected. Despite the closure of \*\*\* facilities, the number of PRWs continued to grow with the addition of \*\*\*, and increases in PRWs for six U.S. producers during 2021-23.

**Table III-23**

**CSPV modules: U.S. producers' employment related information, by period**

Item	2021	2022	2023
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.

Note: \*\*\*. \*\*\* U.S. producer questionnaire response, section II-11.

## Part IV: U.S. imports, apparent U.S. consumption, and market shares

### U.S. importers

The Commission issued importer questionnaires to 74 firms believed to be importers of subject CSPV cells and modules, as well as to all U.S. producers of CSPV cells and modules.<sup>1</sup> Usable questionnaire responses were received from 46 companies, representing \*\*\* percent of U.S. imports from Cambodia, \*\*\* percent of U.S. imports from Malaysia, \*\*\* percent of U.S. imports from Thailand, and \*\*\* percent of U.S. imports from Vietnam in 2023<sup>2</sup> under HTS subheadings 8541.40.6015, 8541.40.6025, 8541.40.6035, 8541.40.6045, 8541.42.0010 and 8541.43.0010<sup>3</sup>, “basket” categories.<sup>4</sup> Table IV-1 lists all responding U.S. importers of CSPV cells and modules from Cambodia, Malaysia, Thailand, and Vietnam and other sources, their locations, and their shares of U.S. imports, in 2023.

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<sup>1</sup> The Commission issued questionnaires to those firms identified in the petitions; staff research; and proprietary, Census-edited Customs’ import records.

<sup>2</sup> Importer questionnaire coverage is calculated using official import statistics and proprietary Census-edited Customs records.

<sup>3</sup> Questionnaire responses account of \*\*\* percent of total imports of official U.S. import statistics.

<sup>4</sup> \*\*\*, \*\*\*, section II-13a.

**Table IV-1****CSPV cells and modules: U.S. importers, their headquarters, and share of imports within each source, 2023**

Share in percent

Firm	Headquarters	Cambodia	Malaysia	Thailand	Vietnam
Allesun	San Jose, CA	***	***	***	***
Alps	Chino Hills, CA	***	***	***	***
Astronergy	Pomona, CA	***	***	***	***
Auxin	San Jose, CA	***	***	***	***
Axitec	Logan Township, NJ	***	***	***	***
Boviet	San Jose, CA	***	***	***	***
BYD	Pasadena, CA	***	***	***	***
Canadian Solar CA	Walnut Creek, CA	***	***	***	***
Canadian Solar TX	Mesquite, TX	***	***	***	***
First Solar	Tempe, AZ	***	***	***	***
GAF Energy	San Jose, CA	***	***	***	***
Hanwha	Irvine, CA	***	***	***	***
Hanwha CA	Irvine, CA	***	***	***	***
Hanwha GA	Dalton, GA	***	***	***	***
HD Hyundai	Seongnam-Si, South Korea	***	***	***	***
Hounen	Phnom Penh, Cambodia	***	***	***	***
Hounen USA	Chino, CA	***	***	***	***
Illuminate	Pataskala, OH	***	***	***	***
Invenergy	Chicago, IL	***	***	***	***
JA Solar	San Jose, CA	***	***	***	***
Jinko CA	San Francisco, CA	***	***	***	***
Jinko FL	Jacksonville, FL	***	***	***	***
Longi	San Ramon, CA	***	***	***	***
Maxeon	San Jose, CA	***	***	***	***
Merlin	San Jose, CA	***	***	***	***
Mission	San Antonio, TX	***	***	***	***
NextEra	Juno Beach, FL	***	***	***	***
PowerFilm	Ames, IA	***	***	***	***
RDK	Buford, GA	***	***	***	***
REC	San Luis Obispo, CA	***	***	***	***
Recurrent	Austin, TX	***	***	***	***
Risen	Kedah Darul Aman, Malaysia	***	***	***	***
Runergy AL	Huntsville, AL	***	***	***	***
Runergy USA Trading	Pleasanton, CA	***	***	***	***
Silfab Canada	Mississauga, ON	***	***	***	***
Silfab WA	Bellingham, WA	***	***	***	***

Table continued.

**Table IV-1 Continued****CSPV cells and modules: U.S. importers, their headquarters, and share of imports within each source, 2023**

Share in percent

<b>Firm</b>	<b>Headquarters</b>	<b>Cambodia</b>	<b>Malaysia</b>	<b>Thailand</b>	<b>Vietnam</b>
<b>Firm</b>	<b>Headquarters</b>	<b>Cambodia</b>	<b>Malaysia</b>	<b>Thailand</b>	<b>Vietnam</b>
SunPower CA	Richmond, CA	***	***	***	***
SunPower OR	Hillsboro, OR	***	***	***	***
SunTegra	Larchmont, NY	***	***	***	***
Talesun	Hong Kong	***	***	***	***
Tech-Seal	Houston, TX	***	***	***	***
Trina	Fremont, CA	***	***	***	***
Vikram	Westborough, MA	***	***	***	***
Waaree	Navsari, GJ	***	***	***	***
Winaico	Des Plaines, IL	***	***	***	***
Yingli	Malvern, PA	***	***	***	***
All firms	Various	100.0	100.0	100.0	100.0

Table continued.

**Table IV-1 Continued****CSPV cells and modules: U.S. importers, their headquarters, and share of imports within each source, 2023**

Share in percent

<b>Firm</b>	<b>Headquarters</b>	<b>Subject sources</b>	<b>Nonsubject sources</b>	<b>All import sources</b>
Allesun	San Jose, CA	***	***	***
Alps	Chino Hills, CA	***	***	***
Astronergy	Pomona, CA	***	***	***
Auxin	San Jose, CA	***	***	***
Axitec	Logan Township, NJ	***	***	***
Boviet	San Jose, CA	***	***	***
BYD	Pasadena, CA	***	***	***
Canadian Solar CA	Walnut Creek, CA	***	***	***
Canadian Solar TX	Mesquite, TX	***	***	***
First Solar	Tempe, AZ	***	***	***
GAF Energy	San Jose, CA	***	***	***
Hanwha	Irvine, CA	***	***	***
Hanwha CA	Irvine, CA	***	***	***
Hanwha GA	Dalton, GA	***	***	***
HD Hyundai	Seongnam-Si, South Korea	***	***	***
Hounen	Phnom Penh, Kandal	***	***	***
Hounen USA	Chino, CA	***	***	***
Illuminate	Pataskala, OH	***	***	***

Table continued.

**Table IV-1 Continued**

**CSPV cells and modules: U.S. importers, their headquarters, and share of imports within each source, 2023**

Share in percent

Firm	Headquarters	Subject sources	Nonsubject sources	All import sources
Invenergy	Chicago, IL	***	***	***
JA Solar	San Jose, CA	***	***	***
Jinko CA	San Francisco, CA	***	***	***
Jinko FL	Jacksonville, FL	***	***	***
Longi	San Ramon, CA	***	***	***
Maxeon	San Jose, CA	***	***	***
Merlin	San Jose, CA	***	***	***
Mission	San Antonio, TX	***	***	***
NextEra	Juno Beach, FL	***	***	***
PowerFilm	Ames, IA	***	***	***
RDK	Buford, GA	***	***	***
REC	San Luis Obispo, CA	***	***	***
Recurrent	Austin, TX	***	***	***
Risen	Kedah Darul Aman, Malaysia	***	***	***
Runergy AL	Huntsville, AL	***	***	***
Runergy USA Trading	Pleasanton, CA	***	***	***
Silfab Canada	Mississauga, ON	***	***	***
Silfab WA	Bellingham, WA	***	***	***
SunPower CA	Richmond, CA	***	***	***
SunPower OR	Hillsboro, OR	***	***	***
SunTegra	Larchmont, NY	***	***	***
Talesun	Hong Kong	***	***	***
Tech-Seal	Houston, TX	***	***	***
Trina	Fremont, CA	***	***	***
Vikram	Westborough, MA	***	***	***
Waaree	Navsari, GJ	***	***	***
Winaico	Des Plaines, IL	***	***	***
Yingli	Malvern, PA	***	***	***
All firms	Various	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 "---".



## U.S. imports

Table IV-2, table IV-3, and figure IV-1 present data for U.S. imports of CSPV cells and modules from Cambodia, Malaysia, Thailand, Vietnam, and all other sources. During 2021-23, imports from Cambodia, Malaysia, Thailand, Vietnam, and nonsubject sources increased both in terms of quantity and in terms of value with the most growth occurring from 2022 to 2023. Imports from subject sources at least doubled during the period for which data were collected. The unit value of CSPV cells and modules imports from Cambodia, Malaysia, Thailand, Vietnam, and all other sources was highest in 2022 and overall increased during 2021-23.

**Table IV-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	2021	2022	2023
Cambodia	Quantity	***	***	***
Malaysia	Quantity	***	***	***
Thailand	Quantity	***	***	***
Vietnam	Quantity	***	***	***
Subject sources	Quantity	***	***	***
Nonsubject sources	Quantity	***	***	***
All import sources	Quantity	***	***	***
Cambodia	Value	***	***	***
Malaysia	Value	***	***	***
Thailand	Value	***	***	***
Vietnam	Value	***	***	***
Subject sources	Value	***	***	***
Nonsubject sources	Value	***	***	***
All import sources	Value	***	***	***
Cambodia	Unit value	***	***	***
Malaysia	Unit value	***	***	***
Thailand	Unit value	***	***	***
Vietnam	Unit value	***	***	***
Subject sources	Unit value	***	***	***
Nonsubject sources	Unit value	***	***	***
All import sources	Unit value	***	***	***

Table continued.

**Table IV-2 Continued**  
**CSPV cells and modules: Share of U.S. imports by source and period**

Share and ratio in percent

Source	Measure	2021	2022	2023
Cambodia	Share of quantity	***	***	***
Malaysia	Share of quantity	***	***	***
Thailand	Share of quantity	***	***	***
Vietnam	Share of quantity	***	***	***
Subject sources	Share of quantity	***	***	***
Nonsubject sources	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	***	***	***
Nonsubject sources	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	***	***	***
Nonsubject sources	Ratio	***	***	***
All import sources	Ratio	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Share of quantity is the share of U.S. imports by quantity; share of value is the share of U.S. imports by value; ratio are U.S. imports to production by quantity.

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 IV-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.

**Table IV-3**

**CSPV cells and modules: Changes in import quantity, values, and unit values between comparison periods**

Changes in percent

Source	Measure	2021-23	2021-22	2022-23
Cambodia	%Δ Quantity	▲ ***	▼ ***	▲ ***
Malaysia	%Δ Quantity	▲ ***	▲ ***	▲ ***
Thailand	%Δ Quantity	▲ ***	▲ ***	▲ ***
Vietnam	%Δ Quantity	▲ ***	▲ ***	▲ ***
Subject sources	%Δ Quantity	▲ ***	▲ ***	▲ ***
Nonsubject sources	%Δ Quantity	▲ ***	▼ ***	▲ ***
All import sources	%Δ Quantity	▲ ***	▲ ***	▲ ***
Cambodia	%Δ Value	▲ ***	▼ ***	▲ ***
Malaysia	%Δ Value	▲ ***	▲ ***	▲ ***
Thailand	%Δ Value	▲ ***	▲ ***	▲ ***
Vietnam	%Δ Value	▲ ***	▲ ***	▲ ***
Subject sources	%Δ Value	▲ ***	▲ ***	▲ ***
Nonsubject sources	%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	▲ ***	▲ ***	▼ ***
Nonsubject sources	%Δ Unit value	▲ ***	▲ ***	▼ ***
All import sources	%Δ Unit 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 "---". Period changes preceded by a "▲" represent an increase, while period changes preceded by a "▼" represent a decrease.

Table IV-4 presents U.S. producers' and their affiliates' U.S. imports by source.

**Table IV-4**  
**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	2021	2022	2023
Cambodia	Quantity	***	***	***
Malaysia	Quantity	***	***	***
Thailand	Quantity	***	***	***
Vietnam	Quantity	***	***	***
Subject sources	Quantity	***	***	***
Nonsubject sources	Quantity	***	***	***
All import sources	Quantity	***	***	***
Cambodia	Ratio	***	***	***
Malaysia	Ratio	***	***	***
Thailand	Ratio	***	***	***
Vietnam	Ratio	***	***	***
Subject sources	Ratio	***	***	***
Nonsubject sources	Ratio	***	***	***
All import 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 "---". Ratio calculated as the quantity of imports by U.S. producers and affiliates relative to U.S. imports as shown in table IV-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.<sup>5</sup> 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.<sup>6</sup> Imports from Cambodia, Malaysia, Thailand, and Vietnam accounted for \*\*\* percent, \*\*\* percent, \*\*\* percent, and \*\*\* percent, respectively, of total imports of CSPV cells and modules by quantity during the period of April 2023 through March 2024.

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<sup>5</sup> 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)).

<sup>6</sup> Section 771 (24) of the Act (19 U.S.C § 1677(24)). 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. 19 U.S.C. § 1677(24)(B).

**Table IV-5**

**CSPV cells and modules: U.S. imports in the twelve-month period preceding the filing of the petition, April 1, 2023 through March 31, 2024**

Quantity in kilowatts; share in percent

Source of imports	Quantity	Share of quantity
Cambodia	***	***
Malaysia	***	***
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 8541.40.6015, 8541.40.6025, 8541.40.6035, 8541.40.6045, 8541.42.0010 and 8541.43.0010 accessed May 16, 2024.

Note: \*\*\*.

## 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 II. Additional information concerning fungibility, geographical markets, and simultaneous presence in the market is presented below.

### Fungibility

Table IV-6 and figure IV-2 present U.S. producers' and U.S. importers' U.S. shipments of CSPV modules by size (60-cell, 72-cell, and other) in 2023. U.S. producers' U.S. shipments and U.S. importers' U.S. shipments from Malaysia, Vietnam and nonsubject sources contained shipments from all three module categories. U.S. importers' U.S. shipments from Cambodia and Thailand contained shipments of 72-cell modules and other modules. The majority of U.S. producers' U.S. shipments were 60-cell modules. The majority of U.S. importers' U.S. shipments from individual subject sources were 72-cell modules and the majority of U.S. importers' U.S. shipments from nonsubject sources were other types of modules.

**Table IV-6**  
**CSPV modules: U.S. producers' and U.S. importers' U.S. shipments, by source and module size, 2023**

Quantity in kilowatts

Source	60-cell	72-cell	Other	All module sizes
U.S. producers	***	***	***	***
Cambodia	***	***	***	***
Malaysia	***	***	***	***
Thailand	***	***	***	***
Vietnam	***	***	***	***
Subject sources	***	***	***	***
Nonsubject sources	***	***	***	***
All import sources	***	***	***	***
All sources	***	***	***	***

Table continued.

**Table IV-6 Continued**  
**CSPV modules: U.S. producers' and U.S. importers' U.S. shipments, by source and module size, 2023**

Shares across in percent

Source	60-cell	72-cell	Other	All module sizes
U.S. producers	***	***	***	100.0
Cambodia	***	***	***	100.0
Malaysia	***	***	***	100.0
Thailand	***	***	***	100.0
Vietnam	***	***	***	100.0
Subject sources	***	***	***	100.0
Nonsubject sources	***	***	***	100.0
All import sources	***	***	***	100.0
All sources	***	***	***	100.0

Table continued.



**Table IV-6 Continued**

**CSPV modules: U.S. producers' and U.S. importers' U.S. shipments, by source and module size, 2023**

Shares down in percent

Source	60-cell	72-cell	Other	All module sizes
U.S. producers	***	***	***	***
Cambodia	***	***	***	***
Malaysia	***	***	***	***
Thailand	***	***	***	***
Vietnam	***	***	***	***
Subject sources	***	***	***	***
Nonsubject sources	***	***	***	***
All import sources	***	***	***	***
All sources	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 IV-2**

**CSPV modules: U.S. producers' and U.S. importers' U.S. shipments, by source and module size, 2023**

\* \* \* \* \*

Source: Compiled from data submitted in response to Commission questionnaires.

## **Geographical markets**

Table IV-7 presents U.S. imports by source and border of entry in 2023. In 2023, 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 (35.5 percent), Thailand (31.8 percent) and nonsubject sources (40.4 percent) entered the United States through ports in the West. The largest share of CSPV cells and modules from Malaysia (44.7 percent) entered the United States through ports in the East. The largest share of CSPV cells and modules from Vietnam (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 IV-7**  
**CSPV cells and modules: U.S. imports by source and border of entry, 2023**

Quantity in kilowatts

Source	East	North	South	West	All borders
Cambodia	1,220,917	732,206	2,383,493	2,385,654	6,722,270
Malaysia	3,016,492	157,875	1,641,038	1,940,052	6,755,457
Thailand	2,994,937	1,112,275	3,124,335	3,373,376	10,604,923
Vietnam	3,036,654	979,944	4,851,003	3,433,920	12,301,520
Subject sources	10,268,999	2,982,301	11,999,869	11,133,002	36,384,171
Nonsubject sources	3,094,902	734,471	1,841,240	3,836,470	9,507,083
All import sources	13,363,901	3,716,772	13,841,109	14,969,472	45,891,254

Table continued.

**Table IV-7 Continued**  
**CSPV cells and modules: U.S. imports by source and border of entry, 2023**

Share across in percent

Source	East	North	South	West	All borders
Cambodia	18.2	10.9	35.5	35.5	100.0
Malaysia	44.7	2.3	24.3	28.7	100.0
Thailand	28.2	10.5	29.5	31.8	100.0
Vietnam	24.7	8.0	39.4	27.9	100.0
Subject sources	28.2	8.2	33.0	30.6	100.0
Nonsubject sources	32.6	7.7	19.4	40.4	100.0
All import sources	29.1	8.1	30.2	32.6	100.0

Table continued.

**Table IV-7 Continued**  
**CSPV cells and modules: U.S. imports by source and border of entry, 2023**

Share down in percent

Source	East	North	South	West	All borders
Cambodia	9.1	19.7	17.2	15.9	14.6
Malaysia	22.6	4.2	11.9	13.0	14.7
Thailand	22.4	29.9	22.6	22.5	23.1
Vietnam	22.7	26.4	35.0	22.9	26.8
Subject sources	76.8	80.2	86.7	74.4	79.3
Nonsubject sources	23.2	19.8	13.3	25.6	20.7
All import sources	100.0	100.0	100.0	100.0	100.0

Source: Compiled from official U.S. import statistics of the U.S. Department of Commerce Census Bureau using statistical reporting numbers 8541.40.6015, 8541.40.6025, 8541.40.6035, 8541.40.6045, 8541.42.0010 and 8541.43.0010, accessed May 6, 2024. Imports area based on the imports for consumption data series.

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 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 IV-8 and figures IV-3 and IV-4 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 2021 through March 2024.

**Table IV-8**  
**CSPV cells and modules: Quantity of U.S. imports, by source and month**

Quantity in kilowatts

Year	Month	Cambodia	Malaysia	Thailand	Vietnam	Subject sources	Nonsubject sources	All import sources
2021	January	49,957	619,745	319,466	552,102	1,541,271	375,363	1,916,634
2021	February	64,221	763,733	247,311	581,763	1,657,028	341,290	1,998,317
2021	March	59,776	833,577	531,082	992,042	2,416,476	472,473	2,888,949
2021	April	98,022	776,061	457,978	856,875	2,188,936	423,327	2,612,262
2021	May	87,061	908,727	531,562	808,809	2,336,160	381,062	2,717,221
2021	June	47,614	868,922	378,220	910,095	2,204,852	495,313	2,700,165
2021	July	44,362	835,726	336,083	572,947	1,789,118	374,975	2,164,093
2021	August	100,018	468,257	311,882	535,876	1,416,033	502,956	1,918,988
2021	September	67,851	437,166	306,768	559,016	1,370,801	405,987	1,776,788
2021	October	61,084	655,134	369,793	762,701	1,848,712	353,198	2,201,910
2021	November	50,340	518,967	274,060	531,507	1,374,874	415,655	1,790,529
2021	December	70,312	358,254	241,208	385,013	1,054,786	476,363	1,531,149
2022	January	48,947	211,959	265,993	291,194	818,093	364,438	1,182,531
2022	February	308,394	303,889	310,638	304,080	1,227,001	292,515	1,519,516
2022	March	84,898	388,962	472,348	537,922	1,484,130	368,457	1,852,588
2022	April	95,161	258,186	400,854	428,334	1,182,535	407,230	1,589,766
2022	May	137,742	312,748	434,175	606,728	1,491,393	403,257	1,894,650
2022	June	132,933	208,036	437,560	600,253	1,378,783	380,033	1,758,815
2022	July	149,129	333,080	328,398	351,907	1,162,514	377,811	1,540,325
2022	August	114,143	185,845	298,950	982,104	1,581,042	547,539	2,128,581
2022	September	170,876	145,683	346,852	977,695	1,641,106	650,652	2,291,757
2022	October	264,375	346,628	423,699	1,157,033	2,191,735	786,393	2,978,128
2022	November	340,281	219,036	396,121	1,122,793	2,078,231	730,099	2,808,330
2022	December	521,628	382,533	509,117	1,095,401	2,508,679	833,375	3,342,053

Table continued.

**Table IV-8 Continued**  
**CSPV cells and modules: Quantity of U.S. imports, by source and month**

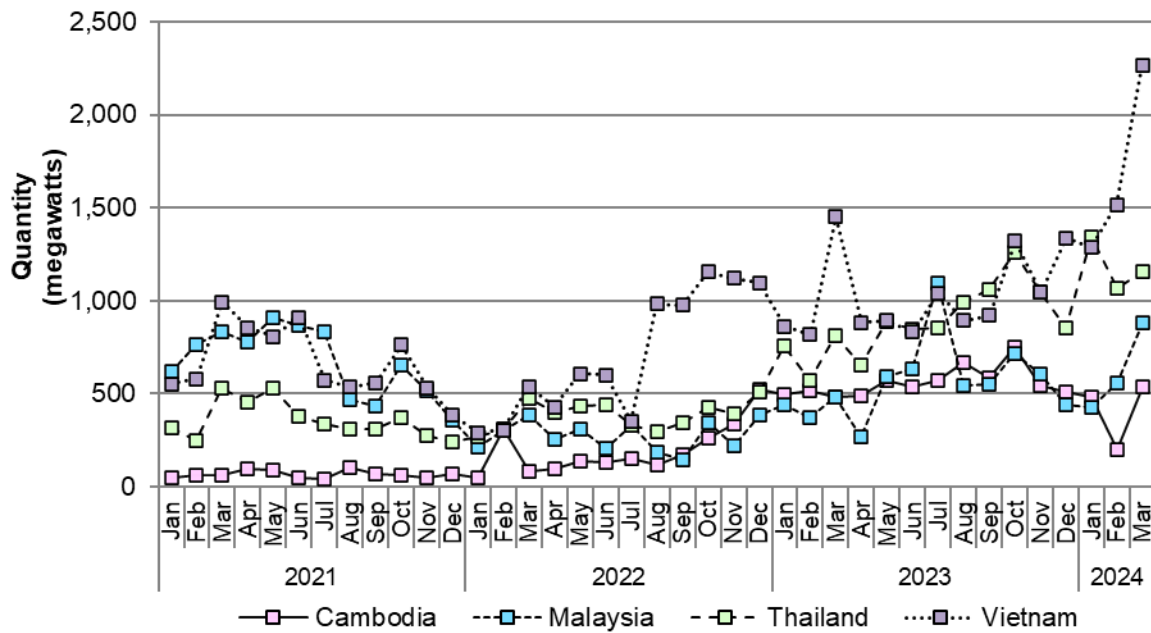
Quantity in kilowatts

Year	Month	Cambodia	Malaysia	Thailand	Vietnam	Subject sources	Nonsubject sources	All import sources
2023	January	492,849	442,508	757,286	861,303	2,553,946	824,081	3,378,027
2023	February	515,387	372,781	568,453	819,759	2,276,381	659,708	2,936,089
2023	March	484,479	483,833	814,964	1,451,020	3,234,297	821,823	4,056,120
2023	April	490,617	271,946	655,030	883,383	2,300,976	618,295	2,919,271
2023	May	569,071	595,167	889,540	894,834	2,948,612	582,623	3,531,235
2023	June	533,969	631,609	844,934	832,950	2,843,463	758,520	3,601,983
2023	July	572,659	1,098,275	855,458	1,040,817	3,567,209	797,492	4,364,701
2023	August	667,760	547,544	994,826	894,010	3,104,139	907,021	4,011,161
2023	September	587,981	549,885	1,064,110	920,225	3,122,202	1,090,119	4,212,321
2023	October	751,903	716,041	1,260,695	1,319,684	4,048,324	917,112	4,965,436
2023	November	547,687	606,898	1,044,660	1,045,483	3,244,728	791,524	4,036,252
2023	December	507,908	438,970	854,964	1,338,051	3,139,893	738,765	3,878,658
2024	January	484,087	424,968	1,342,386	1,285,831	3,537,270	617,292	4,154,563
2024	February	201,315	556,197	1,067,598	1,518,295	3,343,406	874,048	4,217,454
2024	March	539,405	884,667	1,160,056	2,269,074	4,853,202	781,623	5,634,825

Source: Compiled from official U.S. import statistics of the U.S. Department of Commerce Census Bureau using statistical reporting numbers 8541.40.6015, 8541.40.6025, 8541.40.6035, 8541.40.6045, 8541.42.0010 and 8541.43.0010, accessed May 6, 2024. Imports area based on the imports for consumption data series.

Note: Zeroes, null values, and undefined calculations are suppressed and shown as "---". 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.

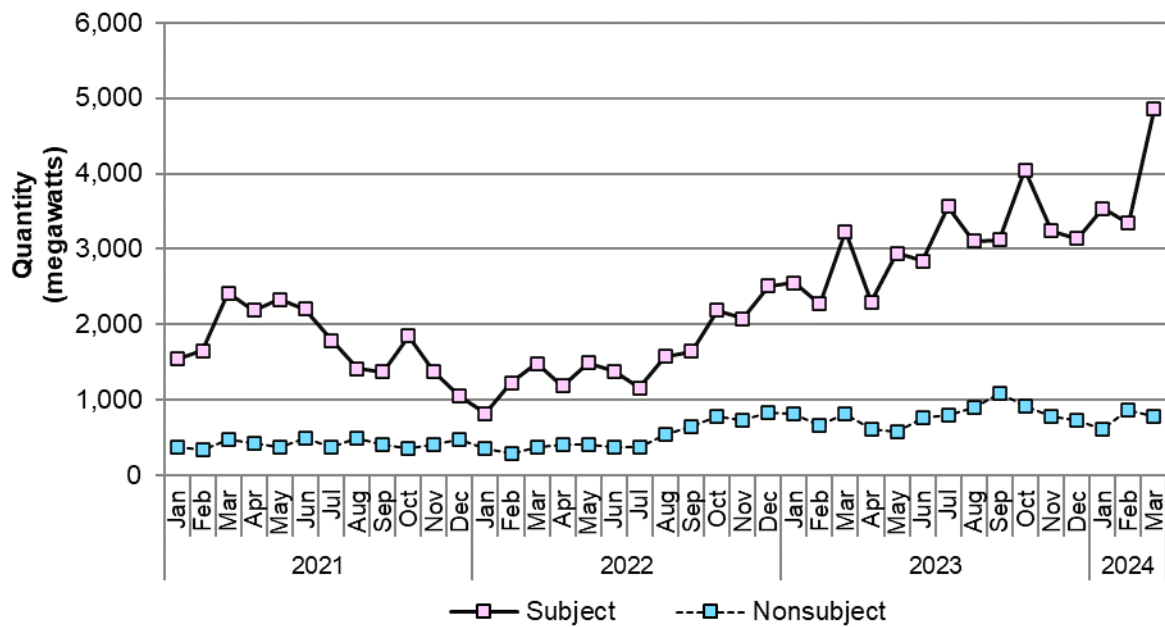
**Figure IV-3**  
**CSPV cells and modules: U.S. imports from individual subject sources, by month**



Source: Compiled from official U.S. import statistics of the U.S. Department of Commerce Census Bureau using statistical reporting numbers 8541.40.6015, 8541.40.6025, 8541.40.6035, 8541.40.6045, 8541.42.0010 and 8541.43.0010, accessed May 6, 2024. 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.

**Figure IV-4**  
**CSPV cells and modules: U.S. imports from aggregated subject and nonsubject sources, by month**



Source: Compiled from official U.S. import statistics of the U.S. Department of Commerce Census Bureau using statistical reporting numbers 8541.40.6015, 8541.40.6025, 8541.40.6035, 8541.40.6045, 8541.42.0010 and 8541.43.0010, accessed May 6, 2024. 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.



## **Apparent U.S. consumption and market shares**

### **Quantity**

Table IV-9 and figure IV-5 present data on apparent U.S. consumption and U.S. market shares by quantity for CSPV cells and modules. During 2021-23, apparent U.S. consumption, in terms of quantity, increased annually and overall by \*\*\* percent. As there is no U.S. production of CSPV cells, U.S. producers did not account for any apparent U.S. consumption of CSPV cells and modules, in terms of quantity, during the period for which data were collected. Combined subject sources' market share increased by \*\*\* percentage points during 2021-23, while the market share of nonsubject imports decreased by \*\*\* percentage points. While the market share of each subject country increased during 2021-23, the market share of imports from Vietnam had the largest increase during 2021-23 (\*\*\* percentage points).

**Table IV-9****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	2021	2022	2023
U.S. producers	Quantity	***	***	***
Cambodia	Quantity	***	***	***
Malaysia	Quantity	***	***	***
Thailand	Quantity	***	***	***
Vietnam	Quantity	***	***	***
Subject sources	Quantity	***	***	***
Nonsubject sources	Quantity	***	***	***
All import sources	Quantity	***	***	***
All sources	Quantity	***	***	***
U.S. producers	Share	***	***	***
Cambodia	Share	***	***	***
Malaysia	Share	***	***	***
Thailand	Share	***	***	***
Vietnam	Share	***	***	***
Subject sources	Share	***	***	***
Nonsubject sources	Share	***	***	***
All import sources	Share	***	***	***
All sources	Share	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 "---". Quantity for U.S. producers' U.S. shipments is zero as there are no 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.

**Figure IV-5**

**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.

Note: Quantity for U.S. producers' U.S. shipments is zero as there are no 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 IV-10 and figure IV-6 present data on apparent U.S. consumption and U.S. market shares by value for CSPV cells and modules. During 2021-23, apparent U.S. consumption, in terms of value, increased each year and overall by \*\*\* percent. U.S. producers' value added to imports as a share of apparent U.S. consumption was highest in 2022 and overall decreased by \*\*\* percentage points during 2021-23 despite increasing value by \*\*\* percent from 2021. The market share of subject imports increased annually and overall by \*\*\* percentage points, with imports from Malaysia accounting for the largest share of the subject imports in each year. The market share of nonsubject imports decreased each year and overall by \*\*\* percentage points.

**Table IV-10****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	2021	2022	2023
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	***	***	***
Nonsubject sources	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	***	***	***
Nonsubject sources	Share	***	***	***
All import sources	Share	***	***	***
All sources	Share	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 "---". Value for U.S. producers' U.S. shipments reflects 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.

**Figure IV-6**  
**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.

Note: Value for U.S. producers' U.S. shipments reflects 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 IV-11 presents U.S. producers' U.S. shipments of modules and their ratio to overall apparent U.S. consumption.

**Table IV-11**

**CSPV cells and modules: U.S. producers' U.S. shipments of modules and ratio to overall apparent consumption**

Quantity in kilowatts; ratios in percent

Item	Measure	2021	2022	2023
U.S. producers' shipments of modules	Quantity	***	***	***
U.S. producers' shipments of modules	Value	***	***	***
U.S. producers' shipments of modules	Quantity ratio	***	***	***
U.S. producers' shipments of 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 share 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 V: 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 figure V-1, average prices for monocrystalline wafers fluctuated upwards throughout most of 2021 but then declined at the end of that year. Wafer prices then fluctuated throughout most of 2022 before declining steeply between September 2022 and January 2023. Prices rose again sharply in February 2023, but then declined throughout most of the remainder of 2023. Overall, prices were lower in December 2023 than in January 2021. 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 figure V-2, average prices for monocrystalline cells followed a similar pattern, ending lower in December 2023 than in January 2021. Cell prices showed even greater convergence over the period than wafer prices.

**Figure V-1**  
**Wafer prices: Average prices for monocrystalline wafers, by month, January 2021 through May 2024**

\* \* \* \* \*

Source: PVInsights, Spot Price Download, <http://pvinsights.com/>, accessed May 29, 2024.

**Table V-1**  
**Wafer prices: Average prices for monocrystalline wafers, by month, January 2021 through May 2024**

Prices in dollars 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
2021	January	***	***	***	***	***	***	***
2021	February	***	***	***	***	***	***	***
2021	March	***	***	***	***	***	***	***
2021	April	***	***	***	***	***	***	***
2021	May	***	***	***	***	***	***	***
2021	June	***	***	***	***	***	***	***
2021	July	***	***	***	***	***	***	***
2021	August	***	***	***	***	***	***	***
2021	September	***	***	***	***	***	***	***
2021	October	***	***	***	***	***	***	***
2021	November	***	***	***	***	***	***	***
2021	December	***	***	***	***	***	***	***

Table continued.



**Table V-1 Continued**

**Wafer prices: Average prices for monocrystalline wafers, by month, January 2021 through May 2024**

Prices in dollars 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	***	***	***	***	***	***	***
2023	July	***	***	***	***	***	***	***
2023	August	***	***	***	***	***	***	***
2023	September	***	***	***	***	***	***	***
2023	October	***	***	***	***	***	***	***
2023	November	***	***	***	***	***	***	***
2023	December	***	***	***	***	***	***	***
2024	January	***	***	***	***	***	***	***
2024	February	***	***	***	***	***	***	***
2024	March	***	***	***	***	***	***	***
2024	April	***	***	***	***	***	***	***
2024	May	***	***	***	***	***	***	***

Source: PVInsights, Spot Price Download, <http://pvinsights.com/>, accessed May 29, 2024.

**Figure V-2**  
**Cell prices: Average prices for monocrystalline cells, by month, January 2021 through May 2024**

\* \* \* \* \*

Source: PVInsights, Spot Price Download, <http://pvinsights.com/>, accessed May 29, 2024.

**Table V-2**  
**Cell prices: Average prices for monocrystalline cells, by month, January 2021 through May 2024**

Prices in dollars per kilowatt

Year	Month	Mono cell	N-type mono cell	PERC mono cell
2021	January	***	***	***
2021	February	***	***	***
2021	March	***	***	***
2021	April	***	***	***
2021	May	***	***	***
2021	June	***	***	***
2021	July	***	***	***
2021	August	***	***	***
2021	September	***	***	***
2021	October	***	***	***
2021	November	***	***	***
2021	December	***	***	***

Table continued.

**Table V-2 Continued****Cell prices: Average prices for monocrystalline cells, by month, January 2021 through May 2024**

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	***	***	***

Source: PVInsights, Spot Price Download, <http://pvinsights.com/>, accessed May 29, 2024.

Table V-3 shows U.S. producers and importers responses regarding perceived changes in the prices of raw materials for CSPV products since January 2021. The most common responses among both U.S. producers and importers were that raw material prices fluctuated up and also that raw material prices fluctuated down.

**Table V-3**  
**CSPV cells and modules: Count of firms' responses regarding raw material price changes, by firm type**

Firm type	Steadily Increase	Fluctuate Up	No change	Fluctuate Down	Steadily Decrease
U.S. producers	2	5	0	4	2
Importers	4	18	2	19	5

Source: Compiled from data submitted in response to Commission questionnaires.

## Transportation costs to the U.S. market

Transportation costs for CSPV products shipped from subject countries to the United States averaged 3.7 percent for Cambodia, 3.6 percent for Malaysia, 3.1 percent for Thailand, and 2.7 percent for Vietnam during 2023. These estimates were derived from official import data and represent the transportation and other charges on imports.<sup>1</sup>

## U.S. inland transportation costs

Eight responding U.S. producers and 33 responding importers reported that they typically arrange transportation to their customers. Among the eight U.S. producers, reported U.S. inland transportation costs ranged from 0 to 5 percent. Among the 33 responding U.S. importers, most also reported costs ranging from 0 to 5 percent.

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<sup>1</sup> The estimated transportation costs were obtained by subtracting the customs value from the c.i.f. value of the imports for 2023 and then dividing by the customs value based on the HTS statistical reporting numbers 8541.40.6015, 8541.40.6025, 8541.40.6035, 8541.40.6045, 8541.42.0010 and 8541.43.0010.

## Pricing practices

### Pricing methods

U.S. producers and importers reported setting prices using transaction-by-transaction negotiations, contracts, price lists, and other methods (table V-4). A majority of U.S. producers and importers reported setting prices using transaction-by-transaction negotiations and contracts.

**Table V-4**  
**CSPV cells and modules: Count of U.S. producers' and importers' reported price setting methods**

Method	U.S. producers	U.S. importers
Transaction-by-transaction	11	28
Contract	7	27
Set price list	4	7
Other	1	8
Responding firms	12	42

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.

A majority of U.S. producers reported selling their CSPV products under either short-term or annual contracts (table V-5). On average, responding U.S. producers reported that \*\*\* percent of their U.S.-produced CSPV product sales in 2023 were on the basis of short-term contracts. Hanwha, \*\*\*, reported that \*\*\* percent of its U.S.-produced CSPV product sales in 2023 were on the basis of short-term contracts. \*\*\* reported the average duration for its short-term contracts was \*\*\* days, and that these contracts \*\*\* during the contract period and were \*\*\*.

Most subject U.S. importers reported selling their CSPV products under either short-term or long-term contracts. On average, responding subject U.S. importers reported that \*\*\* percent of their sales of CSPV products from subject sources in 2023 were on the basis of short-term contracts. \*\*\* reported that \*\*\* percent of its sales in 2023 were done under short-term contracts while \*\*\* reported that \*\*\* percent of its sales in 2023 were done under short-term contracts. \*\*\* reported that \*\*\* percent of its sales in 2023 were done under long-term contracts. The average duration of a short-term contract for \*\*\* was \*\*\* days, and these contracts \*\*\*, \*\*\*, and \*\*\*.

**Table V-5**  
**CSPV cells and modules: U.S. producers' and importers' shares of commercial U.S. shipments by type of sale, 2023**

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

Out of 13 responding U.S. producers, seven reported they typically quote prices on a delivered basis while the remainder reported they typically quote price on an f.o.b. basis. A majority of responding importers (23 of 34) reported they typically quote price on a delivered basis. A majority of responding U.S. producers reported they do not provide a discount policy, while five reported quantity discounts and two reported discounts by annual total volume. \*\*\* reported it provides both quantity and annual total volume discounts. A majority of responding importers (23 of 42) reported they typically offer no discounts while 13 reported they typically provide a quantity discount and seven reported they provide discounts by annual total volume.

## 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 products shipped to unrelated U.S. customers during January 2021 through December 2023.

**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.

## Price data

Seven U.S. producers and 15 importers provided usable pricing data for sales of the requested products, although not all firms reported pricing for all products for all quarters.<sup>2 3 4</sup>

<sup>5 6 7</sup> Pricing data reported by these firms accounted for approximately \*\*\* percent of reported U.S. producers' shipments of CSPV products, \*\*\* percent of reported U.S. shipments of subject imports from Cambodia<sup>8</sup>, \*\*\* percent of reported U.S. shipments of subject imports from Malaysia, \*\*\* percent of reported U.S. shipments of subject imports from Thailand, and \*\*\* percent of reported U.S. shipments of subject imports from Vietnam in 2023.

Price data for products 1-4 are presented in tables V-6 to V-9 and figures V-3 to V-6.

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<sup>2</sup> 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.

<sup>3</sup> In addition, U.S. producers Heliene USA Inc. and Tesla, Inc. submitted producer questionnaire responses; however, these were submitted too late to be incorporated into the dataset.

<sup>4</sup> Importer \*\*\* submitted revisions to its pricing product data from Vietnam; however, these revisions were submitted too late to be incorporated into the dataset.

<sup>5</sup> Pricing product data reported by producer/importer \*\*\* was removed because it \*\*\*.

<sup>6</sup> U.S. producer pricing product data reported by \*\*\* for Products 1 and 3 were converted from thousands of dollars to actual dollars for consistency.

<sup>7</sup> Pricing product data reported by importer \*\*\* for the year 2022 was removed because staff determined it to be nonsubject.

<sup>8</sup> Pricing product data for Product 4 from Cambodia reported by importer \*\*\* during July-September 2022 and October-December 2022 were removed.



**Table V-6**

**CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 1 and margins of underselling/(overselling), by 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
2021 Q1	***	***	***	***	***	***	***	***
2021 Q2	***	***	***	***	***	***	***	***
2021 Q3	***	***	***	***	***	***	***	***
2021 Q4	***	***	***	***	***	***	***	***
2022 Q1	***	***	***	***	***	***	***	***
2022 Q2	***	***	***	***	***	***	***	***
2022 Q3	***	***	***	***	***	***	***	***
2022 Q4	***	***	***	***	***	***	***	***
2023 Q1	***	***	***	***	***	***	***	***
2023 Q2	***	***	***	***	***	***	***	***
2023 Q3	***	***	***	***	***	***	***	***
2023 Q4	***	***	***	***	***	***	***	***

Table continued.

**Table V-6 Continued**

**CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 1 and margins of underselling/(overselling), by 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
2021 Q1	***	***	***	***	***	***	***	***
2021 Q2	***	***	***	***	***	***	***	***
2021 Q3	***	***	***	***	***	***	***	***
2021 Q4	***	***	***	***	***	***	***	***
2022 Q1	***	***	***	***	***	***	***	***
2022 Q2	***	***	***	***	***	***	***	***
2022 Q3	***	***	***	***	***	***	***	***
2022 Q4	***	***	***	***	***	***	***	***
2023 Q1	***	***	***	***	***	***	***	***
2023 Q2	***	***	***	***	***	***	***	***
2023 Q3	***	***	***	***	***	***	***	***
2023 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 V-3**

**CSPV modules: Weighted-average prices and quantities of domestic and imported product 1, by 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 V-7**

**CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 2 and margins of underselling/(overselling), by 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
2021 Q1	***	***	***	***	***	***	***	***
2021 Q2	***	***	***	***	***	***	***	***
2021 Q3	***	***	***	***	***	***	***	***
2021 Q4	***	***	***	***	***	***	***	***
2022 Q1	***	***	***	***	***	***	***	***
2022 Q2	***	***	***	***	***	***	***	***
2022 Q3	***	***	***	***	***	***	***	***
2022 Q4	***	***	***	***	***	***	***	***
2023 Q1	***	***	***	***	***	***	***	***
2023 Q2	***	***	***	***	***	***	***	***
2023 Q3	***	***	***	***	***	***	***	***
2023 Q4	***	***	***	***	***	***	***	***

Table continued.

**Table V-7 Continued**

**CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 2 and margins of underselling/(overselling), by 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
2021 Q1	***	***	***	***	***	***	***	***
2021 Q2	***	***	***	***	***	***	***	***
2021 Q3	***	***	***	***	***	***	***	***
2021 Q4	***	***	***	***	***	***	***	***
2022 Q1	***	***	***	***	***	***	***	***
2022 Q2	***	***	***	***	***	***	***	***
2022 Q3	***	***	***	***	***	***	***	***
2022 Q4	***	***	***	***	***	***	***	***
2023 Q1	***	***	***	***	***	***	***	***
2023 Q2	***	***	***	***	***	***	***	***
2023 Q3	***	***	***	***	***	***	***	***
2023 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 V-4**

**CSPV modules: Weighted-average prices and quantities of domestic and imported product 2, by 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 V-8**

**CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 3 and margins of underselling/(overselling), by 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
2021 Q1	***	***	***	***	***	***	***	***
2021 Q2	***	***	***	***	***	***	***	***
2021 Q3	***	***	***	***	***	***	***	***
2021 Q4	***	***	***	***	***	***	***	***
2022 Q1	***	***	***	***	***	***	***	***
2022 Q2	***	***	***	***	***	***	***	***
2022 Q3	***	***	***	***	***	***	***	***
2022 Q4	***	***	***	***	***	***	***	***
2023 Q1	***	***	***	***	***	***	***	***
2023 Q2	***	***	***	***	***	***	***	***
2023 Q3	***	***	***	***	***	***	***	***
2023 Q4	***	***	***	***	***	***	***	***

Table continued.

**Table V-8 Continued**

**CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 3 and margins of underselling/(overselling), by 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
2021 Q1	***	***	***	***	***	***	***	***
2021 Q2	***	***	***	***	***	***	***	***
2021 Q3	***	***	***	***	***	***	***	***
2021 Q4	***	***	***	***	***	***	***	***
2022 Q1	***	***	***	***	***	***	***	***
2022 Q2	***	***	***	***	***	***	***	***
2022 Q3	***	***	***	***	***	***	***	***
2022 Q4	***	***	***	***	***	***	***	***
2023 Q1	***	***	***	***	***	***	***	***
2023 Q2	***	***	***	***	***	***	***	***
2023 Q3	***	***	***	***	***	***	***	***
2023 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 V-5**

**CSPV modules: Weighted-average prices and quantities of domestic and imported product 3, by 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 V-9**

**CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 4 and margins of underselling/(overselling), by 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
2021 Q1	***	***	***	***	***	***	***	***
2021 Q2	***	***	***	***	***	***	***	***
2021 Q3	***	***	***	***	***	***	***	***
2021 Q4	***	***	***	***	***	***	***	***
2022 Q1	***	***	***	***	***	***	***	***
2022 Q2	***	***	***	***	***	***	***	***
2022 Q3	***	***	***	***	***	***	***	***
2022 Q4	***	***	***	***	***	***	***	***
2023 Q1	***	***	***	***	***	***	***	***
2023 Q2	***	***	***	***	***	***	***	***
2023 Q3	***	***	***	***	***	***	***	***
2023 Q4	***	***	***	***	***	***	***	***

Table continued.

**Table V-9 Continued**

**CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 4 and margins of underselling/(overselling), by 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
2021 Q1	***	***	***	***	***	***	***	***
2021 Q2	***	***	***	***	***	***	***	***
2021 Q3	***	***	***	***	***	***	***	***
2021 Q4	***	***	***	***	***	***	***	***
2022 Q1	***	***	***	***	***	***	***	***
2022 Q2	***	***	***	***	***	***	***	***
2022 Q3	***	***	***	***	***	***	***	***
2022 Q4	***	***	***	***	***	***	***	***
2023 Q1	***	***	***	***	***	***	***	***
2023 Q2	***	***	***	***	***	***	***	***
2023 Q3	***	***	***	***	***	***	***	***
2023 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 V-6**

**CSPV modules: Weighted-average prices and quantities of domestic and imported product 4, by 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

Table V-10 summarizes the price trends, by country and by product. As shown in the table, U.S. producers reported pricing data for all four products. During 2021 through 2023, domestic prices increased by \*\*\* percent for product 1 but decreased by \*\*\* percent, \*\*\* percent, and \*\*\* percent for products 2, 3, and 4, respectively.

For products 1 and 2, the price of imports increased for all subject countries and ranged from \*\*\* percent to \*\*\* percent. For product 3, the price of imports increased for Vietnam (\*\*\* percent) but decreased for Malaysia (\*\*\* percent). For product 4, the price of imports decreased for all subject countries except Malaysia (\*\*\* percent), ranging from \*\*\* percent to \*\*\* percent.

**Table V-10**  
**CSPV modules: Summary of price data, by product and source**

Volume in kilowatts, price and cost in dollars per kilowatt

Product	Source	Number of quarters	Quantity	Low price	High price	First quarter price	Last quarter price	Quarterly change	Change over period
Product 1	United States	***	***	***	***	***	***	***	***
Product 1	Cambodia	***	***	***	***	***	***	---	***
Product 1	Malaysia	***	***	***	***	***	***	***	***
Product 1	Thailand	***	***	***	***	***	***	***	***
Product 1	Vietnam	***	***	***	***	***	***	***	***
Product 2	United States	***	***	***	***	***	***	***	***
Product 2	Cambodia	***	***	***	***	***	***	---	***
Product 2	Malaysia	***	***	***	***	***	***	***	***
Product 2	Thailand	***	***	***	***	***	***	***	***
Product 2	Vietnam	***	***	***	***	***	***	***	***
Product 3	United States	***	***	***	***	***	***	***	***
Product 3	Cambodia	***	***	***	***	***	***	---	***
Product 3	Malaysia	***	***	***	***	***	***	***	***
Product 3	Thailand	***	***	***	***	***	***	---	***
Product 3	Vietnam	***	***	***	***	***	***	***	***
Product 4	United States	***	***	***	***	***	***	***	***
Product 4	Cambodia	***	***	***	***	***	***	***	***
Product 4	Malaysia	***	***	***	***	***	***	***	***
Product 4	Thailand	***	***	***	***	***	***	***	***
Product 4	Vietnam	***	***	***	***	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Percentage change from the first quarter in which data were available in 2021 to the last quarter in which data were available in 2023.

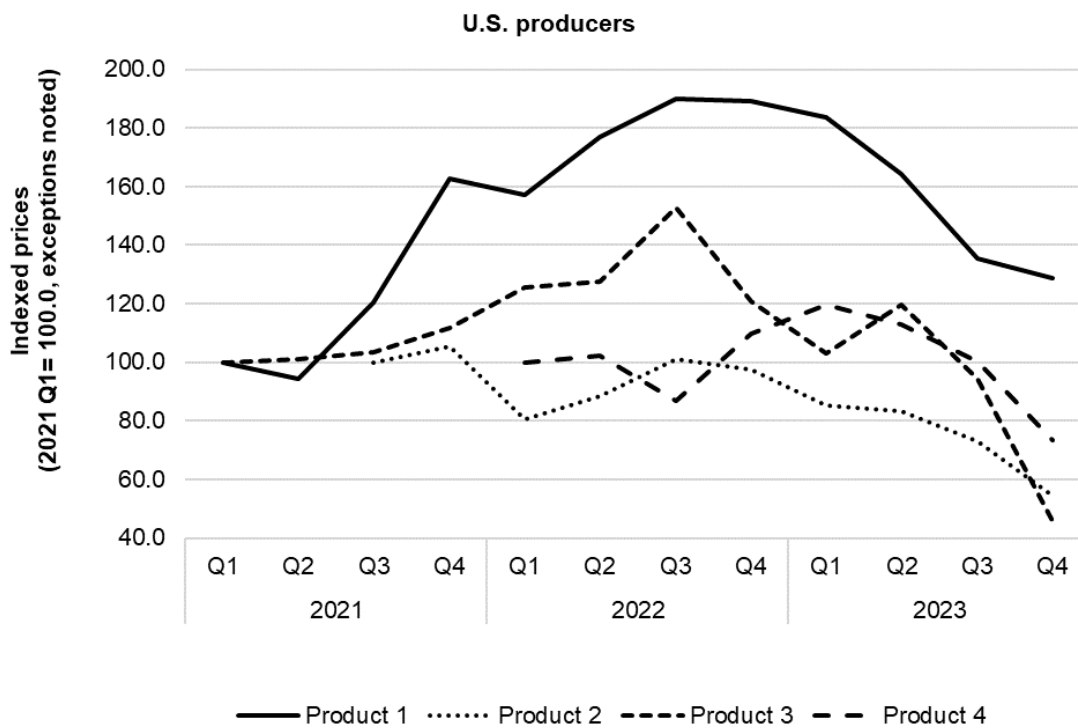
**Table V-11****CSPV modules: Indexed U.S. producer prices, by quarter**

Indexed price in percent

Period	Product 1	Product 2	Product 3	Product 4
2021 Q1	100.0	---	100.0	---
2021 Q2	94.5	---	101.0	---
2021 Q3	120.3	100.0	103.2	---
2021 Q4	162.8	105.6	111.8	---
2022 Q1	157.1	80.5	125.4	100.0
2022 Q2	176.9	88.4	127.6	102.3
2022 Q3	190.1	101.1	152.7	86.8
2022 Q4	189.0	97.6	120.8	109.8
2023 Q1	183.4	85.3	103.2	119.6
2023 Q2	164.2	83.3	119.7	112.9
2023 Q3	135.4	72.9	94.3	100.1
2023 Q4	128.7	54.6	45.9	73.4

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Zeroes, null values, and undefined calculations are suppressed and shown as “---”.

**Figure V-7****CSPV modules: Indexed U.S. producer prices, by quarter**

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Product 2 is indexed to 2021 Q3 = 100.0 percent; and Product 4 is indexed to 2022 Q1 = 100.0 percent.

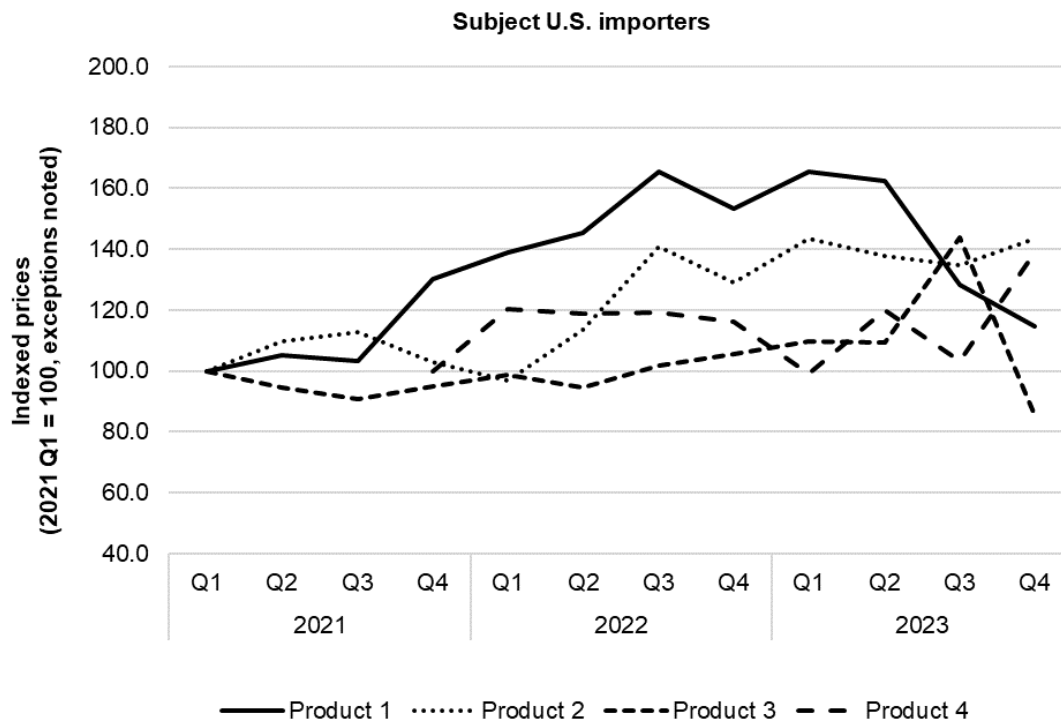
**Table V-12****CSPV modules: Indexed subject U.S. importer prices, by quarter**

Indexed price in percent

Period	Product 1	Product 2	Product 3	Product 4
2021 Q1	100.0	100.0	100.0	---
2021 Q2	105.1	109.9	94.6	---
2021 Q3	103.4	112.9	90.9	---
2021 Q4	130.2	103.0	95.0	100.0
2022 Q1	138.8	96.7	98.8	120.4
2022 Q2	145.3	113.6	94.4	118.8
2022 Q3	165.5	140.7	101.6	119.3
2022 Q4	153.3	129.1	105.4	116.0
2023 Q1	165.3	143.5	109.6	99.2
2023 Q2	162.5	137.6	109.3	119.8
2023 Q3	128.4	134.8	143.8	103.2
2023 Q4	114.8	143.3	85.6	138.9

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Zeroes, null values, and undefined calculations are suppressed and shown as "---".

**Figure V-8****CSPV modules: Indexed subject U.S. importer prices, by quarter**

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Product 2 is indexed to 2021 Q3 = 100.0 percent; and Product 4 is indexed to 2022 Q1 = 100.0 percent.

## Price comparisons

As shown in table V-13, prices for CSPV modules imported from subject sources, combined, were below those for U.S.-produced CSPV modules in 86 of 105 instances (15.5 million kilowatts); margins of underselling ranged from 0.4 to 99.9 percent. In the remaining 19 instances (4.3 million kilowatts), prices for CSPV modules from subject sources were between 1.7 and 108.8 percent above prices for the domestic product.

Prices for product imported from Cambodia were below those for U.S.-produced product in 5 of 6 instances (\*\* kilowatts); margins of underselling ranged from \*\* to \*\* percent. In the remaining instance (\*\* kilowatts), the price for product from Cambodia was \*\* percent above prices for the domestic product.

Prices for product imported from Malaysia were below those for U.S.-produced product in 27 of 41 instances (\*\* kilowatts); margins of underselling ranged from \*\* to \*\* percent. In the remaining 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 15 of 17 instances (\*\* kilowatts); the margins of underselling ranged from \*\* to \*\* percent. In the remaining instances (\*\* kilowatts), the prices for product from Thailand were \*\* and \*\* percent above prices for the domestic product.

Prices for product imported from Vietnam were below those for U.S.-produced product in 39 of 41 instances (\*\* kilowatts); margins of underselling ranged from \*\* percent. In the remaining instances (\*\* kilowatts), the prices for product from Vietnam were \*\* and \*\* percent above prices for the domestic product.

**Table V-13**

**CSPV modules: Instances of underselling and overselling and the range and average of margins for all subject sources, by product**

Quantity in kilowatts; margin in percent

Products	Type	Number of quarters	Quantity	Average margin	Min margin	Max margin
Product 1	Underselling	32	***	***	***	***
Product 2	Underselling	11	***	***	***	***
Product 3	Underselling	22	***	***	***	***
Product 4	Underselling	21	***	***	***	***
All products	Underselling	86	15,474,067	25.3	0.4	99.9
Product 1	Overselling	2	***	***	***	***
Product 2	Overselling	9	***	***	***	***
Product 3	Overselling	3	***	***	***	***
Product 4	Overselling	5	***	***	***	***
All products	Overselling	19	4,259,004	(33.8)	(1.7)	(108.8)

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 V-14**

**CSPV modules: Instances of underselling and overselling and the range and average of margins, by source**

Quantity in kilowatts; margin in percent

Sources	Type	Number of quarters	Quantity	Average margin	Min margin	Max margin
Cambodia	Underselling	5	***	***	***	***
Malaysia	Underselling	27	***	***	***	***
Thailand	Underselling	15	***	***	***	***
Vietnam	Underselling	39	***	***	***	***
Subject sources	Underselling	86	15,474,067	25.3	0.4	99.9
Subject sources less Cambodia and Thailand	Underselling	66	***	***	***	***
Cambodia	Overselling	1	***	***	***	***
Malaysia	Overselling	14	***	***	***	***
Thailand	Overselling	2	***	***	***	***
Vietnam	Overselling	2	***	***	***	***
All subject sources	Overselling	19	4,259,004	(33.8)	(1.7)	(108.8)
Subject sources less Cambodia and Thailand	Overselling	16	***	***	***	***

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 V-15**

**CSPV modules: Instances of underselling and overselling and the range and average of margins for all subject sources, by year**

Quantity in kilowatts; margin in percent

Years	Type	Number of quarters	Quantity	Average margin	Min margin	Max margin
2021	Underselling	23	***	***	***	***
2022	Underselling	32	***	***	***	***
2023	Underselling	31	***	***	***	***
All years	Underselling	86	***	***	***	***
2021	Overselling	3	***	***	***	***
2022	Overselling	5	***	***	***	***
2023	Overselling	11	***	***	***	***
All years	Overselling	19	***	***	***	***

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

The Commission requested that U.S. producers of CSPV products report purchasers with which they experienced instances of lost sales or revenue due to competition from imports of CSPV products from Cambodia, Malaysia, Thailand, and Vietnam during January 2021 through December 2023. Of the 15 responding U.S. producers, six reported that they had to reduce prices, three reported that they had to roll back announced price increases, and six reported that they had lost sales. 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).

Staff contacted 37 purchasers and received responses from six purchasers. Responding purchasers reported purchasing \*\*\* kilowatts of CSPV products during January 2021 through December 2023 (table V-16).<sup>9</sup> During 2023, responding purchasers purchased \*\*\* percent of their purchase of CSPV products from U.S. producers, \*\*\* percent from Cambodia, \*\*\* percent from Malaysia, \*\*\* percent from Thailand, \*\*\* percent from Vietnam, \*\*\* percent from nonsubject countries, and \*\*\* percent from “unknown source” countries.

**Table V-16**  
**CSPV cells and modules: Purchasers’ reported purchases and imports, by firm and source**

Quantity in kilowatts, changes in shares in percent points

Firm	Domestic quantity	Subject quantity	All other quantity	Change in domestic share	Change in subject share
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
All firms	***	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: All other includes all other sources and unknown sources. Change is the percentage point change in the share of the firm’s total purchases of domestic and/or subject country imports between first and last years.

<sup>9</sup> These purchases include imports of \*\*\* kilowatts, \*\*\*.

Purchasers were asked about changes in their purchasing patterns from different sources since 2021 (table V-17). Of the responding purchasers, one reported decreasing purchases from domestic producers, one reported purchases fluctuating upwards, one reported no change, and three did not purchase any domestic product.<sup>10</sup> The purchaser's explanation for purchases of domestic product fluctuating upwards was the domestic industry showing signs of expansion in manufacturing CSPV modules. The purchaser's explanation for decreasing purchases of domestic product was supply chain disruptions caused by the COVID-19 pandemic.

**Table V-17**  
**CSPV cells and modules: Count of changes in purchase patterns from U.S., subject, and nonsubject countries**

Count in number of firms reporting

Source of purchases	Steadily Increase	Fluctuate Up	No change	Fluctuate Down	Steadily Decrease	Did not purchase
United States	0	1	1	0	1	3
Cambodia	0	1	0	1	1	3
Malaysia	0	0	2	0	1	3
Thailand	1	2	2	0	0	1
Vietnam	1	2	1	1	0	1
All other sources	1	2	1	0	0	1
Sources unknown	0	1	1	1	0	3

Source: Compiled from data submitted in response to Commission questionnaires.

Of the six responding purchasers, five reported that, since 2021, they had purchased imported CSPV products from subject sources instead of U.S.-produced product (table V-16). Although these five purchasers noted that imports were priced lower than the domestic product, only two reported that price was a primary reason for purchasing subject imports rather than the domestic product. Reasons not related to price for purchasing subject imports instead of domestic CSPV modules were primarily related to lack of supply. One purchaser estimated the quantity of CSPV products from subject sources purchased instead of domestic product; quantities ranged from \*\*\* to \*\*\* kilowatts across subject sources. When asked if U.S. producers reduced their prices to compete with lower-priced subject imports, three purchasers each responded that U.S. producers had not or that they did not know.

In responding to the lost sales lost revenue survey, purchasers were asked to list the main factors their firm considers in deciding from whom to purchase CSPV cells and modules. The most common answers across purchasers were related to the quality of the product, supply, and price.

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<sup>10</sup> Of the six responding purchasers, two purchasers indicated that they did not know the source of the CSPV products they purchased.



**Table V-18**

**CSPV cells and modules: Purchasers' responses to purchasing subject imports instead of domestic product, by source**

Quantity in kilowatts

Source	Purchased subject imports instead of domestic	Imports priced lower	Choice based on price	Quantity
Cambodia	3	3	2	***
Malaysia	2	2	1	***
Thailand	5	5	2	***
Vietnam	4	4	1	***
Subject sources	5	5	2	***

Source: Compiled from data submitted in response to Commission questionnaires.

**Table V-19**

**CSPV cells and modules: Purchasers' responses to purchasing subject imports instead of domestic product, by firm**

Quantity in kilowatts

Firm	Purchased subject imports instead of domestic	Imports priced lower	Choice based on price	Quantity	Narrative on reasons for purchasing imports
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***

Table continued.

**Table V-19 Continued**

**CSPV cells and modules: Purchasers' responses to purchasing subject imports instead of domestic product, by firm**

Quantity in kilowatts

<b>Firm</b>	<b>Purchased subject imports instead of domestic</b>	<b>Imports priced lower</b>	<b>Choice based on price</b>	<b>Quantity</b>	<b>Narrative on reasons for purchasing imports</b>
***	***	***	***	***	***
***	***	***	***	***	***
All firms	Yes--5; No--1	Yes--5; No--0	Yes--2; No--3	***	NA

Source: Compiled from data submitted in response to Commission questionnaires.

## Part VI: Financial experience of U.S. producers

### Background<sup>1</sup>

Eleven U.S. producers provided usable financial results on their CSPV modules operations.<sup>2 3 4 5</sup> All responding U.S. producers reported financial data on a calendar year basis. Nine out of 11 of the U.S. producers provided their financial data on the basis of GAAP.<sup>6</sup> No responding U.S. producer reported production of CSPV cells from 2021 to 2023; however,

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<sup>1</sup> 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” or “per-unit basis”), research and development expenses (“R&D expenses”), return on assets (“ROA”), and January 1, 2021 to December 31, 2023 (“period examined”).

<sup>2</sup> An additional five new CSPV module producers (\*\*\*) submitted U.S. producer questionnaire response with no sales data (\*\*\*) or very small amounts of net sales data (less than \*\*\* percent of total CSPV net sales) classified as transfers to related firms without COGS breakouts (\*\*\*). These five new U.S. producers are not included in the aggregated financial data but are included in responses in tables VI-12 and VI-13.

<sup>3</sup> From the confidential record in the second monitoring of the global safeguard on CSPV modules, three additional CSPV module producers in the United States (\*\*\*) reported production and sales in at least one period from 2021 to 2023 but failed to provide the Commission with timely U.S. producer questionnaire responses in this proceeding. Investigation No. TA-201-75 (Second Monitoring): Crystalline Silicon Photovoltaic Cells—Staff Report, INV-VV-112, December 21, 2023, pp. III-15 (table III-5) and IV-7 (table IV-3). \*\*\* provided the Commission with U.S. producer questionnaires three weeks after the due of the questionnaires, as a result, their responses were too late to be examined and aggregated in this proceeding.

<sup>4</sup> Two responding U.S. producers (\*\*\*) shut down their CSPV module operations during the period examined. See part III of this report.

<sup>5</sup> Discounting the small differences due to rounding and timing, trade and financial sections of U.S. producer questionnaires values do not reconcile in 2021 and 2023 from two small U.S. producers (\*\*\*). \*\*\* did not provide COGS breakouts for its sales in 2023 when it began production, resulting in the removal of \*\*\* from aggregated financial results. \*\*\*. \*\*\* percent or less in 2021 and 2023 and did not have a material impact on the data trends.

<sup>6</sup> One company (\*\*\*) reported its financial results in accordance with International Financial Reporting Standards (IFRS) while one company (\*\*\*) reported using a tax accrual basis.

several current U.S. producers of CSPV modules (Hanwha and Canadian Solar) and several new producers have announced plans to start CSPV cell production in the United States.<sup>7</sup>

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 2021 to 2023. Despite five new module producers entering and two existing the industry during the period examined, aggregated financial data for CSPV modules largely reflect the operations of \*\*\*.<sup>8</sup> Net sales consists of commercial sales and transfers to related firms (no internal consumption was reported).<sup>9</sup> Non-commercial sales are included but not presented separately in this section of the report.<sup>10</sup> Figure VI-1 presents each responding U.S. producer's share of the total reported CSPV module net sales quantity in 2023.

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<sup>7</sup> At least 11 companies (Boviet, Canadian Solar, Convalt, Enel, Hanwha, Hounen Solar, Maxeon, Meyer Burger, Suniva, Trina, and Vikram Solar) are planning or in the process of building CSPV cell facilities in the United States. These planned cell facilities will include the production of PERC cells and the next generation tunnel oxide passivated contact (TOPCon) cells (cost difference between production mono PERC and TOPCon cells ranges between \$0.01 and \$0.025 per watt). Of these, five companies (\*\*\*) have announced delays to the construction of their cell facilities. One company (CubicPV) cancelled the construction of its wafer cell factory in December 2022. Conference transcript, p. 35 (Achuthan) and p. 93 (Johnson); Petitioner's postconference brief, exh. 1 pp. 13-27, exh. 26, and exh. 31; and, Respondent Canadian Solar, Answers to Staff, pp. 14-17 and 23.

<sup>8</sup> By the end of 2023, eight new companies (\*\*\*) had begun CSPV module production in the United States while (\*\*\*) shut down their CSPV module operations. Five new module producers (\*\*\*) are not included in the financial data tables because no sales were reported or very small production runs with no breakout of COGS. See Part III for details on responding U.S. producer's changes in operations.

<sup>9</sup> All 11 firms included in the aggregated financial data (\*\*\*) reported commercial sales and four reported transfers (\*\*\*). With the exception of \*\*\* kilowatts of export sales in 2021, commercial sales are made up of domestic sales during the period examined.

<sup>10</sup> In this proceeding, \*\*\*. As reported, commercial sales account for \*\*\* percent and transfer account for \*\*\* percent of net sales from 2021 to 2023. Given that \*\*\* U.S. shipments in Part II and III and that \*\*\* accounts for \*\*\* percent of transfers and \*\*\* percent of net sales from 2021 to 2023, transfers are not presented separately in this section of the report.

**Figure VI-1**  
**CSPV modules: U.S. producers’ share of net sales quantity in 2023, by firm**

\* \* \* \* \*

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Two U.S. producers (\*\*\*) stopped CSPV module operations prior to 2023. See footnote 2 in this section of the report for more details.

**Operations on CSPV modules**

Table VI-1 presents aggregated data on U.S. producers’ operations in relation to CSPV modules, while table VI-2 presents corresponding changes in AUVs. Table VI-3 presents selected company-specific financial data.<sup>11</sup>

<sup>11</sup> Two \*\*\* U.S. producers (\*\*\*) reported toll arrangements as a tollee; \*\*\*. Given that \*\*\* sales accounted for \*\*\* percent of total net sales quantity and value from 2021 to 2023, these tolling arrangements have minimal impact on the aggregated financial data. U.S. producer questionnaires, II-6.

**Table VI-1**  
**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	2021	2022	2023
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	***	***	***
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 VI-1 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	2021	2022	2023
COGS: Raw materials	Share	***	***	***
COGS: Direct labor	Share	***	***	***
COGS: Other factory	Share	***	***	***
COGS: Total	Share	***	***	***
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	***	***	***
Net losses	Count	***	***	***
Data	Count	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: Shares represent the share of COGS. 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 VI-2**  
**CSPV modules: Changes in AUVs between comparison periods**

Changes in percent

Item	2021-23	2021-22	2022-23
Total net sales	▼ ***	▲ ***	▼ ***
COGS: Raw materials	▼ ***	▲ ***	▼ ***
COGS: Direct labor	▼ ***	▼ ***	▲ ***
COGS: Other factory	▲ ***	▲ ***	▲ ***
COGS: Total	▲ ***	▲ ***	▼ ***

Table continued.

**Table VI-2 Continued**  
**CSPV modules: Changes in AUVs between comparison periods**

Changes in dollars per kilowatt

Item	2021-23	2021-22	2022-23
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. 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 VI-3**  
**CSPV modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period**

**Net sales quantity**

Quantity in kilowatts

Firm	2021	2022	2023
Auxin	***	***	***
GAF Energy	***	***	***
Hanwha	***	***	***
Hounen	***	***	***
Jinko	***	***	***
Merlin	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Silfab	***	***	***
Solar4america	***	***	***
SunPower	***	***	***
All firms	***	***	***

Table continued.

**Table VI-3 Continued**  
**CSPV modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period**

**Net sales value**

Value in 1,000 dollars

Firm	2021	2022	2023
Auxin	***	***	***
GAF Energy	***	***	***
Hanwha	***	***	***
Hounen	***	***	***
Jinko	***	***	***
Merlin	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Silfab	***	***	***
Solar4america	***	***	***
SunPower	***	***	***
All firms	***	***	***

Table continued.

**Table VI-3 Continued****CSPV modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period****COGS**

Value in 1,000 dollars

<b>Firm</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>
Auxin	***	***	***
GAF Energy	***	***	***
Hanwha	***	***	***
Hounen	***	***	***
Jinko	***	***	***
Merlin	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Silfab	***	***	***
Solar4america	***	***	***
SunPower	***	***	***
All firms	***	***	***

Table continued.

**Table VI-3 Continued****CSPV modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period****Gross profit or (loss)**

Value in 1,000 dollars

<b>Firm</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>
Auxin	***	***	***
GAF Energy	***	***	***
Hanwha	***	***	***
Hounen	***	***	***
Jinko	***	***	***
Merlin	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Silfab	***	***	***
Solar4america	***	***	***
SunPower	***	***	***
All firms	***	***	***

Table continued.

**Table VI-3 Continued****CSPV modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period****SG&A expenses**

Value in 1,000 dollars

<b>Firm</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>
Auxin	***	***	***
GAF Energy	***	***	***
Hanwha	***	***	***
Hounen	***	***	***
Jinko	***	***	***
Merlin	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Silfab	***	***	***
Solar4america	***	***	***
SunPower	***	***	***
All firms	***	***	***

Table continued.

**Table VI-3 Continued****CSPV modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period****Operating income or (loss)**

Value in 1,000 dollars

<b>Firm</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>
Auxin	***	***	***
GAF Energy	***	***	***
Hanwha	***	***	***
Hounen	***	***	***
Jinko	***	***	***
Merlin	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Silfab	***	***	***
Solar4america	***	***	***
SunPower	***	***	***
All firms	***	***	***

Table continued.

**Table VI-3 Continued****CSPV modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period****Net income or (loss)**

Value in 1,000 dollars

<b>Firm</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>
Auxin	***	***	***
GAF Energy	***	***	***
Hanwha	***	***	***
Hounen	***	***	***
Jinko	***	***	***
Merlin	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Silfab	***	***	***
Solar4america	***	***	***
SunPower	***	***	***
All firms	***	***	***

Table continued.

**Table VI-3 Continued****CSPV modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period****COGS to net sales ratio**

Ratios in percent

<b>Firm</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>
Auxin	***	***	***
GAF Energy	***	***	***
Hanwha	***	***	***
Hounen	***	***	***
Jinko	***	***	***
Merlin	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Silfab	***	***	***
Solar4america	***	***	***
SunPower	***	***	***
All firms	***	***	***

Table continued.

**Table VI-3 Continued****CSPV modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period****Gross profit or (loss) to net sales ratio**

Ratios in percent

<b>Firm</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>
Auxin	***	***	***
GAF Energy	***	***	***
Hanwha	***	***	***
Hounen	***	***	***
Jinko	***	***	***
Merlin	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Silfab	***	***	***
Solar4america	***	***	***
SunPower	***	***	***
All firms	***	***	***

Table continued.

**Table VI-3 Continued****CSPV modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period****SG&A expenses to net sales ratio**

Ratios in percent

<b>Firm</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>
Auxin	***	***	***
GAF Energy	***	***	***
Hanwha	***	***	***
Hounen	***	***	***
Jinko	***	***	***
Merlin	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Silfab	***	***	***
Solar4america	***	***	***
SunPower	***	***	***
All firms	***	***	***

Table continued.

**Table VI-3 Continued****CSPV modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period****Operating income or (loss) to net sales ratio**

Ratios in percent

<b>Firm</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>
Auxin	***	***	***
GAF Energy	***	***	***
Hanwha	***	***	***
Hounen	***	***	***
Jinko	***	***	***
Merlin	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Silfab	***	***	***
Solar4america	***	***	***
SunPower	***	***	***
All firms	***	***	***

Table continued.

**Table VI-3 Continued****CSPV modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period****Net income or (loss) to net sales ratio**

Ratios in percent

<b>Firm</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>
Auxin	***	***	***
GAF Energy	***	***	***
Hanwha	***	***	***
Hounen	***	***	***
Jinko	***	***	***
Merlin	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Silfab	***	***	***
Solar4america	***	***	***
SunPower	***	***	***
All firms	***	***	***

Table continued.

**Table VI-3 Continued****CSPV modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period****Unit net sales value**

Unit values in dollars per kilowatt

<b>Firm</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>
Auxin	***	***	***
GAF Energy	***	***	***
Hanwha	***	***	***
Hounen	***	***	***
Jinko	***	***	***
Merlin	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Silfab	***	***	***
Solar4america	***	***	***
SunPower	***	***	***
All firms	***	***	***

Table continued.

**Table VI-3 Continued****CSPV modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period****Unit raw material costs**

Unit values in dollars per kilowatt

<b>Firm</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>
Auxin	***	***	***
GAF Energy	***	***	***
Hanwha	***	***	***
Hounen	***	***	***
Jinko	***	***	***
Merlin	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Silfab	***	***	***
Solar4america	***	***	***
SunPower	***	***	***
All firms	***	***	***

Table continued.

**Table VI-3 Continued****CSPV modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period****Unit direct labor costs**

Unit values in dollars per kilowatt

<b>Firm</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>
Auxin	***	***	***
GAF Energy	***	***	***
Hanwha	***	***	***
Hounen	***	***	***
Jinko	***	***	***
Merlin	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Silfab	***	***	***
Solar4america	***	***	***
SunPower	***	***	***
All firms	***	***	***

Table continued.

**Table VI-3 Continued****CSPV modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period****Unit other factory costs**

Unit values in dollars per kilowatt

<b>Firm</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>
Auxin	***	***	***
GAF Energy	***	***	***
Hanwha	***	***	***
Hounen	***	***	***
Jinko	***	***	***
Merlin	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Silfab	***	***	***
Solar4america	***	***	***
SunPower	***	***	***
All firms	***	***	***

Table continued.



**Table VI-3 Continued****CSPV modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period****Unit COGS**

Unit values in dollars per kilowatt

<b>Firm</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>
Auxin	***	***	***
GAF Energy	***	***	***
Hanwha	***	***	***
Hounen	***	***	***
Jinko	***	***	***
Merlin	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Silfab	***	***	***
Solar4america	***	***	***
SunPower	***	***	***
All firms	***	***	***

Table continued.

**Table VI-3 Continued****CSPV modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period****Unit gross profit or (loss)**

Unit values in dollars per kilowatt

<b>Firm</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>
Auxin	***	***	***
GAF Energy	***	***	***
Hanwha	***	***	***
Hounen	***	***	***
Jinko	***	***	***
Merlin	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Silfab	***	***	***
Solar4america	***	***	***
SunPower	***	***	***
All firms	***	***	***

Table continued.

**Table VI-3 Continued****CSPV modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period****Unit SG&A expenses**

Unit values in dollars per kilowatt

<b>Firm</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>
Auxin	***	***	***
GAF Energy	***	***	***
Hanwha	***	***	***
Hounen	***	***	***
Jinko	***	***	***
Merlin	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Silfab	***	***	***
Solar4america	***	***	***
SunPower	***	***	***
All firms	***	***	***

Table continued.

**Table VI-3 Continued****CSPV modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period****Unit operating income or (loss)**

Unit values in dollars per kilowatt

<b>Firm</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>
Auxin	***	***	***
GAF Energy	***	***	***
Hanwha	***	***	***
Hounen	***	***	***
Jinko	***	***	***
Merlin	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Silfab	***	***	***
Solar4america	***	***	***
SunPower	***	***	***
All firms	***	***	***

Table continued.

**Table VI-3 Continued**

**CSPV modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period**

**Unit net income or (loss)**

Unit values in dollars per kilowatt

<b>Firm</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>
Auxin	***	***	***
GAF Energy	***	***	***
Hanwha	***	***	***
Hounen	***	***	***
Jinko	***	***	***
Merlin	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Silfab	***	***	***
Solar4america	***	***	***
SunPower	***	***	***
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 VI-1, total net sales quantity consistently increased while total net sales value irregularly increased from 2021 to 2023. Table VI-3 shows how individual U.S. producers' net sales quantity and value trends differed. One U.S. producer (\*\*\*) accounted for \*\*\* of net sales by quantity and value.<sup>12</sup> As presented in table VI-1, net sales AUVs irregularly decreased from 2021 to 2023.<sup>13</sup> The lowest net sales AUV was reported in 2023 by \*\*\* CSPV modules while \*\*\* reported the highest net sales AUVs throughout the period examined.<sup>14</sup> Net sales increases are

<sup>12</sup> \*\*\* accounted for \*\*\* percent and \*\*\* percent of net sales quantity and value, respectively, from 2021 to 2023 and drove the trends in net sales as well as other financial indicators of the aggregated CSPV module industry in the United States. As noted earlier in this section of the report, \*\*\* net sales were mostly \*\*\*. Hanwha's U.S. producer questionnaire, III-7a.

<sup>13</sup> The peak of net sales AUVs in 2022 primarily reflects raw material AUVs being the highest during the period examined.

<sup>14</sup> \*\*\*. Email from Dan Stieler, PowerFilm, May 13, 2024.

partially explained by U.S. producers which reported shifting to CPSV panels with larger cell formats (e.g., \*\*\*) and using cells with high efficiency n-type cells (e.g., TOPCon).<sup>15</sup>

## **Cost of goods sold and gross profit or loss**

As presented in table VI-1, raw material costs represented the most substantial share of total COGS from 2021 to 2023, ranging from 78.7 to 82.8 percent of total COGS. Raw material costs irregularly increased in absolute value, but irregularly decreased on a per-unit basis and as a share of net sales from 2021 to 2023.<sup>16</sup> Table VI-3 presents company-specific raw material cost AUVs, with variations partially attributable to the type of CSPV module, the volume of sales, and different raw material sourcing among U.S. producers.<sup>17</sup> Imported CSPV cells made up the majority of raw material costs in 2023. Table VI-4 presents raw material cost data, by type.<sup>18</sup>

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<sup>15</sup> U.S. producer questionnaires, II-2a and III-12b, III-13b. Conference witness testified to changes and modification of CSPV modules from technical advances, resulting in CSPV module product shifts to larger form factor panels using higher efficiency cells. Conference transcript, pp. 100-101 (Moskowitz).

<sup>16</sup> U.S. producers used a variety of methods to source raw materials. \*\*\*. U.S. Producer questionnaires, IV-20 to IV-21 and petitioner's postconference brief, pp. 47 and 142.

<sup>17</sup> As noted earlier, CSPV modules 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).

<sup>18</sup> Four U.S. producers purchased inputs from related firms in 2023. \*\*\*.

**Table VI-4**  
**CSPV modules: U.S. producers' raw material costs in 2023**

Value in 1,000 dollars; share of value in percent

Item	Value	Share of value
Domestic cells	***	***
Subject source cells	***	***
Nonsubject source cells	***	***
All CSPV cell costs	***	***
Backsheet	***	***
Encapsulant	***	***
Framing	***	***
Junction boxes	***	***
Solar glass	***	***
Other raw materials	***	***
All non-cell costs	***	***
All raw materials	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Other factory costs accounted for the second largest share of total COGS, and consistently increased in total value, increased on a per-unit value basis, and irregularly increased as a share of net sales from 2021 to 2023. The increase in other factory costs is partially attributable to manufacturing product shifts to larger format and more efficient modules.<sup>19</sup>

Direct labor costs, which accounted for the smallest share of total COGS, consistently increased in total value (as new producers came online) and were relatively stable on a per-unit basis from 2021 to 2023. When measured as a ratio to total net sales, direct labor irregularly decreased during the same period.

As presented in table VI-1, total COGS and the ratio of COGS to net sales irregularly increased from 2021 to 2023, primarily the result of raw material costs increasing more than net sales values. The AUVs of total COGS also irregularly increased from 2021 to 2023, reflecting the previously discussed irregular increases in per-unit raw materials, direct labor, and other factory costs.

Table VI-1 shows that the U.S. industry reported a gross loss in 2021, but a gross profit in 2022, before declining to a gross loss in 2023 (driven by COGS increasing more than sales

<sup>19</sup> U.S. producer questionnaires, II-2a and III-12b, III-13b.

prices). The positive gross profit in 2022 mostly reflects sales prices increasing at a faster rate than increases in COGS.<sup>20</sup>

## **SG&A expenses and operating income or loss**

As presented in table VI-1, U.S. producers' total SG&A expenses, SG&A expense ratios (i.e., total SG&A expenses divided by net sales), and per-unit SG&A expenses all irregularly increased from 2021 to 2023. As shown in table VI-3, \*\*\* U.S. producer (\*\*\*) reported SG&A expenses increasing annually from 2021 to 2023 (as its sales volumes increased), with per-unit SG&A expenses being relatively stable. \*\*\* SG&A expense ratios were lower than the industry average throughout the period, decreasing irregularly from 2021 to 2023. U.S. producers \*\*\* reported much higher than industry average SG&A expenses on a per-unit basis and as a ratio to net sales, due in part to \*\*\*.<sup>21</sup> (\*\*\*) reported the highest per-unit SG&A expenses in 2022 \*\*\* CSPV modules.

Table VI-1 shows that U.S. producers' operating losses irregularly increased from 2021 to 2023. Operating performance of U.S. producers trended similarly to gross profit from 2021 to 2023. As shown in table VI-3, individual U.S. producers of CSPV modules reported large variations in operating results from 2021 to 2023, with nine U.S. producers reporting operating losses in at least one annual year period.<sup>22</sup> \*\*\* U.S. producer \*\*\* reported positive operating income in 2021 and 2022, but an operating loss in 2023 caused by raw materials and other factory costs increasing faster than net sales values.

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<sup>20</sup> The U.S. industry's gross loss in 2021 was partially attributable to six U.S. producers reporting issues with sourcing raw materials and labor shortages resulting from COVID-19. U.S. producer questionnaires, III-18.

<sup>21</sup> \*\*\*.

<sup>22</sup> \*\*\*.

## All other expenses and net income or loss

Classified below the operating income level are interest expenses, other expenses, and other income.<sup>23</sup> Table VI-1 shows interest expenses and all other expenses consistently increased each year from 2021 to 2023, but all other income from government incentives more than offset increases in interest expenses and other expenses in 2023.<sup>24 25</sup>

Net income differed from operating income as result of all other expenses and income, with the industry reporting net losses of \$\*\*\* in 2021 and \$\*\*\* in 2022, and \$\*\*\* in 2023.<sup>26 27</sup>

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<sup>23</sup> Two U.S. producers reported large nonrecurring from government incentives classified as all other income in 2023: \*\*\*.

\*\*\* also reported nonrecurring income of \*\*\* classified as all other income.

\*\*\* reported nonrecurring expense of \$\*\*\* from \*\*\* in 2023. Email from Lucy Zhao, GAF Energy, May 29, 2024.

\*\*\* reported nonrecurring expense of \*\*\* in 2023 reported as all other expenses.

<sup>24</sup> U.S. producers reported \$\*\*\* of all other income mostly as nonrecurring income from government incentives (e.g., credits from federally funded IRA and Solar Investment Tax Credits as well state and local government incentives). One U.S. producer (\*\*\* ) accounted for \*\*\* percent of all other income in 2023.

<sup>25</sup> GAF Energy \*\*\* the recall announced on July 27, 2023, of its CSPV roof product. Email from Lucy Zhao, GAF Energy, 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.

<sup>26</sup> The tax credits reported by U.S. producers reduced net losses in 2023. See appendix E for more details on government incentives for CSPV module producers.

<sup>27</sup> A variance analysis is not shown due to \*\*\* among the reporting firms.

## Capital expenditures and research and development expenses<sup>28</sup>

Table VI-5 presents capital expenditures, by firm, and table VI-7 presents R&D expenses, by firm. Tables VI-6 and VI-8 present the firms' narrative explanations of the nature, focus, and significance of their capital expenditures and R&D expenses, respectively. The level of overall capital expenditures increased dramatically from 2021 to 2023, with three new producers \*\*\* starting module production as well as existing producers expanding their module production (\*\*\*). R&D expenses were reported by six producers and irregularly increased from 2021 to 2023 (driven mostly by \*\*\*).

**Table VI-5**  
**CSPV modules: U.S. producers' capital expenditures, by firm and period**

Value in 1,000 dollars

Firm	2021	2022	2023
Auxin	***	***	***
GAF Energy	***	***	***
Hanwha	***	***	***
Hounen	***	***	***
Jinko	***	***	***
Merlin	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Silfab	***	***	***
Solar4america	***	***	***
SunPower	***	***	***
All firms	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

<sup>28</sup> The five new module producers (\*\*\*) that started production in 2023 but did not provide sales or cost breakouts are not included in the capital expenditures and R&D expenses compilations. See footnote 2 on p. VI-1 for more details.



**Table VI-6****CSPV modules: U.S. producers' narrative descriptions of their capital expenditures, by firm**

<b>Firm</b>	<b>Narrative on capital expenditures</b>
Auxin	***
GAF Energy	***
Hanwha	***
Hounen	***
Jinko	***
Merlin	***
Mission	***
PowerFilm	***
Silfab	***
Solar4america	***
SunPower	***

Source: Compiled from data submitted in response to Commission questionnaires

**Table VI-7**  
**CSPV modules: U.S. producers' R&D expenses, by firm and period**

Value in 1,000 dollars

Firm	2021	2022	2023
Auxin	***	***	***
GAF Energy	***	***	***
Hanwha	***	***	***
Hounen	***	***	***
Jinko	***	***	***
Merlin	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Silfab	***	***	***
Solar4america	***	***	***
SunPower	***	***	***
All firms	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

**Table VI-8**  
**CSPV modules: U.S. producers' narrative descriptions of their R&D expenses, by firm**

Firm	Narrative on R&D expenses
Auxin	***
GAF Energy	***
Hanwha	***
Hounen	***
Jinko	***
Merlin	***
Mission	***
PowerFilm	***
Silfab	***
Solar4america	***
SunPower	***

Source: Compiled from data submitted in response to Commission questionnaires.

## Assets and return on assets<sup>29</sup>

Table VI-9 presents data on the U.S. producers' total assets while table VI-10 presents their operating ROA.<sup>30</sup> Table VI-11 presents U.S. producers' narrative responses explaining their major asset categories and any significant changes in asset levels over time.

**Table VI-9**  
**CSPV modules: U.S. producers' total net assets, by firm and period**

Value in 1,000 dollars

Firm	2021	2022	2023
Auxin	***	***	***
GAF Energy	***	***	***
Hanwha	***	***	***
Hounen	***	***	***
Jinko	***	***	***
Merlin	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Silfab	***	***	***
Solar4america	***	***	***
SunPower	***	***	***
All firms	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

<sup>29</sup> The five new module producers (\*\*\*) that started production in 2023 but did not provide sales or cost breakouts are not included in the net assets and ROA compilations. See footnote 2 on p. VI-1 for more details.

<sup>30</sup> 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 VI-10**  
**CSPV modules: U.S. producers' ROA, by firm and period**

Ratio in percent

Firm	2021	2022	2023
Auxin	***	***	***
GAF Energy	***	***	***
Hanwha	***	***	***
Hounen	***	***	***
Jinko	***	***	***
Merlin	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Silfab	***	***	***
Solar4america	***	***	***
SunPower	***	***	***
All firms	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

**Table VI-11**  
**CSPV modules: U.S. producers' narrative descriptions of their total net assets, by firm**

Firm	Narrative on assets
Auxin	***
GAF Energy	***
Hanwha	***
Hounen	***
Jinko	***
Merlin	***
Mission	***
PowerFilm	***
Silfab	***
Solar4america	***
SunPower	***

Source: Compiled from data submitted in response to Commission questionnaires.

## Capital and investment<sup>31</sup>

The Commission requested U.S. producers of CSPV modules to describe any actual or potential negative effects of imports of CSPV modules from Cambodia, Malaysia, Thailand, and/or Vietnam on their firms' growth, investment, ability to raise capital, development and

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<sup>31</sup> Responses from the five new CSPV module producers (\*\*\*) that started production in 2023 but did not provide sales or cost breakouts have been included in the compilations on capital and investment. See footnote 2 on p. VI-1 for more details.

production efforts, or the scale of capital investments. Table VI-12 presents the number of firms reporting an impact in each category and table VI-13 provides the U.S. producers' narrative responses.

**Table VI-12**

**CSPV modules: Count of firms indicating actual and anticipated negative effects of imports from subject sources on investment, growth, and development since January 1, 2021, by effect**

Number of firms reporting

Effect	Category	Count
Cancellation, postponement, or rejection of expansion projects	Investment	4
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	0
Any negative effects on investment	Investment	6
Rejection of bank loans	Growth	2
Lowering of credit rating	Growth	1
Problem related to the issue of stocks or bonds	Growth	0
Ability to service debt	Growth	5
Other growth and development effects	Growth	3
Any negative effects on growth and development	Growth	7
Anticipated negative effects of imports	Future	8

Source: Compiled from data submitted in response to Commission questionnaires.

**Table VI-13**

**CSPV modules: U.S. producers' narratives relating to actual and anticipated negative effects of imports on investment, growth, and development, since January 1, 2021, by firm and effect**

<b>Item</b>	<b>Firm name and narrative on impact of imports of CSPV modules</b>
Modules: Cancellation, postponement, or rejection of expansion projects	***
Modules: Cancellation, postponement, or rejection of expansion projects	***
Modules: Cancellation, postponement, or rejection of expansion projects	***
Modules: Cancellation, postponement, or rejection of expansion projects	***
Modules: Cancellation, postponement, or rejection of expansion projects	***
Modules: Denial or rejection of investment proposal	***
Modules: Denial or rejection of investment proposal	***
Modules: Denial or rejection of investment proposal	***
Modules: Reduction in the size of capital investments	***
Modules: Reduction in the size of capital investments	***
Modules: Reduction in the size of capital investments	***
Modules: Reduction in the size of capital investments	***
Modules: Return on specific investments negatively impacted	***

Item	Firm name and narrative on impact of imports of CSPV modules
Modules: Return on specific investments negatively impacted	***
Modules: Return on specific investments negatively impacted	***
Modules: Return on specific investments negatively impacted	***
Modules: Return on specific investments negatively impacted	***
Modules: Return on specific investments negatively impacted	***
Modules: Return on specific investments negatively impacted	***
Modules: Other negative effects on investments	***
Modules: Rejection of bank loans	***
Modules: Rejection of bank loans	***
Modules: Rejection of bank loans	***
Modules: Lowering of credit rating	***
Modules: Lowering of credit rating	***
Modules: Problem related to the issue of stocks or bonds	***
Modules: Ability to service debt	***
Modules: Ability to service debt	***
Modules: Ability to service debt	***

Item	Firm name and narrative on impact of imports of CSPV modules
Modules: Ability to service debt	***
Modules: Other effects on growth and development	***
Modules: Other effects on growth and development	***
Modules: Other effects on growth and development	***
Modules: Other effects on growth and development	***
Modules: Other effects on growth and development	***
Modules: Anticipated effects of imports	***
Modules: Anticipated effects of imports	***
Modules: Anticipated effects of imports	***
Modules: Anticipated effects of imports	***
Modules: Anticipated effects of imports	***
Modules: Anticipated effects of imports	***
Modules: Anticipated effects of imports	***
Modules: Anticipated effects of imports	***

Source: Compiled from data submitted in response to Commission questionnaires.



## Part VII: 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 factors<sup>1</sup>--*

- (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,*

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<sup>1</sup> 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).<sup>2</sup>*

Information on the nature of the alleged subsidies was presented earlier in this report; information on the volume and pricing of imports of the subject merchandise is presented in Parts IV and V; and information on the effects of imports of the subject merchandise on U.S. producers' existing development and production efforts is presented in Part VI. 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.

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<sup>2</sup> 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 93 firms believed to produce and/or export CSPV cells and modules from Cambodia, Malaysia, Thailand, and Vietnam.<sup>3</sup> Usable responses to the Commission's questionnaire were received from three firms in Cambodia, six firms in Malaysia, four firms in Thailand, and 11 firms in Vietnam.<sup>4</sup>

These firms' exports to the United States accounted for the following shares of U.S. imports of CSPV cells and modules by source in 2023, based on questionnaire data:

- Cambodia, \*\*\*
- Malaysia \*\*\* percent
- Thailand, \*\*\*
- Vietnam, \*\*\* percent
- Total subject, \*\*\* percent

According to estimates requested of the responding subject producers, the production of CSPV cells and modules reported in questionnaire responses accounted for \*\*\* percent of cell production and \*\*\* module production of CSPV products in Cambodia; \*\*\* cell production and \*\*\* percent of module production of CSPV products in Malaysia; \*\*\* percent of cell production and \*\*\* percent of module production of CSPV products in Thailand; and \*\*\* cell and module production of CSPV products in Vietnam in 2023.

Tables VII-1 through VII-4 present information on the CSPV cells and modules operations of the responding subject producers and exporters during 2023. Table VII-5 presents data on subject resellers of CSPV modules.

\*\*\* was both the leading producer and the leading exporter of CSPV cells to the United States by kilowatts, and \*\*\* had the highest percentage of its shipments, \*\*\* percent, being exports to the United States. In addition, the majority of all shipments by subject module producers are exports to the United States.

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<sup>3</sup> These firms were identified through a review of information submitted in the petition and presented in third-party sources.

<sup>4</sup> Three additional firms \*\*\* indicated subject production but did not submit their questionnaires in time to be included in the dataset.

**Table VII-1**  
**CSPV cells: Summary data for subject foreign producers, by firm, 2023**

Quantity in kilowatts; share in percent

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)
Allesun (Vietnam)	***	***	***	***	***	***
Astronergy (Thailand)	***	***	***	***	***	***
Boviet (Vietnam)	***	***	***	***	***	***
Canadian Solar (Thailand)	***	***	***	***	***	***
CRC (Vietnam)	***	***	***	***	***	***
Hanwha (Malaysia)	***	***	***	***	***	***
Hounen (Cambodia)	***	***	***	***	***	***
Irex (Vietnam)	***	***	***	***	***	***
Jinko (Malaysia)	***	***	***	***	***	***
Jinko (Vietnam)	***	***	***	***	***	***
Jinko Tech (Malaysia)	***	***	***	***	***	***
Kosol (Cambodia)	***	***	***	***	***	***
Longi (Malaysia)	***	***	***	***	***	***
Nwestern (Vietnam)	***	***	***	***	***	***
Red Sun (Vietnam)	***	***	***	***	***	***
Risen (Malaysia)	***	***	***	***	***	***
Solar Power (Vietnam)	***	***	***	***	***	***
Sunflower (Cambodia)	***	***	***	***	***	***
SunPower (Malaysia)	***	***	***	***	***	***
Talesun (Thailand)	***	***	***	***	***	***
Trina (Thailand)	***	***	***	***	***	***
Trina (Vietnam)	***	***	***	***	***	***
Vietnam Green Energy (Vietnam)	***	***	***	***	***	***
Vietnergy (Vietnam)	***	***	***	***	***	***
All individual producers	29,060,391	100.0	***	100.0	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

**Table VII-2**

**CSPV cells: Summary data for subject foreign producers, by subject foreign industry, 2023**

<b>Subject foreign industry</b>	<b>Production (kilowatts)</b>	<b>Share of reported production (percent)</b>	<b>Exports to the United States (kilowatts)</b>	<b>Share of reported exports to the United States (percent)</b>	<b>Total shipments (kilowatts)</b>	<b>Share of firm's total shipments exported to the United States (percent)</b>
Cambodia	***	***	***	***	***	***
Malaysia	***	***	***	***	***	***
Thailand	***	***	***	***	***	***
Vietnam	***	***	***	***	***	***
All subject foreign industries	29,060,391	100.0	***	100.0	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Table VII-3

## CSPV modules: Summary data for subject foreign producers, by firm, 2023

Quantity in kilowatts; share in percent

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)
Allesun (Vietnam)	***	***	***	***	***	***
Astronergy (Thailand)	***	***	***	***	***	***
Boviet (Vietnam)	***	***	***	***	***	***
Canadian Solar (Thailand)	***	***	***	***	***	***
CRC (Vietnam)	***	***	***	***	***	***
Hanwha (Malaysia)	***	***	***	***	***	***
Hounen (Cambodia)	***	***	***	***	***	***
Irex (Vietnam)	***	***	***	***	***	***
Jinko (Malaysia)	***	***	***	***	***	***
Jinko (Vietnam)	***	***	***	***	***	***
Jinko Tech (Malaysia)	***	***	***	***	***	***
Kosol (Cambodia)	***	***	***	***	***	***
Longi (Malaysia)	***	***	***	***	***	***
Nwestern (Vietnam)	***	***	***	***	***	***
Red Sun (Vietnam)	***	***	***	***	***	***
Risen (Malaysia)	***	***	***	***	***	***
Solar Power (Vietnam)	***	***	***	***	***	***
Sunflower (Cambodia)	***	***	***	***	***	***
SunPower (Malaysia)	***	***	***	***	***	***
Talesun (Thailand)	***	***	***	***	***	***
Trina (Thailand)	***	***	***	***	***	***
Trina (Vietnam)	***	***	***	***	***	***
Vietnam Green Energy (Vietnam)	***	***	***	***	***	***
Vietnergy (Vietnam)	***	***	***	***	***	***
All individual producers	19,142,083	100.0	15,314,343	100.0	17,961,164	85.3

Source: Compiled from data submitted in response to Commission questionnaires.

**Table VII-4****CSPV modules: Summary data for subject foreign producers, by subject foreign industry, 2023**

<b>Subject foreign industry</b>	<b>Production (kilowatts)</b>	<b>Share of reported production (percent)</b>	<b>Exports to the United States (kilowatts)</b>	<b>Share of reported exports to the United States (percent)</b>	<b>Total shipments (kilowatts)</b>	<b>Share of firm's total shipments exported to the United States (percent)</b>
Cambodia	***	***	***	***	***	***
Malaysia	***	***	***	***	***	***
Thailand	***	***	***	***	***	***
Vietnam	***	***	***	***	***	***
All subject foreign industries	19,142,083	100.0	15,314,343	100.0	17,961,164	85.3

Source: Compiled from data submitted in response to Commission questionnaires.

**Table VII-5****CSPV modules: Summary data for subject foreign resellers, by firm, 2023**

<b>Producer and (subject foreign industry)</b>	<b>Production (kilowatts)</b>	<b>Share of reported production (percent)</b>
Hounen (Cambodia)	***	***
Kosol (Cambodia)	***	***
Talesun (Thailand)	***	***
Vietnam Green Energy (Vietnam)	***	***
All individual resellers	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Table VII-6 presents events in subject foreign industries since January 1, 2021.

**Table VII-6**  
**CSPV cells and modules: Important industry events in subject foreign industries since 2021**

Item	Firm	Event
Plant Opening (Cambodia)	Solarspace	L-Q New Energy, a unit of Chinese solar cell and module manufacturer Solarspace, opened a solar cell and module manufacturing plant in Cambodia in early 2023 with a capacity to produce 1.2 GW of cells and modules annually. The factory produces PERC modules.
Plant Opening (Cambodia)	New East Solar Energy Co.	New East Solar began construction of its Phnom Penh plant in Cambodia in 2019 and by the end of 2021 it had completed its phase III, which increased its manufacturing capacity to 1.6 GW of CSPV products. In 2023, it expanded annual manufacturing capacity to 2.7 GW.
Plant Opening (Cambodia)	Imperial Star Solar	Imperial Star Solar began cell and module production in October 2021 with an initial annual manufacturing capacity of 3 GW. By the end of 2023, Imperial Star had an annual capacity of 2GW of cells and 2.5 GW of modules.
Plant Opening (Malaysia)	Longi	Longi completed the first of a two-phase construction project at its Serendah Module Plant in Malaysia in October 2023. In its first phase, the manufacturing facility has an annual capacity of 2.8 GW of solar modules. In its second phase, the facility will have a manufacturing capacity of 8.8 GW.
Plant Opening (Malaysia)	Risen Energy	Risen Energy began manufacturing operations in 2022, with an annual module manufacturing capacity of 3 GW.
Plant Opening (Vietnam)	Thornova Solar	In July 2023, Thornova Solar ramped up module production in Vietnam. The manufacturing plant has the capacity to produce 1.5 GW of CSPV bifacial TOPCon and PERC modules.
Plant Opening (Vietnam)	AD Green	In June 2023, AD began solar module production at its Thai Binh manufacturing facility with plans to ramp up annual capacity to 3 GW within 12 months.
Plant Expansion (Thailand)	Astronergy (CHINT)	In May 2023, Astronergy announced the expansion of its Thailand manufacturing cell and module plants. The expansion increased module production capacity to 3 GW and cell manufacturing capacity to 3 GW.
Plant Expansion (Thailand)	Astronergy (CHINT)	In August 2022, Astronergy expanded its CSPV cell and module manufacturing capacity to 1.5 GW each.
Plant Closure (Malaysia)	JA Solar	JA Solar closed its 400 MW cell manufacturing operations in Malaysia in 2022.

Note: This table is based on publicly available information.



## 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 January 1, 2021. All but one responding subject producer indicated in their questionnaires that they had experienced such changes. Firms in all subject countries reported plant openings and expansions. Tables VII-7 and VII-8 present the changes identified by these producers.

**Table VII-7**  
**CSPV cells and modules: Count of reported changes in operations since January 1, 2021, by country**

Count in number of firms reporting

Item	Cambodia	Malaysia	Thailand	Vietnam	Subject producers
Plant openings	2	4	1	4	11
Plant closings	0	3	0	1	4
Prolonged shutdowns	0	1	1	3	5
Production curtailments	0	3	1	4	8
Relocations	0	0	1	1	2
Expansions	1	1	3	2	7
Acquisitions	0	0	0	0	0
Consolidations	0	2	0	0	2
Weather-related or force majeure events	0	0	0	1	1
Other	0	1	2	1	4
Any change	3	6	4	10	23

Source: Compiled from data submitted in response to Commission questionnaires.

**Table VII-8****CSPV cells and modules: Reported changes in operations in subject industries since January 1, 2021, by firm**

<b>Item</b>	<b>Firm name (subject foreign industry) and accompanying narrative response regarding changes in operations</b>
Plant openings	***
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	***

Table continued.

**Table VII-8 Continued**

**CSPV cells and modules: Reported changes in operations in subject industries since January 1, 2021, by firm**

<b>Item</b>	<b>Firm name (subject foreign industry) and accompanying narrative response regarding changes in operations</b>
Prolonged shutdowns	***
Prolonged shutdowns	***
Prolonged shutdowns	***
Prolonged shutdowns	***
Prolonged shutdowns	***
Production curtailments	***
Production curtailments	***
Production curtailments	***
Production curtailments	***
Production curtailments	***
Production curtailments	***
Production curtailments	***
Production curtailments	***

Table continued.

**Table VII-8 Continued**

**CSPV cells and modules: Reported changes in operations in subject industries since January 1, 2021, by firm**

<b>Item</b>	<b>Firm name (subject foreign industry) and accompanying narrative response regarding changes in operations</b>
Production curtailments	***
Relocations	***
Relocations	***
Expansions	***
Expansions	***
Expansions	***
Expansions	***
Expansions	***
Expansions	***
Expansions	***
Expansions	***
Consolidations	***
Consolidations	***
Weather-related or force majeure events	***
Other	***
Other	***
Other	***
Other	***

Source: Compiled from data submitted in response to Commission questionnaires.

## Operations on CSPV cells and modules

Table VII-9 presents data on subject foreign producers' installed capacity, practical overall capacity, and practical capacity of CSPV cells and table VII-10 presents subject foreign producers' installed capacity, practical overall capacity, and practical capacity of CSPV modules and production on the same equipment.

During 2021-23 subject cell producers' installed overall capacity, practical overall capacity, and practical CSPV cells capacity increased annually and overall by 73.1 percent, by 71.4 percent and by 86.9 percent, respectively. Production and capacity utilization followed similar trends with CSPV cell production increasing by 130.4 percent and practical CSPV cell capacity utilization increasing by 13.0 percentage points. Out-of-scope production was present in 2022-23 and accounted for less than \*\*\* percent of total production on the same equipment and machinery used to produce CSPV cells.

During 2021-23 subject producers' installed overall capacity, practical overall capacity, and practical CSPV modules capacity increased by 64.0 percent, by 58.4 percent and by \*\*\* percent, respectively. Production and capacity utilization followed similar trends with practical CSPV modules production increasing by 188.6 percent and practical CSPV module capacity utilization increasing by 26.7 percentage points during 2021-23. Out-of-scope production was present in 2022-23 and accounted for less than \*\*\* percent of total production on the same equipment and machinery used to produce CSPV modules.

**Table VII-9**

**CSPV cells: Producers' in subject foreign industries installed and practical capacity and production on the same equipment as subject production, by period, 2023**

Capacity and production in kilowatts; utilization in percent

Item	Measure	2021	2022	2023
Installed overall	Capacity	27,826,600	36,762,329	48,159,144
Installed overall	Production	***	***	***
Installed overall	Utilization	***	***	***
Practical overall	Capacity	25,086,745	30,689,201	43,001,742
Practical overall	Production	***	***	***
Practical overall	Utilization	***	***	***
Practical CSPV cells	Capacity	22,623,745	29,685,201	42,291,742
Practical CSPV cells	Production	12,610,504	18,943,012	29,060,391
Practical CSPV cells	Utilization	55.7	63.8	68.7

Source: Compiled from data submitted in response to Commission questionnaires.

**Table VII-10**

**CSPV modules: Producers' in subject foreign industries installed and practical capacity and production on the same equipment as subject production, by period, 2023**

Capacity and production in kilowatts; utilization in percent

Item	Measure	2021	2022	2023
Installed overall	Capacity	20,888,246	23,861,890	34,257,159
Installed overall	Production	***	***	***
Installed overall	Utilization	***	***	***
Practical overall	Capacity	18,467,164	21,906,732	29,254,559
Practical overall	Production	***	***	***
Practical overall	Utilization	***	***	***
Practical CSPV modules	Capacity	16,381,962	20,000,530	28,915,127
Practical CSPV modules	Production	6,633,413	9,064,046	19,142,083
Practical CSPV modules	Utilization	40.5	45.3	67.2

Source: Compiled from data submitted in response to Commission questionnaires.

Table VII-11 presents subject producers' reported capacity constraints since January 1, 2021.

**Table VII-11**

**CSPV cells and modules: Producers' in subject foreign industries reported constraints to practical overall capacity, since January 1, 2021**

<b>Item</b>	<b>Firm name (subject foreign industry) and narrative response on constraints to practical overall capacity</b>
Production bottlenecks	***
Production bottlenecks	***
Production bottlenecks	***
Production bottlenecks	***
Production bottlenecks	***
Production bottlenecks	***
Existing labor force	***
Existing labor force	***
Supply of material inputs	***
Supply of material inputs	***
Supply of material inputs	***
Supply of material inputs	***
Supply of material inputs	***
Fuel or energy	***
Fuel or energy	***
Fuel or energy	***
Fuel or energy	***
Logistics/transportation	***

Table continued.

**Table VII-11 Continued**

**CSPV cells and modules: Producers' in subject foreign industries reported constraints to practical overall capacity, since January 1, 2021**

<b>Item</b>	<b>Firm name (subject foreign industry) and narrative response on constraints to practical overall capacity</b>
Logistics/transportation	***
Logistics/transportation	***
Logistics/transportation	***
Logistics/transportation	***
Logistics/transportation	***
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 VII-12 presents information on the CSPV cell operations of the responding subject producers. Table VII-13 presents information on the CSPV cell operation of subject producers by country. Table VII-14 presents information subject producers' CSPV cell exports. During 2021-23, subject producers' CSPV cell production and capacity increased. Subject producers' capacity and production are projected to increase in 2024 and then decreases somewhat in 2025.<sup>5</sup> Overall, during 2023-2025 subject producers project CSPV cell production to increase. Subject producers' exports to the United States increased during 2021-23, and subject producers' project exports to the United States to increase \*\*\* during 2023-25. During 2024-25, the

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<sup>5</sup> \*\*\*. Emails from \*\*\*, May 16, 2024; May 17, 2024; and May 20, 2024.



U.S. will remain an export market for all subject countries. Capacity, production, and volume of exports to the U.S. market are all projected to be higher in 2025 than in 2023.

**Table VII-12**  
**CSPV cells: Data on subject foreign industries, by item and period**

Quantity in kilowatts; ratio and share in percent

Item	2021	2022	2023	Projection 2024	Projection 2025
Capacity	22,623,745	29,685,201	42,291,742	52,982,531	46,927,425
Production	12,610,504	18,943,012	29,060,391	42,043,888	37,020,220
End-of-period inventories	667,799	1,202,270	2,734,714	1,916,397	1,795,227
Internal consumption	***	***	***	***	***
Commercial home market shipments	***	***	***	***	***
Home market shipments	6,322,975	8,389,063	16,493,247	28,211,265	18,959,219
Exports to the United States	***	***	***	***	***
Exports to all other markets	***	***	***	***	***
Export shipments	6,385,780	9,975,806	11,031,696	12,932,176	16,460,587
Total shipments	12,708,755	18,364,869	27,524,943	41,143,441	35,419,806

Table continued.

**Table VII-12 Continued**  
**CSPV cells: Data on subject foreign industries, by item and period**

Ratio and share in percent

Item	2021	2022	2023	Projection 2024	Projection 2025
Capacity utilization ratio	55.7	63.8	68.7	79.4	78.9
Inventory ratio to production	5.3	6.3	9.4	4.6	4.8
Inventory ratio to total shipments	5.3	6.5	9.9	4.7	5.1
Internal consumption share	***	***	***	***	***
Commercial home market shipments share	***	***	***	***	***
Home market shipments share	49.8	45.7	59.9	68.6	53.5
Exports to the United States share	***	***	***	***	***
Exports to all other markets share	***	***	***	***	***
Export shipments share	50.2	54.3	40.1	31.4	46.5
Total shipments share	100.0	100.0	100.0	100.0	100.0

Source: Compiled from data submitted in response to Commission questionnaires.

**Table VII-13**

**CSPV cells: Subject foreign industries' output: Practical capacity, by subject foreign industry and period**

Quantity in kilowatts

<b>Subject foreign industry</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>Projection 2024</b>	<b>Projection 2025</b>
Cambodia	***	***	***	***	***
Malaysia	13,144,355	17,917,102	21,517,026	19,706,182	11,997,638
Thailand	***	***	***	***	***
Vietnam	***	***	***	***	***
All subject foreign industries	22,623,745	29,685,201	42,291,742	52,982,531	46,927,425

Table continued.

**Table VII-13 Continued**

**CSPV cells: Subject foreign industries' output: Production, by subject foreign industry and period**

Quantity in kilowatts

<b>Subject foreign industry</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>Projection 2024</b>	<b>Projection 2025</b>
Cambodia	***	***	***	***	***
Malaysia	8,816,782	13,220,891	16,831,071	12,768,263	7,811,839
Thailand	***	***	***	***	***
Vietnam	***	***	***	***	***
All subject foreign industries	12,610,504	18,943,012	29,060,391	42,043,888	37,020,220

Table continued.

**Table VII-13 Continued**

**CSPV cells: Subject foreign industries' output: Capacity utilization ratio, by subject foreign industry and period**

Ratio in percent

<b>Subject foreign industry</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>Projection 2024</b>	<b>Projection 2025</b>
Cambodia	***	***	***	***	***
Malaysia	67.1	73.8	78.2	64.8	65.1
Thailand	***	***	***	***	***
Vietnam	***	***	***	***	***
All subject foreign industries	55.7	63.8	68.7	79.4	78.9

Table continued.

**Table VII-13 Continued****CSPV cells: Subject foreign industries' output: Share of production, by subject foreign industry and period**

Shares in percent

<b>Subject foreign industry</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>Projection 2024</b>	<b>Projection 2025</b>
Cambodia	***	***	***	***	***
Malaysia	69.9	69.8	57.9	30.4	21.1
Thailand	***	***	***	***	***
Vietnam	***	***	***	***	***
All subject foreign industries	100.0	100.0	100.0	100.0	100.0

Source: Compiled from data submitted in response to Commission questionnaires.

**Table VII-14****CSPV cells: Subject foreign industries' exports: Exports to the United States, by subject foreign industry and period**

Quantity in kilowatts

<b>Subject foreign industry</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>Projection 2024</b>	<b>Projection 2025</b>
Cambodia	***	***	***	***	***
Malaysia	***	***	***	***	***
Thailand	***	***	***	***	***
Vietnam	***	***	***	***	***
All subject foreign industries	909,366	1,985,887	2,292,874	10,675,556	14,670,920

Table continued.

**Table VII-14 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

<b>Subject foreign industry</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>Projection 2024</b>	<b>Projection 2025</b>
Cambodia	***	***	***	***	***
Malaysia	***	***	***	***	***
Thailand	***	***	***	***	***
Vietnam	***	***	***	***	***
All subject foreign industries	***	***	***	***	***

Table continued.

**Table VII-14 Continued****CSPV cells: Subject foreign industries' exports: Total exports, by subject foreign industry and period**

Quantity in kilowatts

Subject foreign industry	2021	2022	2023	Projection 2024	Projection 2025
Cambodia	***	***	***	***	***
Malaysia	***	***	***	***	***
Thailand	***	***	***	***	***
Vietnam	***	***	***	***	***
All subject foreign industries	12,708,755	18,364,869	27,524,943	41,143,441	35,419,806

Table continued.

**Table VII-14 Continued****CSPV cells: Subject foreign industries' exports: Share of total shipments exported, by subject foreign industry and period**

Share in percent

Subject foreign industry	2021	2022	2023	Projection 2024	Projection 2025
Cambodia	***	***	***	***	***
Malaysia	***	***	***	***	***
Thailand	***	***	***	***	***
Vietnam	***	***	***	***	***
All subject foreign industries	***	***	***	***	***

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 VII-15 presents information on the CSPV modules operations of the responding subject producers. Table VII-16 presents information on the CSPV modules operation of subject producers by country. Table VII-17 presents information subject producers' CSPV modules exports. During 2021-23, subject producers' CSPV modules production and capacity increased. Subject producers project capacity and production to increase in 2024 and then decrease somewhat in 2025, while remaining above 2023 levels.<sup>6</sup> Overall, during 2023-2025 subject producers project CSPV modules production to decrease. Subject producers' exports to the United States increased during 2021-23, and subject producers' project exports to the United States to overall increase during 2023-25.

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<sup>6</sup> \*\*\*. Emails from \*\*\*, May 16, 2024; May 17, 2024; and May 20, 2024.

**Table VII-15****CSPV modules: Data on subject foreign industries, by item and period**

Quantity in kilowatts; ratio and share in percent

Item	2021	2022	2023	Projection 2024	Projection 2025
Capacity	16,381,962	20,000,530	28,481,357	40,322,787	34,880,940
Production	6,633,413	9,064,046	19,142,083	31,466,401	23,078,686
End-of-period inventories	561,585	632,363	1,812,152	2,297,432	2,307,790
Internal consumption	***	***	***	***	***
Commercial home market shipments	***	***	***	***	***
Home market shipments	***	***	***	***	***
Exports to the United States	***	***	***	***	***
Exports to all other markets	***	***	***	***	***
Export shipments	***	***	***	***	***
Total shipments	6,633,649	8,993,268	17,961,164	30,981,121	23,068,328
Resales exported to the United States	***	***	***	***	***
Total exports to the United States	***	***	***	***	***

Table continued.

**Table VII-15 Continued****CSPV modules: Data on subject foreign industries, by item and period**

Ratio and share in percent

Item	2021	2022	2023	Projection 2024	Projection 2025
Capacity utilization ratio	40.5	45.3	67.2	78.0	66.2
Inventory ratio to production	8.5	7.0	9.5	7.3	10.0
Inventory ratio to total shipments	8.5	7.0	10.1	7.4	10.0
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.

**Table VII-16****CSPV modules: Subject foreign industries' output: Practical capacity, by subject foreign industry and period**

Quantity in kilowatts

<b>Subject foreign industry</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>Projection 2024</b>	<b>Projection 2025</b>
Cambodia	***	***	***	***	***
Malaysia	***	***	***	***	***
Thailand	***	***	***	***	***
Vietnam	***	***	***	***	***
All subject foreign industries	16,381,962	20,000,530	28,481,357	40,322,787	34,880,940

Table continued.

**Table VII-16 Continued****CSPV modules: Subject foreign industries' output: Production, by subject foreign industry and period**

Quantity in kilowatts

<b>Subject foreign industry</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>Projection 2024</b>	<b>Projection 2025</b>
Cambodia	***	***	***	***	***
Malaysia	***	***	***	***	***
Thailand	***	***	***	***	***
Vietnam	***	***	***	***	***
All subject foreign industries	6,633,413	9,064,046	19,142,083	31,466,401	23,078,686

Table continued.

**Table VII-16 Continued****CSPV modules: Subject foreign industries' output: Capacity utilization ratio, by subject foreign industry and period**

Ratio in percent

<b>Subject foreign industry</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>Projection 2024</b>	<b>Projection 2025</b>
Cambodia	***	***	***	***	***
Malaysia	***	***	***	***	***
Thailand	***	***	***	***	***
Vietnam	***	***	***	***	***
All subject foreign industries	40.5	45.3	67.2	78.0	66.2

Table continued.

**Table VII-16 Continued****CSPV modules: Subject foreign industries' output: Share of production, by subject foreign industry and period**

Shares in percent

<b>Subject foreign industry</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>Projection 2024</b>	<b>Projection 2025</b>
Cambodia	***	***	***	***	***
Malaysia	***	***	***	***	***
Thailand	***	***	***	***	***
Vietnam	***	***	***	***	***
All subject foreign industries	100.0	100.0	100.0	100.0	100.0

Source: Compiled from data submitted in response to Commission questionnaires.

**Table VII-17****CSPV modules: Subject foreign industries' exports: Exports to the United States, by subject foreign industry and period**

Quantity in kilowatts

<b>Subject foreign industry</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>Projection 2024</b>	<b>Projection 2025</b>
Cambodia	***	***	***	***	***
Malaysia	***	***	***	***	***
Thailand	***	***	***	***	***
Vietnam	***	***	***	***	***
All subject foreign industries	***	***	***	***	***

Table continued.

**Table VII-17 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

<b>Subject foreign industry</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>Projection 2024</b>	<b>Projection 2025</b>
Cambodia	***	***	***	***	***
Malaysia	***	***	***	***	***
Thailand	***	***	***	***	***
Vietnam	***	***	***	***	***
All subject foreign industries	***	***	***	***	***

Table continued.

**Table VII-17 Continued**

**CSPV modules: Subject foreign industries' exports: Total exports, by subject foreign industry and period**

Quantity in kilowatts

<b>Subject foreign industry</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>Projection 2024</b>	<b>Projection 2025</b>
Cambodia	***	***	***	***	***
Malaysia	***	***	***	***	***
Thailand	***	***	***	***	***
Vietnam	***	***	***	***	***
All subject foreign industries	***	***	***	***	***

Table continued.

**Table VII-17 Continued**

**CSPV modules: Subject foreign industries' exports: Share of total shipments exported, by subject foreign industry and period**

Share in percent

<b>Subject foreign industry</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>Projection 2024</b>	<b>Projection 2025</b>
Cambodia	***	***	***	***	***
Malaysia	***	***	***	***	***
Thailand	***	***	***	***	***
Vietnam	***	***	***	***	***
All subject foreign industries	***	***	***	***	***

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 "---".



## Alternative products

Tables VII-18 and VII-19 present subject producers' overall production on the same equipment and machinery used as subject production of CSPV cells and modules, respectively. Two subject producers \*\*\* reported production of out-of-scope products on the same equipment and machinery used to produce CSPV cells.<sup>7</sup> \*\*\* also reported out-of-scope production on the same equipment and machinery used to produce CSPV modules. Production of other products on the same equipment and machinery used to produce CSPV modules has increased during 2021-23.

**Table VII-18**

**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	2021	2022	2023
CSPV cells	Quantity	12,610,504	18,943,012	29,060,391
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.

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 "---".

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<sup>7</sup> This includes products outside the scope of these investigations which are subject to the China AD/CVD orders.

**Table VII-19**

**CSPV modules: 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	2021	2022	2023
CSPV cells	Quantity	6,633,413	9,064,046	19,142,083
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.

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 "----".

## Exports

Table VII-20 presents 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 VII-20**

**CSPV cells and modules: Global exports from subject exporters: Exports to the United States, by exporter and period**

Value in 1,000 dollars

Exporter	Measure	2021	2022	2023
Cambodia	Value	218,746	768,866	2,379,764
Malaysia	Value	1,549,005	1,771,224	2,907,808
Thailand	Value	1,024,774	1,308,612	3,210,564
Vietnam	Value	2,054,052	3,454,788	4,981,589
Subject exporters	Value	4,846,577	7,303,490	13,479,725

Table continued.

**Table VII-20 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	236,553	893,737	2,569,588
Malaysia	Value	4,883,605	4,502,406	4,165,078
Thailand	Value	1,978,817	2,154,048	4,237,355
Vietnam	Value	2,949,684	5,349,137	6,780,952
Subject exporters	Value	10,048,659	12,899,328	17,752,974

Table continued.

**Table VII-20 Continued**

**CSPV cells and modules: Global exports from subject exporters: Share of exports exported to the United States, by exporter and period**

Share in percent

Exporter	Measure	2021	2022	2023
Cambodia	Value	92.5	86.0	92.6
Malaysia	Value	31.7	39.3	69.8
Thailand	Value	51.8	60.8	75.8
Vietnam	Value	69.6	64.6	73.5
Subject exporters	Value	48.2	56.6	75.9

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 database, accessed May 9, 2024.

Note: Shares represent the shares of value exported to the United States out of all destination markets. 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. inventories of imported merchandise**

Table VII-21 presents data on U.S. importers' reported inventories of CSPV cells and modules. During 2021-23, U.S. importers from Cambodia \*\*\*. U.S. importers' inventories from Malaysia and Vietnam increased by \*\*\* percent and by \*\*\* percent, respectively, during 2021-23. As a ratio to imports, U.S. shipments of imports, and total shipments of imports, U.S. importers' inventories from Malaysia and nonsubject sources fluctuated but overall decreased during 2021-23. As a ratio to imports, U.S. shipments of imports, and total shipments of imports U.S. importers' inventories from Vietnam fluctuated but overall increased during 2021-23. U.S. importers' inventories from Thailand \*\*\*. In 2023, U.S. importer's inventories from Vietnam accounted for a majority of subject inventories. In 2021, U.S. importers' inventories from nonsubject sources accounted for the majority of inventories, whereas during 2022-23 U.S. importers' inventories from subject sources accounted for the majority of inventories.

**Table VII-21****CSPV cells and modules: U.S. importers' inventories and their ratio to items, by source and period**

Quantity in kilowatts; ratio in percent

Measure	Source	2021	2022	2023
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	***	***	***
Ratio to imports	Subject	***	***	***
Ratio to U.S. shipments of imports	Subject	***	***	***
Ratio to total Shipments of imports	Subject	***	***	***
Inventories quantity	Nonsubject	***	***	***
Ratio to imports	Nonsubject	***	***	***
Ratio to U.S. shipments of imports	Nonsubject	***	***	***
Ratio to total Shipments of imports	Nonsubject	***	***	***
Inventories quantity	All	3,293,777	5,033,501	7,846,734
Ratio to imports	All	20.3	24.4	18.0
Ratio to U.S. shipments of imports	All	21.4	27.2	19.3
Ratio to total Shipments of imports	All	21.3	26.6	19.2

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. 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 after December 31, 2023. Twenty-two of 46 firms indicated arranged imports from subject sources and nonsubject sources. Nonsubject imports accounted for a majority of total arranged imports for 2024. Their reported data is presented in table VII-22.

**Table VII-22**  
**CSPV cells and modules: U.S. importers' arranged imports, by source and period**

Quantity in kilowatts; share in percent

Source	Measure	Jan-Mar 2024	Apr-Jun 2024	Jul-Sep 2024	Oct-Dec 2024	Total
Cambodia	Quantity	***	***	***	***	***
Malaysia	Quantity	***	***	***	***	***
Thailand	Quantity	***	***	***	***	***
Vietnam	Quantity	***	***	***	***	***
Subject sources	Quantity	***	***	***	***	***
Nonsubject sources	Quantity	***	***	***	***	***
All import sources	Quantity	14,958,019	9,352,594	4,991,875	2,901,724	32,204,212
Cambodia	Share	***	***	***	***	***
Malaysia	Share	***	***	***	***	***
Thailand	Share	***	***	***	***	***
Vietnam	Share	***	***	***	***	***
Subject sources	Share	***	***	***	***	***
Nonsubject sources	Share	***	***	***	***	***
All import sources	Share	100.0	100.0	100.0	100.0	100.0

Source: Compiled from data submitted in response to Commission questionnaires.

## Third-country trade actions

Table VII-23 provides information on trade remedy actions on CSPV cells and modules in third-country markets.

**Table VII-23**  
**CSPV: Third-country market import restraints, 2016–23**

Date	Third-country market import restraint
January 2016	Canada imposed AD/CVD duties on CSPV modules from China
January 2016	EU imposed antidumping (AD) duties on CSPV cells and modules from China.
January 2016	China imposed AD and countervailing (CVD) duties on polysilicon (HTS 2804.61) from the EU, Korea, and the United States.
February 2016	Conclusion of EU anti-circumvention investigation and extension of duties to certain companies in Malaysia and Taiwan.
October 2016	Australia terminated an AD investigation on module imports from China.
April 2017	Turkey imposed AD duties on modules from China, with rates ranging from \$20 - \$25 per square meter.
April 2017	Korea imposed AD duties on PET film (HTS 3920.90) from Chinese Taipei, Thailand, and the United Emirates.
August 2017	India imposed duties on glass for PV modules from China.
September 2017	EU announced that it would progressively reduce minimum import prices.
November 2017	China adjusts AD duties on polysilicon (HTS 2804.61) from Korea from 4.4 percent to 113.8 percent.
December 2017	Indonesia initiated a sunset review on biaxially oriented polypropylene (BOPP) (HS 3920.20.10, 3920.20.91, 3920.20) from Thailand and Vietnam. Quota limits were placed on Biaxially Oriented Polypropylene from Thailand.
February 2018	Brazil initiated anti-dumping investigations on polyethylene terephthalate films from the Kingdom of Bahrain and Peru. AD duties of \$480.15/ton on imports from the Kingdom of Bahrain and \$123.20/ton on imports from Peru were effective January 7, 2019.
March 2018	Indian Solar Manufacturers Association withdrew an AD petition.
April 2018	India initiated an AD investigation on ethyl vinyl acetate sheet for solar modules (HTS 3901, 3920, 3921) from China. Anti-dumping duties on China were enforced March 29, 2019.
May 2018	The EU initiated an AD investigation on solar glass (HS 7007.19) from Malaysia.
June 2018	India initiated AD and CVD investigations on textured tempered coated and uncoated glass (7007.19) from Malaysia. On February 26, 2019, India imposed duties of \$114.58 per MT.
July 2018	India imposed safeguard duties on solar cells and modules. Developing countries except China and Malaysia, were exempt. The duties include 25 percent in the first year, 20 percent for the first six months of the second year and 15 percent thereafter.
September 2018	EU terminated measures on cells and modules from China.
November 2018	China duties on polysilicon (HS 2804.61) imports from the EU expired.
January 2019	China initiated a sunset review of polysilicon (HTS 2804.61) imports from Korea and the United States. AD/CVD measures against Korea and the United States were continued.

Table continued.

**Table VII-23 Continued**

**CSPV: Third-country market import restraints, 2016–23**

<b>Date</b>	<b>Third-country market import restraint</b>
August 2019	Indonesia initiated AD investigations on BOPP (HTS 3920.20.10, 3920.20.91, 3920.20) from China and Malaysia.
January 2020	China imposed a 5-year extension on AD duties on imports of solar-grade polysilicon from Korea and the United States.
July 2020	India reviewed the safeguard duty on PV solar cells and modules and granted a one-year extension for products imported from China, Thailand, and Vietnam. Malaysian products were exempted from the safeguard duties.
July 2020	EU extended AD duties on imports of solar glass from China.
March 2021	India announced that it would impose a basic customs duty of 25 percent on PV cells and 40 percent on PV modules, effective April 1, 2022.
September 2022	India announced that no measure would be imposed on solar cells from China, Thailand, Vietnam, as the investigation was terminated.

Source: Second monitoring publication, pp. I-61—I-62; and information collected from each country's semiannual reports from the WTO's committee on Anti-Dumping Practices. Additional information can be found online at: "World Trade Organization's Anti-dumping Gateway," retrieved May 16, 2024.

## Information on nonsubject countries

Global PV cell production (including out-of-scope thin film products) increased from 244 GW in 2021 to 394 GW in 2022.<sup>8</sup> Global PV cell production capacity increased from 441 GW in 2021 to 599 GW in 2022.<sup>9</sup> Capacity utilization was 55 percent in 2021 and 66 percent in 2022.<sup>10</sup> The leading global CSPV cell producers in 2022, as measured by manufacturers' own production, were Tongwei (49.2 GW), Longi (36.2 GW), Aiko (33.7 GW), Trina (33.6 GW), and JA Solar (32.7 GW).<sup>11</sup>

China was the leading global PV cell producer in 2021 totaling 198 GW, accounting for 81.2 percent of production, followed by Malaysia (5 percent), Vietnam (4 percent), and South

<sup>8</sup> References to "PV" in this section include out-of-scope thin film products. IEA PVPS, *Trends in Photovoltaic Applications 2022*, IEA-PVPS T1-43:2022, p. 47 [https://iea-pvps.org/wp-content/uploads/2023/02/PVPS\\_Trend\\_Report\\_2022.pdf](https://iea-pvps.org/wp-content/uploads/2023/02/PVPS_Trend_Report_2022.pdf), retrieved May 14, 2024; IEA PVPS, *Trends in Photovoltaic Applications 2023*, IEA-PVPS T1-43:2023, p. 50 [https://iea-pvps.org/wp-content/uploads/2023/10/PVPS\\_Trends\\_Report\\_2023\\_WEB.pdf](https://iea-pvps.org/wp-content/uploads/2023/10/PVPS_Trends_Report_2023_WEB.pdf), retrieved May 14, 2024.

<sup>9</sup> IEA PVPS, *Trends in Photovoltaic Applications 2022*, IEA-PVPS T1-43:2022, p. 47 [https://iea-pvps.org/wp-content/uploads/2023/02/PVPS\\_Trend\\_Report\\_2022.pdf](https://iea-pvps.org/wp-content/uploads/2023/02/PVPS_Trend_Report_2022.pdf), retrieved May 14, 2024; IEA PVPS, *Trends in Photovoltaic Applications 2023*, IEA-PVPS T1-43:2023, p. 50 [https://iea-pvps.org/wp-content/uploads/2023/10/PVPS\\_Trends\\_Report\\_2023\\_WEB.pdf](https://iea-pvps.org/wp-content/uploads/2023/10/PVPS_Trends_Report_2023_WEB.pdf), retrieved May 16, 2024.

<sup>10</sup> IEA PVPS, *Trends in Photovoltaic Applications 2022*, IEA-PVPS T1-43:2022, p. 47 [https://iea-pvps.org/wp-content/uploads/2023/02/PVPS\\_Trend\\_Report\\_2022.pdf](https://iea-pvps.org/wp-content/uploads/2023/02/PVPS_Trend_Report_2022.pdf), May 16, 2024; IEA PVPS, *Trends in Photovoltaic Applications 2023*, IEA-PVPS T1-43:2023, p. 50 [https://iea-pvps.org/wp-content/uploads/2023/10/PVPS\\_Trends\\_Report\\_2023\\_WEB.pdf](https://iea-pvps.org/wp-content/uploads/2023/10/PVPS_Trends_Report_2023_WEB.pdf), retrieved May 16, 2024.

<sup>11</sup> IEA PVPS, *Trends in Photovoltaic Applications 2023*, IEA-PVPS T1-43:2023, p. 50 [https://iea-pvps.org/wp-content/uploads/2023/10/PVPS\\_Trends\\_Report\\_2023\\_WEB.pdf](https://iea-pvps.org/wp-content/uploads/2023/10/PVPS_Trends_Report_2023_WEB.pdf), retrieved May 16, 2024.

Korea (2 percent).<sup>12</sup> In 2022, China's cell production totaled 331 GW, accounting for 84 percent of global production, followed by Malaysia (5 percent), Vietnam (5 percent), and South Korea (1 percent).<sup>13</sup> During the first half of 2023, China's PV cell production totaled more than 220 GW, an increase of more than 60 percent over the same period the previous year.<sup>14</sup>

The size of global cell production plants has increased over time. In 2021, plants with less than 2 GW in annual production capacity accounted for approximately 25 percent of the market, 2 to 5 GW plants for around 50 percent, and plants with more than 5 GW for approximately 25 percent.<sup>15</sup> In 2023, plants with less than 2 GW in annual production capacity accounted for slightly more than 15 percent, 2 to 5 GW for slightly more than 50 percent, and plants with more than 5 GW for slightly more than 30 percent.<sup>16</sup>

The shift in CSPV cell shipments by technology from multicrystalline cells to monocrystalline continued during 2021-2023, as multicrystalline cells are not currently the focus of producers. Multicrystalline cells declined from \*\*\* percent of CSPV cell shipments in 2021 to \*\*\* percent in 2023, while monocrystalline cells increased from \*\*\* percent in 2021 to \*\*\* percent in 2023 (figure VII-X).<sup>17</sup> N-type cells \*\*\* monocrystalline cell technologies shipped in 2021-2023. N-type CSPV cells shipments increased, from around \*\*\* percent of shipments in 2021 to \*\*\* percent in 2023.<sup>18</sup>

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<sup>12</sup> IEA PVPS, *Trends in Photovoltaic Applications 2022*, IEA-PVPS T1-43:2022, p. 47 [https://iea-pvps.org/wp-content/uploads/2023/02/PVPS\\_Trend\\_Report\\_2022.pdf](https://iea-pvps.org/wp-content/uploads/2023/02/PVPS_Trend_Report_2022.pdf), retrieved May 16, 2024.

<sup>13</sup> IEA PVPS, *Trends in Photovoltaic Applications 2023*, IEA-PVPS T1-43:2023, p. 50 [https://iea-pvps.org/wp-content/uploads/2023/10/PVPS\\_Trends\\_Report\\_2023\\_WEB.pdf](https://iea-pvps.org/wp-content/uploads/2023/10/PVPS_Trends_Report_2023_WEB.pdf), retrieved May 16, 2024.

<sup>14</sup> IEA PVPS, *Trends in Photovoltaic Applications 2023*, IEA-PVPS T1-43:2023, p. 51 [https://iea-pvps.org/wp-content/uploads/2023/10/PVPS\\_Trends\\_Report\\_2023\\_WEB.pdf](https://iea-pvps.org/wp-content/uploads/2023/10/PVPS_Trends_Report_2023_WEB.pdf), retrieved May 16, 2024.

<sup>15</sup> The ITRPV report does not specify if this is by number of plants or weighted by annual production capacity. ITRPV, *2020 Results*, p.32, <https://www.vdma.org/international-technology-roadmap-photovoltaic>, retrieved May 16, 2024; Trube, Jutta, "Trend: Cell fab size," <https://eurec.be/cms/wp-content/uploads/International-Technology-Roadmap-ITRPV-Jutta-Trube.pdf>, retrieved May 16, 2024; Trube, Jutta, "International Technology Roadmap (ITRPV)," June 9, 2021 <https://eurec.be/cms/wp-content/uploads/International-Technology-Roadmap-ITRPV-Jutta-Trube.pdf>, retrieved May 16, 2024.

<sup>16</sup> ITRPV, *2022 Results*, April 2023, p. 33, <https://www.vdma.org/international-technology-roadmap-photovoltaic>, retrieved May 16, 2024.

<sup>17</sup> \*\*\*.

<sup>18</sup> \*\*\*.



**Figure VII-1**  
**CSPV cells: Global shipments by technology, 2023**

\* \* \* \* \*

Sources: \*\*\*.

Note: \*\*\*.

## Global CSPV module production

Global CSPV module production increased from 242 GW in 2021 to 379 GW in 2022, and again to approximately 1,000 GW (1 TW).<sup>19</sup> Shipments were lower than production in 2022 and 2023, with PV module (including out-of-scope thin film) shipments totaling 295 GW and 502 GW, respectively.<sup>20</sup> Global production capacity (including out-of-scope thin film products)

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<sup>19</sup> IEA PVPS, *Trends in Photovoltaic Applications 2022*, IEA-PVPS T1-43:2022, p. 48 [https://iea-pvps.org/wp-content/uploads/2023/02/PVPS\\_Trend\\_Report\\_2022.pdf](https://iea-pvps.org/wp-content/uploads/2023/02/PVPS_Trend_Report_2022.pdf), retrieved May 16, 2024; IEA PVPS, *Trends in Photovoltaic Applications 2023*, EIA-PVPS T1-43:2023, p. 51 [https://iea-pvps.org/wp-content/uploads/2023/10/PVPS\\_Trends\\_Report\\_2023\\_WEB.pdf](https://iea-pvps.org/wp-content/uploads/2023/10/PVPS_Trends_Report_2023_WEB.pdf), retrieved May 16, 2024; ITRPV, *ITRPV 15<sup>th</sup> edition, March 2024, key findings & selected report presentation*, March 13, 2024, p. 5, <https://www.vdma.org/international-technology-roadmap-photovoltaic>, retrieved May 14, 2024.

<sup>20</sup> ITRPV, *2022 Results*, April 2023, p. 4, <https://www.vdma.org/international-technology-roadmap-photovoltaic>, retrieved May 16, 2024.

increased from 483 GW in 2021 to 717 GW in 2022.<sup>21</sup> Global PV capacity utilization declined from 54 percent in 2020 to 53 percent in 2022.<sup>22</sup> China was the leading global module producer in 2021 and 2022, accounting for 75 and 78 percent, respectively, of global PV module production.<sup>23</sup> Countries and/or regions with the largest increases in PV production capacity during 2020-2022 were China (up 260 GW), Asia Pacific region (up 33 GW), and India (up 15 GW).<sup>24</sup> Countries are undertaking significant PV production capacity additions in 2023 and 2024, with the leading countries and regions in capacity expansions in 2024 expected to be China (up 178 GW), and the United States, which is expected to reach 35 GW by the end of 2024.<sup>25</sup>

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<sup>21</sup> IEA PVPS, *Trends in Photovoltaic Applications 2023*, EIA-PVPS T1-43:2023, p. 54 [https://iea-pvps.org/wp-content/uploads/2023/10/PVPS\\_Trends\\_Report\\_2023\\_WEB.pdf](https://iea-pvps.org/wp-content/uploads/2023/10/PVPS_Trends_Report_2023_WEB.pdf), retrieved May 16, 2024; IEA, “Solar PV manufacturing capacity according to announced projects and in the Net Zero Scenario, 2015-2030,” July 10, 2023, <https://www.iea.org/data-and-statistics/charts/solar-pv-manufacturing-capacity-according-to-announced-projects-and-in-the-net-zero-scenario-2015-2030>, retrieved May 16, 2024.

<sup>22</sup> IEA PVPS, *Trends in Photovoltaic Applications 2023*, EIA-PVPS T1-43:2023, p. 54 [https://iea-pvps.org/wp-content/uploads/2023/10/PVPS\\_Trends\\_Report\\_2023\\_WEB.pdf](https://iea-pvps.org/wp-content/uploads/2023/10/PVPS_Trends_Report_2023_WEB.pdf), May 16, 2024.

<sup>23</sup> IEA PVPS, *Trends in Photovoltaic Applications 2022*, IEA-PVPS T1-43:2022, p. 48 [https://iea-pvps.org/wp-content/uploads/2023/02/PVPS\\_Trend\\_Report\\_2022.pdf](https://iea-pvps.org/wp-content/uploads/2023/02/PVPS_Trend_Report_2022.pdf), retrieved May 16, 2024; IEA PVPS, *Trends in Photovoltaic Applications 2023*, EIA-PVPS T1-43:2023, p. 51 [https://iea-pvps.org/wp-content/uploads/2023/10/PVPS\\_Trends\\_Report\\_2023\\_WEB.pdf](https://iea-pvps.org/wp-content/uploads/2023/10/PVPS_Trends_Report_2023_WEB.pdf), retrieved May 16, 2024.

<sup>24</sup> IEA PVPS, *Trends in Photovoltaic Applications 2021*, IEA-PVPS T1-43:2022, pp. 46-47 <https://iea-pvps.org/wp-content/uploads/2022/01/IEA-PVPS-Trends-report-2021-4.pdf>, retrieved May 16, 2024; IEA, Solar PV manufacturing capacity by component in China, 2021-2024, IEA, Paris <https://www.iea.org/data-and-statistics/charts/solar-pv-manufacturing-capacity-by-component-in-china-2021-2024>, retrieved May 16, 2024; IEA, Solar PV manufacturing capacity by component in the Asia Pacific Region, 2021-2024, IEA, Paris <https://www.iea.org/data-and-statistics/charts/solar-pv-manufacturing-capacity-by-component-in-the-asia-pacific-region-2021-2024>, retrieved September 29, 2023; IEA, Solar PV manufacturing capacity by component in India, 2021-2024, IEA, Paris <https://www.iea.org/data-and-statistics/charts/solar-pv-manufacturing-capacity-by-component-in-india-2021-2024>, retrieved May 16, 2024.

<sup>25</sup> IEA, Solar PV manufacturing capacity by component in China, 2021-2024, IEA, Paris <https://www.iea.org/data-and-statistics/charts/solar-pv-manufacturing-capacity-by-component-in-china-2021-2024>, retrieved May 16, 2024; IEA, Solar PV manufacturing capacity by component in the Asia Pacific Region, 2021-2024, IEA, Paris <https://www.iea.org/data-and-statistics/charts/solar-pv-manufacturing-capacity-by-component-in-the-asia-pacific-region-2021-2024>, retrieved May 16, 2024; and IEA, Solar PV manufacturing capacity by component in India, 2021-2024, IEA, Paris <https://www.iea.org/data-and-statistics/charts/solar-pv-manufacturing-capacity-by-component-in-india-2021-2024>, retrieved May 16, 2024; PV Tech, “US module capacity to reach 35GW by year’s end, says CEA,” February 22, 2024 <https://www.pv-tech.org/us-module-capacity-to-reach-35gw-by-years-end-says-cea/>, retrieved May 16, 2024.

The largest module producers, in terms of annual production in 2022, were Longi (48.2 GW), Trina (45.4 GW), JA Solar (43.9 GW), Jinko (40 GW), and Canadian Solar (21.1 GW).<sup>26</sup> The firms with the largest annual production capacity at the end of 2022 were Jinko (68 GW), Longi (65 GW), Trina (50 GW), JA Solar (49 GW), and Canadian Solar (32 GW).<sup>27</sup> Together, these firms constitute approximately 37 percent of global capacity.<sup>28</sup> These same companies have announced significant production capacity expansions, totaling an estimated 42 percent of global production capacity additions by 2026.<sup>29</sup> The firms with the largest increases in production capacity during 2020-2022 were Jinko (up 37 GW), Trina (up 28 GW), JA Solar (up 26 GW), Canadian Solar (up 16 GW), and Longi (up 15 GW).<sup>30</sup>

As with cell production plants, the size of global module production plants has increased over time. Module facilities with less than 1 GW or less in annual production capacity accounted for more than 20 percent of plants in 2020, those with 1 GW to 5 GW in annual capacity for more than 60 percent, and those with more than 5 GW in capacity for more than 10 percent.<sup>31</sup> In 2022, facilities with 1 GW or less in annual production capacity accounted for approximately 17 percent, those with 1 GW to 5 GW for about 60 percent, and those with more than 5 GW for about 23 percent.<sup>32</sup>

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<sup>26</sup> IEA PVPS, *Trends in Photovoltaic Applications 2023*, EIA-PVPS T1-43:2023, p. 51 [https://iea-pvps.org/wp-content/uploads/2023/10/PVPS\\_Trends\\_Report\\_2023\\_WEB.pdf](https://iea-pvps.org/wp-content/uploads/2023/10/PVPS_Trends_Report_2023_WEB.pdf), retrieved May 16, 2024.

<sup>27</sup> RTS, *PV Activities in Japan and Global PV Highlights*, vol. 28, no. 2, February 2022, p. 33 <https://www.rts-pv.com/en/downloads/#7699>, retrieved May 16, 2024.

<sup>28</sup> IEA PVPS, *Trends in Photovoltaic Applications 2023*, EIA-PVPS T1-43:2023, p. 51 [https://iea-pvps.org/wp-content/uploads/2023/10/PVPS\\_Trends\\_Report\\_2023\\_WEB.pdf](https://iea-pvps.org/wp-content/uploads/2023/10/PVPS_Trends_Report_2023_WEB.pdf), retrieved May 16, 2024; RTS, *PV Activities in Japan and Global PV Highlights*, vol. 28, no. 2, February 2022, p. 33 <https://www.rts-pv.com/en/downloads/#7699>, retrieved May 16, 2024; IEA, *Energy Technology Perspectives 2023*, p. 219 <https://www.iea.org/reports/energy-technology-perspectives-2023>, retrieved May 16, 2024.

<sup>29</sup> IEA, *Energy Technology Perspectives 2023*, p. 220 <https://www.iea.org/reports/energy-technology-perspectives-2023>, retrieved May 16, 2024.

<sup>30</sup> RTS, *PV Activities in Japan and Global PV Highlights*, vol. 28, no. 2, February 2022, p. 33 <https://www.rts-pv.com/en/downloads/#7699>, retrieved May 16, 2024.

<sup>31</sup> Crystalline Silicon Photovoltaic Cells, Whether or Not Partially or Fully Assembled Into Other Products, Inv. No. TA-201-75 (Extension), USITC Publication 5266, December 2021, p. I-20.

<sup>32</sup> ITRPV, *2022 Results*, April 2023, p. 44, <https://www.vdma.org/international-technology-roadmap-photovoltaic>, retrieved May 16, 2024.

The global market share of select module technologies is shown in figure VII-X. Half-cut cells were about 90 percent of the global market in 2022.<sup>33</sup> Bifacial modules accounted for almost 30 percent of the global market and monofacial for more than 70 percent.<sup>34</sup>

**Figure VII-2**

**CSPV modules: Global market share by technology type, 2022**

Full and cut cells (incorporating  $\leq$ M10 wafers)

- Full cell: About 10 percent
- Half cell: About 90 percent

Cut cells (incorporating  $\geq$ M10 wafers)

- Half cell: About 90 percent
- Third cell: About 10 percent

Monofacial and bifacial

- Bifacial: About 30 percent
- Monofacial: About 70 percent

Source: ITRPV, *2022 Results*, April 2023, pp. 43-44, 48 <https://www.vdma.org/international-technology-roadmap-photovoltaic>, retrieved May 16, 2024.

Note: Technologies with a small share of the market for which data could not be discerned in the report are not included here.

<sup>33</sup> ITRPV, *2022 Results*, April 2023, pp. 43-44, <https://www.vdma.org/international-technology-roadmap-photovoltaic>, retrieved May 16, 2024.

<sup>34</sup> ITRPV, *2022 Results*, April 2023, p. 48, <https://www.vdma.org/international-technology-roadmap-photovoltaic>, retrieved May 16, 2024.

## Global exports

China is the largest global exporter of PV cells and modules (including out-of-scope thin film), with exports totaling \$43.8 billion in 2023 (table VII-24).<sup>35</sup> Vietnam was the second largest exporter with \$6.8 billion in 2023.

**Table VII-24**  
**CSPV cells and modules: Global exports, by reporting country and by period**

Quantity in kilowatts; Value in 1,000 dollars

Exporting country	Measure	2021	2022	2023
United States	Value	2,456,670	48,272	93,231
Cambodia	Value	236,553	893,737	2,569,588
Malaysia	Value	4,883,605	4,502,406	4,165,078
Thailand	Value	1,978,817	2,154,048	4,237,355
Vietnam	Value	2,949,684	5,349,137	6,780,952
Subject exporters	Value	10,048,659	12,899,328	17,752,974
China	Value	33,457,596	46,378,428	43,783,325
Netherlands	Value	5,170,386	8,237,383	7,997,447
India	Value	165,020	572,166	1,836,433
Germany	Value	3,067,642	1,557,261	1,185,704
South Korea	Value	3,053,825	1,576,203	1,159,182
Belgium	Value	321,207	414,072	699,834
Portugal	Value	319,779	745,788	617,878
All other exporters	Value	16,294,929	6,329,225	4,931,381
Nonsubject exporters	Value	61,850,384	65,810,526	62,211,185
All reporting exporters	Value	74,355,713	78,758,125	80,057,390

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 database, accessed May 9, 2024.

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 "---". United States is shown at the top followed by the countries under investigation, all remaining top exporting countries in descending order of 2023 data.

<sup>35</sup> These data may be overstated as HS statistical reporting number 8541.40 may contain products outside the scope of this investigation including photosensitive semiconductor devices and light-emitting diodes.

## Non-subject country profiles

### China

China was the leading global PV cell (including out-of-scope thin film) producer in 2021-2022. In 2021, China's production accounted for 81.2 percent (198 GW) of global production.<sup>36</sup> In 2022, China's PV cell production totaled 331 GW, accounting for 84 percent of global production.<sup>37</sup> Chinese PV module (including out-of-scope thin film) production rose from 181.8 GW in 2021 to 294.7 GW in 2022.<sup>38</sup> China's PV cell (including out-of-scope thin film) production capacity increased from 360 GW in 2021 to 506 GW in 2022, while PV module (including out-of-scope thin film) production capacity increased from 244 GW in 2020 to 552 GW in 2022.<sup>39</sup>

Chinese exports of PV modules (including out-of-scope thin film) increased from 98.5 GW in 2021 to 153.6 GW in 2022.<sup>40</sup> In 2022 and 2023, Chinese exports of PV cells (including out-of-scope thin film) were valued at approximately \$4.0 billion and \$4.2 billion, respectively.<sup>41</sup> Chinese exports of PV modules (including out-of-scope thin film) in 2022 and 2023 were valued at \$42.4 billion and \$39.6 billion, respectively.<sup>42</sup> The top five export destinations in 2023, by value, for PV cells were Turkey (27.9 percent), India (23.2 percent),

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<sup>36</sup> IEA PVPS, *Trends in Photovoltaic Applications 2022*, IEA-PVPS T1-43:2022, p. 47 [https://iea-pvps.org/wp-content/uploads/2023/02/PVPS\\_Trend\\_Report\\_2022.pdf](https://iea-pvps.org/wp-content/uploads/2023/02/PVPS_Trend_Report_2022.pdf), retrieved May 16, 2024.

<sup>37</sup> IEA PVPS, *Trends in Photovoltaic Applications 2023*, EIA-PVPS T1-43:2023, p. 50 [https://iea-pvps.org/wp-content/uploads/2023/10/PVPS\\_Trends\\_Report\\_2023\\_WEB.pdf](https://iea-pvps.org/wp-content/uploads/2023/10/PVPS_Trends_Report_2023_WEB.pdf), retrieved May 16, 2024.

<sup>38</sup> IEA PVPS, *Trends in Photovoltaic Applications 2022*, IEA-PVPS T1-43:2022, p. 48 [https://iea-pvps.org/wp-content/uploads/2023/02/PVPS\\_Trend\\_Report\\_2022.pdf](https://iea-pvps.org/wp-content/uploads/2023/02/PVPS_Trend_Report_2022.pdf), retrieved May 16, 2024; IEA PVPS, *Trends in Photovoltaic Applications 2023*, EIA-PVPS T1-43:2023, p. 51 [https://iea-pvps.org/wp-content/uploads/2023/10/PVPS\\_Trends\\_Report\\_2023\\_WEB.pdf](https://iea-pvps.org/wp-content/uploads/2023/10/PVPS_Trends_Report_2023_WEB.pdf), retrieved May 16, 2024.

<sup>39</sup> IEA PVPS, *Trends in Photovoltaic Applications 2022*, IEA-PVPS T1-43:2022, pp. 47-48 [https://iea-pvps.org/wp-content/uploads/2023/02/PVPS\\_Trend\\_Report\\_2022.pdf](https://iea-pvps.org/wp-content/uploads/2023/02/PVPS_Trend_Report_2022.pdf), retrieved May 16, 2024; *Trends in Photovoltaic Applications 2023*, EIA-PVPS T1-43:2023, pp. 50-51 [https://iea-pvps.org/wp-content/uploads/2023/10/PVPS\\_Trends\\_Report\\_2023\\_WEB.pdf](https://iea-pvps.org/wp-content/uploads/2023/10/PVPS_Trends_Report_2023_WEB.pdf), retrieved May 16, 2024; IEA, Solar PV manufacturing capacity by component in China, 2021-2024, <https://www.iea.org/data-and-statistics/charts/solar-pv-manufacturing-capacity-by-component-in-china-2021-2024>, retrieved May 16, 2024.

<sup>40</sup> IEA PVPS, *Trends in Photovoltaic Applications 2022*, IEA-PVPS T1-43:2022, p. 48 [https://iea-pvps.org/wp-content/uploads/2023/02/PVPS\\_Trend\\_Report\\_2022.pdf](https://iea-pvps.org/wp-content/uploads/2023/02/PVPS_Trend_Report_2022.pdf), retrieved May 26, 2024; IEA PVPS, *Trends in Photovoltaic Applications 2023*, EIA-PVPS T1-43:2023, p. 51 [https://iea-pvps.org/wp-content/uploads/2023/10/PVPS\\_Trends\\_Report\\_2023\\_WEB.pdf](https://iea-pvps.org/wp-content/uploads/2023/10/PVPS_Trends_Report_2023_WEB.pdf), retrieved May 26, 2024.

<sup>41</sup> Official exports statistics under HS subheading 8541.42 for China from China's customs as reported in the Global Trade Atlas Suite database, accessed May 26, 2024.

<sup>42</sup> Official exports statistics under HS subheading 8541.43 for China from China's customs as reported in the Global Trade Atlas Suite database, accessed May 26, 2024.

Cambodia (17.5 percent), Thailand (8.4 percent), and South Korea (4.8 percent).<sup>43</sup> The top five export destinations in 2023, by value, for PV modules were the Netherlands (22.8 percent), Brazil (9.4 percent), Spain (5.6 percent), India (5.6 percent), and Pakistan (3.6 percent).<sup>44</sup>

## South Korea

South Korea's PV cell (including out-of-scope thin film) production totaled 5.5 GW, while PV module production was 8 GW.<sup>45</sup> In 2022, South Korea's PV cell production decreased to 4.1 GW, while PV module production decreased to 7.2 GW.<sup>46</sup> South Korea's exports of PV cells (including out-of-scope thin film) totaled \$28.5 million in 2022 and \$157.8 million in 2023, while exports of PV modules (including out-of-scope thin film) totaled \$1.5 billion and \$1.0 billion in 2022 and 2023, respectively.<sup>47</sup> The top export destination in 2023, by value, for PV cells was the United States (96.0 percent).<sup>48</sup> The top export destination in 2023, by value, for PV modules was the United States (95.6 percent).<sup>49</sup>

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<sup>43</sup> Official exports statistics under HS subheading 8541.42 for China from China's customs as reported in the Global Trade Atlas Suite database, accessed May 26, 2024.

<sup>44</sup> Official exports statistics under HS subheading 8541.43 for China from China's customs as reported in the Global Trade Atlas Suite database, accessed May 26, 2024.

<sup>45</sup> IEA PVPS, *Trends in Photovoltaic Applications 2022*, IEA-PVPS T1-43:2022, pp. 47-48 [https://iea-pvps.org/wp-content/uploads/2023/02/PVPS\\_Trend\\_Report\\_2022.pdf](https://iea-pvps.org/wp-content/uploads/2023/02/PVPS_Trend_Report_2022.pdf), retrieved May 26, 2024.

<sup>46</sup> *Trends in Photovoltaic Applications 2023*, IEA-PVPS T1-43:2023, pp. 50-51 [https://iea-pvps.org/wp-content/uploads/2023/10/PVPS\\_Trends\\_Report\\_2023\\_WEB.pdf](https://iea-pvps.org/wp-content/uploads/2023/10/PVPS_Trends_Report_2023_WEB.pdf), retrieved May 26, 2024.

<sup>47</sup> Official exports statistics under HS subheadings 8541.42 and 8541.43 for South Korea as reported by national statistical authorities in the Global Trade Atlas Suite database, accessed May 26, 2024.

<sup>48</sup> Official exports statistics under HS subheading 8541.42 for South Korea as reported by national statistical authorities in the Global Trade Atlas Suite database, accessed May 26, 2024.

<sup>49</sup> Official exports statistics under HS subheading 8541.43 for South Korea as reported by national statistical authorities in the Global Trade Atlas Suite database, accessed May 26, 2024.





**APPENDIX A**

**FEDERAL REGISTER NOTICES**



The Commission makes available notices relevant to its investigations and reviews on its website, [www.usitc.gov](http://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>	<a href="https://www.govinfo.gov/content/pkg/FR-2024-04-30/pdf/2024-09307.pdf">https://www.govinfo.gov/content/pkg/FR-2024-04-30/pdf/2024-09307.pdf</a>
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>	<a href="https://www.govinfo.gov/content/pkg/FR-2024-05-20/pdf/2024-11027.pdf">https://www.govinfo.gov/content/pkg/FR-2024-05-20/pdf/2024-11027.pdf</a>
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>	<a href="https://www.govinfo.gov/content/pkg/FR-2024-05-20/pdf/2024-11031.pdf">https://www.govinfo.gov/content/pkg/FR-2024-05-20/pdf/2024-11031.pdf</a>



## **APPENDIX B**

### **LIST OF STAFF CONFERENCE WITNESSES**



## CALENDAR OF PUBLIC PRELIMINARY CONFERENCE

Those listed below appeared in the United States International Trade Commission's Preliminary Conference:

**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 (Preliminary)

**Date and Time:** May 15, 2024 - 9:30 a.m.

Sessions were held in connection with these preliminary phase investigations in the Main Hearing Room (Room 101), 500 E Street, SW., Washington, DC.

### **OPENING REMARKS:**

In Support of Imposition (**Laura El-Sabaawi**, Wiley Rein LLP)

In Opposition to Imposition (**Alexander H. Schaefer**, Crowell & Moring LLP)

### **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

**Harold J. Connolly**, Vice President and Head of Public Policy and  
Government Affairs, Hanwha Q CELLS USA

**Scott Moskowitz**, Senior Director of Market Strategy and Public Affairs,  
Hanwha Q CELLS USA

**Sam Martens**, President, Mission Solar

**Ardes Johnson**, President, Meyer Burger

**Hari Achuthan**, Founder, Chairman, Chief Executive Officer,  
Convalt Energy

**In Support of the Imposition of the  
Antidumping and Countervailing Duty Orders (continued):**

**Seth Kaplan**, President, International Economic Research LLC

<b>Timothy Brightbill</b>	)
	) – OF COUNSEL
<b>Laura El-Sabaawi</b>	)

**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

<b>Alexander H. Schaefer</b>	)
<b>Robert L. LaFrankie</b>	) – OF COUNSEL
<b>Simeon A. Yerokun</b>	)

Hogan Lovells US LLP  
Washington, DC  
on behalf of

Canadian Solar US Module Manufacturing Corporation  
 (“Canadian Solar”)

**Andrew Williams**, Vice President, Policy & Market Development,  
Canadian Solar Inc.

**Michael Bowen**, Senior Counsel, Trade Compliance, Canadian Solar (USA) Inc.

<b>Jonathan T. Stoel</b>	)
<b>Michael G. Jacobson</b>	) – OF COUNSEL
<b>Nicholas Sparks</b>	)

BYD America LLC (“BYD”)

<b>Nicholas Laneville</b>	) – OF COUNSEL
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**In Opposition to the Imposition of the  
Antidumping and Countervailing Duty Orders (continued):**

Akin Gump Strauss Hauer & Feld LLP  
Washington, DC  
on behalf of

NextEra Energy, Inc., (“NextEra”)

**Matthew R. Nicely** )  
**Julia K. Eppard** ) – 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

**Susannah Perkins**, Senior Economic Consultant, ION Economics, LLC

**Kristin H. Mowry** ) – OF COUNSEL

Trade Pacific PLLC  
Washington, DC  
on behalf of

Trina Solar U.S.

**Mike Nelson**, Head of Legal, North America Region, Trina Solar U.S.

**MacKensie Sugama** ) – OF COUNSEL

**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**

Table C-1: CSPV cells and modules: Summary data concerning the U.S. market.....	C-3
Table C-2: CSPV cells: Summary data concerning the U.S. market .....	C-6
Table C-3: CSPV modules: Summary data concerning the U.S. market.....	C-8

## 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 changes		
	2021	2022	2023	2021-23	2021-22	2022-23
U.S. consumption quantity:						
Amount.....	***	***	***	▲***	▲***	▲***
Producers' share (fn1) (fn2).....	***	***	***	***	***	***
Importers' share (fn1):						
Cambodia.....	***	***	***	▲***	▼***	▲***
Malaysia.....	***	***	***	▲***	▲***	▲***
Thailand.....	***	***	***	▲***	▲***	▲***
Vietnam.....	***	***	***	▲***	▲***	▼***
Subject sources.....	***	***	***	▲***	▲***	▲***
Nonsubject sources.....	***	***	***	▼***	▼***	▼***
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.....	***	***	***	▲***	▲***	▲***
Nonsubject sources.....	***	***	***	▼***	▼***	▼***
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-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 changes		
	Calendar year			Comparison years		
	2021	2022	2023	2021-23	2021-22	2022-23
U.S. importers' U.S. shipments of imports from: Continued						
Subject sources:						
Quantity.....	***	***	***	▲ ***	▲ ***	▲ ***
Value.....	***	***	***	▲ ***	▲ ***	▲ ***
Unit value.....	***	***	***	▲ ***	▲ ***	▼ ***
Ending inventory quantity.....	***	***	***	▲ ***	▲ ***	▲ ***
Nonsubject sources:						
Quantity.....	***	***	***	▲ ***	▼ ***	▲ ***
Value.....	***	***	***	▲ ***	▲ ***	▲ ***
Unit value.....	***	***	***	▲ ***	▲ ***	▼ ***
Ending inventory quantity.....	***	***	***	▲ ***	▼ ***	▲ ***
All import sources:						
Quantity.....	***	***	***	▲ ***	▲ ***	▲ ***
Value.....	***	***	***	▲ ***	▲ ***	▲ ***
Unit value.....	***	***	***	▲ ***	▲ ***	▼ ***
Ending inventory quantity.....	***	***	***	▲ ***	▲ ***	▲ ***
U.S. producers' (fn3):						
Practical capacity quantity.....	***	***	***	▲ ***	▲ ***	▲ ***
Production quantity.....	***	***	***	▲ ***	▲ ***	▲ ***
Capacity utilization (fn1).....	***	***	***	▼ ***	▲ ***	▼ ***
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.....	***	***	***	▲ ***	▲ ***	▼ ***
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-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 changes		
	Calendar year			Comparison years		
	2021	2022	2023	2021-23	2021-22	2022-23
U.S. producers' (fn3): Continued						
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. 508-compliant tables for these data are contained in parts III, IV, VI, and VII 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.

fn1.--Reported data are in percent and period changes are in percentage points.

fn2.--Quantity for U.S. producers' U.S. shipments is zero as there are no domestically produced cells to assemble into modules. Value for U.S. producers' U.S. shipments reflects 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 for module production only.

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 changes		
	Calendar year			Comparison years		
	2021	2022	2023	2021-23	2021-22	2022-23
U.S. consumption quantity:						
Amount.....	***	***	***	▲***	▲***	▲***
Producers' share (fn1).....	***	***	***	***	***	***
Importers' share (fn1):						
Cambodia (KH).....	***	***	***	***	***	***
Malaysia.....	***	***	***	▲***	▲***	▼***
Thailand (TH).....	***	***	***	▼***	▼***	▲***
Vietnam.....	***	***	***	▼***	▼***	▼***
Subject sources.....	***	***	***	▲***	▲***	▼***
Subject less KH and TH.....	***	***	***	▲***	▲***	▼***
Nonsubject sources.....	***	***	***	▼***	▼***	▲***
Nonsubject plus KH and TH.....	***	***	***	▼***	▼***	▲***
All import sources.....	100.0	100.0	100.0	---	---	---
U.S. consumption value:						
Amount.....	***	***	***	▲***	▲***	▼***
Producers' share (fn1).....	***	***	***	***	***	***
Importers' share (fn1):						
Cambodia (KH).....	***	***	***	***	***	***
Malaysia.....	***	***	***	▲***	▲***	▼***
Thailand (TH).....	***	***	***	▼***	▼***	▲***
Vietnam.....	***	***	***	▼***	▼***	▼***
Subject sources.....	***	***	***	▲***	▲***	▼***
Subject less KH and TH.....	***	***	***	▲***	▲***	▼***
Nonsubject sources.....	***	***	***	▼***	▼***	▲***
Nonsubject plus KH and TH.....	***	***	***	▼***	▼***	▲***
All import sources.....	100.0	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 changes		
	Calendar year			Comparison years		
	2021	2022	2023	2021-23	2021-22	2022-23
U.S. importers' U.S. shipments of imports from: Continued						
Subject sources:						
Quantity.....	***	***	***	▲ ***	▲ ***	▲ ***
Value.....	***	***	***	▲ ***	▲ ***	▼ ***
Unit value.....	***	***	***	▲ ***	▲ ***	▼ ***
Ending inventory quantity.....	***	***	***	▲ ***	▼ ***	▲ ***
Subject less Cambodia and Thailand:						
Quantity.....	***	***	***	▲ ***	▲ ***	▲ ***
Value.....	***	***	***	▲ ***	▲ ***	▼ ***
Unit value.....	***	***	***	▲ ***	▲ ***	▼ ***
Ending inventory quantity.....	***	***	***	▲ ***	▼ ***	▲ ***
Nonsubject sources:						
Quantity.....	***	***	***	▲ ***	▼ ***	▲ ***
Value.....	***	***	***	▼ ***	▼ ***	▲ ***
Unit value.....	***	***	***	▼ ***	▲ ***	▼ ***
Ending inventory quantity.....	***	***	***	▲ ***	▼ ***	▲ ***
Nonsubject plus Cambodia and Thailand:						
Quantity.....	***	***	***	▲ ***	▼ ***	▲ ***
Value.....	***	***	***	▼ ***	▼ ***	▲ ***
Unit value.....	***	***	***	▼ ***	▲ ***	▼ ***
Ending inventory quantity.....	***	***	***	▲ ***	▼ ***	▲ ***
All import sources:						
Quantity.....	***	***	***	▲ ***	▲ ***	▲ ***
Value.....	***	***	***	▲ ***	▲ ***	▼ ***
Unit value.....	***	***	***	▲ ***	▲ ***	▼ ***
Ending inventory quantity.....	***	***	***	▲ ***	▼ ***	▲ ***

Source: Compiled from data submitted in response to Commission questionnaires. 508-compliant tables for these data are contained in appendix J 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.

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 changes		
	Calendar year			Comparison years		
	2021	2022	2023	2021-23	2021-22	2022-23
U.S. consumption quantity:						
Amount.....	***	***	***	▲***	▲***	▲***
Producers' share (fn1).....	***	***	***	▼***	▼***	▼***
Importers' share (fn1):						
Cambodia.....	***	***	***	▲***	▼***	▲***
Malaysia.....	***	***	***	▲***	▼***	▲***
Thailand.....	***	***	***	▲***	▲***	▲***
Vietnam.....	***	***	***	▲***	▲***	▲***
Subject sources.....	***	***	***	▲***	▲***	▲***
Nonsubject sources.....	***	***	***	▼***	▼***	▼***
All import sources.....	***	***	***	▲***	▲***	▲***
U.S. consumption value:						
Amount.....	***	***	***	▲***	▲***	▲***
Producers' share (fn1).....	***	***	***	▼***	▲***	▼***
Importers' share (fn1):						
Cambodia.....	***	***	***	▲***	▼***	▲***
Malaysia.....	***	***	***	▲***	▼***	▲***
Thailand.....	***	***	***	▲***	▲***	▲***
Vietnam.....	***	***	***	▲***	▲***	▲***
Subject sources.....	***	***	***	▲***	▲***	▲***
Nonsubject sources.....	***	***	***	▼***	▼***	▼***
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 changes		
	Calendar year			Comparison years		
	2021	2022	2023	2021-23	2021-22	2022-23
U.S. importers' U.S. shipments of imports from: Continued						
Subject sources:						
Quantity.....	***	***	***	▲ ***	▲ ***	▲ ***
Value.....	***	***	***	▲ ***	▲ ***	▲ ***
Unit value.....	***	***	***	▼ ***	▲ ***	▼ ***
Ending inventory quantity.....	***	***	***	▲ ***	▲ ***	▲ ***
Nonsubject sources:						
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 changes		
	Calendar year			Comparison years		
	2021	2022	2023	2021-23	2021-22	2022-23
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. 508-compliant tables for these data are contained in appendix K 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.

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**

**SEMI-FINISHED PRODUCT ANALYSIS**



**Table D-1****CSPV cells and modules: U.S. producers' narrative responses regarding the semi-finished product analysis comparing CSPV cells to CSPV modules**

<b>Factor</b>	<b>Producer name and narrative regarding semi-finished product analysis</b>
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	***
Differences in characteristics	***

Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
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Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in cost	***
Differences in cost	***



Differences in cost	***
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Differences in cost	***
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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	***
Transformation intensive	***
Transformation intensive	***

Source: Compiled from data submitted in response to Commission questionnaires.

**Table D-2**

**CSPV cells and modules: U.S. importers' narrative responses regarding the semi-finished product analysis comparing CSPV cells to CSPV modules**

<b>Factor</b>	<b>Importer name and narrative regarding semi-finished product analysis</b>
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	***
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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	***
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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.



**APPENDIX E**

**CHANGES IN GOVERNMENT INCENTIVES**



Tables E-1 through E-4 detail U.S. producers' and importers' narrative responses regarding changes in the levels or availability of government incentives since January 1, 2021 and changes in the price of conventionally generated electricity since January 1, 2021, respectively. Tables E-1 and E-2 correspond to firms' responses in table II-6, and tables E-3 and E-4 correspond to firms' responses provided in table II-7.

**Table E-1**

**CSPV products: U.S. producers' narrative descriptions on changes in government incentives since January 1, 2021, by firm**

<b>Firm</b>	<b>Narrative on changes in government incentives</b>
***	***
***	***
***	***
***	***
***	***
***	***
***	***
***	***
***	***
***	***
***	***
***	***



<b>Firm</b>	<b>Narrative on changes in government incentives</b>
***	***

Source: Compiled from data submitted in response to Commission questionnaires.

**Table E-2**

**CSPV products: U.S. importers' narrative descriptions on changes in government incentives since January 1, 2021, by firm**

<b>Firm</b>	<b>Narrative on changes in government incentives</b>
***	***
***	***
***	***
***	***
***	***
***	***

Firm	Narrative on changes in government incentives
***	***
***	***
***	***



Firm	Narrative on changes in government incentives
***	***
***	***
***	***
***	***
***	***
***	***

Source: Compiled from data submitted in response to Commission questionnaires.

**Table E-3**

**CSPV products: U.S. producers' narrative descriptions on changes in price of electricity generated from conventional energy since January 1, 2021, by firm**

Firm	Narrative on changes in price of conventionally generated electricity
***	***
***	***
***	***
***	***
***	***
***	***
***	***
***	***

Source: Compiled from data submitted in response to Commission questionnaires.

**Table E-4**

**CSPV products: U.S. importers' narrative descriptions on changes in price of electricity generated from conventional energy since January 1, 2021, by firm**

<b>Firm</b>	<b>Narrative on changes price of conventionally generated electricity</b>
***	***
***	***
***	***
***	***
***	***
***	***
***	***
***	***
***	***
***	***

Table continued on next page.

**Table E-4--Continued**

**CSPV products: U.S. importers' narrative descriptions on changes in price of electricity generated from conventional energy since January 1, 2021, by firm**

<b>Firm</b>	<b>Narrative on changes price of conventionally generated electricity</b>
***	***
***	***
***	***
***	***
***	***
***	***
***	***
***	***
***	***
***	***
***	***
***	***

**CSPV products: U.S. importers' narrative descriptions on changes in price of electricity generated from conventional energy since January 1, 2021, by firm**

<b>Firm</b>	<b>Narrative on changes price of conventionally generated electricity</b>
***	***
***	***
***	***
***	***
***	***
***	***

Source: Compiled from data submitted in response to Commission questionnaires.





## **APPENDIX F**

### **U.S. PRODUCERS' RESPONSES REGARDING CSPV CELL PRODUCTION**



**Table F-1**

**CSPV cells: Count of U.S. producers' responses regarding production of CSPV cells since January 1, 2021, by item**

Count in number of firms reporting

Item	No	Yes
Trial production commencement	13	0
Commercial production commencement	13	0
Commercial production suspension	11	0
Production prior to January 1, 2021	12	0
Business plan prepared and/or commissioned	10	4

Source: Compiled from data submitted in response to Commission questionnaires.

**Table F-2**

**CSPV cells: U.S. producers' projected future CSPV cells practical capacity, production, by period**

Capacity and production in kilowatts; utilization in percent

Measure	2024	2025
Capacity	***	***
Trial production	***	***
Commercial production	***	***
All production	***	***
Capacity utilization	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

Note: \*\*\*



**APPENDIX G**

**U.S. PRODUCERS' BUSINESS MODELS**



**Table G-1**

**CSPV cells and modules: \*\*\*'s business model for U.S. net sales of CSPV modules, by CSPV cell origin and period**

Quantity in kilowatts; Value in 1,000 dollars; Unit values in dollars per kilowatt; Shares in percent

CSPV cell origin	Measure	2021	2022	2023
Net sales of modules: using domestic cells	Quantity	***	***	***
Net sales of modules: using subject cells	Quantity	***	***	***
Net sales of modules: using nonsubject cells	Quantity	***	***	***
Net sales of modules: using cells of any origin	Quantity	***	***	***
Net sales of modules: using domestic cells	Value	***	***	***
Net sales of modules: using subject cells	Value	***	***	***
Net sales of modules: using nonsubject cells	Value	***	***	***
Net sales of modules: using cells of any origin	Value	***	***	***
Net sales of modules: using domestic cells	Unit value	***	***	***
Net sales of modules: using subject cells	Unit value	***	***	***
Net sales of modules: using nonsubject cells	Unit value	***	***	***
Net sales of modules: using cells of any origin	Unit value	***	***	***
Net sales of modules: using domestic cells	Share of quantity	***	***	***
Net sales of modules: using subject cells	Share of quantity	***	***	***
Net sales of modules: using nonsubject cells	Share of quantity	***	***	***
Net sales of modules: using cells of any origin	Share of quantity	100.0	100.0	100.0
Net sales of modules: using domestic cells	Share of quantity	***	***	***
Net sales of modules: using subject cells	Share of quantity	***	***	***
Net sales of modules: using nonsubject cells	Share of quantity	***	***	***
Net sales of modules: using cells of any origin	Share of quantity	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 "---". Share is the share of quantity.

**Table G-2****CSPV cells and modules: \*\*\*'s imports and purchases of imports, by source, product type and period**

Quantity in kilowatts

Procurement type	Source	Product type	2021	2022	2023
Imports	Cambodia	Cells	***	***	***
Imports	Malaysia	Cells	***	***	***
Imports	Thailand	Cells	***	***	***
Imports	Vietnam	Cells	***	***	***
Imports	Subject source imports	Cells	***	***	***
Imports	Nonsubject source imports	Cells	***	***	***
Imports	All import source imports	Cells	***	***	***
Imports	Cambodia	Modules	***	***	***
Imports	Malaysia	Modules	***	***	***
Imports	Thailand	Modules	***	***	***
Imports	Vietnam	Modules	***	***	***
Imports	Subject source imports	Modules	***	***	***
Imports	Nonsubject source imports	Modules	***	***	***
Imports	All import source imports	Modules	***	***	***
Imports	Cambodia	Cells and modules	***	***	***
Imports	Malaysia	Cells and modules	***	***	***
Imports	Thailand	Cells and modules	***	***	***
Imports	Vietnam	Cells and modules	***	***	***
Imports	Subject source imports	Cells and modules	***	***	***
Imports	Nonsubject source imports	Cells and modules	***	***	***
Imports	All import source imports	Cells and modules	***	***	***
Purchases	Cambodia	Cells and modules	***	***	***
Purchases	Malaysia	Cells and modules	***	***	***
Purchases	Thailand	Cells and modules	***	***	***
Purchases	Vietnam	Cells and modules	***	***	***
Purchases	Subject source purchases	Cells and modules	***	***	***
Purchases	Nonsubject source purchases	Cells and modules	***	***	***
Purchases	All import source purchases	Cells and modules	***	***	***
Imports and purchases	Cambodia	Cells and modules	***	***	***
Imports and purchases	Malaysia	Cells and modules	***	***	***
Imports and purchases	Thailand	Cells and modules	***	***	***
Imports and purchases	Vietnam	Cells and modules	***	***	***
Imports and purchases	Subject source purchases	Cells and modules	***	***	***
Imports and purchases	Nonsubject source purchases	Cells and modules	***	***	***
Imports and purchases	All import source purchases	Cells and modules	***	***	***

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 "---". Share is the share of quantity.



**Table G-3**

**CSPV cells and modules: \*\*\*'s business model for U.S. net sales of CSPV modules, by CSPV cell origin and period**

Quantity in kilowatts; Value in 1,000 dollars; Unit values in dollars per kilowatt; Shares in percent

CSPV cell origin	Measure	2021	2022	2023
Net sales of modules: using domestic cells	Quantity	***	***	***
Net sales of modules: using subject cells	Quantity	***	***	***
Net sales of modules: using nonsubject cells	Quantity	***	***	***
Net sales of modules: using cells of any origin	Quantity	***	***	***
Net sales of modules: using domestic cells	Value	***	***	***
Net sales of modules: using subject cells	Value	***	***	***
Net sales of modules: using nonsubject cells	Value	***	***	***
Net sales of modules: using cells of any origin	Value	***	***	***
Net sales of modules: using domestic cells	Unit value	***	***	***
Net sales of modules: using subject cells	Unit value	***	***	***
Net sales of modules: using nonsubject cells	Unit value	***	***	***
Net sales of modules: using cells of any origin	Unit value	***	***	***
Net sales of modules: using domestic cells	Share of quantity	***	***	***
Net sales of modules: using subject cells	Share of quantity	***	***	***
Net sales of modules: using nonsubject cells	Share of quantity	***	***	***
Net sales of modules: using cells of any origin	Share of quantity	---	---	---
Net sales of modules: using domestic cells	Share of quantity	***	***	***
Net sales of modules: using subject cells	Share of quantity	***	***	***
Net sales of modules: using nonsubject cells	Share of quantity	***	***	***
Net sales of modules: using cells of any origin	Share of quantity	---	---	---

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 "---". Share is the share of quantity.

**Table G-4**  
**CSPV cells and modules: \*\*\*'s imports and purchases of imports, by source, product type and period**

Quantity in kilowatts

Procurement type	Source	Product type	2021	2022	2023
Imports	Cambodia	Cells	***	***	***
Imports	Malaysia	Cells	***	***	***
Imports	Thailand	Cells	***	***	***
Imports	Vietnam	Cells	***	***	***
Imports	Subject source imports	Cells	***	***	***
Imports	Nonsubject source imports	Cells	***	***	***
Imports	All import source imports	Cells	***	***	***
Imports	Cambodia	Modules	***	***	***
Imports	Malaysia	Modules	***	***	***
Imports	Thailand	Modules	***	***	***
Imports	Vietnam	Modules	***	***	***
Imports	Subject source imports	Modules	***	***	***
Imports	Nonsubject source imports	Modules	***	***	***
Imports	All import source imports	Modules	***	***	***
Imports	Cambodia	Cells and modules	***	***	***
Imports	Malaysia	Cells and modules	***	***	***
Imports	Thailand	Cells and modules	***	***	***
Imports	Vietnam	Cells and modules	***	***	***
Imports	Subject source imports	Cells and modules	***	***	***
Imports	Nonsubject source imports	Cells and modules	***	***	***
Imports	All import source imports	Cells and modules	***	***	***
Purchases	Cambodia	Cells and modules	***	***	***
Purchases	Malaysia	Cells and modules	***	***	***
Purchases	Thailand	Cells and modules	***	***	***
Purchases	Vietnam	Cells and modules	***	***	***
Purchases	Subject source purchases	Cells and modules	***	***	***
Purchases	Nonsubject source purchases	Cells and modules	***	***	***
Purchases	All import source purchases	Cells and modules	***	***	***
Imports and purchases	Cambodia	Cells and modules	***	***	***
Imports and purchases	Malaysia	Cells and modules	***	***	***
Imports and purchases	Thailand	Cells and modules	***	***	***
Imports and purchases	Vietnam	Cells and modules	***	***	***
Imports and purchases	Subject source purchases	Cells and modules	***	***	***
Imports and purchases	Nonsubject source purchases	Cells and modules	***	***	***
Imports and purchases	All import source purchases	Cells and modules	***	***	***

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 "---". Share is the share of quantity.

**Table G-5**

**CSPV cells and modules: \*\*\*'s business model for U.S. net sales of CSPV modules, by CSPV cell origin and period**

Quantity in kilowatts; Value in 1,000 dollars; Unit values in dollars per kilowatt; Shares in percent

CSPV cell origin	Measure	2021	2022	2023
Net sales of modules: using domestic cells	Quantity	***	***	***
Net sales of modules: using subject cells	Quantity	***	***	***
Net sales of modules: using nonsubject cells	Quantity	***	***	***
Net sales of modules: using cells of any origin	Quantity	***	***	***
Net sales of modules: using domestic cells	Value	***	***	***
Net sales of modules: using subject cells	Value	***	***	***
Net sales of modules: using nonsubject cells	Value	***	***	***
Net sales of modules: using cells of any origin	Value	***	***	***
Net sales of modules: using domestic cells	Unit value	***	***	***
Net sales of modules: using subject cells	Unit value	***	***	***
Net sales of modules: using nonsubject cells	Unit value	***	***	***
Net sales of modules: using cells of any origin	Unit value	***	***	***
Net sales of modules: using domestic cells	Share of quantity	***	***	***
Net sales of modules: using subject cells	Share of quantity	***	***	***
Net sales of modules: using nonsubject cells	Share of quantity	***	***	***
Net sales of modules: using cells of any origin	Share of quantity	---	100.0	100.0
Net sales of modules: using domestic cells	Share of quantity	***	***	***
Net sales of modules: using subject cells	Share of quantity	***	***	***
Net sales of modules: using nonsubject cells	Share of quantity	***	***	***
Net sales of modules: using cells of any origin	Share of quantity	---	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 "---". Share is the share of quantity.

**Table G-6****CSPV cells and modules: \*\*\*'s imports and purchases of imports, by source, product type and period**

Quantity in kilowatts

Procurement type	Source	Product type	2021	2022	2023
Imports	Cambodia	Cells	***	***	***
Imports	Malaysia	Cells	***	***	***
Imports	Thailand	Cells	***	***	***
Imports	Vietnam	Cells	***	***	***
Imports	Subject source imports	Cells	***	***	***
Imports	Nonsubject source imports	Cells	***	***	***
Imports	All import source imports	Cells	***	***	***
Imports	Cambodia	Modules	***	***	***
Imports	Malaysia	Modules	***	***	***
Imports	Thailand	Modules	***	***	***
Imports	Vietnam	Modules	***	***	***
Imports	Subject source imports	Modules	***	***	***
Imports	Nonsubject source imports	Modules	***	***	***
Imports	All import source imports	Modules	***	***	***
Imports	Cambodia	Cells and modules	***	***	***
Imports	Malaysia	Cells and modules	***	***	***
Imports	Thailand	Cells and modules	***	***	***
Imports	Vietnam	Cells and modules	***	***	***
Imports	Subject source imports	Cells and modules	***	***	***
Imports	Nonsubject source imports	Cells and modules	***	***	***
Imports	All import source imports	Cells and modules	***	***	***
Purchases	Cambodia	Cells and modules	***	***	***
Purchases	Malaysia	Cells and modules	***	***	***
Purchases	Thailand	Cells and modules	***	***	***
Purchases	Vietnam	Cells and modules	***	***	***
Purchases	Subject source purchases	Cells and modules	***	***	***
Purchases	Nonsubject source purchases	Cells and modules	***	***	***
Purchases	All import source purchases	Cells and modules	***	***	***
Imports and purchases	Cambodia	Cells and modules	***	***	***
Imports and purchases	Malaysia	Cells and modules	***	***	***
Imports and purchases	Thailand	Cells and modules	***	***	***
Imports and purchases	Vietnam	Cells and modules	***	***	***
Imports and purchases	Subject source purchases	Cells and modules	***	***	***
Imports and purchases	Nonsubject source purchases	Cells and modules	***	***	***
Imports and purchases	All import source purchases	Cells and modules	***	***	***

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 "---". Share is the share of quantity.

**Table G-7**

**CSPV cells and modules: \*\*\*'s business model for U.S. net sales of CSPV modules, by CSPV cell origin and period**

Quantity in kilowatts; Value in 1,000 dollars; Unit values in dollars per kilowatt; Shares in percent

CSPV cell origin	Measure	2021	2022	2023
Net sales of modules: using domestic cells	Quantity	***	***	***
Net sales of modules: using subject cells	Quantity	***	***	***
Net sales of modules: using nonsubject cells	Quantity	***	***	***
Net sales of modules: using cells of any origin	Quantity	***	***	***
Net sales of modules: using domestic cells	Value	***	***	***
Net sales of modules: using subject cells	Value	***	***	***
Net sales of modules: using nonsubject cells	Value	***	***	***
Net sales of modules: using cells of any origin	Value	***	***	***
Net sales of modules: using domestic cells	Unit value	***	***	***
Net sales of modules: using subject cells	Unit value	***	***	***
Net sales of modules: using nonsubject cells	Unit value	***	***	***
Net sales of modules: using cells of any origin	Unit value	***	***	***
Net sales of modules: using domestic cells	Share of quantity	***	***	***
Net sales of modules: using subject cells	Share of quantity	***	***	***
Net sales of modules: using nonsubject cells	Share of quantity	***	***	***
Net sales of modules: using cells of any origin	Share of quantity	100.0	100.0	100.0
Net sales of modules: using domestic cells	Share of quantity	***	***	***
Net sales of modules: using subject cells	Share of quantity	***	***	***
Net sales of modules: using nonsubject cells	Share of quantity	***	***	***
Net sales of modules: using cells of any origin	Share of quantity	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 "---". Share is the share of quantity.

**Table G-8**  
**CSPV cells and modules: \*\*\*'s imports and purchases of imports, by source, product type and period**

Quantity in kilowatts

Procurement type	Source	Product type	2021	2022	2023
Imports	Cambodia	Cells	***	***	***
Imports	Malaysia	Cells	***	***	***
Imports	Thailand	Cells	***	***	***
Imports	Vietnam	Cells	***	***	***
Imports	Subject source imports	Cells	***	***	***
Imports	Nonsubject source imports	Cells	***	***	***
Imports	All import source imports	Cells	***	***	***
Imports	Cambodia	Modules	***	***	***
Imports	Malaysia	Modules	***	***	***
Imports	Thailand	Modules	***	***	***
Imports	Vietnam	Modules	***	***	***
Imports	Subject source imports	Modules	***	***	***
Imports	Nonsubject source imports	Modules	***	***	***
Imports	All import source imports	Modules	***	***	***
Imports	Cambodia	Cells and modules	***	***	***
Imports	Malaysia	Cells and modules	***	***	***
Imports	Thailand	Cells and modules	***	***	***
Imports	Vietnam	Cells and modules	***	***	***
Imports	Subject source imports	Cells and modules	***	***	***
Imports	Nonsubject source imports	Cells and modules	***	***	***
Imports	All import source imports	Cells and modules	***	***	***
Purchases	Cambodia	Cells and modules	***	***	***
Purchases	Malaysia	Cells and modules	***	***	***
Purchases	Thailand	Cells and modules	***	***	***
Purchases	Vietnam	Cells and modules	***	***	***
Purchases	Subject source purchases	Cells and modules	***	***	***
Purchases	Nonsubject source purchases	Cells and modules	***	***	***
Purchases	All import source purchases	Cells and modules	***	***	***
Imports and purchases	Cambodia	Cells and modules	***	***	***
Imports and purchases	Malaysia	Cells and modules	***	***	***
Imports and purchases	Thailand	Cells and modules	***	***	***
Imports and purchases	Vietnam	Cells and modules	***	***	***
Imports and purchases	Subject source purchases	Cells and modules	***	***	***
Imports and purchases	Nonsubject source purchases	Cells and modules	***	***	***
Imports and purchases	All import source purchases	Cells and modules	***	***	***

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 "---". Share is the share of quantity.

**Table G-9**

**CSPV cells and modules: \*\*\*'s business model for U.S. net sales of CSPV modules, by CSPV cell origin and period**

Quantity in kilowatts; Value in 1,000 dollars; Unit values in dollars per kilowatt; Shares in percent

CSPV cell origin	Measure	2021	2022	2023
Net sales of modules: using domestic cells	Quantity	***	***	***
Net sales of modules: using subject cells	Quantity	***	***	***
Net sales of modules: using nonsubject cells	Quantity	***	***	***
Net sales of modules: using cells of any origin	Quantity	***	***	***
Net sales of modules: using domestic cells	Value	***	***	***
Net sales of modules: using subject cells	Value	***	***	***
Net sales of modules: using nonsubject cells	Value	***	***	***
Net sales of modules: using cells of any origin	Value	***	***	***
Net sales of modules: using domestic cells	Unit value	***	***	***
Net sales of modules: using subject cells	Unit value	***	***	***
Net sales of modules: using nonsubject cells	Unit value	***	***	***
Net sales of modules: using cells of any origin	Unit value	***	***	***
Net sales of modules: using domestic cells	Share of quantity	***	***	***
Net sales of modules: using subject cells	Share of quantity	***	***	***
Net sales of modules: using nonsubject cells	Share of quantity	***	***	***
Net sales of modules: using cells of any origin	Share of quantity	---	---	100.0
Net sales of modules: using domestic cells	Share of quantity	***	***	***
Net sales of modules: using subject cells	Share of quantity	***	***	***
Net sales of modules: using nonsubject cells	Share of quantity	***	***	***
Net sales of modules: using cells of any origin	Share of quantity	---	---	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 "---". Share is the share of quantity.

**Table G-10****CSPV cells and modules: \*\*\*'s imports and purchases of imports, by source, product type and period**

Quantity in kilowatts

Procurement type	Source	Product type	2021	2022	2023
Imports	Cambodia	Cells	***	***	***
Imports	Malaysia	Cells	***	***	***
Imports	Thailand	Cells	***	***	***
Imports	Vietnam	Cells	***	***	***
Imports	Subject source imports	Cells	***	***	***
Imports	Nonsubject source imports	Cells	***	***	***
Imports	All import source imports	Cells	***	***	***
Imports	Cambodia	Modules	***	***	***
Imports	Malaysia	Modules	***	***	***
Imports	Thailand	Modules	***	***	***
Imports	Vietnam	Modules	***	***	***
Imports	Subject source imports	Modules	***	***	***
Imports	Nonsubject source imports	Modules	***	***	***
Imports	All import source imports	Modules	***	***	***
Imports	Cambodia	Cells and modules	***	***	***
Imports	Malaysia	Cells and modules	***	***	***
Imports	Thailand	Cells and modules	***	***	***
Imports	Vietnam	Cells and modules	***	***	***
Imports	Subject source imports	Cells and modules	***	***	***
Imports	Nonsubject source imports	Cells and modules	***	***	***
Imports	All import source imports	Cells and modules	***	***	***
Purchases	Cambodia	Cells and modules	***	***	***
Purchases	Malaysia	Cells and modules	***	***	***
Purchases	Thailand	Cells and modules	***	***	***
Purchases	Vietnam	Cells and modules	***	***	***
Purchases	Subject source purchases	Cells and modules	***	***	***
Purchases	Nonsubject source purchases	Cells and modules	***	***	***
Purchases	All import source purchases	Cells and modules	***	***	***
Imports and purchases	Cambodia	Cells and modules	***	***	***
Imports and purchases	Malaysia	Cells and modules	***	***	***
Imports and purchases	Thailand	Cells and modules	***	***	***
Imports and purchases	Vietnam	Cells and modules	***	***	***
Imports and purchases	Subject source purchases	Cells and modules	***	***	***
Imports and purchases	Nonsubject source purchases	Cells and modules	***	***	***
Imports and purchases	All import source purchases	Cells and modules	***	***	***

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 "---". Share is the share of quantity.



**Table G-11**

**CSPV cells and modules: \*\*\*'s business model for U.S. net sales of CSPV modules, by CSPV cell origin and period**

Quantity in kilowatts; Value in 1,000 dollars; Unit values in dollars per kilowatt; Shares in percent

CSPV cell origin	Measure	2021	2022	2023
Net sales of modules: using domestic cells	Quantity	***	***	***
Net sales of modules: using subject cells	Quantity	***	***	***
Net sales of modules: using nonsubject cells	Quantity	***	***	***
Net sales of modules: using cells of any origin	Quantity	***	***	***
Net sales of modules: using domestic cells	Value	***	***	***
Net sales of modules: using subject cells	Value	***	***	***
Net sales of modules: using nonsubject cells	Value	***	***	***
Net sales of modules: using cells of any origin	Value	***	***	***
Net sales of modules: using domestic cells	Unit value	***	***	***
Net sales of modules: using subject cells	Unit value	***	***	***
Net sales of modules: using nonsubject cells	Unit value	***	***	***
Net sales of modules: using cells of any origin	Unit value	***	***	***
Net sales of modules: using domestic cells	Share of quantity	***	***	***
Net sales of modules: using subject cells	Share of quantity	***	***	***
Net sales of modules: using nonsubject cells	Share of quantity	***	***	***
Net sales of modules: using cells of any origin	Share of quantity	100.0	100.0	100.0
Net sales of modules: using domestic cells	Share of quantity	***	***	***
Net sales of modules: using subject cells	Share of quantity	***	***	***
Net sales of modules: using nonsubject cells	Share of quantity	***	***	***
Net sales of modules: using cells of any origin	Share of quantity	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 "---". Share is the share of quantity.

**Table G-12****CSPV cells and modules: \*\*\*'s imports and purchases of imports, by source, product type and period**

Quantity in kilowatts

Procurement type	Source	Product type	2021	2022	2023
Imports	Cambodia	Cells	***	***	***
Imports	Malaysia	Cells	***	***	***
Imports	Thailand	Cells	***	***	***
Imports	Vietnam	Cells	***	***	***
Imports	Subject source imports	Cells	***	***	***
Imports	Nonsubject source imports	Cells	***	***	***
Imports	All import source imports	Cells	***	***	***
Imports	Cambodia	Modules	***	***	***
Imports	Malaysia	Modules	***	***	***
Imports	Thailand	Modules	***	***	***
Imports	Vietnam	Modules	***	***	***
Imports	Subject source imports	Modules	***	***	***
Imports	Nonsubject source imports	Modules	***	***	***
Imports	All import source imports	Modules	***	***	***
Imports	Cambodia	Cells and modules	***	***	***
Imports	Malaysia	Cells and modules	***	***	***
Imports	Thailand	Cells and modules	***	***	***
Imports	Vietnam	Cells and modules	***	***	***
Imports	Subject source imports	Cells and modules	***	***	***
Imports	Nonsubject source imports	Cells and modules	***	***	***
Imports	All import source imports	Cells and modules	***	***	***
Purchases	Cambodia	Cells and modules	***	***	***
Purchases	Malaysia	Cells and modules	***	***	***
Purchases	Thailand	Cells and modules	***	***	***
Purchases	Vietnam	Cells and modules	***	***	***
Purchases	Subject source purchases	Cells and modules	***	***	***
Purchases	Nonsubject source purchases	Cells and modules	***	***	***
Purchases	All import source purchases	Cells and modules	***	***	***
Imports and purchases	Cambodia	Cells and modules	***	***	***
Imports and purchases	Malaysia	Cells and modules	***	***	***
Imports and purchases	Thailand	Cells and modules	***	***	***
Imports and purchases	Vietnam	Cells and modules	***	***	***
Imports and purchases	Subject source purchases	Cells and modules	***	***	***
Imports and purchases	Nonsubject source purchases	Cells and modules	***	***	***
Imports and purchases	All import source purchases	Cells and modules	***	***	***

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 "---". Share is the share of quantity.

**Table G-13**

**CSPV cells and modules: \*\*\*'s business model for U.S. net sales of CSPV modules, by CSPV cell origin and period**

Quantity in kilowatts; Value in 1,000 dollars; Unit values in dollars per kilowatt; Shares in percent

CSPV cell origin	Measure	2021	2022	2023
Net sales of modules: using domestic cells	Quantity	***	***	***
Net sales of modules: using subject cells	Quantity	***	***	***
Net sales of modules: using nonsubject cells	Quantity	***	***	***
Net sales of modules: using cells of any origin	Quantity	***	***	***
Net sales of modules: using domestic cells	Value	***	***	***
Net sales of modules: using subject cells	Value	***	***	***
Net sales of modules: using nonsubject cells	Value	***	***	***
Net sales of modules: using cells of any origin	Value	***	***	***
Net sales of modules: using domestic cells	Unit value	***	***	***
Net sales of modules: using subject cells	Unit value	***	***	***
Net sales of modules: using nonsubject cells	Unit value	***	***	***
Net sales of modules: using cells of any origin	Unit value	***	***	***
Net sales of modules: using domestic cells	Share of quantity	***	***	***
Net sales of modules: using subject cells	Share of quantity	***	***	***
Net sales of modules: using nonsubject cells	Share of quantity	***	***	***
Net sales of modules: using cells of any origin	Share of quantity	100.0	100.0	---
Net sales of modules: using domestic cells	Share of quantity	***	***	***
Net sales of modules: using subject cells	Share of quantity	***	***	***
Net sales of modules: using nonsubject cells	Share of quantity	***	***	***
Net sales of modules: using cells of any origin	Share of quantity	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 "---". Share is the share of quantity.

**Table G-14****CSPV cells and modules: \*\*\*'s imports and purchases of imports, by source, product type and period**

Quantity in kilowatts

Procurement type	Source	Product type	2021	2022	2023
Imports	Cambodia	Cells	***	***	***
Imports	Malaysia	Cells	***	***	***
Imports	Thailand	Cells	***	***	***
Imports	Vietnam	Cells	***	***	***
Imports	Subject source imports	Cells	***	***	***
Imports	Nonsubject source imports	Cells	***	***	***
Imports	All import source imports	Cells	***	***	***
Imports	Cambodia	Modules	***	***	***
Imports	Malaysia	Modules	***	***	***
Imports	Thailand	Modules	***	***	***
Imports	Vietnam	Modules	***	***	***
Imports	Subject source imports	Modules	***	***	***
Imports	Nonsubject source imports	Modules	***	***	***
Imports	All import source imports	Modules	***	***	***
Imports	Cambodia	Cells and modules	***	***	***
Imports	Malaysia	Cells and modules	***	***	***
Imports	Thailand	Cells and modules	***	***	***
Imports	Vietnam	Cells and modules	***	***	***
Imports	Subject source imports	Cells and modules	***	***	***
Imports	Nonsubject source imports	Cells and modules	***	***	***
Imports	All import source imports	Cells and modules	***	***	***
Purchases	Cambodia	Cells and modules	***	***	***
Purchases	Malaysia	Cells and modules	***	***	***
Purchases	Thailand	Cells and modules	***	***	***
Purchases	Vietnam	Cells and modules	***	***	***
Purchases	Subject source purchases	Cells and modules	***	***	***
Purchases	Nonsubject source purchases	Cells and modules	***	***	***
Purchases	All import source purchases	Cells and modules	***	***	***
Imports and purchases	Cambodia	Cells and modules	***	***	***
Imports and purchases	Malaysia	Cells and modules	***	***	***
Imports and purchases	Thailand	Cells and modules	***	***	***
Imports and purchases	Vietnam	Cells and modules	***	***	***
Imports and purchases	Subject source purchases	Cells and modules	***	***	***
Imports and purchases	Nonsubject source purchases	Cells and modules	***	***	***
Imports and purchases	All import source purchases	Cells and modules	***	***	***

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 "---". Share is the share of quantity.

**Table G-15**

**CSPV cells and modules: \*\*\*'s business model for U.S. net sales of CSPV modules, by CSPV cell origin and period**

Quantity in kilowatts; Value in 1,000 dollars; Unit values in dollars per kilowatt; Shares in percent

CSPV cell origin	Measure	2021	2022	2023
Net sales of modules: using domestic cells	Quantity	***	***	***
Net sales of modules: using subject cells	Quantity	***	***	***
Net sales of modules: using nonsubject cells	Quantity	***	***	***
Net sales of modules: using cells of any origin	Quantity	***	***	***
Net sales of modules: using domestic cells	Value	***	***	***
Net sales of modules: using subject cells	Value	***	***	***
Net sales of modules: using nonsubject cells	Value	***	***	***
Net sales of modules: using cells of any origin	Value	***	***	***
Net sales of modules: using domestic cells	Unit value	***	***	***
Net sales of modules: using subject cells	Unit value	***	***	***
Net sales of modules: using nonsubject cells	Unit value	***	***	***
Net sales of modules: using cells of any origin	Unit value	***	***	***
Net sales of modules: using domestic cells	Share of quantity	***	***	***
Net sales of modules: using subject cells	Share of quantity	***	***	***
Net sales of modules: using nonsubject cells	Share of quantity	***	***	***
Net sales of modules: using cells of any origin	Share of quantity	100.0	100.0	100.0
Net sales of modules: using domestic cells	Share of quantity	***	***	***
Net sales of modules: using subject cells	Share of quantity	***	***	***
Net sales of modules: using nonsubject cells	Share of quantity	***	***	***
Net sales of modules: using cells of any origin	Share of quantity	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 "---". Share is the share of quantity.

**Table G-16****CSPV cells and modules: \*\*\*'s imports and purchases of imports, by source, product type and period**

Quantity in kilowatts

Procurement type	Source	Product type	2021	2022	2023
Imports	Cambodia	Cells	***	***	***
Imports	Malaysia	Cells	***	***	***
Imports	Thailand	Cells	***	***	***
Imports	Vietnam	Cells	***	***	***
Imports	Subject source imports	Cells	***	***	***
Imports	Nonsubject source imports	Cells	***	***	***
Imports	All import source imports	Cells	***	***	***
Imports	Cambodia	Modules	***	***	***
Imports	Malaysia	Modules	***	***	***
Imports	Thailand	Modules	***	***	***
Imports	Vietnam	Modules	***	***	***
Imports	Subject source imports	Modules	***	***	***
Imports	Nonsubject source imports	Modules	***	***	***
Imports	All import source imports	Modules	***	***	***
Imports	Cambodia	Cells and modules	***	***	***
Imports	Malaysia	Cells and modules	***	***	***
Imports	Thailand	Cells and modules	***	***	***
Imports	Vietnam	Cells and modules	***	***	***
Imports	Subject source imports	Cells and modules	***	***	***
Imports	Nonsubject source imports	Cells and modules	***	***	***
Imports	All import source imports	Cells and modules	***	***	***
Purchases	Cambodia	Cells and modules	***	***	***
Purchases	Malaysia	Cells and modules	***	***	***
Purchases	Thailand	Cells and modules	***	***	***
Purchases	Vietnam	Cells and modules	***	***	***
Purchases	Subject source purchases	Cells and modules	***	***	***
Purchases	Nonsubject source purchases	Cells and modules	***	***	***
Purchases	All import source purchases	Cells and modules	***	***	***
Imports and purchases	Cambodia	Cells and modules	***	***	***
Imports and purchases	Malaysia	Cells and modules	***	***	***
Imports and purchases	Thailand	Cells and modules	***	***	***
Imports and purchases	Vietnam	Cells and modules	***	***	***
Imports and purchases	Subject source purchases	Cells and modules	***	***	***
Imports and purchases	Nonsubject source purchases	Cells and modules	***	***	***
Imports and purchases	All import source purchases	Cells and modules	***	***	***

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 "---". Share is the share of quantity.

**Table G-17**

**CSPV cells and modules: \*\*\*'s business model for U.S. net sales of CSPV modules, by CSPV cell origin and period**

Quantity in kilowatts; Value in 1,000 dollars; Unit values in dollars per kilowatt; Shares in percent

CSPV cell origin	Measure	2021	2022	2023
Net sales of modules: using domestic cells	Quantity	***	***	***
Net sales of modules: using subject cells	Quantity	***	***	***
Net sales of modules: using nonsubject cells	Quantity	***	***	***
Net sales of modules: using cells of any origin	Quantity	***	***	***
Net sales of modules: using domestic cells	Value	***	***	***
Net sales of modules: using subject cells	Value	***	***	***
Net sales of modules: using nonsubject cells	Value	***	***	***
Net sales of modules: using cells of any origin	Value	***	***	***
Net sales of modules: using domestic cells	Unit value	***	***	***
Net sales of modules: using subject cells	Unit value	***	***	***
Net sales of modules: using nonsubject cells	Unit value	***	***	***
Net sales of modules: using cells of any origin	Unit value	***	***	***
Net sales of modules: using domestic cells	Share of quantity	***	***	***
Net sales of modules: using subject cells	Share of quantity	***	***	***
Net sales of modules: using nonsubject cells	Share of quantity	***	***	***
Net sales of modules: using cells of any origin	Share of quantity	100.0	100.0	100.0
Net sales of modules: using domestic cells	Share of quantity	***	***	***
Net sales of modules: using subject cells	Share of quantity	***	***	***
Net sales of modules: using nonsubject cells	Share of quantity	***	***	***
Net sales of modules: using cells of any origin	Share of quantity	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 "---". Share is the share of quantity.

**Table G-18****CSPV cells and modules: \*\*\*'s imports and purchases of imports, by source, product type and period**

Quantity in kilowatts

Procurement type	Source	Product type	2021	2022	2023
Imports	Cambodia	Cells	***	***	***
Imports	Malaysia	Cells	***	***	***
Imports	Thailand	Cells	***	***	***
Imports	Vietnam	Cells	***	***	***
Imports	Subject source imports	Cells	***	***	***
Imports	Nonsubject source imports	Cells	***	***	***
Imports	All import source imports	Cells	***	***	***
Imports	Cambodia	Modules	***	***	***
Imports	Malaysia	Modules	***	***	***
Imports	Thailand	Modules	***	***	***
Imports	Vietnam	Modules	***	***	***
Imports	Subject source imports	Modules	***	***	***
Imports	Nonsubject source imports	Modules	***	***	***
Imports	All import source imports	Modules	***	***	***
Imports	Cambodia	Cells and modules	***	***	***
Imports	Malaysia	Cells and modules	***	***	***
Imports	Thailand	Cells and modules	***	***	***
Imports	Vietnam	Cells and modules	***	***	***
Imports	Subject source imports	Cells and modules	***	***	***
Imports	Nonsubject source imports	Cells and modules	***	***	***
Imports	All import source imports	Cells and modules	***	***	***
Purchases	Cambodia	Cells and modules	***	***	***
Purchases	Malaysia	Cells and modules	***	***	***
Purchases	Thailand	Cells and modules	***	***	***
Purchases	Vietnam	Cells and modules	***	***	***
Purchases	Subject source purchases	Cells and modules	***	***	***
Purchases	Nonsubject source purchases	Cells and modules	***	***	***
Purchases	All import source purchases	Cells and modules	***	***	***
Imports and purchases	Cambodia	Cells and modules	***	***	***
Imports and purchases	Malaysia	Cells and modules	***	***	***
Imports and purchases	Thailand	Cells and modules	***	***	***
Imports and purchases	Vietnam	Cells and modules	***	***	***
Imports and purchases	Subject source purchases	Cells and modules	***	***	***
Imports and purchases	Nonsubject source purchases	Cells and modules	***	***	***
Imports and purchases	All import source purchases	Cells and modules	***	***	***

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 "---". Share is the share of quantity.



**Table G-19**

**CSPV cells and modules: \*\*\*'s business model for U.S. net sales of CSPV modules, by CSPV cell origin and period**

Quantity in kilowatts; Value in 1,000 dollars; Unit values in dollars per kilowatt; Shares in percent

CSPV cell origin	Measure	2021	2022	2023
Net sales of modules: using domestic cells	Quantity	***	***	***
Net sales of modules: using subject cells	Quantity	***	***	***
Net sales of modules: using nonsubject cells	Quantity	***	***	***
Net sales of modules: using cells of any origin	Quantity	***	***	***
Net sales of modules: using domestic cells	Value	***	***	***
Net sales of modules: using subject cells	Value	***	***	***
Net sales of modules: using nonsubject cells	Value	***	***	***
Net sales of modules: using cells of any origin	Value	***	***	***
Net sales of modules: using domestic cells	Unit value	***	***	***
Net sales of modules: using subject cells	Unit value	***	***	***
Net sales of modules: using nonsubject cells	Unit value	***	***	***
Net sales of modules: using cells of any origin	Unit value	***	***	***
Net sales of modules: using domestic cells	Share of quantity	***	***	***
Net sales of modules: using subject cells	Share of quantity	***	***	***
Net sales of modules: using nonsubject cells	Share of quantity	***	***	***
Net sales of modules: using cells of any origin	Share of quantity	100.0	100.0	100.0
Net sales of modules: using domestic cells	Share of quantity	***	***	***
Net sales of modules: using subject cells	Share of quantity	***	***	***
Net sales of modules: using nonsubject cells	Share of quantity	***	***	***
Net sales of modules: using cells of any origin	Share of quantity	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 "---". Share is the share of quantity.

**Table G-20****CSPV cells and modules: \*\*\*'s imports and purchases of imports, by source, product type and period**

Quantity in kilowatts

Procurement type	Source	Product type	2021	2022	2023
Imports	Cambodia	Cells	***	***	***
Imports	Malaysia	Cells	***	***	***
Imports	Thailand	Cells	***	***	***
Imports	Vietnam	Cells	***	***	***
Imports	Subject source imports	Cells	***	***	***
Imports	Nonsubject source imports	Cells	***	***	***
Imports	All import source imports	Cells	***	***	***
Imports	Cambodia	Modules	***	***	***
Imports	Malaysia	Modules	***	***	***
Imports	Thailand	Modules	***	***	***
Imports	Vietnam	Modules	***	***	***
Imports	Subject source imports	Modules	***	***	***
Imports	Nonsubject source imports	Modules	***	***	***
Imports	All import source imports	Modules	***	***	***
Imports	Cambodia	Cells and modules	***	***	***
Imports	Malaysia	Cells and modules	***	***	***
Imports	Thailand	Cells and modules	***	***	***
Imports	Vietnam	Cells and modules	***	***	***
Imports	Subject source imports	Cells and modules	***	***	***
Imports	Nonsubject source imports	Cells and modules	***	***	***
Imports	All import source imports	Cells and modules	***	***	***
Purchases	Cambodia	Cells and modules	***	***	***
Purchases	Malaysia	Cells and modules	***	***	***
Purchases	Thailand	Cells and modules	***	***	***
Purchases	Vietnam	Cells and modules	***	***	***
Purchases	Subject source purchases	Cells and modules	***	***	***
Purchases	Nonsubject source purchases	Cells and modules	***	***	***
Purchases	All import source purchases	Cells and modules	***	***	***
Imports and purchases	Cambodia	Cells and modules	***	***	***
Imports and purchases	Malaysia	Cells and modules	***	***	***
Imports and purchases	Thailand	Cells and modules	***	***	***
Imports and purchases	Vietnam	Cells and modules	***	***	***
Imports and purchases	Subject source purchases	Cells and modules	***	***	***
Imports and purchases	Nonsubject source purchases	Cells and modules	***	***	***
Imports and purchases	All import source purchases	Cells and modules	***	***	***

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 "---". Share is the share of quantity.

**Table G-21**

**CSPV cells and modules: \*\*\*'s business model for U.S. net sales of CSPV modules, by CSPV cell origin and period**

Quantity in kilowatts; Value in 1,000 dollars; Unit values in dollars per kilowatt; Shares in percent

CSPV cell origin	Measure	2021	2022	2023
Net sales of modules: using domestic cells	Quantity	***	***	***
Net sales of modules: using subject cells	Quantity	***	***	***
Net sales of modules: using nonsubject cells	Quantity	***	***	***
Net sales of modules: using cells of any origin	Quantity	***	***	***
Net sales of modules: using domestic cells	Value	***	***	***
Net sales of modules: using subject cells	Value	***	***	***
Net sales of modules: using nonsubject cells	Value	***	***	***
Net sales of modules: using cells of any origin	Value	***	***	***
Net sales of modules: using domestic cells	Unit value	***	***	***
Net sales of modules: using subject cells	Unit value	***	***	***
Net sales of modules: using nonsubject cells	Unit value	***	***	***
Net sales of modules: using cells of any origin	Unit value	***	***	***
Net sales of modules: using domestic cells	Share of quantity	***	***	***
Net sales of modules: using subject cells	Share of quantity	***	***	***
Net sales of modules: using nonsubject cells	Share of quantity	***	***	***
Net sales of modules: using cells of any origin	Share of quantity	---	100.0	100.0
Net sales of modules: using domestic cells	Share of quantity	***	***	***
Net sales of modules: using subject cells	Share of quantity	***	***	***
Net sales of modules: using nonsubject cells	Share of quantity	***	***	***
Net sales of modules: using cells of any origin	Share of quantity	---	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 "---". Share is the share of quantity.

**Table G-22****CSPV cells and modules: \*\*\*'s imports and purchases of imports, by source, product type and period**

Quantity in kilowatts

Procurement type	Source	Product type	2021	2022	2023
Imports	Cambodia	Cells	***	***	***
Imports	Malaysia	Cells	***	***	***
Imports	Thailand	Cells	***	***	***
Imports	Vietnam	Cells	***	***	***
Imports	Subject source imports	Cells	***	***	***
Imports	Nonsubject source imports	Cells	***	***	***
Imports	All import source imports	Cells	***	***	***
Imports	Cambodia	Modules	***	***	***
Imports	Malaysia	Modules	***	***	***
Imports	Thailand	Modules	***	***	***
Imports	Vietnam	Modules	***	***	***
Imports	Subject source imports	Modules	***	***	***
Imports	Nonsubject source imports	Modules	***	***	***
Imports	All import source imports	Modules	***	***	***
Imports	Cambodia	Cells and modules	***	***	***
Imports	Malaysia	Cells and modules	***	***	***
Imports	Thailand	Cells and modules	***	***	***
Imports	Vietnam	Cells and modules	***	***	***
Imports	Subject source imports	Cells and modules	***	***	***
Imports	Nonsubject source imports	Cells and modules	***	***	***
Imports	All import source imports	Cells and modules	***	***	***
Purchases	Cambodia	Cells and modules	***	***	***
Purchases	Malaysia	Cells and modules	***	***	***
Purchases	Thailand	Cells and modules	***	***	***
Purchases	Vietnam	Cells and modules	***	***	***
Purchases	Subject source purchases	Cells and modules	***	***	***
Purchases	Nonsubject source purchases	Cells and modules	***	***	***
Purchases	All import source purchases	Cells and modules	***	***	***
Imports and purchases	Cambodia	Cells and modules	***	***	***
Imports and purchases	Malaysia	Cells and modules	***	***	***
Imports and purchases	Thailand	Cells and modules	***	***	***
Imports and purchases	Vietnam	Cells and modules	***	***	***
Imports and purchases	Subject source purchases	Cells and modules	***	***	***
Imports and purchases	Nonsubject source purchases	Cells and modules	***	***	***
Imports and purchases	All import source purchases	Cells and modules	***	***	***

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 "---". Share is the share of quantity.

**Table G-23**

**CSPV cells and modules: \*\*\*'s business model for U.S. net sales of CSPV modules, by CSPV cell origin and period**

Quantity in kilowatts; Value in 1,000 dollars; Unit values in dollars per kilowatt; Shares in percent

CSPV cell origin	Measure	2021	2022	2023
Net sales of modules: using domestic cells	Quantity	***	***	***
Net sales of modules: using subject cells	Quantity	***	***	***
Net sales of modules: using nonsubject cells	Quantity	***	***	***
Net sales of modules: using cells of any origin	Quantity	***	***	***
Net sales of modules: using domestic cells	Value	***	***	***
Net sales of modules: using subject cells	Value	***	***	***
Net sales of modules: using nonsubject cells	Value	***	***	***
Net sales of modules: using cells of any origin	Value	***	***	***
Net sales of modules: using domestic cells	Unit value	***	***	***
Net sales of modules: using subject cells	Unit value	***	***	***
Net sales of modules: using nonsubject cells	Unit value	***	***	***
Net sales of modules: using cells of any origin	Unit value	***	***	***
Net sales of modules: using domestic cells	Share of quantity	***	***	***
Net sales of modules: using subject cells	Share of quantity	***	***	***
Net sales of modules: using nonsubject cells	Share of quantity	***	***	***
Net sales of modules: using cells of any origin	Share of quantity	100.0	---	---
Net sales of modules: using domestic cells	Share of quantity	***	***	***
Net sales of modules: using subject cells	Share of quantity	***	***	***
Net sales of modules: using nonsubject cells	Share of quantity	***	***	***
Net sales of modules: using cells of any origin	Share of quantity	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 "---". Share is the share of quantity.

**Table G-24****CSPV cells and modules: \*\*\*'s imports and purchases of imports, by source, product type and period**

Quantity in kilowatts

Procurement type	Source	Product type	2021	2022	2023
Imports	Cambodia	Cells	***	***	***
Imports	Malaysia	Cells	***	***	***
Imports	Thailand	Cells	***	***	***
Imports	Vietnam	Cells	***	***	***
Imports	Subject source imports	Cells	***	***	***
Imports	Nonsubject source imports	Cells	***	***	***
Imports	All import source imports	Cells	***	***	***
Imports	Cambodia	Modules	***	***	***
Imports	Malaysia	Modules	***	***	***
Imports	Thailand	Modules	***	***	***
Imports	Vietnam	Modules	***	***	***
Imports	Subject source imports	Modules	***	***	***
Imports	Nonsubject source imports	Modules	***	***	***
Imports	All import source imports	Modules	***	***	***
Imports	Cambodia	Cells and modules	***	***	***
Imports	Malaysia	Cells and modules	***	***	***
Imports	Thailand	Cells and modules	***	***	***
Imports	Vietnam	Cells and modules	***	***	***
Imports	Subject source imports	Cells and modules	***	***	***
Imports	Nonsubject source imports	Cells and modules	***	***	***
Imports	All import source imports	Cells and modules	***	***	***

Table continued.

**Table G-24 Continued****CSPV cells and modules: \*\*\*'s imports and purchases of imports, by source, product type and period**

Quantity in kilowatts

Procurement type	Source	Product type	2021	2022	2023
Purchases	Cambodia	Cells and modules	***	***	***
Purchases	Malaysia	Cells and modules	***	***	***
Purchases	Thailand	Cells and modules	***	***	***
Purchases	Vietnam	Cells and modules	***	***	***
Purchases	Subject source purchases	Cells and modules	***	***	***
Purchases	Nonsubject source purchases	Cells and modules	***	***	***
Purchases	All import source purchases	Cells and modules	***	***	***
Imports and purchases	Cambodia	Cells and modules	***	***	***
Imports and purchases	Malaysia	Cells and modules	***	***	***
Imports and purchases	Thailand	Cells and modules	***	***	***
Imports and purchases	Vietnam	Cells and modules	***	***	***
Imports and purchases	Subject source purchases	Cells and modules	***	***	***
Imports and purchases	Nonsubject source purchases	Cells and modules	***	***	***
Imports and purchases	All import source purchases	Cells and modules	***	***	***

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 "---". Share is the share of quantity.





**APPENDIX H**  
**NEGLIGENCE**



**Table H-1**

**CSPV cells and modules: U.S. imports in the twelve month period preceding the filing of the petition excluding product from China and all circumventing firms, April 2023 through March 2024**

Quantity in kilowatts; Share of quantity in percent

Source of imports	Quantity	Share of quantity
Cambodia	***	***
Malaysia	***	***
Thailand	***	***
Vietnam	***	***
All subject sources	***	***
All other sources	***	***
All import sources	***	100.0

Source: Compiled from data submitted in response to Commission questionnaires and official U.S. import statistics of the U.S. Department of Commerce Census Bureau using HTS statistical reporting numbers using HTS statistical reporting numbers 8541.40.6015, 8541.40.6025, 8541.40.6035, 8541.40.6045, 8541.42.0010 and 8541.43.0010, accessed May 7, 2024. Imports area based on the imports for consumption data series.

Note: Questionnaire responses were used for non-circumventing petition source data. The all other sources and all import sources data have been adjusted to exclude product from China (official import statistics) and circumventing firms from petition sources (official import statistics for each subject source minus the reported non-circumventing questionnaire data).



**APPENDIX J**

**TRADE DATA REGARDING CSPV CELLS**



**Table J-1**  
**CSPV cells: Share of U.S. shipments by source, channel of distribution, and period**

Shares in percent

Source	Channel	2021	2022	2023
Cambodia	Assemblers	***	***	***
Cambodia	Distributors	***	***	***
Cambodia	Installers	***	***	***
Cambodia	Utilities	***	***	***
Malaysia	Assemblers	***	***	***
Malaysia	Distributors	***	***	***
Malaysia	Installers	***	***	***
Malaysia	Utilities	***	***	***
Thailand	Assemblers	***	***	***
Thailand	Distributors	***	***	***
Thailand	Installers	***	***	***
Thailand	Utilities	***	***	***
Vietnam	Assemblers	***	***	***
Vietnam	Distributors	***	***	***
Vietnam	Installers	***	***	***
Vietnam	Utilities	***	***	***
Subject	Assemblers	***	***	***
Subject	Distributors	***	***	***
Subject	Installers	***	***	***
Subject	Utilities	***	***	***
Subject less Cambodia and Thailand	Assemblers	***	***	***
Subject less Cambodia and Thailand	Distributors	***	***	***
Subject less Cambodia and Thailand	Installers	***	***	***
Subject less Cambodia and Thailand	Utilities	***	***	***
Nonsubject	Assemblers	***	***	***
Nonsubject	Distributors	***	***	***
Nonsubject	Installers	***	***	***
Nonsubject	Utilities	***	***	***
Nonsubject plus Cambodia and Thailand	Assemblers	***	***	***
Nonsubject plus Cambodia and Thailand	Distributors	***	***	***
Nonsubject plus Cambodia and Thailand	Installers	***	***	***
Nonsubject plus Cambodia and Thailand	Utilities	***	***	***
All imports	Assemblers	***	***	***
All imports	Distributors	***	***	***
All imports	Installers	***	***	***
All imports	Utilities	***	***	***

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 J-2**  
**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	2021	2022	2023
Cambodia	Quantity	***	***	***
Malaysia	Quantity	***	***	***
Thailand	Quantity	***	***	***
Vietnam	Quantity	***	***	***
Subject sources	Quantity	***	***	***
Subject less Cambodia and Thailand	Quantity	***	***	***
Nonsubject sources	Quantity	***	***	***
Nonsubject plus Cambodia and Thailand	Quantity	***	***	***
All import sources	Quantity	***	***	***
Cambodia	Value	***	***	***
Malaysia	Value	***	***	***
Thailand	Value	***	***	***
Vietnam	Value	***	***	***
Subject sources	Value	***	***	***
Subject less Cambodia and Thailand	Quantity	***	***	***
Nonsubject sources	Value	***	***	***
Nonsubject plus Cambodia and Thailand	Quantity	***	***	***
All import sources	Value	***	***	***
Cambodia	Unit value	***	***	***
Malaysia	Unit value	***	***	***
Thailand	Unit value	***	***	***
Vietnam	Unit value	***	***	***
Subject sources	Unit value	***	***	***
Subject less Cambodia and Thailand	Quantity	***	***	***
Nonsubject sources	Unit value	***	***	***
Nonsubject plus Cambodia and Thailand	Quantity	***	***	***
All import sources	Unit value	***	***	***

Table continued.



**Table J-2 Continued**  
**CSPV cells: U.S. imports, by source and period**

Shares and ratios in percent; Ratios represent the ratio to U.S. production (CSPV modules only)

Source	Measure	2021	2022	2023
Cambodia	Share of quantity	***	***	***
Malaysia	Share of quantity	***	***	***
Thailand	Share of quantity	***	***	***
Vietnam	Share of quantity	***	***	***
Subject sources	Share of quantity	***	***	***
Subject less Cambodia and Thailand	Share of quantity	***	***	***
Nonsubject sources	Share of quantity	***	***	***
Nonsubject 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 less Cambodia and Thailand	Share of value	***	***	***
Nonsubject sources	Share of value	***	***	***
Nonsubject 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 less Cambodia and Thailand	Ratio	***	***	***
Nonsubject sources	Ratio	***	***	***
Nonsubject plus Cambodia and Thailand	Ratio	***	***	***
All import 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 "---".

**Figure J-1**  
**CSPV cells: U.S. import quantities and average unit values, by source and period**

\* \* \* \* \*

Source: Compiled from data submitted in response to Commission questionnaires.

**Table J-3**  
**CSPV cells: U.S. producers' and/or their affiliates' U.S. imports, by source and period**

Quantity in kilowatts; Ratio in percent

Source	Measure	2021	2022	2023
Cambodia	Quantity	***	***	***
Malaysia	Quantity	***	***	***
Thailand	Quantity	***	***	***
Vietnam	Quantity	***	***	***
Subject sources	Quantity	***	***	***
Nonsubject sources	Quantity	***	***	***
All import sources	Quantity	***	***	***
Cambodia	Ratio	***	***	***
Malaysia	Ratio	***	***	***
Thailand	Ratio	***	***	***
Vietnam	Ratio	***	***	***
Subject sources	Ratio	***	***	***
Nonsubject sources	Ratio	***	***	***
All import 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 "---". Ratio calculated as the quantity of imports by U.S. producers and affiliates relative to U.S. imports as shown in table J-2.

**Table J-4**

**CSPV cells: U.S. imports in the twelve month period preceeding the filing of the petition, April 2023 through March 2024**

Quantity in kilowatts; Share of quantity in percent

Source of imports	Quantity	Share of quantity
Cambodia	***	***
Malaysia	***	***
Thailand	***	***
Vietnam	***	***
All other sources	***	***
All import sources	***	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 "---".

**Table J-5****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	2021	2022	2023
U.S. producers	Quantity	***	***	***
Cambodia	Quantity	***	***	***
Malaysia	Quantity	***	***	***
Thailand	Quantity	***	***	***
Vietnam	Quantity	***	***	***
Subject sources	Quantity	***	***	***
Subject less Cambodia and Thailand	Quantity	***	***	***
Nonsubject sources	Quantity	***	***	***
Nonsubject 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 less Cambodia and Thailand	Share	***	***	***
Nonsubject sources	Share	***	***	***
Nonsubject 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.

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 J-2**  
**CSPV cells: Apparent U.S. consumption based on quantity data, by source and period**

\* \* \* \* \*

Source: Compiled from data submitted in response to Commission questionnaires.

**Table J-6****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	2021	2022	2023
U.S. producers	Value	***	***	***
Cambodia	Value	***	***	***
Malaysia	Value	***	***	***
Thailand	Value	***	***	***
Vietnam	Value	***	***	***
Subject sources	Value	***	***	***
Subject less Cambodia and Thailand	Value	***	***	***
Nonsubject sources	Value	***	***	***
Nonsubject plus Cambodia and Thailand	Value	***	***	***
All import sources	Value	***	***	***
All sources	Value	***	***	***
U.S. producers	Share	***	***	***
Cambodia	Share	***	***	***
Malaysia	Share	***	***	***
Thailand	Share	***	***	***
Vietnam	Share	***	***	***
Subject sources	Share	***	***	***
Subject less Cambodia and Thailand	Share	***	***	***
Nonsubject sources	Share	***	***	***
Nonsubject 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.

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 J-3**  
**CSPV cells: Apparent U.S. consumption based on value data, by source and period**

\* \* \* \* \*

Source: Compiled from data submitted in response to Commission questionnaires.

**Table J-7**  
**CSPV cells: Data on foreign industries in Cambodia and Thailand, by item and period**

Quantity in kilowatts

Item	2021	2022	2023	Projection 2024	Projection 2025
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 J-7 Continued****CSPV cells: Data on foreign industries in Cambodia and Thailand, by item and period**

Shares and ratios in percent

Item	2021	2022	2023	Projection 2024	Projection 2025
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 "---".



**Table J-8**  
**CSPV cells: U.S. importers' inventories and their ratio to select items, by source and period**

Quantity in kilowatts; Ratios in percent

Measure	Source	2021	2022	2023
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	***	***	***
Ratio to imports	Subject	***	***	***
Ratio to U.S. shipments of imports	Subject	***	***	***
Ratio to total Shipments of imports	Subject	***	***	***
Inventories quantity	Subject less Cambodia and Thailand	***	***	***
Ratio to imports	Subject less Cambodia and Thailand	***	***	***
Ratio to U.S. shipments of imports	Subject less Cambodia and Thailand	***	***	***
Ratio to total Shipments of imports	Subject less Cambodia and Thailand	***	***	***
Inventories quantity	Nonsubject	***	***	***
Ratio to imports	Nonsubject	***	***	***
Ratio to U.S. shipments of imports	Nonsubject	***	***	***
Ratio to total Shipments of imports	Nonsubject	***	***	***
Inventories quantity	Nonsubject plus Cambodia and Thailand	***	***	***
Ratio to imports	Nonsubject plus Cambodia and Thailand	***	***	***
Ratio to U.S. shipments of imports	Nonsubject plus Cambodia and Thailand	***	***	***
Ratio to total Shipments of imports	Nonsubject plus Cambodia and Thailand	***	***	***
Inventories quantity	All	***	***	***
Ratio to imports	All	***	***	***
Ratio to U.S. shipments of imports	All	***	***	***
Ratio to total Shipments of imports	All	***	***	***

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 J-9**  
**CSPV cells: Arranged imports, by source and by period**

Quantity in kilowatts: Share in percent

Source	Measure	Jan-Mar 2024	Apr-Jun 2024	Jul-Sep 2024	Oct-Dec 2024	Total
Cambodia	Quantity	***	***	***	***	***
Malaysia	Quantity	***	***	***	***	***
Thailand	Quantity	***	***	***	***	***
Vietnam	Quantity	***	***	***	***	***
Subject sources	Quantity	***	***	***	***	***
Subject less Cambodia and Thailand	Quantity	***	***	***	***	***
Nonsubject sources	Quantity	***	***	***	***	***
Nonsubject plus Cambodia and Thailand	Quantity	***	***	***	***	***
All import sources	Quantity	***	***	***	***	***
Cambodia	Share	***	***	***	***	***
Malaysia	Share	***	***	***	***	***
Thailand	Share	***	***	***	***	***
Vietnam	Share	***	***	***	***	***
Subject sources	Share	***	***	***	***	***
Subject less Cambodia and Thailand	Share	***	***	***	***	***
Nonsubject sources	Share	***	***	***	***	***
Nonsubject plus Cambodia and Thailand	Share	***	***	***	***	***
All import sources	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 "---".

**APPENDIX K**

**TRADE DATA REGARDING CSPV MODULES**



**Table K-1****CSPV modules: Share of U.S. shipments by source, channel of distribution, and period**

Shares in percent

Source	Channel	2021	2022	2023
United States	Assemblers	***	***	***
United States	Distributors	***	***	***
United States	Installers	***	***	***
United States	Utilities	***	***	***
Cambodia	Assemblers	***	***	***
Cambodia	Distributors	***	***	***
Cambodia	Installers	***	***	***
Cambodia	Utilities	***	***	***
Malaysia	Assemblers	***	***	***
Malaysia	Distributors	***	***	***
Malaysia	Installers	***	***	***
Malaysia	Utilities	***	***	***
Thailand	Assemblers	***	***	***
Thailand	Distributors	***	***	***
Thailand	Installers	***	***	***
Thailand	Utilities	***	***	***
Vietnam	Assemblers	***	***	***
Vietnam	Distributors	***	***	***
Vietnam	Installers	***	***	***
Vietnam	Utilities	***	***	***
Subject	Assemblers	***	***	***
Subject	Distributors	***	***	***
Subject	Installers	***	***	***
Subject	Utilities	***	***	***
Nonsubject	Assemblers	***	***	***
Nonsubject	Distributors	***	***	***
Nonsubject	Installers	***	***	***
Nonsubject	Utilities	***	***	***
All imports	Assemblers	***	***	***
All imports	Distributors	***	***	***
All imports	Installers	***	***	***
All imports	Utilities	***	***	***

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 K-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	2021	2022	2023
Cambodia	Quantity	***	***	***
Malaysia	Quantity	***	***	***
Thailand	Quantity	***	***	***
Vietnam	Quantity	***	***	***
Subject sources	Quantity	***	***	***
Nonsubject sources	Quantity	***	***	***
All import sources	Quantity	***	***	***
Cambodia	Value	***	***	***
Malaysia	Value	***	***	***
Thailand	Value	***	***	***
Vietnam	Value	***	***	***
Subject sources	Value	***	***	***
Nonsubject sources	Value	***	***	***
All import sources	Value	***	***	***
Cambodia	Unit value	***	***	***
Malaysia	Unit value	***	***	***
Thailand	Unit value	***	***	***
Vietnam	Unit value	***	***	***
Subject sources	Unit value	***	***	***
Nonsubject sources	Unit value	***	***	***
All import sources	Unit value	***	***	***

Table continued.

**Table K-2 Continued**  
**CSPV modules: U.S. imports, by source and period**

Shares and ratios in percent; Ratios represent the ratio to U.S. production (CSPV modules only)

Source	Measure	2021	2022	2023
Cambodia	Share of quantity	***	***	***
Malaysia	Share of quantity	***	***	***
Thailand	Share of quantity	***	***	***
Vietnam	Share of quantity	***	***	***
Subject sources	Share of quantity	***	***	***
Nonsubject sources	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	***	***	***
Nonsubject sources	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	***	***	***
Nonsubject sources	Ratio	***	***	***
All import 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 "---".

**Figure K-1**  
**CSPV modules: U.S. import quantities and average unit values, by source and period**

\* \* \* \* \*

Source: Compiled from data submitted in response to Commission questionnaires.

**Table K-3**  
**CSPV modules: U.S. producers' and/or their affiliates' U.S. imports, by source and period**

Quantity in kilowatts; Ratio in percent

Source	Measure	2021	2022	2023
Cambodia	Quantity	***	***	***
Malaysia	Quantity	***	***	***
Thailand	Quantity	***	***	***
Vietnam	Quantity	***	***	***
Subject sources	Quantity	***	***	***
Nonsubject sources	Quantity	***	***	***
All import sources	Quantity	***	***	***
Cambodia	Ratio	***	***	***
Malaysia	Ratio	***	***	***
Thailand	Ratio	***	***	***
Vietnam	Ratio	***	***	***
Subject sources	Ratio	***	***	***
Nonsubject sources	Ratio	***	***	***
All import 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 "---". Ratio calculated as the quantity of imports by U.S. producers and affiliates relative to U.S. imports as shown in table K-2.



**Table K-4**

**CSPV modules: U.S. imports in the twelve month period preceding the filing of the petition, April 2023 through March 2024**

Quantity in kilowatts; Share of quantity in percent

Source of imports	Quantity	Share of quantity
Cambodia	***	***
Malaysia	***	***
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 8541.40.6015, 8541.40.6025, 8541.40.6035, 8541.40.6045, 8541.42.0010 and 8541.43.0010 accessed May 16, 2024.

Note: \*\*\*.

**Table K-5**

**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	2021	2022	2023
U.S. producers	Quantity	***	***	***
Cambodia	Quantity	***	***	***
Malaysia	Quantity	***	***	***
Thailand	Quantity	***	***	***
Vietnam	Quantity	***	***	***
Subject sources	Quantity	***	***	***
Nonsubject sources	Quantity	***	***	***
All import sources	Quantity	***	***	***
All sources	Quantity	***	***	***
U.S. producers	Share	***	***	***
Cambodia	Share	***	***	***
Malaysia	Share	***	***	***
Thailand	Share	***	***	***
Vietnam	Share	***	***	***
Subject sources	Share	***	***	***
Nonsubject sources	Share	***	***	***
All import sources	Share	***	***	***
All sources	Share	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 K-2**

**CSPV modules: Apparent U.S. consumption based on quantity data, by source and period**

\* \* \* \* \*

Source: Compiled from data submitted in response to Commission questionnaires.

**Table K-6****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	2021	2022	2023
U.S. producers	Value	***	***	***
Cambodia	Value	***	***	***
Malaysia	Value	***	***	***
Thailand	Value	***	***	***
Vietnam	Value	***	***	***
Subject sources	Value	***	***	***
Nonsubject sources	Value	***	***	***
All import sources	Value	***	***	***
All sources	Value	***	***	***
U.S. producers	Share	***	***	***
Cambodia	Share	***	***	***
Malaysia	Share	***	***	***
Thailand	Share	***	***	***
Vietnam	Share	***	***	***
Subject sources	Share	***	***	***
Nonsubject sources	Share	***	***	***
All import sources	Share	***	***	***
All sources	Share	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 K-3**

**CSPV modules: Apparent U.S. consumption based on value data, by source and period**

\* \* \* \* \*

Source: Compiled from data submitted in response to Commission questionnaires.

**Table K-7****CSPV modules: U.S. importers' inventories and their ratio to select items, by source and period**

Quantity in kilowatts; Ratios in percent

Measure	Source	2021	2022	2023
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	***	***	***
Ratio to imports	Subject	***	***	***
Ratio to U.S. shipments of imports	Subject	***	***	***
Ratio to total Shipments of imports	Subject	***	***	***
Inventories quantity	Nonsubject	***	***	***
Ratio to imports	Nonsubject	***	***	***
Ratio to U.S. shipments of imports	Nonsubject	***	***	***
Ratio to total Shipments of imports	Nonsubject	***	***	***
Inventories quantity	All	***	***	***
Ratio to imports	All	***	***	***
Ratio to U.S. shipments of imports	All	***	***	***
Ratio to total Shipments of imports	All	***	***	***

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 K-8**  
**CSPV modules: Arranged imports, by source and by period**

Quantity in kilowatts: Share in percent

Source	Measure	Jan-Mar 2024	Apr-Jun 2024	Jul-Sep 2024	Oct-Dec 2024	Total
Cambodia	Quantity	***	***	***	***	***
Malaysia	Quantity	***	***	***	***	***
Thailand	Quantity	***	***	***	***	***
Vietnam	Quantity	***	***	***	***	***
Subject sources	Quantity	***	***	***	***	***
Nonsubject sources	Quantity	***	***	***	***	***
All import sources	Quantity	***	***	***	***	***
Cambodia	Share	***	***	***	***	***
Malaysia	Share	***	***	***	***	***
Thailand	Share	***	***	***	***	***
Vietnam	Share	***	***	***	***	***
Subject sources	Share	***	***	***	***	***
Nonsubject sources	Share	***	***	***	***	***
All import sources	Share	100.0	100.0	100.0	100.0	100.0

Source: Compiled from data submitted in response to Commission questionnaires.

**APPENDIX L**

**MARKET FOR CSPV MODULES**





**Table L-1**  
**CSPV modules: Market for CSPV modules to assemblers**

Quantity in kilowatts; Share and ratio in percent; Ratios are to CSPV modules overall apparent consumption as presented in table K-5

Source	Measure	2021	2022	2023
U.S. producers	Quantity	***	***	***
Cambodia	Quantity	***	***	***
Malaysia	Quantity	***	***	***
Thailand	Quantity	***	***	***
Vietnam	Quantity	***	***	***
Subject sources	Quantity	***	***	***
Nonsubject sources	Quantity	***	***	***
All import sources	Quantity	***	***	***
All sources	Quantity	***	***	***
U.S. producers	Share	***	***	***
Cambodia	Share	***	***	***
Malaysia	Share	***	***	***
Thailand	Share	***	***	***
Vietnam	Share	***	***	***
Subject sources	Share	***	***	***
Nonsubject sources	Share	***	***	***
All import sources	Share	***	***	***
All sources	Share	***	***	***
U.S. producers	Ratio	***	***	***
Cambodia	Ratio	***	***	***
Malaysia	Ratio	***	***	***
Thailand	Ratio	***	***	***
Vietnam	Ratio	***	***	***
Subject sources	Ratio	***	***	***
Nonsubject sources	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 "---". \*\*\*.

**Table L-2**  
**CSPV modules: Market for CSPV modules to distributors**

Quantity in kilowatts; Share and ratio in percent; Ratios are to CSPV modules overall apparent consumption as presented in table K-5

Source	Measure	2021	2022	2023
U.S. producers	Quantity	***	***	***
Cambodia	Quantity	***	***	***
Malaysia	Quantity	***	***	***
Thailand	Quantity	***	***	***
Vietnam	Quantity	***	***	***
Subject sources	Quantity	***	***	***
Nonsubject sources	Quantity	***	***	***
All import sources	Quantity	***	***	***
All sources	Quantity	***	***	***
U.S. producers	Share	***	***	***
Cambodia	Share	***	***	***
Malaysia	Share	***	***	***
Thailand	Share	***	***	***
Vietnam	Share	***	***	***
Subject sources	Share	***	***	***
Nonsubject sources	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	***	***	***
Nonsubject sources	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 "---". \*\*\*.

**Table L-3**  
**CSPV modules: Market for CSPV modules to installers**

Quantity in kilowatts; Share and ratio in percent; Ratios are to CSPV modules overall apparent consumption as presented in table K-5

Source	Measure	2021	2022	2023
U.S. producers	Quantity	***	***	***
Cambodia	Quantity	***	***	***
Malaysia	Quantity	***	***	***
Thailand	Quantity	***	***	***
Vietnam	Quantity	***	***	***
Subject sources	Quantity	***	***	***
Nonsubject sources	Quantity	***	***	***
All import sources	Quantity	***	***	***
All sources	Quantity	***	***	***
U.S. producers	Share	***	***	***
Cambodia	Share	***	***	***
Malaysia	Share	***	***	***
Thailand	Share	***	***	***
Vietnam	Share	***	***	***
Subject sources	Share	***	***	***
Nonsubject sources	Share	***	***	***
All import sources	Share	***	***	***
All sources	Share	***	***	***
U.S. producers	Ratio	***	***	***
Cambodia	Ratio	***	***	***
Malaysia	Ratio	***	***	***
Thailand	Ratio	***	***	***
Vietnam	Ratio	***	***	***
Subject sources	Ratio	***	***	***
Nonsubject sources	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 "---". \*\*\*.

**Table L-4**  
**CSPV modules: Market for CSPV modules to utilities**

Quantity in kilowatts; Share and ratio in percent; Ratios are to CSPV modules overall apparent consumption as presented in table K-5

Source	Measure	2021	2022	2023
U.S. producers	Quantity	***	***	***
Cambodia	Quantity	***	***	***
Malaysia	Quantity	***	***	***
Thailand	Quantity	***	***	***
Vietnam	Quantity	***	***	***
Subject sources	Quantity	***	***	***
Nonsubject sources	Quantity	***	***	***
All import sources	Quantity	***	***	***
All sources	Quantity	***	***	***
U.S. producers	Share	***	***	***
Cambodia	Share	***	***	***
Malaysia	Share	***	***	***
Thailand	Share	***	***	***
Vietnam	Share	***	***	***
Subject sources	Share	***	***	***
Nonsubject sources	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	***	***	***
Nonsubject sources	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 "---". \*\*\*.