Certain Crystalline Silicon Photovoltaic Products from China and Taiwan

Investigation Nos. 701-TA-511 and 731-TA-1246-1247 (Review)

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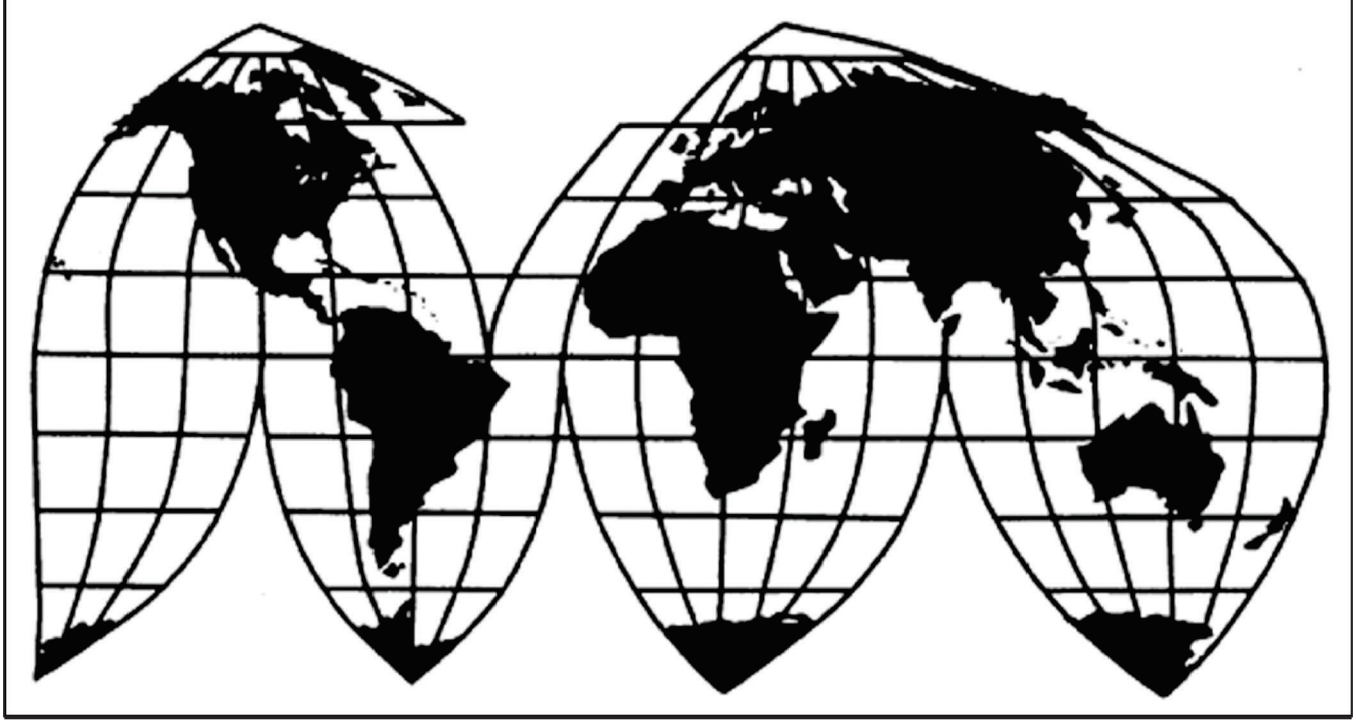

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Secretary to the Commission
United States International Trade Commission
Washington, DC 20436

U.S. International Trade Commission

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UNITED STATES INTERNATIONAL TRADE COMMISSION

Investigation Nos. 701-TA-511 and 731-TA-1246-1247 (Review)

Certain Crystalline Silicon Photovoltaic Products from China and Taiwan

DETERMINATIONS

On the basis of the record[1] developed in the subject five-year reviews, the United States International Trade Commission ("Commission") determines, pursuant to the Tariff Act of 1930 ("the Act"), that revocation of the countervailing and antidumping duty orders on certain crystalline silicon photovoltaic products ("CSPV products") from China and the antidumping duty order on CSPV products from Taiwan would be likely to lead to continuation or recurrence of material injury to an industry in the United States within a reasonably foreseeable time.

BACKGROUND

The Commission instituted these reviews on January 2, 2020 (85 FR 120) and determined on April 6, 2020 that it would conduct expedited review (85 FR 42430, July 14, 2020).

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

Views of the Commission

Based on the record in these five-year reviews, we determine under section 751(c) of the Tariff Act of 1930, as amended ("the Tariff Act"), that revocation of the countervailing duty order on certain crystalline silicon photovoltaic ("CSPV") products from China and the antidumping duty orders on CSPV products from China and Taiwan would be likely to lead to continuation or recurrence of material injury to an industry in the United States within a reasonably foreseeable time.

I. Background

Original Investigations: The original investigations resulted from petitions filed on December 31, 2013, with the U.S. Department of Commerce ("Commerce") and the Commission by SolarWorld Industries America, Inc. ("SolarWorld"), Hillsboro, Oregon. The Commission determined on February 5, 2015, that the domestic industry was materially injured by reason of imports of CSPV products from China and Taiwan that were found by Commerce to be sold in the United States at less than fair value ("LTFV") and subsidized by the government of China.[1] On February 18, 2015, Commerce published antidumping duty orders on CSPV products from China and Taiwan and a countervailing duty order on CSPV products from China.[2]

The Current Reviews: On January 2, 2020, the Commission instituted these reviews of the antidumping duty orders on CSPV products from China and Taiwan and the countervailing duty order on CSPV products from China.[3] The Commission received responses to its notice of institution from Hanwa Q CELLS USA, Inc. ("Q CELLS") and SunPower Manufacturing Oregon LLC ("SPMOR") (collectively, "domestic interested parties"), which are domestic producers of CSPV

[1] *Certain Crystalline Silicon Photovoltaic Products from China and Taiwan*, Investigation Nos. 701-TA-511 and 731-TA-1246-1247, USITC Pub. 4519 (Feb. 2015) ("Original Determinations"). Petitioners had filed these antidumping and countervailing duty petitions covering CSPV products imported from China and Taiwan after Commerce determined that CSPV modules imported from China were not subject to earlier orders on China if they were made using CSPV cells produced in countries other than China. *Id.* at 3-4; *see infra* note 102 and accompanying text.

[2] *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. Red. 8592 (Feb. 18, 2015); *Certain Crystalline Silicon Photovoltaic Products From Taiwan: Antidumping Duty Order,* 80 Fed. Reg. 8596 (Feb. 18, 2015).

[3] *Certain Crystalline Silicon Photovoltaic Products From China and Taiwan; Institution of Five-Year Reviews,* 85 Fed. Reg. 120 (Jan. 2, 2020).

products.[4] The Commission did not receive a response to the notice of institution from any respondent interested party. On April 6, 2020, the Commission determined that the domestic interested party group response to its notice of institution was adequate and that the respondent interested party group response was inadequate.[5] It therefore determined to conduct expedited reviews.[6] The domestic interested parties each filed comments on adequacy and final comments.

U.S. industry data are based on information that the domestic producers submitted in response to the notice of institution. The responding domestic producers accounted for approximately *** percent of domestic production of CSPV products in 2019.[7] U.S. import data and related information are based on Commerce's official import statistics.[8] Foreign industry data and related information are based on information from the domestic producers, questionnaire responses from the original investigations, publicly available information gathered by staff, and the Commission's report on its monitoring of developments in the domestic industry producing CSPV products since the imposition of the safeguard measures on CSPV products.[9] One U.S. purchaser of CSPV products responded to the Commission's adequacy phase questionnaire.[10]

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[4] SPMOR is also an importer of CSPV products from ***. Confidential Report, INV-SS-036 (Mar. 25, 2020) ("CR")/ Public Report ("PR") at I-2 n.5.

[5] *Certain Crystalline Silicon Photovoltaic Products From China and Taiwan; Scheduling of Expedited Five-Year Reviews,* 85 Fed. Reg. 42430 (July 14, 2020). The Commission has determined these reviews are extraordinarily complicated and therefore has exercised its authority to extend the review period by up to 90 days pursuant to 19 U.S.C. § 1675(c)(5)(B).

[6] 85 Fed. Reg. 42430.

[7] CR/PR at Table I-1.

[8] CR/PR at I-49. Import data for 2019 contain products outside the scope of these reviews, such as thin film products. *Id.* at Table I-5.

[9] *See* CR/PR at I-53-I-67; *see also Crystalline Silicon Photovoltaic Cells, Whether or Not Partially or Fully Assembled Into Other Products: Monitoring Developments in the Domestic Industry*, Inv. No. TA-201-75 (Monitoring), USITC Publication 5021 (Feb. 2020) ("CSPV Products Monitoring Report") (EDIS Doc. 70377). We discuss imposition of the safeguard measure on CSPV products in section IV.B.3 below. Because the initial duration of the measure exceeded three years, the Commission was required to prepare a mid-term report to the President and the Congress on the results of its monitoring of developments with respect to the domestic industry since the imposition of the safeguard measure. 19 U.S.C. § 2254(a)(2).

[10] CR/PR at D-3.

II. Domestic Like Product and Industry

A. Domestic Like Product

In making its determination under section 751(c) of the Tariff Act, the Commission defines the "domestic like product" and the "industry."[11] 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 under this subtitle."[12] The Commission's practice in five-year reviews is to examine the domestic like product definition from the original investigation and consider whether the record indicates any reason to revisit the prior findings.[13]

Commerce has defined the scope of the antidumping and countervailing duty orders on CSPV products from China in these five-year reviews as follows:

> The merchandise covered by the *Order* are modules, laminates and/or panels consisting of crystalline silicon photovoltaic cells, whether or not partially or fully assembled into other products, including building integrated materials. Subject merchandise includes modules, laminates and/or panels assembled in China consisting of crystalline silicon photovoltaic cells produced in a customs territory other than China.
>
> Subject merchandise includes modules, laminates and/or panels assembled in China consisting of 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

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[11] 19 U.S.C. § 1677(4)(A).

[12] 19 U.S.C. § 1677(10); *see*, *e.g., Cleo Inc. v. United States*, 501 F.3d 1291, 1299 (Fed. Cir. 2007); *NEC Corp. v. Department of Commerce*, 36 F. Supp. 2d 380, 383 (Ct. Int'l Trade 1998); *Nippon Steel Corp. v. United States*, 19 CIT 450, 455 (1995); *Timken Co. v. United States*, 913 F. Supp. 580, 584 (Ct. Int'l Trade 1996); *Torrington Co. v. United States*, 747 F. Supp. 744, 748-49 (Ct. Int'l Trade 1990), *aff'd*, 938 F.2d 1278 (Fed. Cir. 1991); *see also* S. Rep. No. 249, 96th Cong., 1st Sess. 90-91 (1979).

[13] *See*, *e.g.*, *Internal Combustion Industrial Forklift Trucks from Japan*, Inv. No. 731-TA-377 (Second Review), USITC Pub. 3831 at 8-9 (Dec. 2005); *Crawfish Tail Meat from China*, Inv. No. 731-TA-752 (Review), USITC Pub. 3614 at 4 (July 2003); *Steel Concrete Reinforcing Bar from Turkey*, Inv. No. 731-TA-745 (Review), USITC Pub. 3577 at 4 (Feb. 2003).

not limited to, metallization and conductor patterns) to collect and forward the electricity that is generated by the cell.

Excluded from the scope of this investigation 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 this investigation are modules, laminates and/or panels assembled in China, consisting of crystalline silicon photovoltaic cells, not exceeding 10,000 mm^2 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 cells. Where more than one module, laminate and/or panel is permanently integrated into a consumer good, the surface area for purposes of this exclusion shall be the total combined surface area of all modules, laminates and/or panels that are integrated into the consumer good. Further, also excluded from the scope of this investigation are any products covered by the existing antidumping and countervailing duty orders on crystalline silicon photovoltaic cells, whether or not assembled into modules, laminates and/or panels, from China. *See 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); *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 this investigation is currently classified in the Harmonized Tariff Schedule of the United States (HTSUS) under subheadings 8501.61.0000, 8507.20.8030, 8507.20.8040, 8507.20.8060, 8507.20.8090, 8541.40.6020, 8541.40.6030 and 8501.31.8000.[14]

[14] Issues and Decision Memorandum for the Final Results of the First Expedited Sunset Review of the Antidumping Duty Orders on Certain Crystalline Silicon Photovoltaic Products from the People's Republic of China and Taiwan (May 1, 2020) at 2-3; Issues and Decision Memorandum for the Final Results of the First Expedited Sunset Review of the Countervailing Duty Order on Certain Crystalline Silicon Photovoltaic Products from the People's Republic of China (May 1, 2020) at 3.

Commerce has defined the scope of the antidumping duty order on CSPV products from Taiwan in these five-year reviews as follows:

> The merchandise covered by this order is crystalline silicon photovoltaic cells, and modules, laminates and/or panels consisting of crystalline silicon photovoltaic cells, whether or not partially or fully assembled into other products, including building integrated materials.
>
> Subject merchandise includes 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.
>
> Modules, laminates, and panels produced in a third country from cells produced in Taiwan are covered by this investigation. However, modules, laminates, and panels produced in Taiwan from cells produced in a third country are not covered by this investigation.
>
> Excluded from the scope of this investigation 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 this investigation are crystalline silicon photovoltaic cells, not exceeding 10,000 mm^2 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 cells. 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. Further, also excluded from the scope of this investigation are any products covered by the existing antidumping and countervailing duty orders on crystalline silicon photovoltaic cells, whether or not assembled into modules, from the People's Republic of China (''PRC''). Also excluded from the scope of this investigation are modules, laminates, and panels produced in the PRC from crystalline silicon photovoltaic cells produced in

> Taiwan that are covered by an existing proceeding on such modules, laminates, and panels from the PRC.
>
> Merchandise covered by this investigation is currently classified in the Harmonized Tariff Schedule of the United States (''HTSUS'') under subheadings 8501.61.0000, 8507.20.8030, 8507.20.8040, 8507.20.8060, 8507.20.8090, 8541.40.6020, 8541.40.6030 and 8501.31.8000. These HTSUS subheadings are provided for convenience and customs purposes; the written description of the scope of this investigation is dispositive.[15]

The scope of these reviews is identical to the scope of the original investigations.[16] As noted, there are other orders that cover certain CSPV imports from China. Therefore, while the Taiwan order under review includes CSPV cells produced in Taiwan, the Chinese orders under review include "modules, laminates and/or panels assembled in China consisting of crystalline silicon photovoltaic cells produced in a customs territory other than China." The Taiwan order, on the other hand, includes modules, laminates, and panels produced in a third country from cells produced in Taiwan but modules, laminates, and panels produced in Taiwan from cells produced in a third country are not covered.

CSPV cells use crystalline silicon to convert sunlight to electricity.[17] 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.[18] 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.[19]

In the original investigations, the Taiwan Photovoltaic Industry Association, a trade association of Taiwanese respondent producers and exporters, requested that the Commission

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[15] Issues and Decision Memorandum for the Final Results of the First Expedited Sunset Review of the Antidumping Duty Orders on Certain Crystalline Silicon Photovoltaic Products from the People's Republic of China and Taiwan (May 1, 2020) at 3-4.

[16] *Compare* Original Determinations, USITC Pub. 4519 at 9-11.

[17] CR/PR at I-13.

[18] CR/PR at I-13.

[19] CR/PR at I-13.

define CSPV cells and CSPV modules as separate domestic like products.[20] Based on a semi-finished products analysis, the Commission determined that CSPV cells and CSPV modules belonged in the same domestic like product.[21] Accordingly, the Commission defined a single domestic like product consisting of all CSPV cells and modules, coextensive with the scope of the investigations.[22]

In the current reviews, the domestic interested parties agree with the Commission's definition of the domestic like product from the original investigations.[23] The record contains no information suggesting that the characteristics of domestically produced CSPV cells and modules have changed since the prior proceedings warranting our revisiting the original like product definition.[24] Accordingly, we define a single domestic like product consisting of all CSPV cells and modules, coextensive with the scope of the orders under review.

B. Domestic Industry

Section 771(4)(A) of the Tariff Act defines the relevant industry 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."[25] 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.

When evaluating the domestic industry definition, the Commission considers whether any producer of the domestic like product should be excluded from the domestic industry

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[20] Original Determinations, USITC Pub. 4519 at 12. In the preliminary phase of these investigations, the Commission determined that the domestic like product did not include thin film products and no party contested that determination in the final phase of these investigations. *Id.*

[21] Original Determinations, USITC Pub. 4519 at 13-15. In particular, the Commission found that CSPV cells were dedicated for use in the production of CSPV modules, with no separate markets for CSPV cells and CSPV modules. *Id.* at 13-14. It found that CSPV cells, as the basic element of CSPV modules, shared the same primary physical characteristics as CSPV modules and had to undergo only one manufacturing step, assembly, to become CSPV modules. *Id.* at 14. Finally, the Commission found that CSPV cells constituted a substantial portion of the value of CSPV modules. *Id.* at 15.

[22] Original Determinations, USITC Pub. 4519 at 15.

[23] SPMOR's Response to the Notice of Institution at 19; Q CELLS USA's Response to the Notice of Institution at 24.

[24] *See generally* CR/PR at I-13-18.

[25] 19 U.S.C. § 1677(4)(A). The definitions in 19 U.S.C. § 1677 are applicable to the entire subtitle containing the antidumping and countervailing duty laws, including 19 U.S.C. §§ 1675 and 1675a. *See* 19 U.S.C. § 1677.

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.[26] Exclusion of such a producer is within the Commission's discretion based upon the facts presented in each investigation.[27]

In the original investigations, the Commission found that numerous U.S. module assemblers were related parties but that appropriate circumstances existed to exclude only two of them, *** and Suntech.[28] While finding that most U.S. module manufacturers that imported subject CSPV cells for assembly into modules were primarily interested in U.S. module production, the Commission found that *** and Suntech imported both CSPV cells and CSPV modules in quantities that exceeded their domestic production of CSPV modules.[29] The Commission therefore defined a single domestic industry consisting of all producers of the domestic like product except *** and Suntech.[30]

In the current reviews, the record contains limited information that is relevant to the definition of the domestic industry. Q CELLS USA is related to Q CELLS (Qidong) Co., Ltd., a

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[26] *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).

[27] 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. U.S. Int'l Trade Comm'n*, 100 F. Supp.3d 1314, 1326-31 (Ct. Int'l. Trade 2015); *see also Torrington Co. v. United States*, 790 F. Supp. at 1168.

[28] Original Determinations, USITC Pub. 4519 at 17-18; Confidential Original Determinations, EDIS Doc. 703771 at 23-24.

[29] Original Determinations, USITC Pub. 4519 at 18-19; Confidential Original Determinations, EDIS Doc. 703771 at 23-28. The Commission determined that domestic producers of modules assembled from subject imported cells engaged in sufficient production-related activities to qualify as domestic producers. Original Determinations, USITC Pub. 4519 at 16; Confidential Original Determinations, EDIS Doc. 703771 at 21-22. The record contains no information suggesting that the significance of assembly of modules by domestic producers from imported cells has changed since the prior proceedings.

[30] Original Determinations, USITC Pub. 4519 at 20.

Chinese producer and exporter of subject merchandise.[31] However, *** and Q CELLS USA, which accounted for ***.[32] As such, Q CELLS USA may qualify as a related party by virtue of its relationship with Q CELLS (Qidong) Co., Ltd. Given Q CELLS USA's large share of U.S. production and the absence of information that Q CELLS (Qidong) exported subject merchandise to the United States, we find that appropriate circumstances do not exist to exclude Q CELLS USA from the domestic industry.

In addition, SPMOR reported that it imported subject CSPV cells from *** in 2019.[33] Accordingly, SPMOR is subject to the related parties provision. Available information also indicates that ***.[34] The ratio of SPMOR's imports of cells from *** to its domestic production of modules was *** percent.[35] The limited information in the record appears to show that SPMOR is more interested in domestic production than in importation. Therefore, we find that appropriate circumstances do not exist to exclude SPMOR from the domestic industry. Consequently, we define the domestic industry to consist of all domestic producers of CSPV cells and modules.

III. Cumulation

A. Legal Standard

With respect to five-year reviews, section 752(a) of the Tariff Act provides as follows:

> the Commission may cumulatively assess the volume and effect of imports of the subject merchandise from all countries with respect to which reviews under

[31] Q CELLS USA's Response to the Notice of Institution at 21.

[32] Q CELLS USA's Response to the Notice of Institution at 19, 21. Q CELLS reported ***. *Id.* at 21.

[33] SPMOR's Response to the Notice of Institution at 17; SPMOR's Additional Response to the Notice of Institution at 3. SPMOR is not related to any Chinese or Taiwan producer and exporter of subject merchandise. SPMOR's Additional Response to the Notice of Institution at 2. Q CELLS USA and SPMOR reported they were unaware of any other domestic producers that might fall under the related parties provision. Q CELLS USA's Response to the Notice of Institution at 18; SPMOR's Response to the Notice of Institution at 14.

[34] SPMOR's Response to the Notice of Institution at 17; CR/PR at I-48.

[35] SPMOR's Response to the Notice of Institution at 16-17; CR/PR at I-48.

> section 1675(b) or (c) of this title were initiated on the same day, if such imports would be likely to compete with each other and with domestic like products in the United States market. The Commission shall not cumulatively assess the volume and effects of imports of the subject merchandise in a case in which it determines that such imports are likely to have no discernible adverse impact on the domestic industry.[36]

Cumulation therefore is discretionary in five-year reviews, unlike original investigations, which are governed by section 771(7)(G)(i) of the Tariff Act.[37] The Commission may exercise its discretion to cumulate, however, only if the reviews are initiated on the same day, the Commission determines that the subject imports are likely to compete with each other and the domestic like product in the U.S. market, and imports from each such subject country are not likely to have no discernible adverse impact on the domestic industry in the event of revocation. Our focus in five-year reviews is not only on present conditions of competition, but also on likely conditions of competition in the reasonably foreseeable future.

In the original investigations, the Commission found there was a reasonable overlap of competition between and among the domestic like product and subject imports from China and Taiwan.[38] The Commission therefore determined to cumulate subject imports from China and Taiwan for its analysis of material injury by reason of subject imports.[39]

In these reviews, the statutory threshold for cumulation is satisfied because all reviews were initiated on the same day: January 2, 2020.[40] Based on the following analysis, we cumulate subject imports from China and Taiwan.

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[36] 19 U.S.C. § 1675a(a)(7).

[37] 19 U.S.C. § 1677(7)(G)(i); *see also*, *e.g.*, *Nucor Corp. v. United States*, 601 F.3d 1291, 1293 (Fed. Cir. 2010) (Commission may reasonably consider likely differing conditions of competition in deciding whether to cumulate subject imports in five-year reviews); *Allegheny Ludlum Corp. v. United States*, 475 F. Supp. 2d 1370, 1378 (Ct. Int'l Trade 2006) (recognizing the wide latitude the Commission has in selecting the types of factors it considers relevant in deciding whether to exercise discretion to cumulate subject imports in five-year reviews); *Nucor Corp. v. United States*, 569 F. Supp. 2d 1328, 1337-38 (Ct. Int'l Trade 2008).

[38] *See* Original Determinations, USITC Pub. 4519 at 25-27.

[39] Original Determinations, USITC Pub. 4519 at 27.

[40] 85 Fed. Reg. 120.

B. Likelihood of No Discernible Adverse Impact

The statute precludes cumulation if the Commission finds that subject imports from a country are likely to have no discernible adverse impact on the domestic industry.[41] Neither the statute nor the Uruguay Round Agreements Act ("URAA") Statement of Administrative Action ("SAA") provides specific guidance on what factors the Commission is to consider in determining that imports "are likely to have no discernible adverse impact" on the domestic industry.[42] With respect to this provision, the Commission generally considers the likely volume of subject imports and the likely impact of those imports on the domestic industry within a reasonably foreseeable time if the orders are revoked. Our analysis for each of the subject countries takes into account, among other things, the nature of the product and the behavior of subject imports in the original investigations.

Based on the record in these reviews, we do not find that imports from either of the subject countries are likely to have no discernible adverse impact on the domestic industry in the event of revocation of the corresponding orders.

China. In the original investigations, subject imports from China increased from 75,356 kW in 2011 to 629,593 kW in 2012 and to 2.2 GW in 2013.[43] They accounted for *** percent of apparent U.S. consumption in 2011, *** percent in 2012, and *** percent in 2013.[44] During the period of review, subject imports from China, by value, increased from $1.6 billion in 2014 to $1.7 billion in 2015, declined to $1.5 billion in 2016, $555.4 million in 2017, and $25.6 million in 2018, and then increased to $113.3 million in 2019.[45] In 2019, subject imports from China as a share of apparent U.S. consumption were *** percent by quantity and *** percent by value.[46]

Chinese producers' capacity increased from 53 GW in 2015 to 128 GW in 2018 for CSPV cells and from 63 GW in 2014 to 130 GW in 2018 for CSPV modules.[47] Their rate of capacity utilization declined irregularly from 77 percent in 2015 to 66 percent in 2018 for CSPV cells and

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[41] 19 U.S.C. § 1675a(a)(7).

[42] SAA, H.R. Rep. No. 103-316, vol. I at 887 (1994).

[43] CR/PR at Table I-6. CSPV product quantities are measured in terms of watts, kilowatts ("kW" (equal to 1,000 watts)), megawatts ("MW" (1,000 kW)), and gigawatts ("GW" (1,000 MW)). *Id.* at I-1 n.3.

[44] CR/PR at Table I-6.

[45] CR/PR at Table I-5. Official statistics showing annual quantities of U.S. imports of CSPV products in terms of watts are not available for calendar years prior to 2019. *Id.* at I-49.

[46] CR/PR at Table I-6.

[47] CR/PR at I-57, Figure I-22. Chinese CSPV cell and module production and capacity figures include out-of-scope thin film products. *Id.* at I-57.

increased irregularly from 57 percent in 2014 to 64 percent in 2018 for CSPV modules.[48] Chinese producers were in the process of expanding their CSPV cell and module capacity towards the end of the period of review, with *** of new CSPV cell capacity and *** of new CSPV module capacity ***.[49] Available data regarding Chinese producers' exports of CSPV cells and modules, which include out-of-scope thin film products, show that exports increased irregularly from $12.3 billion in 2014 to $19.2 billion in 2019.[50] Subject imports from China undersold the domestic like product in *** of *** quarterly comparisons during the original investigations, although no pricing product data were collected in these expedited reviews.[51]

In light of the foregoing, including the substantial capacity and excess capacity of the subject industry,[52] its substantial exports, and the significant and growing volume of imports prior to imposition of the order, we do not find that subject imports from China are likely to have no discernible adverse impact on the domestic industry if the antidumping duty order and/or the countervailing duty order covering these imports were revoked.

Taiwan. In the original investigations, subject imports from Taiwan increased from 70,665 kW in 2011 to 247,722 kW in 2012 and to 282,689 kW in 2013.[53] They accounted for *** percent of apparent U.S. consumption in 2011, *** percent in 2012, and *** percent in 2013.[54] During the period of review, subject imports from Taiwan, by value, declined from $761.9 million in 2014 to $342.5 million in 2015, $245.8 million in 2016, $26.8 million in 2017, and $25.3 million in 2018, before increasing to $112.2 million in 2019.[55] In 2019, subject imports from Taiwan as a share of apparent U.S. consumption were *** percent by quantity and *** percent by value.[56]

Taiwan producers' capacity for CSPV cells increased from 7.1 GW in 2014 to *** in 2018 and remained *** for CSPV modules at 2.9 GW, compared to *** in 2014 and 2016.[57] Beginning in early 2019, however, several Taiwan producers

[48] CR/PR at I-57.
[49] CR/PR at I-58, I-60.
[50] CR/PR at I-61.
[51] Confidential Report from the Original Investigations, EDIS Doc. 703758 at Table E-25.
[52] For example, U.S. module capacity totaled 1.9 GWs in 2019, compared to China's 130 GWs of module capacity in 2018. CR/PR at Tables I-4 and I-57.
[53] CR/PR at Table I-6.
[54] CR/PR at Table I-6.
[55] CR/PR at Table I-5.
[56] CR/PR at Table I-6.
[57] CR/PR at I-65.

announced plans to close 2.2 GW of CSPV cell capacity and idle an additional 2.5 GW of CSVP cell capacity.[58] Taiwan producers' exports of CSPV cells and modules declined from $3.7 billion in 2014 to $409 million in 2019.[59] Subject imports from Taiwan undersold the domestic like product in *** of *** quarterly comparisons during the original investigations, although no pricing product data were collected in these expedited reviews.[60]

In light of the foregoing, including the substantial capacity of the subject industry,[61] its substantial exports, its continued interest in the U.S. market, and the significant and growing volume of imports prior to imposition of the order, we do not find that subject imports from Taiwan are likely to have no discernible adverse impact on the domestic industry if the antidumping duty order covering these imports were revoked.

C. Likelihood of a Reasonable Overlap of Competition

The Commission generally has considered four factors intended to provide a framework for determining whether subject imports compete with each other and with the domestic like product.[62] Only a "reasonable overlap" of competition is required.[63] In five-year reviews, the

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[58] CR/PR at I-65. One Taiwan producer reported that it could bring back online its idled 2.5 GW of CSPV cell capacity if demand increased. *Id.*

[59] CR/PR at I-66.

[60] Confidential Report from the Original Investigations, EDIS Doc. 703758 at Table E-25; CR/PR at Table V-10.

[61] For example, U.S. module capacity totaled 1.9 GWs in 2019, compared to Taiwan's 2.9 GWs of module capacity in 2018. CR/PR at Table I-6 and I-65.

[62] The four factors generally considered by the Commission in assessing whether imports compete with each other and with the domestic like product are as follows: (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 geographical markets of 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 subject imports are simultaneously present in the market with one another and the domestic like product. *See, e.g., Wieland Werke, AG v. United States*, 718 F. Supp. 50 (Ct. Int'l Trade 1989).

[63] *See Mukand Ltd. v. United States*, 937 F. Supp. 910, 916 (Ct. Int'l Trade 1996); *Wieland Werke,* 718 F. Supp. at 52 ("Completely overlapping markets are not required."); *United States Steel Group v. United States,* 873 F. Supp. 673, 685 (Ct. Int'l Trade 1994), *aff'd*, 96 F.3d 1352 (Fed. Cir. 1996). We note, however, that there have been investigations where the Commission has found an insufficient overlap in competition and has declined to cumulate subject imports. *See, e.g*., *Live Cattle from Canada and Mexico*, Inv. Nos. 701-TA-386 and 731-TA-812-13 (Preliminary), USITC Pub. 3155 at 15 (Feb. 1999), *aff'd sub nom, Ranchers-Cattlemen Action Legal Foundation v. United States*, 74 F. Supp. 2d 1353 (Ct. Int'l (Continued…)

relevant inquiry is whether there likely would be competition even if none currently exists because the subject imports are absent from the U.S. market.[64]

Fungibility. In the original investigations, the Commission found that subject imports from China and Taiwan and the domestic like product were fungible.[65] While recognizing that there were no imports of CSPV cells from China, the Commission explained that imports of CSPV modules from China overlapped with CSPV modules imported from Taiwan and those produced domestically.[66] A majority of responding domestic producers, importers, and purchasers reported that CSPV products from all three sources were always or frequently interchangeable, and at least a majority of responding purchasers reported that CSPV products from all three sources were comparable in terms of non-price factors.[67]

In these reviews, the domestic interested parties argue that subject imports from China and Taiwan remain fungible with each other and with the domestic like product.[68] There is nothing in the record of these reviews to indicate that the fungibility of CSPV products from subject sources has changed from that previously observed.

Channels of Distribution. In the original investigations, the Commission found that domestic producers and importers of subject CSPV products from China and Taiwan each made at least nominal sales to all four channels of distribution, including distributors, residential installers, commercial installers, and utilities/developers.[69]

In these reviews, the domestic interested parties argue that subject imports from China and Taiwan would likely compete with domestically produced CSPV products in all parts of the market after revocation.[70] There is nothing in the record of these reviews to indicate that the distribution patterns observed in the original investigations would change if the orders were revoked.

Geographic Overlap and Simultaneous Presence in Market. In the original investigations, the Commission found that subject imports from China and Taiwan and the domestic like

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Trade 1999); *Static Random Access Memory Semiconductors from the Republic of Korea and Taiwan*, Inv. Nos. 731-TA-761-62 (Final), USITC Pub. 3098 at 13-15 (Apr. 1998).

[64] *See generally*, *Chefline Corp. v. United States*, 219 F. Supp. 2d 1313, 1314 (Ct. Int'l Trade 2002).

[65] Original Determinations, USITC Pub. 4519 at 26.

[66] Original Determinations, USITC Pub. 4519 at 25.

[67] Original Determinations, USITC Pub. 4519 at 25-26.

[68] Q CELLS USA's Response to the Notice of Institution at 13-14; SPMOR's Response to the Notice of Institution at 9-10.

[69] Original Determinations, USITC Pub. 4519 at 26.

[70] SPMOR Response to the Notice of Institution at 11; Q CELLS's Response to the Notice of Institution at 14; Q CELLS's Comments at 10.

product were present in all regions of the United States during the period of investigation.[71] The Commission also found that subject imports from China and Taiwan were simultaneously present in the U.S. market with the domestic like product in every month of the period of investigation.[72]

In these reviews, the record indicates that subject imports from both China and Taiwan entered through northern, southern, eastern, and western borders of entry in all years during 2014-19.[73] The record also indicates that subject imports from both China and Taiwan were reported in all 72 of the months from January 2014 through December 2019.[74] There is nothing in the record of these reviews that suggests that, were the orders to be revoked, there would be a change in the simultaneous presence or the geographic overlap of sales of the domestic like product and the subject imports observed in the original investigations and current review period.

Conclusion. The record in these expedited reviews contains limited information concerning subject imports in the U.S. market during the period of review. The record, however, contains no information suggesting a change in the considerations that led the Commission in the original investigations to conclude that there was a reasonable overlap of competition among and between imports from different subject sources and the domestic like product. The information available on the record of these reviews continues to support the Commission's findings from the original investigations that CSPV products imported from China and Taiwan and those produced domestically are fungible with one another, sold in all channels of distribution and regions of the U.S. market, and are simultaneously present in the U.S. market. In light of this, we find that there would likely be a reasonable overlap in competition between and among subject imports from China and Taiwan and the domestic like product if the orders were revoked.

D. Likely Conditions of Competition

In determining whether to exercise our discretion to cumulate the subject imports, we assess whether subject imports from the subject countries would compete under similar or different conditions in the U.S. market if the orders under review were revoked. We find that the record in these reviews does not indicate that there would likely be any significant

[71] Original Determinations, USITC Pub. 4519 at 27.
[72] Original Determinations, USITC Pub. 4519 at 27.
[73] CR/PR at I-53.
[74] CR/PR at I-53.

difference in the conditions of competition between subject imports from China and Taiwan upon revocation of the orders.

E. Conclusion

Based on the record, we find that subject imports from each of the subject countries would not be likely to have no discernible adverse impact on the domestic industry if the orders were revoked. We also find a likely reasonable overlap of competition between and among subject imports from China and Taiwan and the domestic like product, and that imports from each subject country are likely to compete in the U.S. market under similar conditions of competition should the orders be revoked. We therefore exercise our discretion to cumulate subject imports from China and Taiwan.

IV. Revocation of the Antidumping and Countervailing Duty Orders Would Likely Lead to Continuation or Recurrence of Material Injury Within a Reasonably Foreseeable Time

A. Legal Standards

In a five-year review conducted under section 751(c) of the Tariff Act, Commerce will revoke an antidumping or countervailing duty order unless: (1) it makes a determination that dumping or subsidization is likely to continue or recur and (2) the Commission makes a determination that revocation of the antidumping or countervailing duty order "would be likely to lead to continuation or recurrence of material injury within a reasonably foreseeable time."[75] The SAA states that "under the likelihood standard, the Commission will engage in a counterfactual analysis; it must decide the likely impact in the reasonably foreseeable future of an important change in the status quo – the revocation or termination of a proceeding and the elimination of its restraining effects on volumes and prices of imports."[76] Thus, the likelihood

[75] 19 U.S.C. § 1675a(a).

[76] SAA at 883-84. The SAA states that "{t}he likelihood of injury standard applies regardless of the nature of the Commission's original determination (material injury, threat of material injury, or material retardation of an industry). Likewise, the standard applies to suspended investigations that were never completed." *Id*. at 883.

standard is prospective in nature.[77] The U.S. Court of International Trade has found that "likely," as used in the five-year review provisions of the Act, means "probable," and the Commission applies that standard in five-year reviews.[78]

The statute states that "the Commission shall consider that the effects of revocation or termination may not be imminent, but may manifest themselves only over a longer period of time."[79] According to the SAA, a "'reasonably foreseeable time' will vary from case-to-case, but normally will exceed the 'imminent' timeframe applicable in a threat of injury analysis in original investigations."[80]

Although the standard in a five-year review is not the same as the standard applied in an original investigation, it contains some of the same fundamental elements. The statute provides that the Commission is to "consider the likely volume, price effect, and impact of imports of the subject merchandise on the industry if the orders are revoked or the suspended investigation is terminated."[81] It directs the Commission to take into account its prior injury determination, whether any improvement in the state of the industry is related to the order or the suspension agreement under review, whether the industry is vulnerable to material injury if an order is revoked or a suspension agreement is terminated, and any findings by Commerce

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[77] While the SAA states that "a separate determination regarding current material injury is not necessary," it indicates that "the Commission may consider relevant factors such as current and likely continued depressed shipment levels and current and likely continued {sic} prices for the domestic like product in the U.S. market in making its determination of the likelihood of continuation or recurrence of material injury if the order is revoked." SAA at 884.

[78] *See NMB Singapore Ltd. v. United States*, 288 F. Supp. 2d 1306, 1352 (Ct. Int'l Trade 2003) ("'likely' means probable within the context of 19 U.S.C. § 1675(c) and 19 U.S.C. § 1675a(a)"), *aff'd mem.*, 140 Fed. Appx. 268 (Fed. Cir. 2005); *Nippon Steel Corp. v. United States*, 26 CIT 1416, 1419 (2002) (same); *Usinor Industeel, S.A. v. United States*, 26 CIT 1402, 1404 nn.3, 6 (2002) ("more likely than not" standard is "consistent with the court's opinion;" "the court has not interpreted 'likely' to imply any particular degree of 'certainty'"); *Indorama Chemicals (Thailand) Ltd. v. United States*, 26 CIT 1059, 1070 (2002) ("standard is based on a likelihood of continuation or recurrence of injury, not a certainty"); *Usinor v. United States*, 26 CIT 767, 794 (2002) ("'likely' is tantamount to 'probable,' not merely 'possible'").

[79] 19 U.S.C. § 1675a(a)(5).

[80] SAA at 887. Among the factors that the Commission should consider in this regard are "the fungibility or differentiation within the product in question, the level of substitutability between the imported and domestic products, the channels of distribution used, the methods of contracting (such as spot sales or long-term contracts), and lead times for delivery of goods, as well as other factors that may only manifest themselves in the longer term, such as planned investment and the shifting of production facilities." *Id*.

[81] 19 U.S.C. § 1675a(a)(1).

regarding duty absorption pursuant to 19 U.S.C. § 1675(a)(4).[82] The statute further provides that the presence or absence of any factor that the Commission is required to consider shall not necessarily give decisive guidance with respect to the Commission's determination.[83]

In evaluating the likely volume of imports of subject merchandise if an order under review is revoked and/or a suspended investigation is terminated, the Commission is directed to consider whether the likely volume of imports would be significant either in absolute terms or relative to production or consumption in the United States.[84] In doing so, the Commission must consider "all relevant economic factors," including four enumerated factors: (1) any likely increase in production capacity or existing unused production capacity in the exporting country; (2) existing inventories of the subject merchandise, or likely increases in inventories; (3) the existence of barriers to the importation of the subject merchandise into countries other than the United States; and (4) 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.[85]

In evaluating the likely price effects of subject imports if an order under review is revoked and/or a suspended investigation is terminated, the Commission is directed to consider whether there is likely to be significant underselling by the subject imports as compared to the domestic like product and whether the subject imports are likely to enter the United States at prices that otherwise would have a significant depressing or suppressing effect on the price of the domestic like product.[86]

In evaluating the likely impact of imports of subject merchandise if an order under review is revoked and/or a suspended investigation is terminated, the Commission is directed to consider all relevant economic factors that are likely to have a bearing on the state of the industry in the United States, including but not limited to the following: (1) likely declines in

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[82] 19 U.S.C. § 1675a(a)(1). Commerce has made no duty absorption findings concerning the antidumping duty orders on CSPV products from China and Taiwan. Issues and Decision Memorandum for the Final Results of the First Expedited Sunset Review of the Antidumping Duty Orders on Certain Crystalline Silicon Photovoltaic Products from the People's Republic of China and Taiwan (May 1, 2020) at 6.

[83] 19 U.S.C. § 1675a(a)(5). Although the Commission must consider all factors, no one factor is necessarily dispositive. SAA at 886.

[84] 19 U.S.C. § 1675a(a)(2).

[85] 19 U.S.C. § 1675a(a)(2)(A-D).

[86] *See* 19 U.S.C. § 1675a(a)(3). The SAA states that "{c}onsistent with its practice in investigations, in considering the likely price effects of imports in the event of revocation and termination, the Commission may rely on circumstantial, as well as direct, evidence of the adverse effects of unfairly traded imports on domestic prices." SAA at 886.

output, sales, market share, profits, productivity, return on investments, and utilization of capacity; (2) likely negative effects on cash flow, inventories, employment, wages, growth, ability to raise capital, and investment; and (3) likely negative effects on the existing development and production efforts of the industry, including efforts to develop a derivative or more advanced version of the domestic like product.[87] All relevant economic factors are to be considered within the context of the business cycle and the conditions of competition that are distinctive to the industry. As instructed by the statute, we have considered the extent to which any improvement in the state of the domestic industry is related to the orders under review and whether the industry is vulnerable to material injury upon revocation.[88]

No respondent interested party participated in these expedited reviews. The record, therefore, contains limited new information with respect to the industries producing CSPV products in China and Taiwan. There also is limited information on the CSPV product market in the United States during the period of review. Accordingly, for our determinations, we rely as appropriate on the facts available from the original investigations, and the limited new information on the record in these reviews.

B. Conditions of Competition and the Business Cycle

In evaluating the likely impact of the subject imports on the domestic industry if an order is revoked, the statute directs the Commission to consider all relevant economic factors "within the context of the business cycle and conditions of competition that are distinctive to the affected industry."[89] The following conditions of competition inform our determinations.

1. Demand Conditions

The Original Investigations. The Commission found that demand for CSPV products is derived from the demand for solar electricity, which is affected by factors such as total energy consumption, environmental concerns, cost competitiveness with traditional energy sources,

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[87] 19 U.S.C. § 1675a(a)(4).

[88] The SAA states that in assessing whether the domestic industry is vulnerable to injury if the order is revoked, the Commission "considers, in addition to imports, other factors that may be contributing to overall injury. While these factors, in some cases, may account for the injury to the domestic industry, they may also demonstrate that an industry is facing difficulties from a variety of sources and is vulnerable to dumped or subsidized imports." SAA at 885.

[89] 19 U.S.C. § 1675a(a)(4).

and the availability of Federal, state, and local incentives.[90] Despite stable or declining federal and state incentives for solar power installations, the Commission found that apparent U.S. consumption had grown substantially during the period of investigation, from *** in 2011 to *** in 2012, and *** in 2013.[91] Apparent U.S. consumption was *** in interim 2014, compared to *** in interim 2013.[92]

The Commission also found that CSPV products were sold in three grid-connected market segments (residential, non-residential/commercial, and utility/co-developers) and for off-grid applications.[93] All three grid-connected segments had experienced considerable growth during the period of investigation.[94]

The Current Reviews. Demand for CSPV products remains derived from demand for solar electricity, which is influenced by its cost competitiveness with other sources of energy and government incentives, among other factors.[95] CSPV products also continue to be sold in three grid-connected market segments (residential, non-residential, and utility) and for off-grid applications.[96] The record shows that apparent U.S. consumption of CSPV modules increased from *** in 2013 to *** in 2019.[97] ***, the responding purchaser, reported that the planned expiration of the investment tax credit in 2015 and the planned phase-out of the investment tax credit in 2019 increased demand for CSPV products in those years, while the imposition of the safeguard measure on CSPV products reduced demand beginning in 2018.[98] In the Commission's midterm review of the safeguard measure on CSPV products completed in February 2020, however, majorities or pluralities of 14 responding domestic producers, 36 responding importers, and 24 responding purchasers reported that U.S. demand for CSPV products had increased since February 7, 2018, the effective date of the measure, and was expected to continue to increase in the future.[99]

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[90] Original Determinations, USITC Pub. 4519 at 31.

[91] Original Determinations, USITC Pub. 4519 at 32-33 & n.177.

[92] Original Determinations, USITC Pub. 4519 at 32-33 & n.177.

[93] Original Determinations, USITC Pub. 4519 at 33.

[94] Original Determinations, USITC Pub. 4519 at 33.

[95] Q CELLS Comments at 3.

[96] CR/PR at I-29; Q CELLS Comments at 4.

[97] CR/PR at Table I-6. No domestic producer of CSPV cells provided a response to the notice of institution in these reviews. *Id.* at I-51.

[98] CR/PR at D-3.

[99] CSPV Products Monitoring Report at 4, Table II-5a.

2. Supply Conditions

The Original Investigations. The Commission found that the U.S. market was supplied by the domestic industry, subject imports from China and Taiwan, and imports from nonsubject sources.[100] The domestic industry, consisting of two domestic producers of CSPV cells and over 12 domestic producers of CSPV modules, supplied a declining share of apparent U.S. consumption, falling from around *** percent in 2011 to *** percent by the end of the period of investigation.[101]

The Commission observed that as a result of previous investigations of CSPV products imported from China, U.S. imports of CSPV cells produced in China, CSPV modules assembled in China from CSPV cells made in China, and CSPV modules assembled in a third country from CSPV cells made in China became subject to antidumping and countervailing duty orders effective December 7, 2012.[102] As nonsubject imports subject to those orders receded from the U.S. market, the Commission explained, subject imports from China and Taiwan increased their share of apparent U.S. consumption from *** percent at the beginning of the period of investigation to over *** percent by the end of the period.[103]

The Commission found that nonsubject imports, consisting largely of imports from China subject to the pre-existing orders, accounted for a declining share of apparent U.S.

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[100] Original Determinations, USITC Pub. 4519 at 34.

[101] Original Determinations, USITC Pub. 4519 at 34; Confidential Original Determinations, EDIS Doc. 703771 at 48.

[102] Original Determinations, USITC Pub. 4519 at 34 (*citing* 77 Fed. Reg. 73017, 73018 (Dec. 7, 2012)). In the earlier investigations, the Commission determined in November 2012 that an industry in the United States was materially injured by reason of certain CSPV products imported from China that Commerce had determined were sold in the United States at less than fair value and subsidized by the government of China. *Crystalline Silicon Photovoltaic Cells and Modules from China*, Inv. Nos. 701-TA-481 and 731-TA-1190 (Final), USITC Pub. 4360 (Nov. 2012). Effective December 7, 2012, Commerce issued antidumping and countervailing duty orders on those imports. 77 Fed. Reg. 73017 (Dec. 7, 2012); 77 Fed. Reg. 73018 (Dec. 7, 2012). As the Commission explained, petitioners filed new antidumping and countervailing duty petitions covering CSPV products imported from China and Taiwan after Commerce determined that CSPV modules imported from China were not subject to the earlier orders if they were made using CSPV cells produced in countries other than China. Original Determinations, USITC Pub. 4519 at 3-4.

[103] Original Determinations, USITC Pub. 4519 at 34; Confidential Original Determinations, EDIS Doc. 703771 at 48-49.

consumption during the period of investigation.[104] Nonsubject imports from countries other than China never accounted for more than *** percent of apparent U.S. consumption.[105]

The Current Reviews. The U.S. market for CSPV modules is supplied primarily by nonsubject imports, but also by the domestic industry and subject imports.[106] The domestic industry's U.S. shipments as a share of apparent U.S. consumption of CSPV modules declined from *** percent in 2013 to *** percent in 2019.[107] As a share of apparent U.S. consumption of CSPV modules, subject imports from China declined from *** percent in 2013 to *** percent in 2019 and subject imports from Taiwan declined from *** percent in 2013 to *** percent in 2019.[108] The balance of U.S. demand for CSPV modules was supplied by nonsubject imports, which increased their share of apparent U.S. consumption from *** percent in 2013 to *** percent in 2019.[109] The top sources of nonsubject imports in 2019, in descending order by volume, were Malaysia, Vietnam, Korea, and Thailand.[110]

3. Substitutability and Other Conditions

The Original Investigations. The Commission found that subject imports from China and Taiwan were highly substitutable with domestically produced CSPV products and that competition between subject imports and the domestic like product depended primarily on price.[111] As the Commission explained, a majority of responding purchasers reported that CSPV products from China, Taiwan, and the United States were always or frequently interchangeable and comparable in terms of non-price factors.[112] Other record evidence showed that CSPV

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[104] Original Determinations, USITC Pub. 4519 at 35; Confidential Original Determinations, EDIS Doc. 703771 at 48-49.

[105] Original Determinations, USITC Pub. 4519 at 35; Confidential Original Determinations, EDIS Doc. 703771 at 48-49.

[106] Data on the supply of CSPV cells is limited in these investigations because no U.S. producer of CSPV cells provided a response to the Commission's notice of institution in these reviews. CR/PR at I-51. Domestic production of CSPV cells ended in May 2020, when Panasonic was scheduled to close its U.S. CSPV cell production facility, although Suniva retains the ability to restart CSPV cell production. *Id.* at I-39.

[107] CR/PR at Table I-6. We note that these data understate the domestic industry's market share in 2019 because industry shipments are limited to responding domestic producers that accounted for *** percent of domestic production that year. *Id.* at Table I-1.

[108] CR/PR at Table I-6.

[109] CR/PR at Table I-6.

[110] CR/PR at Table I-5.

[111] Original Determinations, USITC Pub. 4519 at 37.

[112] Original Determinations, USITC Pub. 4519 at 35.

products from all three sources usually or always met minimum quality specifications and that differences other than price were almost never significant.[113] The Commission also found that importers of CSPV products from China and Taiwan and domestic producers served all U.S. market segments, offered both monocrystalline and multicrystalline CSPV products, and supplied modules in a range of wattages and in 60-cell and 72-cell configurations.[114]

The Commission found that raw materials as a share of the domestic industry's cost of goods sold declined from *** percent in 2011 to *** percent in 2013 for CSPV modules and from *** percent in 2011 to *** percent in 2013 for CSPV cells.[115] As the Commission explained, the cost of polysilicon wafers and ingots, the key inputs for CSPV cell production, declined 75 percent between the first quarters of 2011 and 2013 before increasing 26.7 and 9.5 percent, respectively, through the second quarter of 2014.[116]

The Current Reviews. There is no new information on the record of the current reviews to indicate that the conditions of competition concerning the substitutability of subject imports and the domestic like product or the importance of price in purchasing decisions have changed since the prior proceedings.[117] We therefore find a high degree of substitutability between subject imports and the domestic like product and that price is the primary factor in purchasing decisions.

Effective February 7, 2018, the President imposed a safeguard measure on imports of CSPV products, including subject imports, consisting of a tariff rate quota on CSPV cells not partially or fully assembled into other products and additional duties on imports of CSPV modules for a period of four years.[118]

Subject imports from China have been subject to additional tariffs pursuant to section 301 of the Trade Act of 1974[119] since September 24, 2018. These tariffs were initially 10

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[113] Original Determinations, USITC Pub. 4519 at 35.

[114] Original Determinations, USITC Pub. 4519 at 36-37.

[115] Confidential Original Determinations, EDIS Doc. 703771 at 52-53; Original Determinations, USITC Pub. 4519 at 37.

[116] Original Determinations, USITC Pub. 4519 at 37.

[117] The domestic interested parties claim that subject imports from China and Taiwan remain fungible with each other and with the domestic like product, and would likely compete in all market segments after revocation. Q CELLS USA's Response to the Notice of Institution at 13-14; SPMOR's Response to the Notice of Institution at 9-11; Q CELLS's Comments at 4, 10. Q CELLS maintains that price continues to be an important consideration in purchasing decisions in the CSPV market, given that CSPV products from the United States, China, and Taiwan remain comparable in terms of non-price factors. Q CELLS's Comments at 4.

[118] CR/PR at I-5-6.

[119] 19 U.S.C. § 2411.

percent *ad valorem* and increased to 25 percent *ad valorem* for entries made on or after June 15, 2019.[120]

C. Likely Volume of Subject Imports

1. The Original Investigations

In the original investigations, the Commission found subject import volume and the increase in subject import volume to be significant, in absolute terms and relative to apparent U.S. consumption and domestic production.[121] Between 2011 and 2013, subject import volume increased 1,611.9 percent, or *** the robust *** percent increase in apparent U.S. consumption.[122] As subject imports gained *** percentage points of market share between 2011 and 2013, before stabilizing in interim 2014, they almost completely replaced nonsubject imports from China subject to the existing antidumping and countervailing duty orders and captured *** percentage points of market share from the domestic industry.[123] The Commission found the increase in subject import market share notable in light of its finding that subject imports were highly substitutable with the domestic like product, and competed in the same geographic markets and market segments as the domestic industry.[124]

2. The Current Reviews

The record shows that cumulated subject imports maintained a presence in the U.S. market throughout the period of review; in 2019 subject imports were 1.0 GW and accounted for *** percent of apparent U.S. consumption of CSPV modules.[125]

The information available in the current reviews further shows that subject producers in China and Taiwan continue to possess the ability to increase exports to the U.S. market. As discussed in section III.B above, Chinese producers increased their capacity from 53 GW in 2015

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[120] CR/PR at I-11-12.

[121] Original Determinations, USITC Pub. 4519 at 39.

[122] Original Determinations, USITC Pub. 4519 at 39; Confidential Original Determinations, EDIS Doc. 703771 at 54. Cumulated subject import volume increased from 146,021 kW in 2011 to 2,499,761 kW in 2013. CR/PR at Table I-6.

[123] Original Determinations, USITC Pub. 4519 at 39; Confidential Original Determinations, EDIS Doc. 703771 at 54-55. As a share of apparent U.S. consumption of CSPV modules, cumulated subject imports increased from *** percent in 2011 to *** percent in 2013. CR/PR at Table I-6.

[124] Original Determinations, USITC Pub. 4519 at 39.

[125] CR/PR at Tables I-5-6.

to 128 GW in 2018 for CSPV cells and from 63 GW in 2014 to 130 GW in 2018 for CSPV modules.[126] Their rate of capacity utilization declined irregularly from 77 percent in 2015 to 66 percent in 2018 for CSPV cells but increased irregularly from 57 percent in 2014 to 64 percent in 2018 for CSPV modules.[127] Chinese producers were in the process of expanding their CSPV cell and module capacity towards the end of the period of review, with *** of new CSPV cell capacity and *** of new CSPV module capacity ***.[128] Towards the end of the period of review, Chinese producers of CSPV modules possessed excess capacity equivalent to more than *** percent of apparent U.S. consumption of CSPV modules in 2019.[129]

Taiwan producers' capacity increased from 7.1 GW in 2014 to *** in 2018 for CSPV cells but remained *** at 2.9 GW for CSPV modules in 2018, compared to *** in 2014 and 2016.[130] Beginning in early 2019, however, several Taiwan producers announced plans to close 2.2 GW of CSPV cell capacity and idle an additional 2.5 GW of CSPV cell capacity.[131] Even if these plans are carried out, however, Taiwan producers would retain substantial capacity to produce CSPV cells and modules.

Moreover, the industries in China and Taiwan continue to export substantial quantities of CSPV products throughout the world. China was the world's largest exporter of CSPV products during the period of review, with Chinese producers' exports of CSPV cells and modules, including out-of-scope thin film products, increasing irregularly from $12.3 billion in 2014 to $19.2 billion in 2019.[132] Recent reductions in China's feed-in-tariff, one of the government's main policies for encouraging domestic solar PV installations, and the substantial decline in solar PV installations in China since 2017, are likely to encourage increased Chinese exports of CSPV products.[133] Taiwan's exports declined from $3.7 billion in 2014 to $409 million in 2019, but remained significant.[134]

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[126] CR/PR at I-57, Figure I-22.

[127] CR/PR at I-57.

[128] CR/PR at I-58, I-60.

[129] *See* CR/PR at I-57 (Chinese producers of CSPV modules possessed excess capacity of 46.8 GW in 2018), Table I-6 (apparent U.S. consumption of CSPV modules was *** in 2019).

[130] CR/PR at I-65.

[131] CR/PR at I-65.

[132] CR/PR at I-61, I-74, Table I-11.

[133] CR/PR at I-55-56, Figure I-21 (Chinese PV solar installations declined 43.3 percent between 2017 and 2019).

[134] CR/PR at Table I-11. Available export data concern a somewhat broader category of merchandise than the subject imports and consequently may include out-of-scope merchandise, such as thin film products. *Id.*

Chinese and Taiwan producers would likely seek to utilize their excess capacity by increasing exports to the U.S. market in the event of revocation, given the continued presence of subject imports and large and growing demand for CSPV products in the U.S. market.[135] Chinese and Taiwan producers demonstrated an ability to rapidly increase their penetration of the U.S. market during the original investigations, and would likely do so again if the orders were revoked. We also observe that Canada imposed antidumping and countervailing duty measures on imports of CSPV products from China, India imposed a safeguard measure on imports of CSPV products from China, and Turkey imposed an antidumping duty measure on imports of CSPV modules from China, increasing the likelihood of exports being diverted from those third country markets to the United States if the orders were revoked.[136]

In light of the Chinese and Taiwan producers' ability and incentive to increase exports to the U.S. market in the event of revocation, we find that the likely cumulated volume of subject imports, both in absolute terms and relative to consumption in the United States, would be significant if the orders were revoked.[137]

D. Likely Price Effects

1. The Original Investigations

In the original investigations, the Commission found that subject imports undersold the domestic like product to a significant degree for both monocrystalline or multicrystalline

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[135] CR/PR at Table I-6; CSPV Products Monitoring Report, USITC Pub. 5021 at 4.

[136] CR/PR at Table I-9. We do not find that the imposition of section 301 tariffs on subject imports from China or the safeguard measure on imports of CSPV products, including those from China and Taiwan, would likely restrain subject imports from entering the U.S. market upon revocation. The section 301 tariffs on subject imports from China are unlikely to restrain subject imports from China in light of the Chinese producers' excess capacity and export orientation, the low average unit value of imports from China, and the attractiveness of the United States as an export market. *See id.* at I-57-58, Table I-5. In the midterm review of the safeguard measure on CSPV products, pluralities of responding producers and purchasers reported that the section 301 tariffs had no effect on subject imports from China, while a plurality of importers reported no change in demand but a decrease in supply. CSPV Products Monitoring Report, USITC 5021 at II-5, Table II-2. Similarly, while there was initially a decline in imports of CSPV products in 2018, following the imposition of the safeguard measure on imports of CSPV products in February 2018, the measures did not prevent the value of such imports from increasing above 2017 levels in 2019. CR/PR at Table I-5; *see also* CSPV Products Monitoring Report, USITC 5021 at 4.

[137] Due to the expedited nature of these reviews, the record does not contain current information regarding inventories of subject merchandise or subject producers' ability to shift production to CSPV products from out-of-scope products.

products and across a range of wattages and cell counts.[138] Subject imports undersold the domestic like product in 60 of 99 possible quarterly comparisons, or 60.6 percent of the time, at margins as high as 39.9 percent.[139] The Commission found that pervasive underselling by subject imports allowed those imports to capture significant market share from the domestic industry.[140]

The Commission recognized that domestic prices declined between January 2011 and June 2014 even as apparent U.S. consumption increased.[141] The Commission found, however, that cumulated subject imports did not depress prices of the domestic like product to a significant degree.[142] The Commission explained that other factors explained the price declines, including declines in raw material costs, ***, product life cycles, and the increasing share of the U.S. CSPV market held by utilities during the period of investigation.[143]

The Commission also found that subject imports did not suppress domestic like product prices to a significant degree.[144] The domestic industry's unit cost of goods sold ("COGS") declined during the investigation period, though the Commission noted that the industry's ratio of cost of COGS to net sales remained high.[145] The Commission explained, however, that it would not have expected the industry to be able to raise prices in light of the various factors other than subject imports that were exerting downward pressure on U.S. prices during the period and declining raw material costs.[146]

2. The Current Reviews

Due to the expedited nature of these reviews, the record does not contain recent product-specific pricing information for CSPV products. As previously discussed, the domestic like product and subject imports are highly substitutable and price is the primary factor in

[138] Original Determinations, USITC Pub. 4519 at 42; CR/PR at I-68.
[139] Original Determinations, USITC Pub. 4519 at 42.
[140] Original Determinations, USITC Pub. 4519 at 42.
[141] Original Determinations, USITC Pub. 4519 at 42.
[142] Original Determinations, USITC Pub. 4519 at 42.
[143] Original Determinations, USITC Pub. 4519 at 42-43; Confidential Original Determinations, EDIS Doc. 703771 at 61.
[144] Original Determinations, USITC Pub. 4519 at 43.
[145] Original Determinations, USITC Pub. 4519 at 43.
[146] Original Determinations, USITC Pub. 4519 at 43.

purchasing decisions. Given this, and the prevalence of underselling by subject imports during the original investigations,[147] we find that significant underselling by subject imports is likely after revocation, as Chinese and Taiwan producers would likely revert to underselling the domestic like product to rapidly increase their penetration of the U.S. market. We find further evidence that significant underselling would likely recur after revocation in the low average unit value of subject imports, at $216 per kW, relative to nonsubject imports, $341 per kW, in 2019, even under the disciplining effect of the orders.[148]

We find insufficient evidence on the record for us to determine whether the significant underselling by subject imports that is likely after revocation would result in the depression or suppression of domestic like product prices to a significant degree. Many of the factors that prevented the Commission from finding price depression or suppression by reason of subject imports in the original investigations continued to prevail towards the end of the period of review. In the midterm review of the safeguard measure on CSPV products, the Commission found that prices for CSPV products generally declined from 2017 through the first half of 2019 due to a combination of factors that have consistently driven prices downward, including declining polysilicon prices; technology advancements (such as wafer slicing technology, wafer thickness, and efficiency); global supply of CSPV modules; and the cost competitiveness of solar power relative to other energy sources.[149] Furthermore, utilities are expected to increase their share of the U.S. CSPV market to two-thirds in each of the next few years, placing additional downward pressure on CSPV product prices.[150] In light of the many factors weighing on CSPV product prices, we cannot conclude that the likely significant underselling by subject imports upon revocation would contribute materially to the depression or suppression of domestic prices within a reasonably foreseeable time.

Thus, we conclude that, if the orders were revoked, likely significant volumes of subject imports would likely undersell the domestic like product significantly and gain market share at the expense of domestic producers.

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[147] Original Determinations, USITC Pub. 4519 at 42.
[148] Q CELLS's Comments at 9-10 (*citing* CR/PR at Table I-5).
[149] CSPV Products Monitoring Report, USITC Pub. 5021 at 5-6.
[150] CR/PR at II-19, Figure II-4a.

E. Likely Impact

1. The Original Investigations

In the original investigations, the Commission found that subject imports had a significant adverse impact on the domestic industry during the period of investigation.[151] The Commission explained that the domestic industry's performance worsened during the period of investigation, and its financial performance was consistently poor, despite strong growth in apparent U.S. consumption. During the period, the industry made fewer U.S. shipments, experienced small and declining net sales quantities, and held a small and declining market share.[152] The industry also reduced its overall production capacity, operated at very low capacity utilization, and laid off numerous production and related workers, as a substantial number of domestic producers shuttered their facilities.[153] Faced with low and declining net sales values, market share, and capacity utilization, the domestic industry incurred operating losses throughout the period.[154] The Commission found that subject imports caused the domestic industry's weak and declining performance as the significant and growing volume of subject imports undersold the domestic like product and took market share from the industry.[155]

The Commission found that none of the alternative causes of injury raised by respondents could explain the domestic industry's poor and often declining performance.[156] First, the Commission rejected respondents' claim that domestic producers experienced poor performance over the period of investigation because they focused on monocrystalline instead of multicrystalline CSPV technology and were slow to introduce higher wattage products with efficiencies comparable to subject imports.[157] As the Commission explained, domestic producers and importers sold both mono- and multicrystalline CSPV products in a range of wattages and purchasers often did not specify a preferred technology, with some purchasers finding domestically produced modules comparable or superior to subject imports in terms of conversion and efficiency.[158]

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[151] Original Determinations, USITC Pub. 4519 at 44.
[152] Original Determinations, USITC Pub. 4519 at 45.
[153] Original Determinations, USITC Pub. 4519 at 45.
[154] Original Determinations, USITC Pub. 4519 at 46.
[155] Original Determinations, USITC Pub. 4519 at 46.
[156] Original Determinations, USITC Pub. 4519 at 47, 49.
[157] Original Determinations, USITC Pub. 4519 at 47.
[158] Original Determinations, USITC Pub. 4519 at 47.

Second, the Commission found that nonsubject imports could not account for the domestic industry's declining performance because most consisted of CSPV products from China that declined substantially after becoming subject to antidumping and countervailing duty orders in 2012.[159] Nonsubject imports from countries other than China never exceeded *** percent of apparent U.S. consumption, declined during the POI, and frequently oversold the U.S. domestic like product.[160]

Third, the Commission considered respondents' argument that CSPV products needed to attain grid parity to compete with electricity generated from natural gas and thin film products.[161] The Commission explained that competition from natural gas and thin film products could not account for the domestic industry's declining performance during the period of investigation when questionnaire respondents reported no link between the price of electricity generated from other sources and demand or prices for CSPV products.[162] The Commission also noted that the need to meet grid parity did not explain the significant increase in subject imports or significant underselling.[163]

Finally, the Commission found that changes in incentive programs did not account for the domestic industry's condition. As the Commission explained, incentive programs were directed at systems owners rather than manufacturers, some incentive programs did not lapse, and any reduction in incentives had not reduced apparent U.S. consumption.[164]

2. The Current Reviews

In these expedited reviews, the information available on the domestic industry's condition is limited to that which the domestic interested parties provided in their response to the notice of institution.[165] In 2019, the domestic industry's CSPV module capacity was ***,

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[159] Original Determinations, USITC Pub. 4519 at 48.

[160] Original Determinations, USITC Pub. 4519 at 48; Confidential Original Determinations, EDIS Doc. 703771 at 68-69.

[161] Original Determinations, USITC Pub. 4519 at 48. Grid parity is the point at which the levelized cost of electricity generated from renewable sources equals the cost from the grid of electricity generated by conventional sources. *Id.* at 32.

[162] Original Determinations, USITC Pub. 4519 at 48-49.

[163] Original Determinations, USITC Pub. 4519 at 49.

[164] Original Determinations, USITC Pub. 4519 at 49.

[165] We recognize that apparent changes in the domestic industry's performance between 2013 and 2019 reflect, to some extent, lower domestic industry coverage in these reviews than in the original investigations. In the original investigations, domestic producers' questionnaires were completed by (Continued…)

its production was ***, and its capacity utilization rate was *** percent.[166] The industry's U.S. shipments were ***.[167] The industry's net sales revenue was $***, and its ratio of COGS to net sales was *** percent.[168] Its gross profit was $***, and its operating *** was $***, resulting in a ratio of operating income to net sales of *** percent.[169] The limited evidence in these expedited reviews is insufficient for us to make a finding on whether the domestic industry is vulnerable to the continuation or recurrence of material injury should the orders be revoked.

As addressed above, we have found that revocation of the orders on subject imports from China and Taiwan would likely result in a significant volume of subject imports that would likely undersell the domestic like product to a significant degree as a means of rapidly gaining market share. Given the high degree of substitutability between subject imports and the domestic like product, we find that the likely increase in subject import market share after revocation would come in part at the domestic industry's expense, adversely impacting the production, shipments, sales, market share, and revenues of the domestic industry. These reductions would have a direct adverse impact on the industry's profitability and employment as well as its ability to raise capital and make and maintain necessary capital investments. We therefore conclude that, if the orders were revoked, subject imports from China and Taiwan would be likely to have a significant impact on the domestic industry within a reasonably foreseeable time.

In our analysis of the likely impact of subject imports from China and Taiwan on the domestic industry, we have taken into account the role of factors other than subject imports, including the presence of nonsubject imports, so as not to attribute likely injury from other factors to the subject imports. As discussed above, nonsubject imports accounted for *** percent of apparent U.S. consumption in 2019, up from *** percent of apparent U.S.

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two domestic producers accounting for all known domestic production of CSPV cells and nine domestic producers accounting for *** percent of domestic production of CSPV modules. Confidential Original Determinations, EDIS Doc. 703771 at 6. In the current reviews, two domestic producers accounting for approximately *** percent of domestic production of CSPV modules responded to the notice of institution. CR/PR at Table I-1. No response was received from any domestic producer of CSPV cells. *Id.* at I-51.

[166] CR/PR at Table I-4.

[167] CR/PR at Table I-4.

[168] CR/PR at Table I-4.

[169] CR/PR at Table I-4.

consumption in 2013.[170] We recognize that the increase in subject import market share that is likely after revocation would come partly at the expense of nonsubject imports.[171] Yet, the higher average unit value of the domestic industry's U.S. shipments compared to the average unit value of imports from nonsubject countries in 2019, coupled with the high degree of substitutability between subject imports and the domestic like product, indicates that low-priced subject imports would also capture market share from the domestic industry, as they did in the original investigations.[172] Accordingly, we find that the likely effects attributable to the subject imports are distinguishable from any effects likely from nonsubject imports in the event of revocation of the orders.

We have also considered the likely effects of demand trends on the domestic industry. Reported apparent U.S. consumption of CSPV modules in 2019 was *** times higher than in 2013, and a majority or plurality of questionnaire respondents in the midterm review of the safeguard measure on CSPV products reported that demand was expected to continue increasing in the future.[173] Demand for CSPV products is also likely to remain robust in light of the continued availability of substantial tax credits under the Solar Investment Tax Credit program for capital expenditures on new solar PV systems starting construction before the end of 2021 and completing construction by the end of 2023.[174] Given this, we find that the likely effects attributable to the subject imports are distinguishable from any effects likely from demand trends in the event of revocation of the order.

In sum, we conclude that, if the antidumping and countervailing duty orders were revoked, subject imports from China and Taiwan would likely have a significant impact on the domestic industry within a reasonably foreseeable time.

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[170] CR/PR at Table I-6. Nonsubject imports as a percent of apparent U.S. consumption increased *** percentage points from 2013 to 2019. *Id.*

[171] *See* CR/PR at Table I-6.

[172] *See* CR/PR at Tables I-4-6.

[173] CR/PR at Table I-6; CSPV Products Monitoring Report, USITC Pub. 5021 at 4. We note that the information on the record of these reviews understates the increase in apparent U.S. consumption of CSPV modules between 2013 and 2019 because the responding domestic producers in these reviews accounted for only *** percent of domestic production of CSPV modules in 2019. CR/PR at Table I-1.

[174] CR/PR at I-44. The Solar Investment Tax Credit program, the major federal incentive for solar installations, provides a tax credit of 30 percent on projects starting construction before the end of 2019, 26 percent on projects starting construction before the end of 2020, and 22 percent on projects starting construction before the end of 2021, provided construction is completed by the end of 2023. *Id.* After 2021, all commercial and utility solar projects will receive a permanent 10 percent tax credit. *Id.*

V. Conclusion

For the reasons discussed above, we determine that revocation of the countervailing duty order on CSPV products from China and the antidumping duty orders on CSPV products from China and Taiwan would be likely to lead to continuation or recurrence of material injury to an industry in the United States within a reasonably foreseeable time.

Information obtained in these reviews

Background

On January 2, 2020, the U.S. International Trade Commission ("Commission") gave notice, pursuant to section 751(c) of the Tariff Act of 1930, as amended ("the Act"),[1] that it had instituted reviews to determine whether revocation of the countervailing and antidumping duty orders on certain crystalline silicon photovoltaic products ("CSPV products") from China and the antidumping duty order on CSPV products from Taiwan would likely lead to the continuation or recurrence of material injury to a domestic industry.[2] All interested parties were requested to respond to this notice by submitting certain information requested by the Commission.[3] [4] The following tabulation presents information relating to the background and schedule of this proceeding:

Effective date	Action
January 1, 2020	Notice of initiation by Commerce (85 FR 67, January 2, 2020)
January 2, 2020	Notice of institution by Commission (85 FR 120, January 2, 2020)
April 6, 2020	Commission's vote on adequacy
May 1, 2020	Commerce's results of its expedited reviews
August 31, 2020	Commission's determinations and views

[1] 19 U.S.C. 1675(c).

[2] 85 FR 120, January 2, 2020. In accordance with section 751(c) of the Act, the U.S. Department of Commerce ("Commerce") published a notice of initiation of five-year reviews of the subject antidumping and countervailing duty orders. 85 FR 67, January 2, 2020. Pertinent Federal Register notices are referenced in app. A, and may be found at the Commission's website (www.usitc.gov).

[3] As part of their response to the notice of institution, interested parties were requested to provide company-specific information. That information is presented in app. B. Summary data compiled in the prior proceeding is presented in app. C. This report discusses data in terms of watts ("W"), kilowatts ("kW" (equal to 1,000 watts)), megawatts ("MW" (1,000 kW)), and gigawatts ("GW" (1,000 MW)).

[4] Interested parties were also requested to provide a list of three to five leading purchasers in the U.S. market for the subject merchandise. Presented in app. D are the responses received from purchaser surveys transmitted to the purchasers identified in this proceeding.

Responses to the Commission's notice of institution

Individual responses

The Commission received two submissions in response to its notice of institution in the subject reviews. They were filed on behalf of the following entities:

1. SunPower Manufacturing Oregon LLC ("SunPower"), a domestic producer of CSPV modules[5]
2. Hanwha Q CELLS USA, Inc. ("Hanwha"), a domestic producer of CSPV modules

A complete response to the Commission's notice of institution requires that the responding interested party submit to the Commission all the information listed in the notice. Responding firms are given an opportunity to remedy and explain any deficiencies in their responses. A summary of the number of responses and estimates of coverage for each is shown in table I-1.

Table I-1
CSPV products: Summary of responses to the Commission's notice of institution

Type of interested party	Completed responses	
	Number of firms	Coverage
Domestic:		
U.S. producer	2	***%
Respondent (***):		
U.S. importer (domestic producer SunPower)	1	***%

Note: The U.S. producer coverage figure is the estimated share of total U.S. production of CSPV modules in 2019 accounted for by responding firms. The estimate was calculated as the quantity of reported module production (***) divided by total estimated U.S. module production in 2019 (2,330,343 kW). U.S. CSPV module production in 2019 is estimated based on U.S. imports of cells under HTS statistical reporting number 8541.40.6025, excluding those dutiable under HTS chapter 99. Hanwha's response to the notice of institution, February 3, 2020, p. 19; Hanwha's supplemental response to the notice of institution, February 24, 2020, pp. 3-4; SunPower's response to the notice of institution, February 3, 2020, p. 16; SunPower's supplemental response to the notice of institution, February 26, 2020, p. 2; and official U.S. import statistics. No U.S. producers of CSPV cells responded to the Commission's notice of institution in these reviews.

Note: The U.S. importer coverage figure is the estimated share of the quantity of total U.S. imports of CSPV products from *** in 2019 accounted for by the responding firm. The estimate was calculated as the quantity of reported imports (***) divided by the quantity of total U.S. imports from *** reported for 2019 in Commerce's official import statistics under HTS statistical reporting numbers 8501.31.8010, 8501.32.6010, 8501.61.0010, 8507.20.8010, 8541.40.6015, and 8541.40.6025 (***). SunPower's response to the notice of institution, February 3, 2020, p. 17.

[5] SunPower, in addition to being a domestic producer of CSPV modules, is a U.S. importer of CSPV cells from ***. SunPower supports the continuation of the order covering imports of CSPV products from China and Taiwan.

Party comments on adequacy

The Commission received party comments on the adequacy of responses to the notice of institution and whether the Commission should conduct expedited or full reviews from SunPower. In its comments, SunPower requests that the Commission conduct expedited reviews of the orders on CSPV products from China and Taiwan.[6]

The original investigations

The original investigations resulted from petitions filed on December 31, 2013 with Commerce and the Commission by SolarWorld Industries America, Inc. ("SolarWorld"), Hillsboro, Oregon.[7] [8] On December 23, 2014, Commerce determined that imports of CSPV products from China and Taiwan were being sold at less than fair value ("LTFV") and subsidized by the Government of China.[9] The Commission determined on February 5, 2015 that the domestic industry was materially injured by reason of imports of CSPV products from China and Taiwan that were found by Commerce to be sold in the United States at LTFV, and subsidized by the government of China.[10] On February 18, 2015, Commerce issued its antidumping duty orders with the final weighted-average dumping margins ranging from 26.71 to 165.04 percent for imports from China and 11.45 to 27.55 percent for imports from Taiwan and its countervailing duty order with net subsidy rates ranging from 27.64 to 49.21 percent for imports from China.[11]

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[6] SunPower's comments on adequacy, March 16, 2020, p. 1.

[7] The former SolarWorld plant in Hillsboro, Oregon, was acquired by SunPower on October 1, 2018. Crystalline Silicon Photovoltaic Cells, Whether or Not Partially or Fully Assembled Into Other Products: Monitoring Developments in the Domestic Industry, Inv. No. TA-201-75 (Monitoring), USITC Publication 5021, February 2020 ("Monitoring publication"), table I-10.

[8] The petitions were also supported by the Coalition for American Solar Manufacturing, which included U.S. producers SolarWorld, ***. Certain Crystalline Silicon Photovoltaic Products from China and Taiwan, Inv. Nos. 701-TA-511 and 731-TA-1246-1247 (Final), USITC Publication 4519, February 2015 ("Original publication"), p. 1; Investigation Nos. 701-TA-511 and 731-TA-1246-1247 (Final): Certain Crystalline Silicon Photovoltaic Products from China and Taiwan, Confidential Report, INV-MM-134, December 23, 2014, as supplemented in INV-NN-005, January 28, 2015 ("Original confidential report"), p. I-1.

[9] 79 FR 76962, 76966, and 76970, December 23, 2014.

[10] 80 FR 7495, February 10, 2015.

[11] 80 FR 8592 and 8596, February 18, 2015.

Previous and related investigations

Crystalline Silicon Photovoltaic Cells and Modules from China (Inv. Nos. 701-TA-481 and 731-TA-1190)

The antidumping and countervailing duty investigations on CSPV cells and modules from China (Inv. Nos. 701-TA-481 and 731-TA-1190) (hereinafter referred to as "CSPV1") resulted from petitions filed by SolarWorld on October 19, 2011.[12] On October 12, 2012, Commerce announced its final affirmative determinations in its antidumping and countervailing duty investigations on CSPV cells and modules from China. The countervailable subsidy margins ranged from 14.78 percent to 15.97 percent[13] and the estimated weighted-average dumping margins ranged from 18.32 percent to 249.96 percent.[14] In November 2012, the Commission determined that an industry in the United States was materially injured by reason of imports of CSPV cells and modules from China that Commerce found were sold at LTFV in the U.S. market and subsidized by the Government of China.[15] Effective December 7, 2012, Commerce issued antidumping and countervailing duty orders on those imports.[16] In CSPV 1, Commerce determined that the country of origin of subject CSPV modules was the country of manufacture of the CSPV cells, including modules assembled outside of China using Chinese CSPV cells. Therefore, the scope of the CSPV 1 orders did not include U.S. imports of CSPV modules assembled in China from CSPV cells made in a country other than China.

[12] Crystalline Silicon Photovoltaic Cells and Modules from China, Inv. Nos. 701-TA-481 and 731-TA-1190 (Final), USITC Publication 4360, November 2012 ("CSPV 1 original publication"), p. I-1.

[13] 77 FR 63788, October 17, 2012.

[14] 77 FR 63791, October 17, 2012. On August 4, 2015, the U.S. Trade Representative ("USTR") instructed Commerce to implement its determinations under Section 129 of the Uruguay Round Agreements Act ("URAA") regarding the antidumping duty investigation of CSPV cells and modules from China which rendered them not inconsistent with the World Trade Organization ("WTO") dispute settlement findings in the Appellate Body report on United States — Countervailing and Anti-dumping Measures on Certain Products from China, WT/DS449/AB/R (July 7, 2014), and the panel report, as modified by the Appellate Body report, WT/DS449/R (March 27, 2014), adopted by the WTO Dispute Settlement Body on July 22, 2014 (DS 449). Accordingly, Commerce revised the antidumping cash deposit rates to account for double remedies, reflecting rates ranging from 6.68 percent to 238.88 percent. 80 FR 48812, August 14, 2015.

[15] CSPV 1 original publication, p. 1. The Commission's determination in CSPV 1 was affirmed on appeal. See Changzhou Trina Solar Energy Co., Ltd. v. U.S. Int'l Trade Comm'n, 879 F.3d 1377 (Fed. Cir. 2018).

[16] 77 FR 73017, December 7, 2012; 77 FR 73018, December 7, 2012.

On November 1, 2017, the Commission gave notice, pursuant to Section 751(c) of the Tariff Act of 1930, as amended,[17] that it had instituted first five-year reviews of the CSPV 1 orders[18] and on February 5, 2018, the Commission determined that it would conduct full reviews.[19] On the basis of the record developed in the first five-year reviews of the CSPV 1 orders, the Commission determined on March 1, 2019, pursuant to the Tariff Act of 1930, that revocation of the antidumping and countervailing duty orders on CSPV cells and modules from China would be likely to lead to continuation or recurrence of material injury to an industry in the United States within a reasonably foreseeable time.[20] Commerce issued a continuation of the antidumping and countervailing duty orders on imports of CSPV cells and modules from China, effective March 20, 2019.[21]

Crystalline Silicon Photovoltaic Cells (Whether or not Partially or Fully Assembled into Other Products) (Investigation No. TA-201-75)

On May 17, 2017, a petition, as amended, was properly filed under section 202(a) of the Trade Act of 1974 ("The Trade Act") (19 U.S.C. § 2552(a)) by counsel for Suniva Inc. ("Suniva"). The petition alleged that certain CSPV products, were being imported into the United States in such increased quantities as to be a substantial cause of serious injury, or threat thereof, to the domestic industry producing an article like or directly competitive with the imported article.[22] The Commission conducted an investigation under section 202(b)(1)(A) of the Act. Following receipt of the report from the Commission in November 2017 under section 202 of the Act (19 U.S.C. § 2252) containing an affirmative serious injury determination and remedy recommendations,[23] the President, on January 23, 2018, pursuant to section 203 of the Act (19 U.S.C. § 2253), issued Proclamation 9693, imposing a safeguard measure in the form of (a) a tariff-rate quota ("TRQ") on imports of CSPV (or "solar") cells not partially or fully assembled

[17] 19 U.S.C. 1675(c).

[18] 82 FR 50681 and 50612, November 1, 2017.

[19] 83 FR 8296, February 26, 2018.

[20] 84 FR 8342, March 7, 2019; Crystalline Silicon Photovoltaic Cells and Modules from China, Inv. Nos. 701-TA-481 and 731-TA-1190 (Review), USITC Publication 4874, March 2019 ("CSPV 1 first review publication"), p. 1.

[21] 84 FR 10299 and 10300, March 20, 2019.

[22] On May 25, 2017, SolarWorld Americas, Inc. ("SolarWorld") and Suniva notified the Commission that SolarWorld was joining Suniva as co-petitioner in the investigation.

[23] Crystalline Silicon Photovoltaic Cells (Whether or not Partially or Fully Assembled Into Other Products), Inv. No. TA-201-75, USITC Publication 4739, November 2017 ("Safeguard publication").

into other products and (b) an increase in duties on imports of CSPV modules for a period of four years, effective February 7, 2018.[24]

The Commission instituted its mid-term monitoring proceeding on July 25, 2019,[25] for the purpose of preparing its mid-term report to the President and the Congress required by section 204(a)(2) of the Trade Act of 1974 ("the Act")[26] on the results of its monitoring of developments with respect to the domestic industry producing CSPV products since the imposition of the safeguard measures on CSPV products. It delivered its monitoring report to the President and the Congress on February 7, 2020.[27]

The Commission also instituted a modification advice proceeding on December 6, 2019, following receipt of a letter from the USTR requesting that the Commission analyze the effect of increasing the level of the TRQ applicable to imports of CSPV cells from 2.5 gigawatts ("GW") to 4, 5, or 6 GW, without other changes to the safeguard remedy.[28] The USTR asked the Commission, under section 204(a)(4) of the Trade Act, to advise the President of the probable economic effect on the domestic CSPV cell and module manufacturing industry of modifying the safeguard measure on imports of CSPV products, as described in Proclamation 9693 of January 23, 2018.[29] The Commission transmitted its modification advice report to the President on March 6, 2020.[30]

[24] 83 FR 3541, January 25, 2018. A court challenge to the Proclamation was rejected, *Silfab Solar, Inc. v. United States*, 892 F.3d 1340 (Fed. Cir. 2018) (affirming denial of injunctive relief), and ultimately withdrawn.

[25] 84 FR 37674, August 1, 2019.

[26] 19 U.S.C. § 2254(a)(2).

[27] Monitoring publication, p. I-1.

[28] Letter from Robert E. Lighthizer, The United States Trade Representative, Executive Office of the President, to David S. Johanson, Chairman, United States International Trade Commission, December 6, 2019.

[29] 84 FR 70565, December 23, 2019. Section 204(a)(4) of the Trade Act (19 U.S.C. 2254(a)(4)) requires the Commission, upon request of the President, to advise the President of its judgment as to the probable economic effect on the industry concerned of any reduction, modification, or termination of the action taken under section 203 of the Trade Act which is under consideration.

[30] Crystalline Silicon Photovoltaic Cells, Whether or Not Partially or Fully Assembled Into Other Products: Advice on the Probable Economic Effect of Certain Modifications to the Safeguard Measure, Inv. No. TA-201-75 (Modification), USITC Publication 5032, March 2020 ("Modification publication").

Commerce's five-year reviews

Commerce is conducting expedited reviews with respect to the orders on imports of CSPV products from China and Taiwan and intends to issue the final results of these reviews based on the facts available not later than May 1, 2020.[31] Commerce's Issues and Decision Memoranda, published concurrently with Commerce's final results, will contain complete and up-to-date information regarding the background and history of the orders, including scope rulings, duty absorption, changed circumstances reviews, and anti-circumvention. Upon publication, a complete version of the Issues and Decision Memoranda can be accessed at http://enforcement.trade.gov/frn/. The Memoranda will also include any decisions that may have been pending at the issuance of this report. Any foreign producers/exporters that are not currently subject to the antidumping and countervailing duty orders on imports of CSPV products from China and Taiwan are noted in the sections titled "The original investigations" and "U.S. imports," if applicable.

The product

Commerce's scope

Scope of the orders concerning imports from China

Commerce has defined the scope of the orders concerning China as follows:

The merchandise covered by these orders are modules, laminates and/or panels consisting of crystalline silicon photovoltaic cells, whether or not partially or fully assembled into other products, including building integrated materials. For purposes of these orders, subject merchandise includes modules, laminates and/or panels assembled in the PRC consisting of crystalline silicon photovoltaic cells produced in a customs territory other than the PRC.

Subject merchandise includes modules, laminates and/or panels assembled in the PRC consisting of 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.

[31] Letter from Steven Presing, Acting Director, AD/CVD Operations, Enforcement and Compliance, U.S. Department of Commerce to Nannette Christ, Director of Investigations, February 25, 2020.

Excluded from the scope of these orders 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 these orders are modules, laminates and/or panels assembled in the PRC, consisting of crystalline silicon photovoltaic cells, not exceeding 10,000 mm^2 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 cells. Where more than one module, laminate and/or panel is permanently integrated into a consumer good, the surface area for purposes of this exclusion shall be the total combined surface area of all modules, laminates and/or panels that are integrated into the consumer good. Further, also excluded from the scope of these orders are any products covered by the existing antidumping and countervailing duty orders on crystalline silicon photovoltaic cells, whether or not assembled into modules, laminates and/or panels, from the PRC.

Merchandise covered by these orders is currently classified in the Harmonized Tariff Schedule of the United States (HTSUS) under subheadings 8501.61.0000, 8507.20.8030, 8507.20.8040, 8507.20.8060, 8507.20.8090, 8541.40.6020, 8541.40.6030 and 8501.31.8000. These HTSUS subheadings are provided for convenience and customs purposes; the written description of the scope of these orders is dispositive.[32]

Scope of the order concerning imports from Taiwan

Commerce has defined the scope of the order concerning Taiwan as follows:

The merchandise covered by this order is crystalline silicon photovoltaic cells, and modules, laminates and/or panels consisting of crystalline silicon photovoltaic cells, whether or not partially or fully assembled into other products, including building integrated materials.

Subject merchandise includes 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.

Modules, laminates, and panels produced in a third country from cells produced in Taiwan are covered by this investigation. However, modules, laminates, and panels produced in Taiwan from cells produced in a third country are not covered by this investigation.

[32] 80 FR 8592, February 18, 2015.

Excluded from the scope of this investigation 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 this investigation are crystalline silicon photovoltaic cells, not exceeding 10,000 mm^2 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 cells. 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.

Further, also excluded from the scope of this investigation are any products covered by the existing antidumping and countervailing duty orders on crystalline silicon photovoltaic cells, whether or not assembled into modules, from the People's Republic of China (''PRC''). Also excluded from the scope of this investigation are modules, laminates, and panels produced in the PRC from crystalline silicon photovoltaic cells produced in Taiwan that are covered by an existing proceeding on such modules, laminates, and panels from the PRC.

Merchandise covered by this investigation is currently classified in the Harmonized Tariff Schedule of the United States (''HTSUS'') under subheadings 8501.61.0000, 8507.20.8030, 8507.20.8040, 8507.20.8060, 8507.20.8090, 8541.40.6020, 8541.40.6030 and 8501.31.8000. These HTSUS subheadings are provided for convenience and customs purposes; the written description of the scope of this investigation is dispositive.[33]

U.S. tariff treatment

The subject merchandise is provided for in subheading 8541.40.60 of the Harmonized Tariff Schedule of the United States ("HTS") and has been free of duty under the general duty column since at least 1987. Within subheading 8541.40.60, the subject merchandise was included in statistical reporting numbers 8541.40.6020 ("solar cells, assembled into modules or made up into panels") and 8541.40.6030 ("solar cells, other") through June 30, 2018. As of July 1, 2018, a superior text for crystalline silicon photovoltaic cells (described in statistical note 11 to chapter 85) applies to two subordinate reporting categories, 8541.40.6015 ("assembled into modules or made up into panels") and 8541.40.6025 ("other").[34] Under subheading 9903.45.22,

[33] 80 FR 8596, February 18, 2015.

[34] Statistical Note 11: For the purposes of statistical reporting numbers 8541.40.6015 and 8541.40.6025, the term "crystalline silicon photovoltaic cells" means crystalline silicon photovoltaic cells of a thickness equal to or greater than 20 micrometers, having a p/n junction (or variant thereof) formed by any means, whether or not the cell imported under statistical reporting number 8541.40.6025 (or subassemblies thereof imported under statistical reporting number 8541.40.6015) has undergone other

imports of cells in excess of the prescribed tariff-rate quota quantity are subject to a general duty rate of 30 percent ad valorem (unless the product of an exempt country); under subheading 9903.45.25 all covered modules from nonexempt countries are dutiable at 30 percent ad valorem.

These articles may also be imported as parts or subassemblies of goods provided for in subheadings 8501.31.80, 8501.61.00, and 8507.20.80.[35] Inverters or batteries with CSPV cells attached are provided for under HTSUS subheadings 8501.61.00 and 8507.20.80, respectively. In addition, CSPV cells covered by the reviews may also be classifiable as DC generators of subheading 8501.31.80, when such generators are imported with CSPV cells attached. Goods classified in subheadings 8501.31.80 and 8501.61.00 have general duty rates 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. The following statistical reporting numbers were added on March 1, 2018: 8501.31.8010 (covering DC generators of an output not exceeding 750 W: photovoltaic generators of a kind described in statistical note 9 to subchapter 85),[36] 8501.32.6010 (DC generators of an output exceeding 750 W but not exceeding 75 kW: photovoltaic generators of a kind described in statistical note 9), 8501.61.0010 (AC generators (alternators): photovoltaic generators of a kind described in statistical note 9), and 8507.20.8010 (other lead-acid storage batteries: of a kind described in subheading 9903.45.25).[37]

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processing, including, but not limited to, cleaning, etching, coating, and/or addition of materials (including, but not limited to, metallization and conductor patterns) to collect and forward the electricity that is generated by the cell. Such cells include photovoltaic cells that contain crystalline silicon in addition to other photovoltaic materials. This includes, but is not limited to, passivated emitter rear contact cells, heterojunction with intrinsic thin-layer cells, and other so-called hybrid cells.

[35] The subject cells may be presented as integral elements of subassemblies of components or of goods of these three subheadings, even if not treated as "parts" for tariff purposes.

[36] Statistical Note 9 to chapter 85 provides as follows: For the purposes of heading 8501, photovoltaic generators consist of panels of photocells combined with other apparatus, e.g., storage batteries and electronic controls (voltage regulator, inverter, etc.) and panels or modules equipped with elements, however simple (for example, diodes to control the direction of the current), which supply the power directly to, for example, a motor, an electrolyser. In these devices, electricity is produced by means of solar cells which convert solar energy directly into electricity (photovoltaic conversion).

[37] HTS 9903.45.25: Modules as defined in note 18(g) to this subchapter (subchapter III of chapter 99), when the product or originating good of a country other than a country described in note 18(b) to this subchapter. U.S. Note 18(g) to subchapter III, chapter 99: Subject to the provisions of subdivision (c)(iii) of this note, for purposes of subheading 9903.45.25 to this subchapter, the term "modules" shall include the following goods provided for in subheading 8541.40.60 of the tariff schedule: a module is a joined group of CSPV cells, as such cells are defined in subdivision (c) of this note, regardless of the number of cells or the shape of the joined group, that are capable of generating electricity. Also included as a "module" are goods each known as a "panel" comprising a CSPV cell that has undergone any processing,

Decisions on the tariff classification and treatment of imported articles are within the authority of U.S. Customs and Border Protection ("Customs"). As stated in Commerce's notices of antidumping and countervailing duty orders, the HTS subheadings and reporting numbers are provided for convenience and customs purposes; the written description of the scope of these orders is dispositive.[38]

Section 301[39]

As a result of Section 301 determinations, products of China under certain applicable subheadings are assessed up to an additional duty of 25 percent ad valorem.[40] CSPV modules and cells, which are primarily classified in HTS subheading 8541.40.60, were included in the list of articles subject to the additional 25-percent duties effective August 23, 2018, under Section 301 of the Trade Act of 1974. This list of articles also included HTS subheadings 8501.31.80 and 8501.32.60 (under which CSPV products also enter).[41] [42] HTS subheadings 8501.61.00 and 8507.20.80 (under which CSPV products also enter) were included in the list of goods subject to additional 10-percent ad valorem duties if they are the product of China and entered the United States on or after September 24, 2018 and prior to May 10, 2019.[43] Goods in HTS subheadings 8501.61.00 and 8507.20.80 exported before May 10, 2019 that entered into the United States by the close of June 14, 2019 continued to be charged the 10-percent additional duty rate. Goods entered on and after June 15, 2019 are subject to the additional 25-percent ad

assembly, or interconnection (including, but not limited to, assembly into a laminate). Such CSPV cells assembled into modules or made up into panels include goods of a type reported for statistical purposes under statistical reporting number 8541.40.6020. Such goods also include (i) CSPV cells which are presented attached to inverters or batteries of subheading 8501.61.00 or 8507.20.80, respectively; and (ii) CSPV cells classifiable as DC generators of subheading 8501.31.80.

[38] 77 FR 73018, December 7, 2012; and 77 FR 73017, December 7, 2012.

[39] Unless otherwise noted, this information is based on Monitoring publication, pp. I-8–I-9.

[40] 83 FR 47974, September 21, 2018; 83 FR 40823, August 16, 2018; and 83 FR 65198, December 19, 2018.

[41] 83 FR 40823, August 16, 2018.

[42] See U.S. notes 20(e) and 20(f), subchapter III of chapter 99 which discuses articles and products from China.

[43] 83 FR 47974, September 21, 2018.

valorem duties, regardless of date of export.[44] Various components used in CSPV module production, such as frames, junction boxes, and backsheets, are also subject to the additional 25-percent ad valorem duties, as are certain balance of system components such as inverters.[45]

Section 232[46]

The relevant HTS subheadings within the scope of these reviews, 8541.40.60, 8501.31.80, 8501.32.60, 8501.61.00, and 8507.20.80, were not included in the enumeration of certain steel products subject to the additional 25-percent ad valorem duties or the aluminum products that are subject to the additional 10-percent ad valorem national-security duties under Section 232 of the Trade Expansion Act of 1962, as amended.[47] However, imports from China and Taiwan of steel, which is used in balance of systems components (such as tracking systems on which modules are mounted) for solar installations,[48] are subject to the Section 232 additional 25-percent ad valorem duty. In addition, imports from China and Taiwan of aluminum, which is used as an input in CSPV module production, as discussed below, and in balance of system components such as racking and mounting systems, [49] are subject to the Section 232 additional 10-percent ad valorem duty.

[44] 84 FR 26930, June 10, 2019.

[45] The goods listed here, which are examples and not an inclusive list of goods subject to additional duties, are included in 9903.88.01, 9903.88.02, and 9903.88.03 in the HTS.

[46] Unless otherwise noted, this information is based on Monitoring publication, pp. I-7–I-8.

[47] 83 FR 11625, March 15, 2018.

[48] See U.S. notes 16(a) and 16(b), subchapter III of chapter 99.

[49] See U.S. notes 19(a), 19(b), 19(c), 19(d), and 19(e), subchapter III of chapter 99.

Physical properties[50]

CSPV cells (figure I-1) use crystalline silicon to convert sunlight to electricity and are the basic elements of a CSPV module. They 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.[51] As of 2018, the most common cell size was 156.75 mm by 156.75 mm (6.17 inches by 6.17 inches), replacing 156.0 mm by 156.0 mm (6.14 inches by 6.14 inches) cells, though firms are commercializing even larger cell sizes.[52] As of 2019, CSPV cells typically have wattages ranging from 4 to 5.4 watts per cell.[53] 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[54] convert sunlight into electricity for on-site use or for distribution through the electric grid.

[50] This section will cover CSPV cells and modules generally, with a focus on the most common product characteristics. The "discussion of specific products" section will cover various other CSPV technologies and products. Unless otherwise noted, this section is derived from the Monitoring publication, pp. I-54–I-59. Citations to direct quotes, pictures, and data were retained.

[51] 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.

[52] ITRPV, Results 2018, March 2019, p. 42, https://itrpv.vdma.org/#, retrieved July 29, 2019.

[53] ENF Solar Webpage, https://www.enfsolar.com/pv/cell, retrieved October 11, 2019.

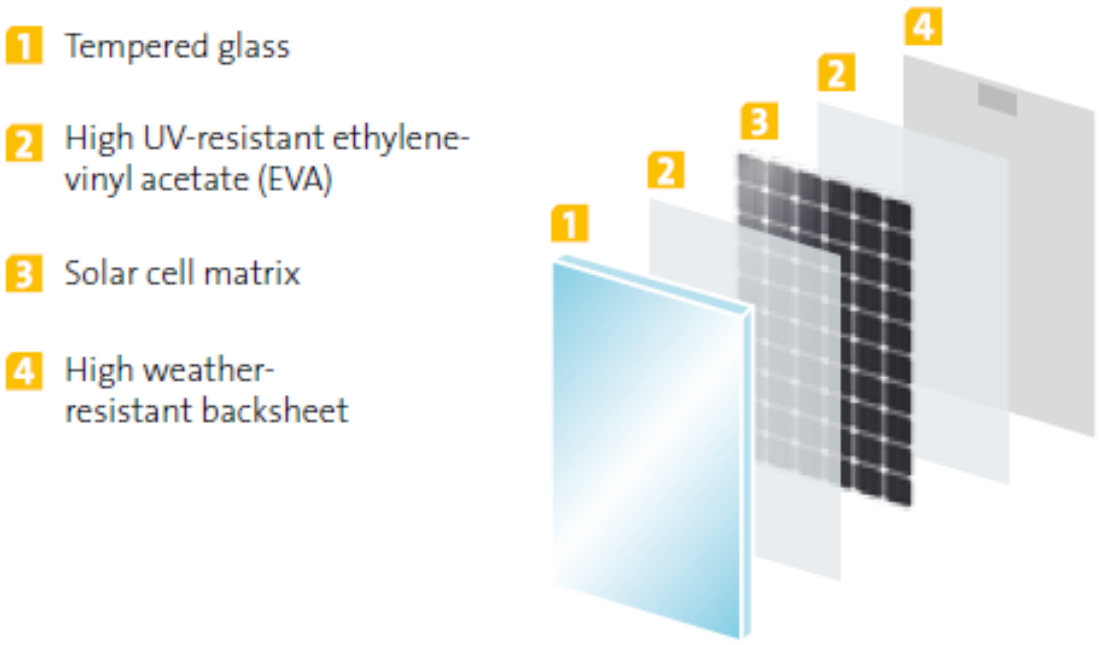
[54] In addition to CSPV products, there is commercial production of thin film photovoltaic products (which are not included in the scope of these reviews). Thin film modules use a several micron thick layer of a photosensitive semiconductor material such as amorphous silicon ("a-Si"), cadmium telluride ("CdTe"), or copper indium (gallium) (di)selenide ("CIS" or "CIGS") to convert sunlight to electricity.

Figure I-1
CSPV products: CSPV cells

Source: SolarWorld Webpage, http://www.solarworld.de/en/group/from-sand-to-module/solar-cells/, retrieved July 6, 2017.

CSPV laminates consist of the CSPV cells that are connected, encapsulated in an ethyl vinyl acetate ("EVA") film,[55] and covered with a glass front layer and a back sheet (figure I-2). The back sheet is most commonly a plastic film composite, though glass is also used in some applications such as bifacial CSPV modules.

Figure I-2
CSPV products: Layers of a typical CSPV laminate



Source: SolarWorld, "SolarWorld Quality," brochure, May 2014, p. 10, https://www.solarworld-usa.com/~/media/www/files/brochures/sw-01-7182us-flyer-solarworldquality.pdf.

[55] There are other encapsulation materials that are used, but EVA accounted for more than 90 percent of the market in 2018. ITRPV, Results 2018, March 2019, p. 17, https://itrpv.vdma.org/#, retrieved July 29, 2019.

CSPV modules typically consist of the laminate that is framed in aluminum, and then attached to a junction box. 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.[56] 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). Typical on-grid CSPV modules have 60 or 72 CSPV cells, though there are other configurations and, in some instances, CSPV cells are cut in half resulting in 120 or 144 half-cut CSPV cells (figure I-3).[57] CSPV 60-cell modules are, on average 65 inches long and 39 inches wide, and are typically 1.5 to 2 inches in depth. CSPV 60-cell modules commonly weigh between 33 and 51 pounds. CSPV 72-cell modules are generally around 78 inches long, 39 inches wide, and 1.5 to 2 inches thick.[58] CSPV 72-cell modules generally weigh from 45 to 61 pounds.[59]

[56] 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.

[57] In 2018, 60 cell/120 half-cut cells accounted for more than 60 percent of the global market, and 72 cell/144 half-cut cells accounted for more than 30 percent. ITRPV, Results 2018, March 2019, p. 49, https://itrpv.vdma.org/#, retrieved July 29, 2019.

[58] EnergySage, "What is the Average Solar Panel Size and Weight?" n.d., http://news.energysage.com/average-solar-panel-size-weight/, retrieved July 7, 2017.

[59] Schwartz, Joe, "High-Power c-Si PV Module Specifications," SolarPro, Issue 10.3, May/June 2017, pp. 48-59, https://solarprofessional.com/articles/products-equipment/modules/high-power-c-si-pv-module-specifications-2017#.WV-8AP6Wx-A, retrieved December 18, 2018.

Figure I-3
CSPV products: CSPV 60-cell module (left) and 72-cell module (right)

Source: Suniva, Suniva Optimus Series Monocrystalline Solar Modules, OPT Series: OPT 72 cell modules (silver frame), brochure, January 18, 2017, http://suniva.com/documents/{SAMD_0060}%20Suniva%20Optimus%2060%20Silver%20OCOF%20Rev%205%202017%2001%2018.pdf, retrieved December 18, 2018; Suniva, Suniva Optimus Series Monocrystalline Solar Modules, OPT Series: OPT 60 cell modules (silver frame), brochure, January 18, 2017, http://suniva.com/documents/{SAMD_0051}%20Suniva%20Optimus%2072%20cell%2038mmOCOF%20-%20Rev%209%20-%202017%2001%2018.pdf, retrieved December 18, 2018.

The two main types of CSPV cells and modules are monocrystalline silicon and multicrystalline (or polycrystalline) silicon, though there are various products within these two categories. 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.[60] For example, efficiencies for 72-cell or more multicrystalline CSPV modules listed in SolarPro's 2017 module specifications ranged from 15.2 to 17.8 percent, while efficiencies for monocrystalline CSPV modules ranged from 15.5 to 21.5 percent.[61]

The average output of 60-cell multicrystalline CSPV modules added to the California Energy Commission's PV Module List during 2017–October 15, 2019 was 280 watts and the

[60] Conversion efficiency is the percent of sunlight that is converted to electricity.

[61] Schwartz, Joe, "High-Power c-Si PV Module Specifications," *SolarPro*, Issue 10.3, May/June 2017, pp. 48-59, retrieved December 18, 2018.

average output of monocrystalline CSPV modules was 308 watts.[62] The average output of 72-cell multicrystalline CSPV modules was 338 watts, while the average power output of 72-cell monocrystalline CSPV modules was 370 watts.[63] The conversion efficiency of CSPV modules has increased over time.

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 are 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) (figure I-4). 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.

Figure I-4
CSPV products: Off-grid solar lighting

Source: Photo courtesy of DOE/NREL, https://www.nrel.gov/.

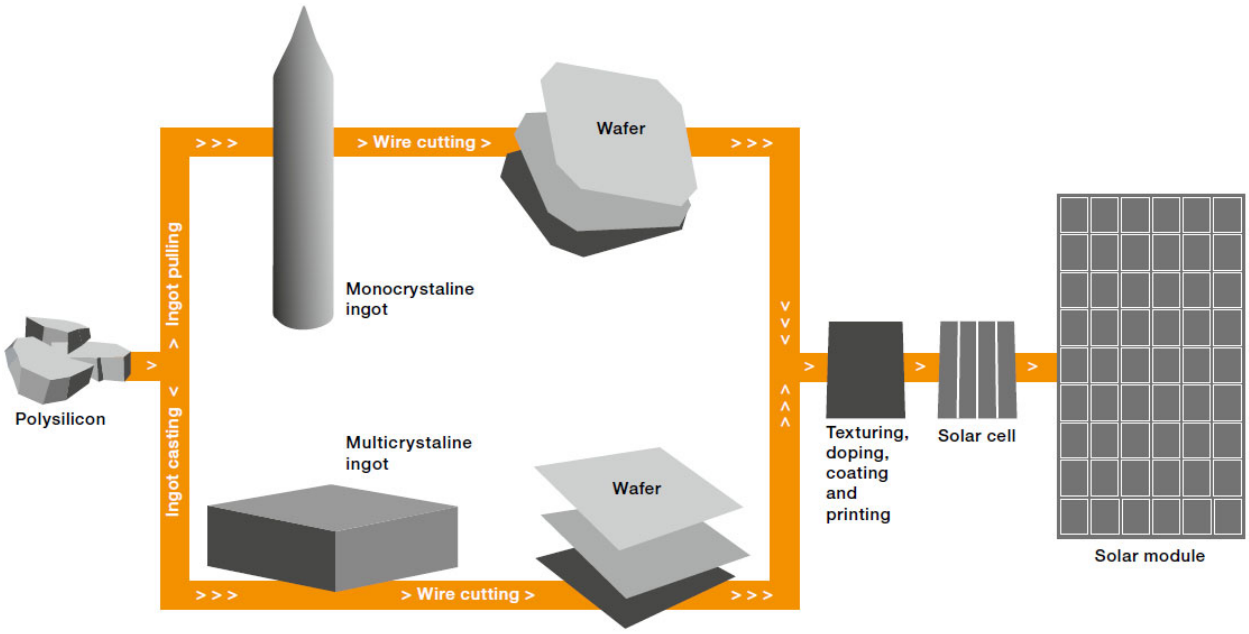
[62] Schwartz, Joe, "60-Cell PV Modules Specifications (2017)," SolarPro, Issue 10.6, November/December 2017, pp. 42-53, retrieved December 18, 2018.

[63] Excludes modules listed as multiple entries of the same model. California Energy Commission PV Module List, October 15, 2019, https://www.gosolarcalifornia.ca.gov/equipment/pv_modules.php, retrieved October 16, 2019.

Manufacturing facilities and processes[64]

There are five principal stages involved in the manufacture of CSPV products (figure I-5). These are discrete production steps that may be done in different plants or locations, and may be produced in-house or sourced from other companies. First, polysilicon is refined, then it is formed into ingots, using different processes to produce monocrystalline ingots (sometimes referred to as crystals) and multicrystalline ingots. The ingots are then sliced into wafers and converted to CSPV cells, which are then assembled into the finished product, CSPV modules. The following discussion covers some of the most common production processes for each of the five steps.

Figure I-5
CSPV products: CSPV module production process



Source: Wacker Chemie AG, "Polysilicon," n.d., p. 10, https://www.wacker.com/cms/media/publications/downloads/7416_EN.pdf, retrieved October 8, 2019.

[64] Unless otherwise noted, this section is derived from Monitoring publication, pp. I-59–I-68. Citations to direct quotes, pictures, and data were retained.

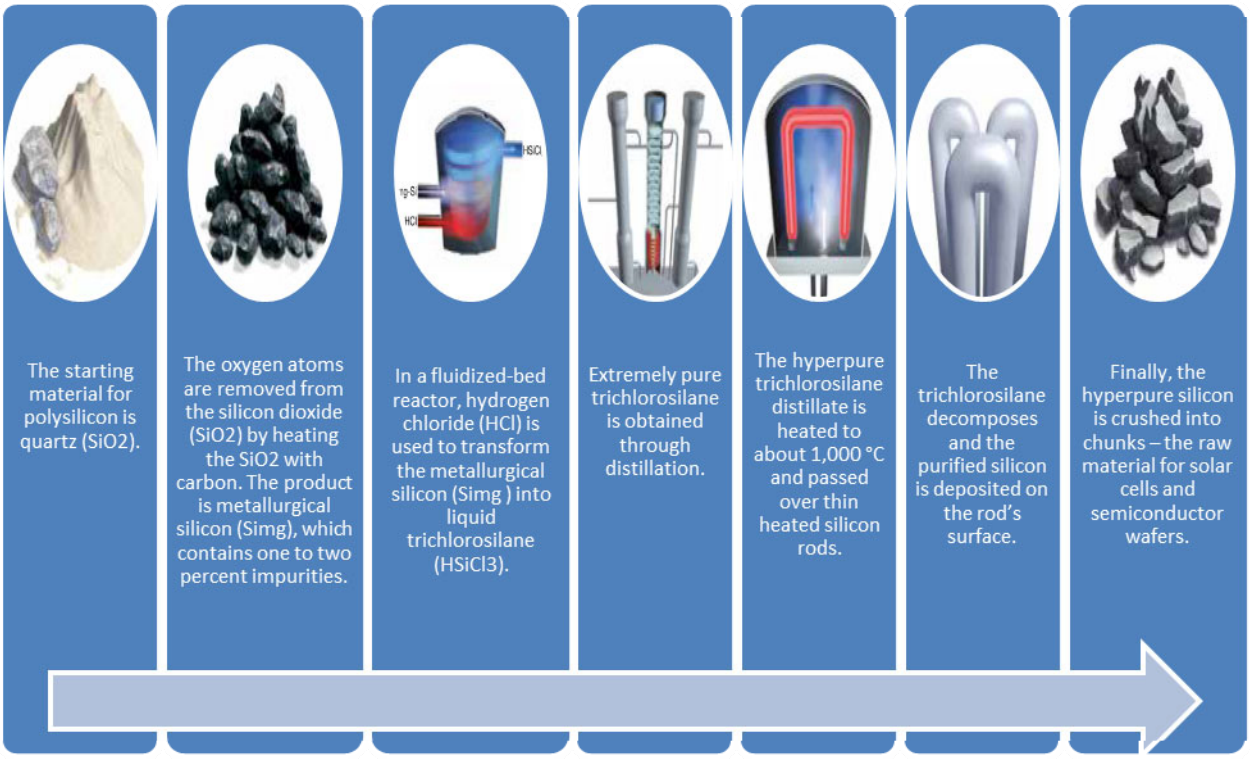
Polysilicon

The first step in the CSPV value chain is refining polysilicon.[65] In the Siemens process (figure I-6), used in the majority of global polysilicon production, first 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. The trichlorosilane is then distilled to increase its purity. Next, heated silicon rods are inserted into a chemical vapor deposition reactor, and hydrogen and trichlorosilane gas are fed into the reactor where they are heated to 1,000 degrees Celsius or more. The silicon from the trichlorosilane is deposited onto the rods, which steadily increase in size until they are removed from the reactor. The resulting high purity polysilicon is crushed into chunks or rocks, then washed, inspected, and packaged.

[65] This discussion will focus on the Siemens method, which accounted for more than 85 percent of global production in 2017. Fluidized bed reactor ("FBR") technology accounted for most of the remaining market. 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. ITRPV, Results 2017 Including Maturity Report, Ninth Edition, September 2018, p. 8; REC Silicon webpage, http://www.recsilicon.com/technology/rec-silicons-fluidized-bed-reactor-process, retrieved June 12, 2017.

Figure I-6

CSPV products: Polysilicon refining process (Siemens method)

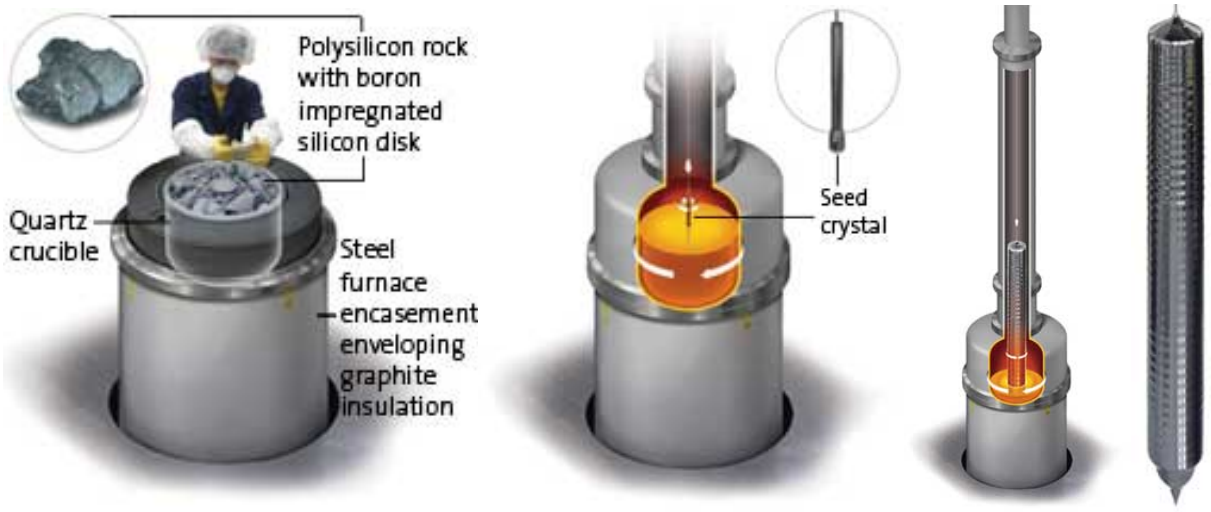


Source: Wacker Chemie AG, "Polysilicon," n.d., p. 8, https://www.wacker.com/cms/media/publications/downloads/7416_EN.pdf, retrieved October 8, 2019.

Ingots

In the Czochralski ("Cz") process[66] for producing crystals used in monocrystalline ingots, polysilicon chunks 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-7). The polysilicon often includes both virgin polysilicon and waste polysilicon generated at later stages of the production process. The crucible is then loaded into a Cz 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.

Figure I-7
CSPV products: Czochralski process, crucible loading/charging (left), seed crystal (second from left), crystal growing (second from right), and finished crystal (right)



Source: SolarWorld Webpage, https://www.solarworld-usa.com/solar-101/making-solar-panels, retrieved July 15, 2017.

[66] This discussion will focus on the Czochralski process, which accounted for more than 95 percent of production in 2016. ITRPV, 2016 Results, March 2017, p. 19, http://www.itrpv.net, retrieved December 18, 2018.

The speed of ingot pulling has increased over time, as has the size of ingots. The mass of a typical monocrystalline ingot was more than 200 kg in 2018.[67] Firms are moving toward rechargeable Czochralski ("RCz") and continuous Czochralski ("CCz") production processes. These processes enable firms "to cast more monocrystalline silicon in a single crucible" and RCz use has been accompanied by a shift toward using larger crucibles. These processes thus produce larger ingots, reduce energy use and downtime, and increase crucible life.[68]

For multicrystalline ingots, the first step is loading polysilicon (including virgin and recovered waste) into a quartz crucible in a Directional Silicon Solidification ("DSS") furnace for melting (figure I-8). Argon is fed into the furnace to "remove impurities and inhibit oxidation."[69] The "molten silicon is cast into a block and crystallized, forming a multicrystalline structure as the molten silicon and crucible cool."[70] The mass of mainstream multicrystalline ingots is about 1,100 kg in 2019.[71] A number of companies are upgrading to cast mono (also referred to as quasi-mono or mono-like ingots), which has higher conversion efficiencies. In this process, seed ingots are used in the furnace to produce an ingot with a more mono type crystal structure.

[67] ITRPV, Results 2018, March 2019, p. 21, https://itrpv.vdma.org/#, retrieved July 29, 2019.

[68] JinkoSolar Holding Co., Ltd., Annual Filing to the Securities and Exchange Commission for the Fiscal Year Ended December 31, 2018, Form 20-F, p. 56, http://ir.jinkosolar.com/financials/annual-reports, retrieved October 8, 2019; Roselund, Christian, "The Weekend Read: Secrets of Monocrystalline Silicon," PV Magazine, November 24, 2018, https://www.pv-magazine.com/2018/11/24/the-weekend-read-secrets-of-monocrystalline-silicon/, retrieved October 9, 2019.

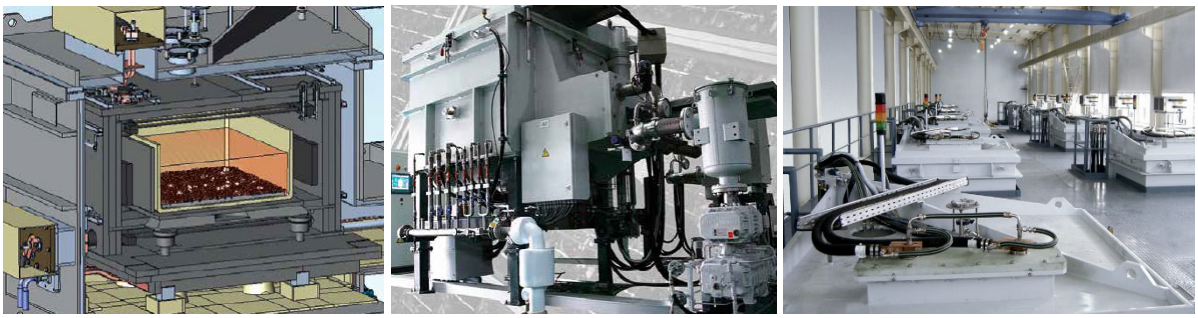
[69] JinkoSolar Holding Co., Ltd., Annual Filing to the Securities and Exchange Commission for the Fiscal Year Ended December 31, 2018, Form 20-F, p. 56, http://ir.jinkosolar.com/financials/annual-reports, retrieved October 8, 2019.

[70] JinkoSolar Holding Co., Ltd., Annual Filing to the Securities and Exchange Commission for the Fiscal Year Ended December 31, 2018, Form 20-F, p. 56, http://ir.jinkosolar.com/financials/annual-reports, retrieved October 8, 2019.

[71] ITRPV, Results 2018, March 2019, p. 20, https://itrpv.vdma.org/#, retrieved July 29, 2019.

Figure I-8

Furnace for multicrystalline ingots: Cross-section (left), single unit (middle), and installed units (right)



Source: ALD Vacuum Technologies, "SCU450 / SCU800 / SCU1200 / SCU1500 Silicon Crystallization Units," October 2016, p. 2, https://www.ald-vt.com, retrieved October 9, 2019; ALD Vacuum Technologies Webpage, https://www.ald-vt.com/portfolio/engineering/vacuum-metallurgy/silicon-crystallization-unit/, retrieved October 9, 2019.

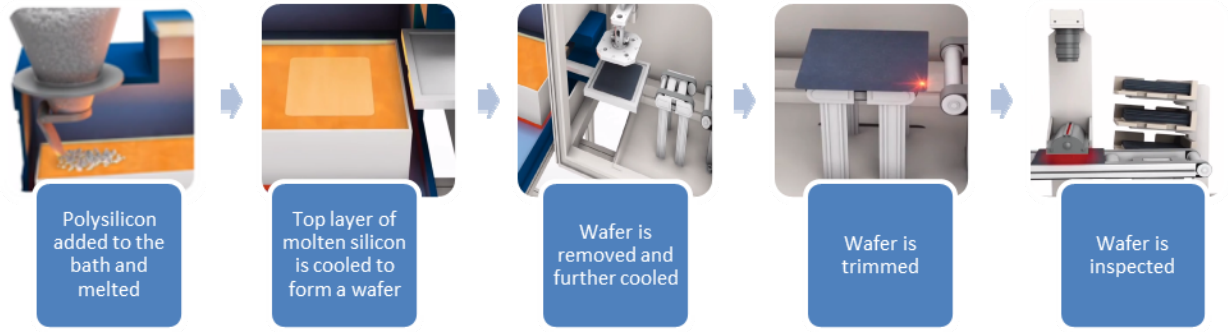
Wafers

Once the ingot has cooled, it is processed into wafers. For monocrystalline ingots: (1) the top and tail (each end of the cylindrical crystal) are cut off, (2) the remaining portion of the crystal (or ingot) is cut into equal length pieces, (3) the ingot is squared,[72] (4) edges are ground, and (5) a wire saw then slices the ingots into wafers. For multicrystalline ingots (1) the ingot is squared, (2) the squared ingot is cut into blocks, (3) the blocks are tested and any parts of the block that do not pass these tests are cropped off, and (4) the blocks are sliced into wafers using a wire saw. Finally, the wafers are cleaned, dried, and inspected. Manufacturers have generally switched to diamond wire saws, which have several benefits including increasing the speed of the production process.

One emerging technology for wafer production is Direct-to-Wafer or Direct Wafer technology. This technology involves converting molten silicon (or another feedstock) directly into wafers, bypassing the ingot stage. One such process is shown in figure I-9.

[72] In monocrystalline ingot squaring, the rounded sides of the ingot are cut into four flat sides, leaving only rounded corners.

Figure I-9
CSPV products: Direct wafer manufacturing process



Source: 1366 technologies webpage, https://1366tech.com/technology-2/#ourwafers, retrieved December 19, 2019.

CSPV cells[73]

The monocrystalline and multicrystalline wafers, which are 180 to 200 micrometers thick, are next processed into CSPV cells (figure I-10). The main steps in producing a standard, p-type, aluminum back surface field CSPV cell are as follows:

- **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.
- **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."[74]
- **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 CSPV 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

[73] The cell manufacturing process varies by company and technology. This section will only describe the process for producing a standard aluminum back surface field cell and a monocrystalline PERC cell. For more on specific technologies and some of the variation in the production process, see the "discussion of specific products" section.

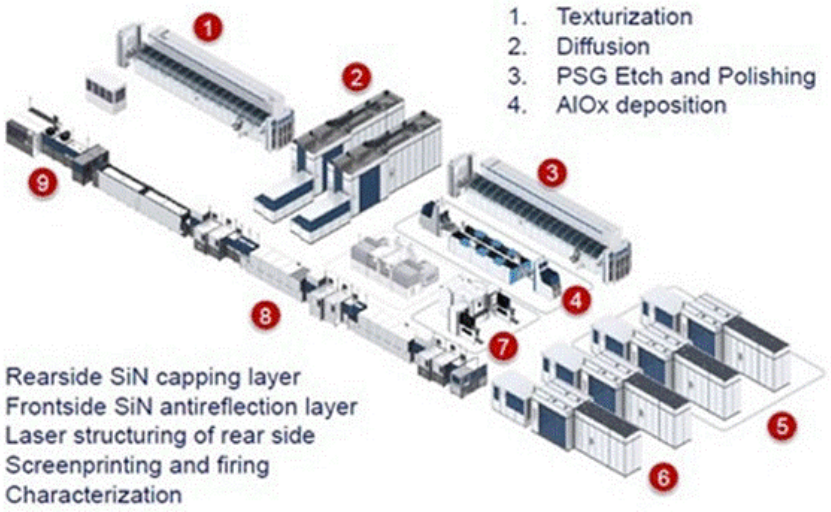
[74] SolarWorld, "Energy for You and Me" brochure, p. 12.

are connected to the rest of the CSPV module via busbars. A metal layer, typically aluminum, is also printed on the back of the CSPV cell.

- **Co-firing:** The CSPV cells then enter a furnace, where the "high temperature causes the silver paste to become imbedded in the surface of the silicon layer, forming a reliable electrical contact."[75]
- **Testing and sorting:** The final step in the process is the testing and sorting of the CSPV cells based on their characteristics and efficiency.

Producing passive emitter rear contact ("PERC") CSPV cells requires several modifications to the production process for Al-BSF CSPV cells. The first modification is that, in the edge-isolation step, texturing on the rear side of the cell is removed (rear polishing). Further, in addition to coating the front of the cell with silicon nitride, the rear side is passivated with aluminum oxide (AlOx) and an antireflective silicon nitride (SiN) layer is added to the rear side. The final process addition involves using lasers to open holes in the rear passivation layer to allow the aluminum to contact the silicon. See the "Discussion of specific products" section for more information on PERC cells.

Figure I-10
CSPV products: CSPV cell production process



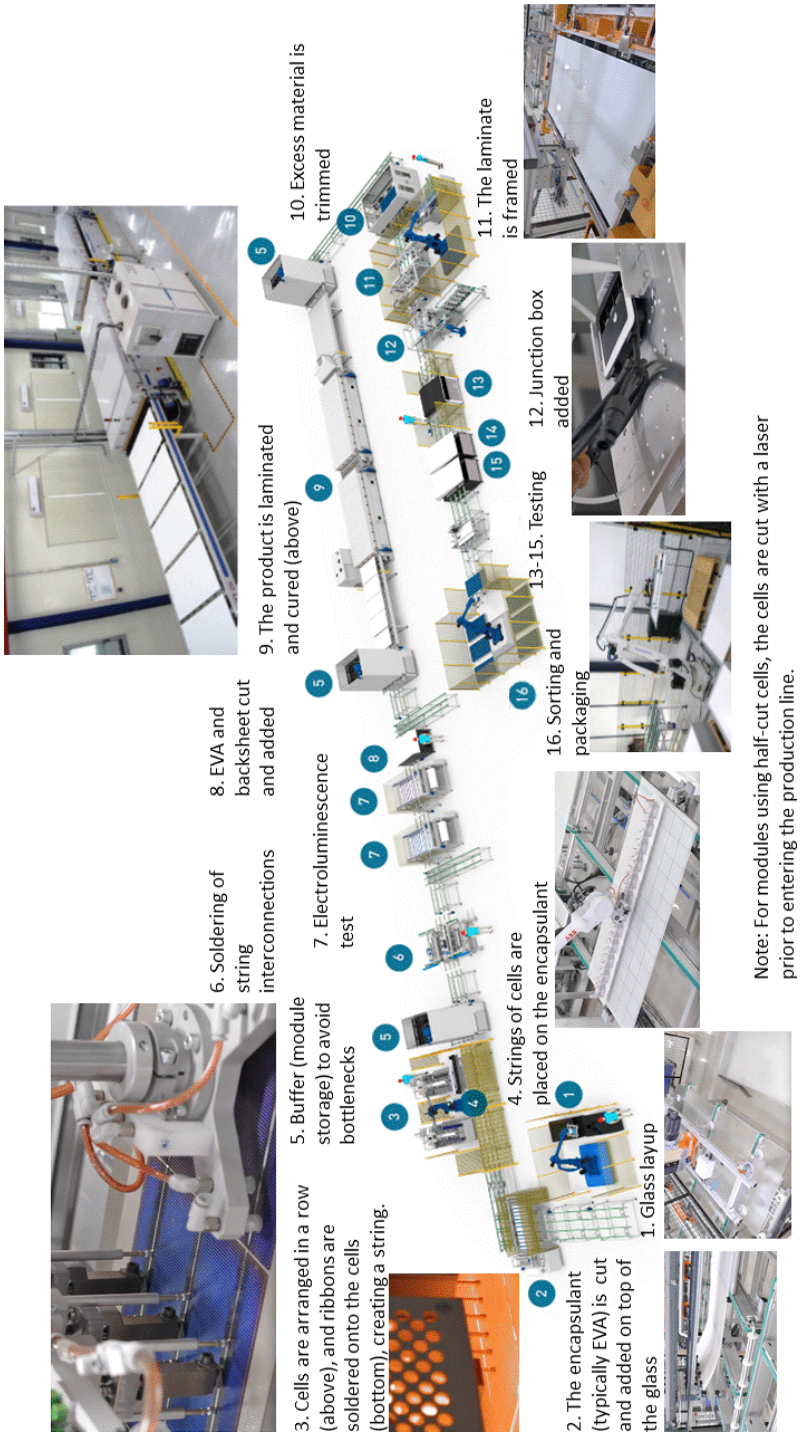
Source: CETC Solar Energy Webpage, http://cetcsolarenergy.com/products/solar_pv_production_equipments.html, retrieved October 10, 2019.

[75] JA Solar, "Form 20-F," April 16, 2013, p. 41.

CSPV modules

The CSPV cells are next assembled into CSPV modules (figure I-11). If half-cut cells are used, the CSPV cells are first cut in half using a laser. Next, a piece of glass is placed on the production line, on top of which is added a piece of ethyl vinyl acetate ("EVA") or another encapsulant. Then a group of CSPV cells is placed in a line and soldered together, creating a string. The strings are then placed on top of the encapsulant, and the string interconnections are soldered together. After this, another layer of EVA and a backsheet are added, then the product is laminated and cured (creating what is referred to as a "laminate"). Excess material is then trimmed, usually a frame is added, and a junction box is attached to the back. CSPV modules are then tested, sorted, and packaged.

Figure I-11
CSPV module production process, fully automated assembly line



Source: Ecoprogetti Webpage, https://ecoprogetti.com/100mw-fully-automatic/, retrieved October 7, 2019; Mondragon Assembly, "Turnkey Solar Module Manufacturing Line–PV Module Factory–Mondragon Assembly," https://www.youtube.com/watch?v=_KTrq63Q2u4, retrieved October 7, 2019.

Applications[76]

There are four primary market segments for CSPV products. There are three grid-connected market segments–residential, nonresidential, and utility–and an off-grid market. In the grid-connected market, installations are usually either ground-mounted or roof-mounted. In addition to the CSPV module, there are a number of other components of the installation called the balance of system ("BOS"). The BOS includes components such as the inverter and the racking on which the modules are installed.[77]

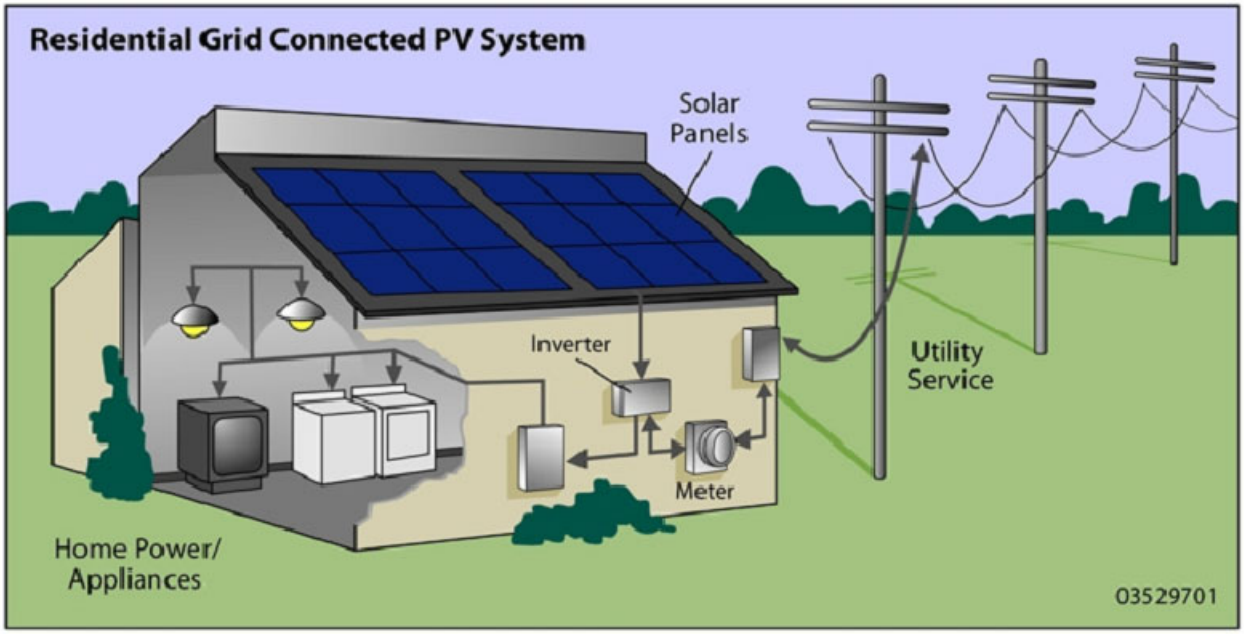
Residential grid-connected systems are installed at individual homes. CSPV modules are typically installed on the roof, though they can also be ground-mounted, and connected to an inverter. The system can use a central inverter, which converts the power from multiple CSPV modules, or each module can have its own microinverter attached. In residential installations, the electricity generated by the system is used for power in the individual home (figure I-12). Homeowners use grid energy when solar electricity generation is not sufficient to meet demand, and often feed energy back into the grid when solar electricity generation exceeds home use. In the United States, the median size of a residential PV installation was 6.4 kW in 2018.[78]

[76] Unless otherwise noted, this section is derived from Monitoring publication, pp. I-69–I-71. Citations to direct quotes, pictures, and data were retained.

[77] In addition to equipment, there are a number of services associated with installing a PV system such as site assessment and design, permitting, financing, and the system installations, as well as operations and maintenance services after the installation is completed.

[78] Barbose, Galen and Naïm Darghouth, Tracking the Sun, 2019 Edition, Lawrence Berkeley National Laboratory, October 2019, p. 10, https://emp.lbl.gov/tracking-the-sun, retrieved November 3, 2019.

Figure I-12
Residential grid-connected CSPV system



Source: DOE, Office of Energy Efficiency and Renewable Energy (EERE) Webpage, http://www.energysavers.gov/your_home/electricity/index.cfm/mytopic=10720, retrieved November 9, 2011.

Nonresidential systems are installed at commercial, industrial, government, and similar buildings and sites. Nonresidential installations are typically larger than residential installations—for nonresidential systems, the median size in 2018 was 47 kW, though systems can be substantially larger.[79] However, they function similarly to residential installations, providing electricity to meet onsite needs, pulling additional electricity from the grid when needed, and feeding excess electricity back into the grid when it is not needed.

[79] Barbose, Galen and Naïm Darghouth, Tracking the Sun, 2019 Edition, Lawrence Berkeley National Laboratory, October 2019, p. 10, https://emp.lbl.gov/tracking-the-sun, retrieved November 3, 2019.

Utility systems are generally the largest systems and provide electricity directly to the electric grid for sale to customers rather than for on-site use (figure I-13). These systems are generally ground-mounted and currently tend to use central inverters rather than microinverters. CSPV utility systems may involve fixed-tilt, single-axis tracking (panels rotate to follow the east-west movement of the sun), or dual-axis tracking (panels also move to follow the north-south movement of the sun during the year). Most large systems use single-axis tracking.

Figure I-13
La Ola PV plant, a utility CSPV system on Lanai, Hawaii

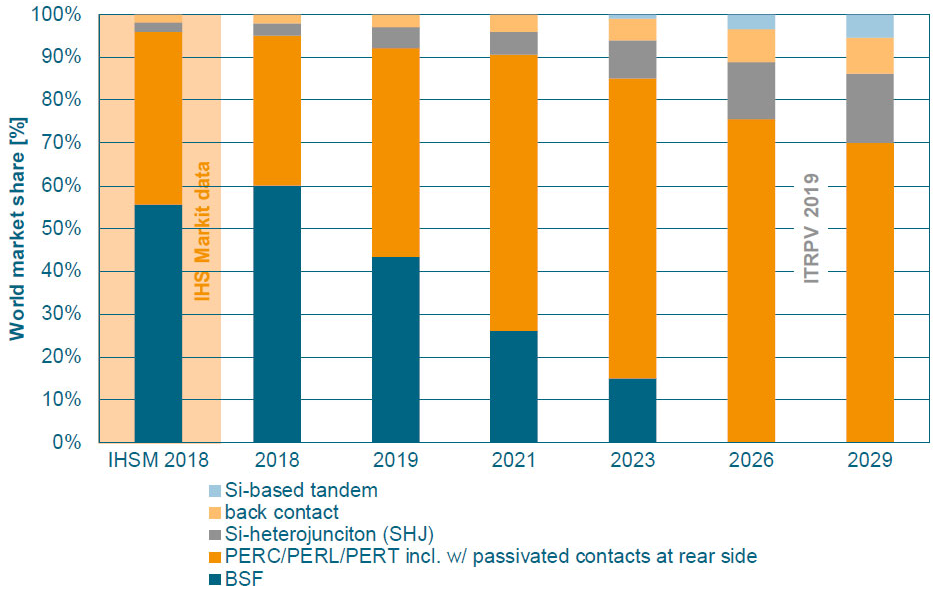
Source: Photo courtesy of DOE/NREL, credit Jamie Keller, https://www.nrel.gov/.

As noted above, there are 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 (e.g., systems for recharging consumer electronics like tablets and phones). These systems often have additional BOS components, such as a battery and charge controller, though inverters are not needed for all off-grid applications.

Discussion of specific products[80]

Within the broad areas of monocrystalline[81] and multicrystalline[82] products, there are a number of CSPV cell and module technologies. The production of passive emitter rear contact ("PERC") and related technologies is rapidly increasing, and these technologies accounted for 35 percent of CSPV cell production in 2018 (figure I-14).[83] Manufacturers have also increased the number of busbars used in CSPV cells, with cells containing five or more busbars accounting for more than 40 percent of global production in 2018.[84] Select CSPV cell and module technologies are described below.

Figure I-14
CSPV products: CSPV cell technology shares



Notes: BSF=Back Surface Field, the standard technology prior to the introduction of PERC; Si=Silicon.

Source: ITRPV, Results 2018, March 2019, p. 43, https://itrpv.vdma.org/#, retrieved July 29, 2019.

[80] Unless otherwise noted, this section is derived from Monitoring publication, pp. I-72–I-80. Citations to direct quotes, pictures, and data were retained.

[81] Monocrystalline cells are made from a single grown crystal and tend to convert sunlight into electricity more efficiently than multicrystalline cells.

[82] Multicrystalline cells have a random crystal structure and tend to have a lower conversion efficiency.

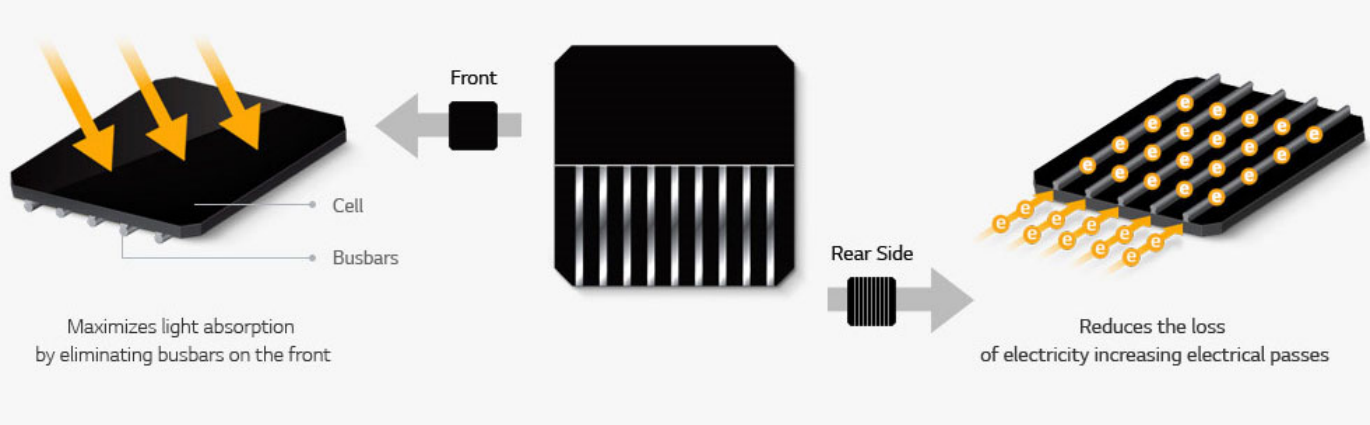
[83] ITRPV, Results 2018, March 2019, p. 44, https://itrpv.vdma.org/#, retrieved July 29, 2019.

[84] ITRPV, Results 2018, March 2019, p. 37, https://itrpv.vdma.org/#, retrieved July 29, 2019.

Back contact CSPV cells

Some manufacturers place metal contacts onto the rear side of the CSPV cell, creating back (or rear contact) cells (figure I-15). This provides several advantages, such as reduced shading, improved cell interconnection, and better aesthetics.

Figure I-15
CSPV products: Back contact CSPV cell with no front gridlines (left) compared to a standard cell (right)

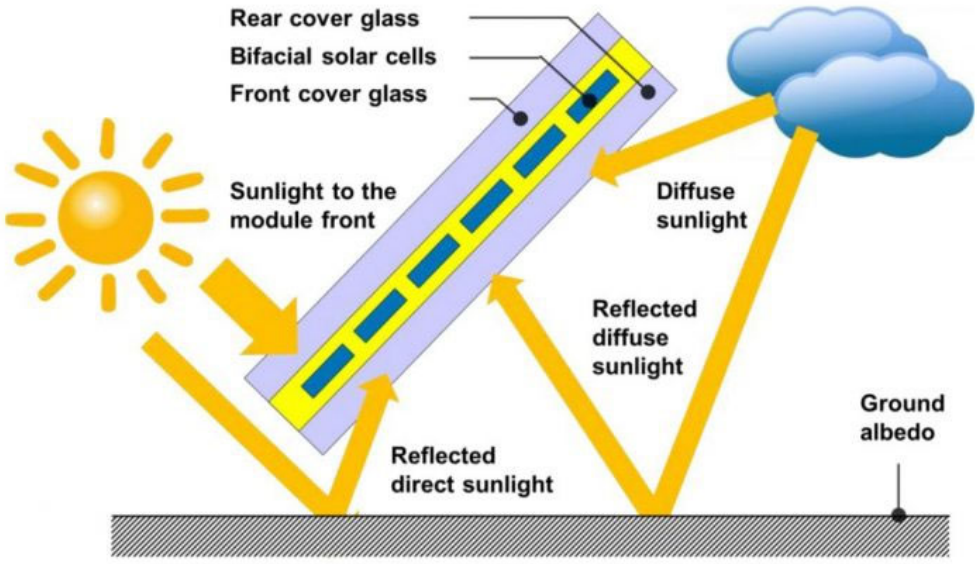


Source: LG Website, https://www.lg.com/uk/business/solar/why-lg-solar/leading-technology, retrieved November 3, 2019.

Bifacial

Bifacial CSPV cells convert light that hits both the front and back of the CSPV cell into electricity (figure I-16). Whereas most CSPV cells have a metalized back layer, bifacial cells allow light through to the back side of the CSPV cell. They often incorporate either the PERC or heterojunction technologies discussed below. When assembled into CSPV modules, they use a transparent back sheet or rear glass layer to allow reflected sunlight on the rear of the CSPV cell.

Figure I-16
CSPV products: Bifacial PV 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-engineering-solar-financings-of-the-future/, retrieved November 3, 2019.

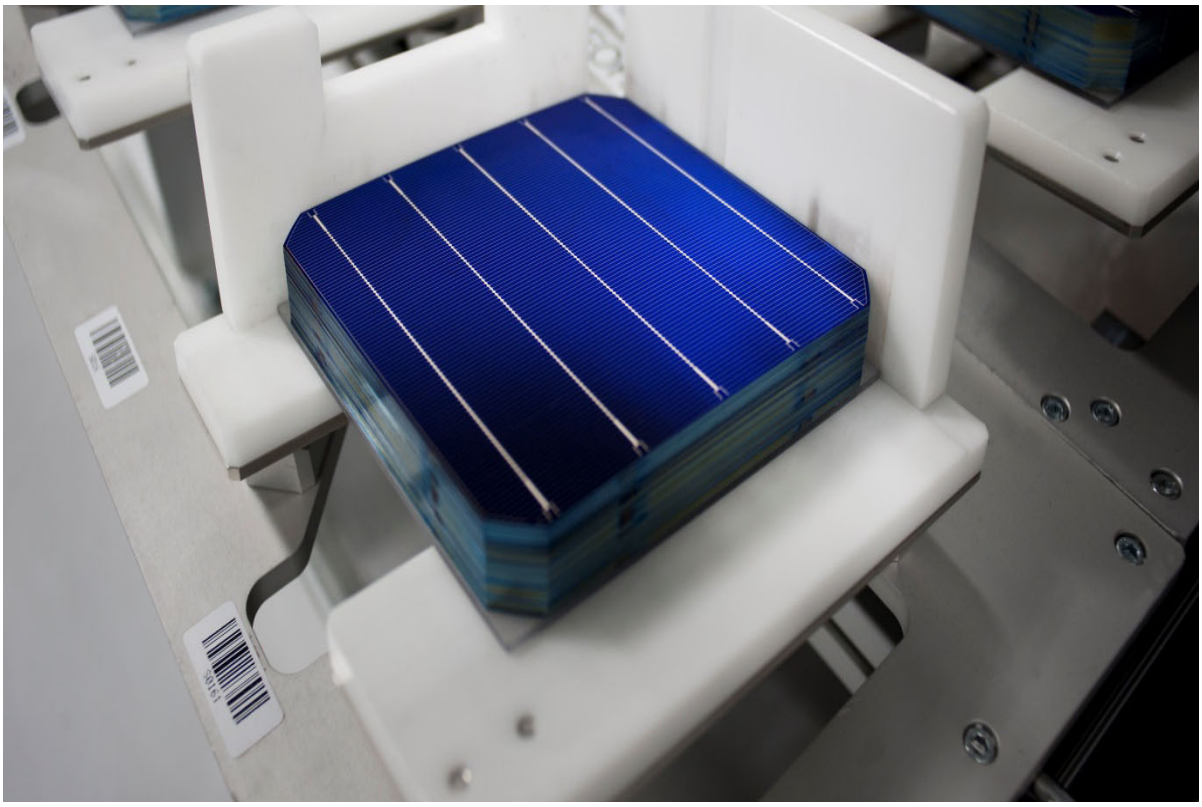
Building integrated

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.

Busbars

Manufacturers are increasing the number of busbars in CSPV cells, which results in higher efficiency and greater power output (figure I-17). Some manufacturers have eliminated busbars, which can provide benefits such as reducing electrical losses and increasing the surface area of the CSPV cell that can absorb sunlight.

Figure I-17
CSPV cell containing five busbars



Source: SolarWorld Webpage, https://www.solarworld-usa.com/newsroom/media-downloads, retrieved September 4, 2017.

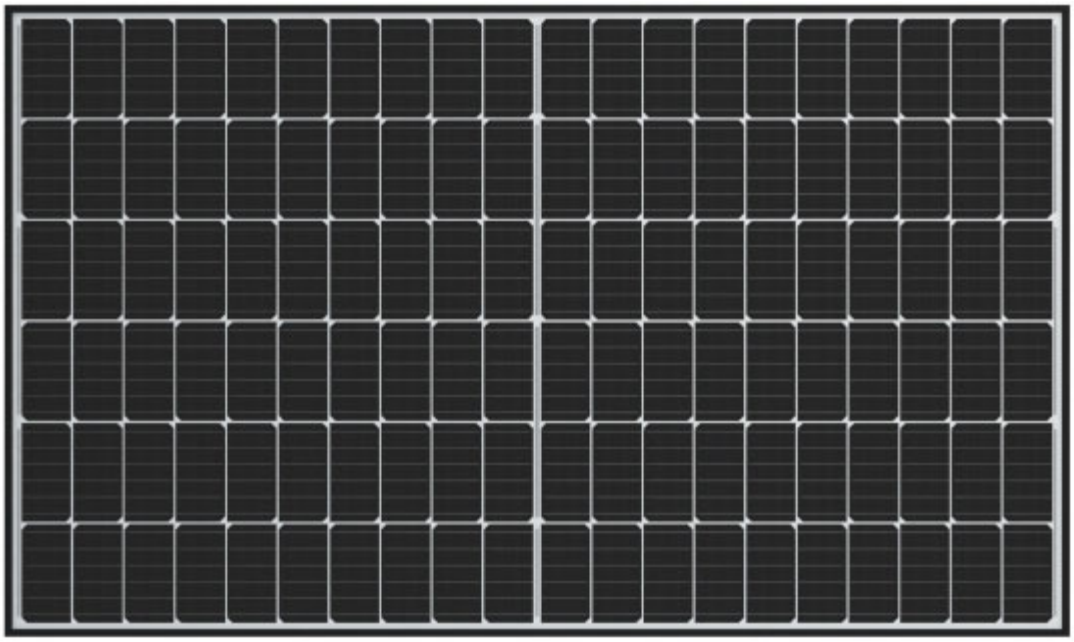
Frameless CSPV modules

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

Half-cut CSPV cells

Some manufacturers have switched to CSPV modules with half-cut CSPV cells (figure I-18). These are standard CSPV cells that are cut in half, 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.

Figure I-18
CSPV products: CSPV module with half-cut cells



Source: Hanwha Webpage, https://www.q-cells.com/en/main/products/solar_panels/residential/residential01.html, retrieved November 3, 2019.

Heterojunction (including HIT)

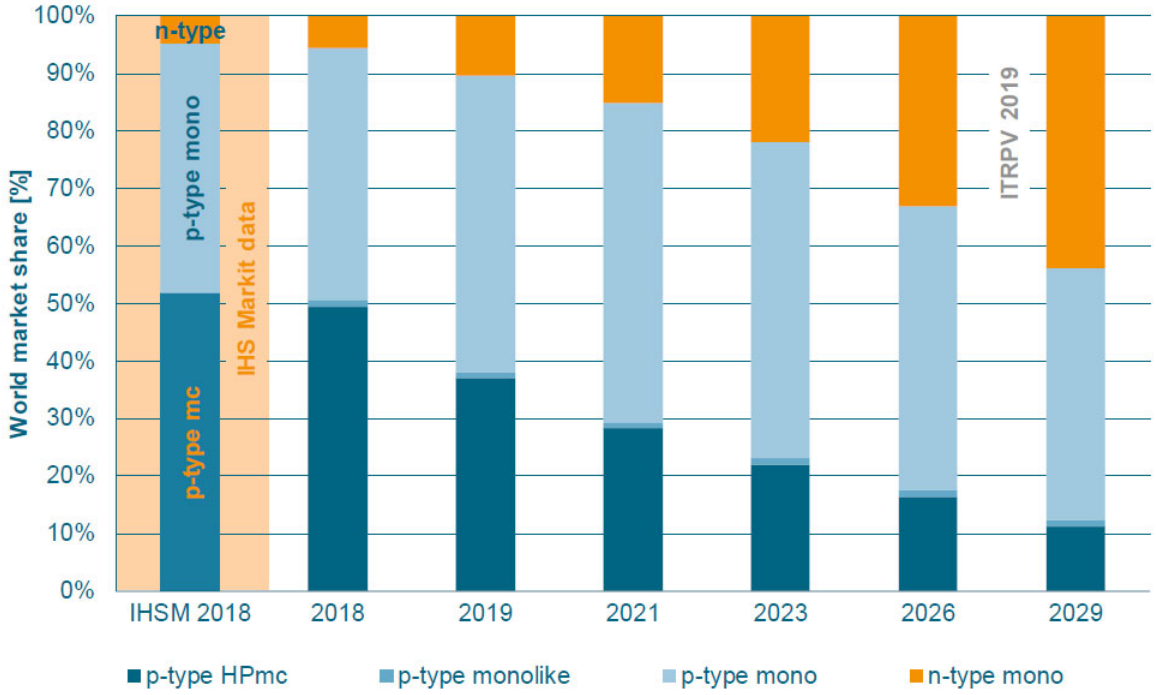
Heterojunction CSPV cells, which include heterojunction with intrinsic thin layer ("HIT"), add thin layers of photosensitive semiconductor materials (typically amorphous silicon) on top of a monocrystalline wafer. These additional layers increase the absorption of sunlight, and the overall efficiencies of the CSPV cells. They also perform better in hot climates than typical monocrystalline cells. As indicated in figure I-19, the share of production accounted for by heterojunction is expected to substantially increase over the next decade.

n-type mono

In the production of most types of monocrystalline CSPV wafers, the silicon is doped with boron 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, no light-induced degradation, and the potential use of less pure wafers. N-type mono was a relatively small share of global production in 2018, but is expected to reach 10 percent of production in 2019 and rapidly increase over the next decade (figure I-19).[85]

Figure I-19
CSPV products: Share of wafer production by type



Note: mc=multicrystalline; HP=high performance.

Source: ITRPV, Results 2018, March 2019, p. 41, https://itrpv.vdma.org/#, retrieved July 29, 2019.

[85] ITRPV, Results 2018, March 2019, pp. 40-41, https://itrpv.vdma.org/#, retrieved July 29, 2019.

Passive emitter rear contact ("PERC")

PERC CSPV 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. Existing CSPV cell production lines can be reconfigured to produce PERC CSPV cells with the addition of two steps. Therefore, the changeover to PERC technology is relatively straightforward, though there are some challenges with PERC technology, such as the potential for more rapid cell degradation. Related technologies include passivated emitter rear totally diffused ("PERT") and passivated emitter rear locally diffused ("PERL").

Shingling and paving

In shingled CSPV modules, CSPV cells are cut into thin strips, the edges of which are overlapped in the CSPV module (like roof shingles). This reduces resistive losses and, therefore, increases power output. The approach can also improve CSPV module aesthetics. Paving uses half-cells, and is an approach that reduces the gap between cells.

The industry in the United States

U.S. producers

During the final phase of the original investigations, the Commission received U.S. producer questionnaires from two U.S. producers of CSPV cells, which accounted for approximately 100.0 percent of total 2013 U.S. CSPV cell production, and 18 U.S. producers of CSPV modules, which accounted for approximately 90.6 percent of total 2012 U.S. production of CSPV modules.[86] In their responses to the Commission's notice of institution in these current reviews, the domestic module producers provided a list of 21 U.S. producers as of year-end 2019.[87] Two firms (Hanwha and SunPower) that accounted for approximately *** percent of production of CSPV modules in the United States during 2019 provided U.S. industry data in

[86] Original publication, p. III-1.

[87] Hanwha's response to the notice of institution, February 3, 2020, p. 17; SunPower's response to the notice of institution, February 3, 2020, p. 14.

response to the Commission's notice of institution in these five-year reviews. No U.S. producers of CSPV cells responded to the Commission's notice of institution in these reviews.[88]

Recent developments

Firm entries and exits[89]

U.S. CSPV cell producer entries and exits (from publicly available data sources) are reported in table I-2. These only include firms that are currently open or have closed manufacturing plants during January 2014–March 2020, and do not include changes in production capacity or announced plants that have not yet opened.[90] Six manufacturing plants closed or announced plans to close during January 2014–March 2020, and—after Panasonic closes in May 2020—there will be no firms that transform wafers into cells in the United States.[91] Suniva does retain the ability to restart production, and stated that it would take 100 days and less than $10 million to restart production after receiving the necessary capital investment. Suniva said that its annual production capacity, upon restarting production, would be 450 MW of mono PERC cells (monofacial) or up to 540 MW of bifacial mono PERC cells.

[88] During 2019, there was only one operating U.S. producer of CSPV cells in the United States, Panasonic, which announced that it plans to close its manufacturing facility by the end of May 2020.

[89] Unless otherwise noted, this information is based on Monitoring publication, pp. I-37–I-41; CSPV 1 first review publication, pp. III-1–III-6; Modification publication, pp. II-2–II-4.

[90] There has been only one announced new U.S. CSPV cell plant. Sunpreme indicated in September 2018 that it planned to open a CSPV cell and module plant in Texas. The first phase of the plant, with 136 MW of capacity, was expected to come online in early 2019. No subsequent updates on the status of the plant or whether the firm is proceeding with the plant are available. Meyer Burger also announced a possible order for heterojunction cell equipment for an unnamed North American start-up, though the order was pending additional fundraising by the customer and no information is available on whether this plant is planned for the United States.

[91] Solaria does not do all steps in the CSPV cell production process internally.

Table I-2

CSPV cells: U.S. firms with CSPV production facilities opening and/or closing, January 2014–March 2020

Company	State	Opening year	Closing year	Notes
Plants open as of March 6, 2020				
Solaria	CA	Not available	Not applicable	All cell manufacturing steps not done internally.
Closed plants				
Mission Solar	TX	2014	2016	
Panasonic	NY	2018	2020	Announced that they will close the plant by the end of May 2020.
Suniva	GA	Prior to 2014	2017	Suniva ceased production in 2017 due to bankruptcy but is emerging from bankruptcy and is working on a plan to restart cell production.
SunPower (former SolarWorld plant)	OR	Prior to 2014	2019	SunPower acquired the plant from SolarWorld on October 1, 2018. Closing year is the year that CSPV cell manufacturing equipment was put up for auction.
Tesla	CA	2015	See note	Tesla listed solar production in Fremont, CA in its annual financial report for the year ending December 31, 2017, but not for the year ending December 31, 2018.
Yingli	TX	Not available	2019	Closing year is based on auction date for cell manufacturing equipment.

Note: This table is based on publicly available information. Information on producers of off-grid products, such as consumer electronic products or solar generators, is not included. In addition, it does not include changes in production capacity at existing plants. SunPower also opened a pilot production line for CSPV cells at a research facility in California in 2017. It is not listed as a CSPV cell production location in their most recent 10-K, so it is not included in this table.

Source: Monitoring publication, pp. I-38–I-39; CSPV 1 first review publication, pp. III-1–III-2; Modification publication, pp. II-2–II-4.

U.S. CSPV module producer entries and exits during January 2014–March 2020 (from publicly available data sources) are reported in table I-3. These only include firms that are currently open or have closed manufacturing plants, and do not include changes in production

capacity or announced plants that have not yet opened.[92] As of March 6, 2020, there were about 19 U.S. CSPV module manufacturing plants. A majority of these plants opened during 2014–19, including five plants with a combined production capacity of at least 3 GW opened during 2018–19.[93] At least 19 module production plants closed during January 2014–March 2020.

Table I-3

CSPV modules: U.S. firms with CSPV production facilities opening and/or closing, January 2014–March 2020

Company	State	Start year	Year closed	Notes
Plants open as of March 6, 2020				
Auxin Solar	CA	Prior to 2014	Not applicable	
CBS Solar	MI	Prior to 2014	Not applicable	
Hanwha Q-Cells	GA	2019	Not applicable	
Heliene	MN	2015	Not applicable	Heliene initially started production at a plant owned by SimpleRay in Minnesota, with this production lasting less than one year. From mid-2016, Silicon Energy produced modules for Heliene at its Minnesota plant. Following the closure of Silicon Energy's plant in 2017, Heliene took over the lease and began manufacturing.
Jinko Solar	FL	2018	Not applicable	
Merlin Solar	CA	2016	Not applicable	Majority stake acquired by Ayala Corporation in 2018.
Mission Solar	TX	2014	Not applicable	
LG	AL	2019	Not applicable	
PowerFilm	IA	2018	Not applicable	
Prism Solar	NY	Prior to 2014	Not applicable	Majority stake acquired by Genie Energy Ltd. in October 2018.
SBM Solar	NC	Prior to 2014	Not applicable	
Silfab Solar	WA	See note	Not applicable	This plant was built in 2017 by Itek Energy, and replaced a smaller facility. In August 2018, Silfab purchased the plant from Itek.
Solaria	CA	Prior to 2014	Not applicable	
SolarTech Universal	FL	2015	Not applicable	
SunPower	OR	Prior to 2014	Not applicable	Former SolarWorld plant acquired by SunPower on October 1, 2018.
Sunergy California	CA	2018	Not applicable	
SunSpark Technology	CA	2015	Not applicable	
Tesla	NY	2017	Not applicable	
Wanxiang New Energy	IL	Prior to 2014	Not applicable	

Table continued on next page.

[92] In addition to the Sunpreme plant noted above, Greenbrilliance announced plans in July 2018 for a 125 MW module plant in Maryland. No additional information on this plant was available.

[93] Monitoring publication, p. I-39.

Table I-3--Continued

CSPV modules: U.S. firms with CSPV production facilities opening and/or closing, January 2014–March 2020

Company	State	Start year	Year closed	Notes
Closed plants				
1Soltech	TX	Prior to 2014	2014	
Flextronics/SunPower	CA	Prior to 2014	See notes	SunPower partnered with contract manufacturer Flextronics to produce modules. The exact date when this manufacturing ended is not publicly available, but it was no longer listed among SunPower's manufacturing locations in its financial report for the year ending January 1, 2017.
Itek Energy	MN	2014	2018	
Mage Solar	GA	Prior to 2014	2015	
Navajo Universal	AZ	Prior to 2016	2017	
Nu-Cell	LA	Prior to 2014	2015	
NuSun	IN	Prior to 2014	2014	
Panasonic	NY	2017	2020	
PureSolar	WA	2017	2018	
Seraphim Solar	MS	2016	2018	
Sharp	TN	Prior to 2014	2014	
Silicon Energy	MN	Prior to 2014	2017	
	WA	Prior to 2014	2016	
Solartec Energia	TX	2014	2019	
Solartech Renewables	NY	Prior to 2014	2014	
Suniva	GA	Prior to 2014	2015	
	MI	2014	2017	
tenKsolar	MN	Prior to 2014	2017	
Tesla	CA	2015	See notes	Tesla listed solar production in Fremont, CA in its annual financial report for the year ending December 31, 2017, but not for the year ending December 31, 2018.
Status not available				
Solar Electric America	VA	Around 2018	See notes	The company website is active, but the business license is listed as canceled.

Note: This table is based on publicly available information. Information on producers of off-grid products is not included. In addition, it does not include changes in production capacity at existing plants.
Two companies, German Solar USA and Upsolar, indicate that their products are made in the United States, but they are not included in the table since a U.S. production location for these products could not be identified. In addition, Perlight previously indicated that some of its CSPV modules were made in Texas, but this is not currently listed on its webpage as a manufacturing location. Amerisolar, CertainTeed, Colored Solar, and Lumos Solar offer U.S. manufactured products, but media reports or company webpages indicate that manufacturing of these products is done by another firm. Beamreach had a pilot PV production line in California.

Source: Monitoring publication, pp. I-40–I-41; CSPV 1 first review publication, pp. III-3–III-6; Safeguard publication, p. III-9; publicly available information.

U.S. demand

U.S. PV installations increased from 6.2 GW in 2014 to 15.2 GW in 2016, then declined to 10.6 GW in 2018 (figure I-20).[94] Installations increased to 13.3 GW in 2019.[95] Apparent U.S. consumption of CSPV modules in 2019 was substantially higher, however, at about 16.9 GW.[96] The share of installations accounted for by the utility sector increased from 63 percent in 2014 to 71 percent in 2016, then declined to 58 percent in 2018. In 2019, the utility sector accounted for 64 percent of installations.[97]

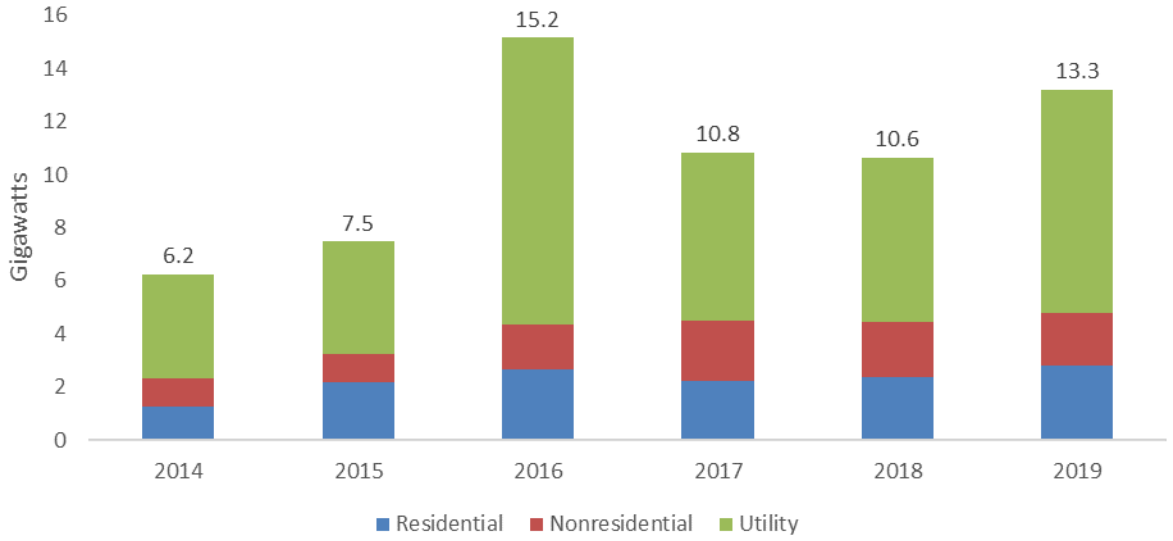
[94] Bolinger, Mark, Joachim Seel, and Dana Robson, Utility-Scale Solar, 2019 Edition, Lawrence Berkeley National Lab, December 2019, Data File, https://emp.lbl.gov/utility-scale-solar, retrieved March 5, 2020.

[95] Solar Energy Industries Association (SEIA) and WoodMac, U.S. Solar Market Insight, 2019 Year in Review, March 2020, pp. 5, 12–16, https://www.seia.org/us-solar-market-insight, retrieved March 23, 2020.

[96] Based on U.S. cell imports in HTS 8541.40.6025, excluding those subject to duties under HS chapter 99, as a proxy for U.S. module production. USITC DataWeb/USDOC, https://dataweb.usitc.gov, retrieved March 6, 2020. Module imports are from Modification publication, p. II-9.

[97] Bolinger, Mark, Joachim Seel, and Dana Robson, Utility-Scale Solar, 2019 Edition, Lawrence Berkeley National Lab, December 2019, Data File, https://emp.lbl.gov/utility-scale-solar, retrieved March 5, 2020; Solar Energy Industries Association (SEIA) and WoodMac, U.S. Solar Market Insight, 2019 Year in Review, March 2020, pp. 5, 12–16, https://www.seia.org/us-solar-market-insight, retrieved March 23, 2020.

Figure I-20
CSPV products: U.S. PV installations, 2014-18



Source: Bolinger, Mark, Joachim Seel, and Dana Robson, Utility-Scale Solar, 2019 Edition, Lawrence Berkeley National Lab, December 2019, Data File, https://emp.lbl.gov/utility-scale-solar, retrieved March 5, 2020.

U.S. policies[98]

The major federal incentive for solar installations is the investment tax credit, which was renewed in 2015.[99] The Solar Investment Tax Credit is a 30 percent tax credit on capital expenditures for new solar PV systems, and has been in place since 2006. The 2015 renewal established a gradual step-down in the value of the tax credit. To receive a tax credit of 30 percent, these projects must have started construction by the end of 2019, as the value of the credit decreased to 26 percent for projects starting construction in 2020 and will decrease to 22 percent for projects starting construction in 2021. Projects must be completed by December 31, 2023 to receive the tax credits. After 2021, the credit for residential systems will drop to zero, while commercial and utility tax credits will decrease to a permanent 10 percent.

[98] Unless otherwise noted, this information is based on Monitoring publication, pp. I-42–I-43 and II-26. Citations to direct quotes and sources for data have been retained.

[99] The ITC cash grant program (Treasury 1603 program), which provided the option to choose a cash grant in lieu of the ITC expired, has not been renewed. Project must have started construction by the end of 2011 and been completed by the end of 2016. CSPV 1 first review publication, p. II-13.

There have also been a number of state-level policy changes, including:

- Renewable portfolio standards: At the state level, 29 states plus the District of Columbia had renewable portfolio standards[100] ("RPS") in both 2014 and 2019.[101] However, a number of these 29 states increased the share of electricity that must come from renewable sources. As a result, the amount of renewable generated electricity required in 2030 increased from 431 terawatt-hours ("TWh") under requirements in place as of 2016 (450 TWh under requirements in 2017) to 600 TWh under requirements in place as of 2019.[102]
- Public Utility Regulatory Policies Act of 1978 ("PURPA"):[103] PURPA is a significant driver of utility-scale solar installations in certain states. However, a number of states have recently made changes to avoided cost rates, qualifying project sizes, and contract terms, which have made solar projects under PURPA less attractive.

[100] An RPS is a regulatory mandate that requires entities that supply electricity, such as utility companies, to generate or buy a portion of their retail electricity sales from renewable energy sources, including solar.

[101] The number of states with solar or distributed generation carve-outs (share of the RPS that must be supplied by these sources) decreased from 17 plus the District of Columbia in 2014 to 15 plus the District of Columbia in 2019. Barbose, Galen, "U.S. Renewables Portfolio Standards: 2019 Annual Status Update," July 2019, pp. 8-9, http://eta-publications.lbl.gov/sites/default/files/rps_annual_status_update-2019_edition.pdf, retrieved November 11, 2019; Barbose, Galen, "Renewable Portfolio Standards: A Status Update," September 22, 2014, pp. 3 and 8, https://www.cesa.org/assets/Uploads/Barbose.pdf, retrieved March 6, 2020.

[102] Barbose, Galen, "U.S. Renewables Portfolio Standards: 2019 Annual Status Update," July 2019, pp. 8 and 24, http://eta-publications.lbl.gov/sites/default/files/rps_annual_status_update-2019_edition.pdf, retrieved November 11, 2019; Barbose, Galen, "U.S. Renewables Portfolio Standards: 2016 Annual Status Update," pp. 5 and 18, April 2016, http://eta-publications.lbl.gov/sites/default/files/lbnl-1005057.pdf, retrieved November 11, 2019; Barbose, Galen, "U.S. Renewables Portfolio Standards: 2017 Annual Status Update," p. 21, July 2017, https://eta-publications.lbl.gov/sites/default/files/2017-annual-rps-summary-report.pdf, retrieved January 21, 2019.

[103] This regulation requires utilities to purchase electricity from qualifying facilities (in the case of solar, a solar project that meets size requirements) at the utility's avoided cost. Avoided cost "is the cost a utility would incur if it chose to either provide the energy itself by building new capacity or the cost incurred by purchasing electricity from non-qualifying facilities." EIA, "PURPA-qualifying Capacity Increases, but it's Still a Small Portion of Added Renewables," August 16, 2018, https://www.eia.gov/todayinenergy/detail.php?id=36912, retrieved November 11, 2019; FERC Webpage, https://www.ferc.gov/industries/electric/gen-info/qual-fac/what-is.asp, retrieved November 11, 2019.

- Net Metering:[104] The number of states with mandatory net metering rules declined from 44 plus the District of Columbia in 2015 to 39 plus the District of Columbia as of October 2019, with 5 of these states in the process of transitioning to other policies.[105]
- California Solar Roof Mandate: Starting in 2020, PV modules are required for all new residential buildings, with certain exceptions.

U.S. producers' trade and financial data

The Commission asked domestic interested parties to provide trade and financial data in their response to the notice of institution in the current five-year reviews.[106] Table I-4 presents a compilation of the data submitted by the two responding U.S. producers of CSPV modules (i.e., Hanwha and SunPower) as well as trade and financial data submitted by U.S. CSPV module producers in the original investigations. Data concerning CSPV cells are not presented in this section of the report because no U.S. producer of CSPV cells provided a response to the Commission's notice of institution in these reviews.

[104] Net metering allows residential and commercial customers that generate their own electricity from solar to receive credit for excess electricity fed into the grid. Residential and commercial customers can use this credit to offset the cost of grid electricity used when their CSPV system does not generate enough electricity to cover their needs.

[105] DSIRE, "Net Metering," October 2019, https://s3.amazonaws.com/ncsolarcen-prod/wp-content/uploads/2019/10/DSIRE_Net_Metering_Oct2019.pdf, retrieved November 11, 2019; DSIRE, "Net Metering," March 2015, https://s3.amazonaws.com/ncsolarcen-prod/wp-content/uploads/2015/04/Net-Metering-Policies.pptx, retrieved November 11, 2019.

[106] Individual company trade and financial data are presented in app. B.

Table I-4

CSPV modules: Trade and financial data submitted by U.S. producers, 2011-13 and 2019

Item	2011	2012	2013	2019
Capacity (kW)	***	***	***	***
Production (kW)	***	***	***	***
Capacity utilization (percent)	***	***	***	***
U.S. shipments:				
Quantity (kW)	***	***	***	***
Value ($1,000)	***	***	***	***
Unit value (dollars per kW)	***	***	***	***
Net sales ($1,000)	***	***	***	***
COGS ($1,000)	***	***	***	***
COGS/net sales (percent)	***	***	***	***
Gross profit (loss) ($1,000)	***	***	***	***
SG&A expenses ($1,000)	***	***	***	***
Operating income (loss) ($1,000)	***	***	***	***
Operating income (loss)/net sales (percent)	***	***	***	***

Note: For a discussion of data coverage, please see “U.S. producers” section.

Source: For the years 2011-13, data are compiled using data submitted in the Commission’s original investigations. See app. C. For the year 2019, data are compiled using data submitted by domestic interested parties. Hanwha’s response to the notice of institution, February 3, 2020, p. 19; Hanwha’s supplemental response to the notice of institution, February 24, 2020, p. 4; and SunPower’s response to the notice of institution, February 3, 2020, p. 16. The data presented for 2011-13 do not include U.S. producers Suntech and *** because the Commission excluded those U.S. producers from the domestic industry as related parties in its original determinations.

Definitions of the domestic like product and domestic industry

The domestic like product is defined as the domestically produced product or products which are like, or in the absence of like, most similar in characteristics and uses with, the subject merchandise. The domestic industry is defined as the U.S. producers as a whole of the domestic like product, or those producers whose collective output of the domestic like product constitutes a major proportion of the total domestic production of the product. Under the related parties provision, the Commission may exclude a related party for purposes of its injury determination if "appropriate circumstances" exist.[107]

In its original determinations, the Commission defined a single domestic like product consisting of CSPV cells and modules, coextensive with Commerce's scope. The Commission also defined the domestic industry as all U.S. producers of CSPV cells and modules, but found that circumstances warranted the exclusion of domestic producers Suntech and *** from the domestic industry as related parties.[108] SunPower and Hanwha indicated in their responses to the notice of institution that they agree with the definitions of domestic like product and domestic industry that the Commission adopted in the original investigations.[109]

Domestic CSPV module producer SunPower indicated in its response to the Commission's notice of institution in these current reviews that it imported subject CSPV cells from *** to supply its domestic module production facility during 2019. Its imports of CSPV cells from *** during 2019 accounted for *** percent of total subject imports of CSPV products from *** and were equivalent to *** percent of the quantity of its U.S. production of CSPV modules. One of two domestic producers of CSPV modules responding to the Commission's notice of institution in these reviews, SunPower accounted for *** percent of U.S. production of CSPV modules in 2019.

[107] Section 771(4)(B) of the Tariff Act of 1930, 19 U.S.C. § 1677(4)(B).

[108] 85 FR 120, January 2, 2020; Original confidential opinion, p. 28.

[109] Hanwha's response to the notice of institution, February 3, 2020, p. 24; SunPower's response to the notice of institution, February 3, 2020, p. 19.

U.S. imports and apparent U.S. consumption

U.S. importers

During the final phase of the original investigations, the Commission received U.S. importer questionnaires from 48 firms, which accounted for all U.S. imports of CSPV products from China and Taiwan during 2013.[110] Import data presented in the original investigations are based on questionnaire responses.

In its response to the notice of institution in these current reviews, one importer of the subject merchandise from *** (i.e., SunPower) that accounted for *** percent of total U.S. imports of CSPV products from *** in 2019 provided data regarding its U.S. imports and shipments of CSPV cells (see appendix B). In addition, Hanwha and SunPower included in their responses to the notice of institution in these current reviews a list of 51 firms that may currently import subject merchandise.[111] Import data presented in these current reviews are based on official Commerce statistics.

U.S. imports

Table I-5 presents the value of U.S. imports from China and Taiwan as well as the other top sources of U.S. imports for 2014-19 (shown in descending order of 2019 imports by value). Because calendar year quantities of U.S. imports of CSPV products in terms of watts are not available for calendar years prior to 2019, the quantity and unit values of U.S. imports are only presented for calendar year 2019.

[110] Original publication, p. IV-1.

[111] Hanwha's response to the notice of institution, February 3, 2020, exh. 2; SunPower's response to the notice of institution, February 3, 2020, exh. 1.

Table I-5
CSPV products: U.S. imports, 2014-19

Item	2014	2015	2016	2017	2018	2019
		Quantity (kW)				
China	NA	NA	NA	NA	NA	484,730
Taiwan	NA	NA	NA	NA	NA	561,078
Subtotal, subject	NA	NA	NA	NA	NA	1,045,808
Malaysia	NA	NA	NA	NA	NA	7,629,332
Vietnam	NA	NA	NA	NA	NA	6,113,762
Korea	NA	NA	NA	NA	NA	2,615,068
Thailand	NA	NA	NA	NA	NA	1,475,999
All other sources	NA	NA	NA	NA	NA	2,209,191
Subtotal, nonsubject	NA	NA	NA	NA	NA	20,043,352
Total imports	NA	NA	NA	NA	NA	21,089,159
		Landed, duty-paid value ($1,000)				
China	1,634,023	1,733,411	1,531,623	555,423	25,558	113,278
Taiwan	761,855	342,487	245,781	26,840	25,299	112,177
Subtotal, subject	2,395,879	2,075,898	1,777,405	582,263	50,857	225,455
Malaysia	896,650	1,315,647	2,530,531	1,616,750	1,268,603	2,868,803
Vietnam	7,408	176,289	529,803	799,072	449,413	1,887,370
Korea	110,817	404,272	1,331,309	1,110,079	629,116	732,546
Thailand	751	40,858	531,950	444,355	193,852	587,641
All other sources	875,274	2,070,077	1,786,016	782,886	877,099	759,202
Subtotal, nonsubject	1,890,900	4,007,143	6,709,608	4,753,142	3,418,084	6,835,562
Total imports	4,286,778	6,083,042	8,487,013	5,335,405	3,468,941	7,061,017
		Unit value (dollars per kW)				
China	NA	NA	NA	NA	NA	234
Taiwan	NA	NA	NA	NA	NA	200
Subtotal, subject	NA	NA	NA	NA	NA	216
Malaysia	NA	NA	NA	NA	NA	376
Vietnam	NA	NA	NA	NA	NA	309
Korea	NA	NA	NA	NA	NA	280
Thailand	NA	NA	NA	NA	NA	398
All other sources	NA	NA	NA	NA	NA	344
Subtotal, nonsubject	NA	NA	NA	NA	NA	341
Total imports	NA	NA	NA	NA	NA	335

Note: Because of rounding, figure may not add to total shown. Complete calendar year data for import quantities in terms of watts is not available prior to calendar year 2019.

Source: Compiled from official Commerce statistics for HTS statistical reporting numbers 8541.40.6015, 8541.40.6020, 8541.40.6025, 8541.40.6030, 8541.40, 6035, and 8541.40.6045 for comparability of data across all time periods. These data are overstated as these HTS statistical reporting numbers contain products outside the scope of these reviews, such as thin film products.

Apparent U.S. consumption and market shares

Table I-6 presents data on U.S. producers' U.S. shipments, U.S. imports, apparent U.S. consumption, and market shares of CSPV modules. Data concerning CSPV cells are not presented in this section of the report because no U.S. producer of CSPV cells provided a response to the Commission's notice of institution in these reviews.

Table I-6
CSPV modules: U.S. producers' U.S. shipments, U.S. imports, apparent U.S. consumption, and market shares 2011-13 and 2019

Item	2011	2012	2013	2019
	Quantity (kW)			
U.S. producers' U.S. shipments	***	***	***	***
U.S. imports from—				
China (subject)	75,356	629,593	2,217,072	484,730
Taiwan (subject)	70,665	247,722	282,689	561,078
Subtotal, subject	146,021	877,315	2,499,761	1,045,808
All other sources	1,039,416	774,442	174,200	20,043,352
Total imports	1,185,437	1,651,757	2,673,961	21,089,159
Apparent U.S. consumption	***	***	***	***
	Value (1,000 dollars)			
U.S. producers' U.S. shipments	***	***	***	***
U.S. imports from—				
China (subject)	100,328	500,073	1,465,188	113,278
Taiwan (subject)	125,175	252,335	254,898	112,177
Subtotal, subject	225,503	752,408	1,720,086	225,455
All other sources	1,417,639	733,114	150,008	6,835,562
Total imports	1,643,142	1,485,522	1,870,094	7,061,017
Apparent U.S. consumption	***	***	***	***

Table continued on next page.

Table I-6--Continued
CSPV modules: U.S. producers' U.S. shipments, U.S. imports, apparent U.S. consumption, and market shares 2011-13 and 2019

Item	2011	2012	2013	2019
	Share of consumption based on quantity (percent)			
U.S. producer's share	***	***	***	***
U.S. imports from.--				
China (subject)	***	***	***	***
Taiwan (subject)	***	***	***	***
Subtotal, subject	***	***	***	***
All other sources	***	***	***	***
Total imports	***	***	***	***
	Share of consumption based on value (percent)			
U.S. producer's share	***	***	***	***
U.S. imports from.--				
China (subject)	***	***	***	***
Taiwan (subject)	***	***	***	***
Subtotal, subject	***	***	***	***
All other sources	***	***	***	***
Total imports	***	***	***	***

Note: For a discussion of data coverage, please see "U.S. producers" and "U.S. importers" sections.

Source: For the years 2011-13, data are compiled using data submitted in the Commission's original investigations. See app. C. For the year 2019, U.S. producers' U.S. shipments are compiled from the domestic interested parties' responses to the Commission's notice of institution and U.S. imports are compiled using official Commerce statistics under HTS statistical reporting numbers 8541.40.6015, 8541.40.6020, 8541.40.6025, 8541.40.6030, 8541.40, 6035, and 8541.40.6045. The import data presented for 2019 are overstated as these HTS statistical reporting numbers contain products outside the scope of these reviews, such as thin film products.

Cumulation considerations[112]

In assessing whether imports should be cumulated in five-year reviews, the Commission considers, among other things, whether there is a likelihood of a reasonable overlap of competition among subject imports and the domestic like product. Additional information concerning geographical markets and simultaneous presence in the market is presented as follows.[113] Imports of CSPV products from both China and Taiwan were reported in all 72 of the months from January 2014 through December 2019 and imports from both China and Taiwan entered through northern, southern, eastern, and western borders of entry in all years during 2014-19.

The industry in China

Producers in China

During the final phase of the original investigations, the Commission received foreign producer/exporter questionnaires from 26 producers of CSPV cells in China, which accounted for approximately 69.5 percent of total 2013 production of CSPV cells in China. The Commission also received questionnaire responses from 46 producers of CSPV modules in China, which accounted for approximately 73.1 percent of total 2013 production of CSPV modules in China.[114] Although the Commission did not receive responses from any foreign producers in these five-year reviews, the domestic interested parties provided a list of 47 possible producers of CSPV products in China in their response to the notice of institution.[115]

[112] Unless otherwise noted, this information is based on official U.S. import statistics for HTS statistical reporting numbers 8541.40.6015, 8541.40.6020, 8541.40.6025, 8541.40.6030, 8541.40, 6035, and 8541.40.6045 for comparability of data across all time periods. The import data presented are overstated as these HTS statistical reporting numbers contain products outside the scope of these reviews, such as thin film products.

[113] In addition, available information concerning subject country producers and the global market is presented in the next section of this report.

[114] Original publication, p. VII-1.

[115] Hanwha's response to the notice of institution, February 3, 2020, exh. 3; SunPower's response to the notice of institution, February 3, 2020, exh. 2.

Recent developments

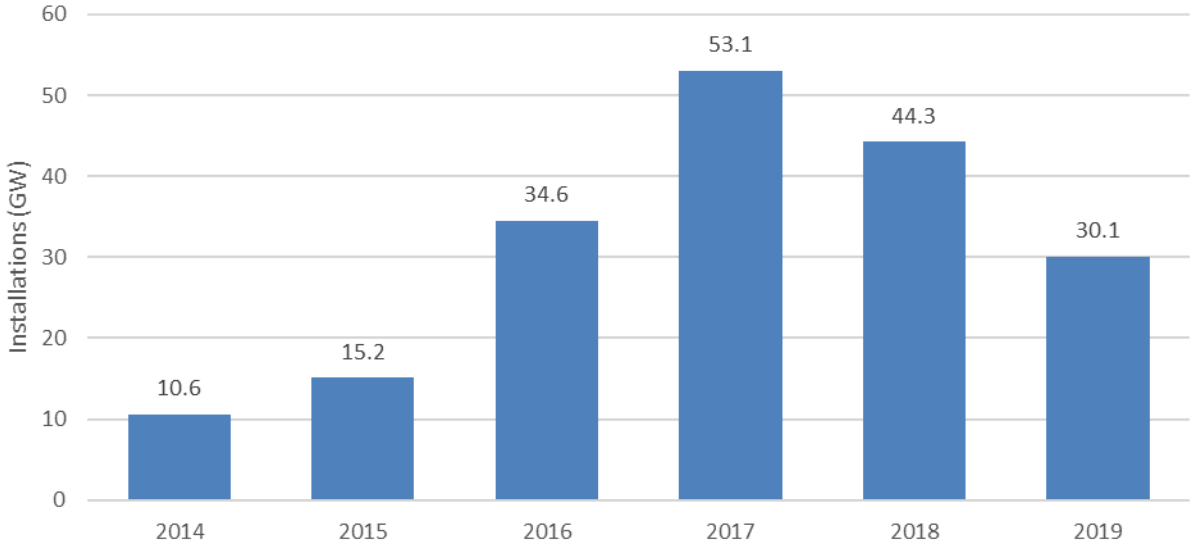
Installations

Chinese PV installations (including nonsubject thin film products) increased from 10.6 GW in 2014 to 53.1 GW in 2017 (figure I-21). Installations then declined to 30.1 GW in 2019, largely due to a change in China's feed-in tariff ("FIT").[116] The China Photovoltaic Industry Association ("CPIA") projects that installations in China will total 35 to 45 GW in 2020, while *** projects that installations will total *** to *** in 2020 and *** to *** in 2021.[117] China's FIT and several other polices to encourage installations that were in effect during 2014–19 are described below, though this is not a comprehensive assessment of all solar policies in China.

[116] IEA PVPS, Trends in Photovoltaic Applications 2019, Report IEA PVPS T1-36: 2019, 2019, p. 97, http://www.iea-pvps.org/?id=256, retrieved December 19, 2019; Wang, Bohua, "Review of China's PV Industry in 2019 and Outlook in 2020," February 2020, https://mp.weixin.qq.com/s/1ufGYXwNhxJ8zMb30APOiw, March 2, 2020.

[117] Bloomberg News, "China's Solar Industry May Grow 50% This Year, Group Says," February 21, 2020, https://www.msn.com/en-us/money/markets/chinas-solar-industry-may-grow-50percent-this-year-group-says/ar-BB10eVXp, retrieved March 3, 2020; ***.

Figure I-21
CSPV products: Chinese PV installations, 2014–19



Note: 2014 through 2018 data are as reported by the IEA. 2019 data are as reported by the CPIA.

Source: IEA PVPS, Trends in Photovoltaic Applications 2019, Report IEA PVPS T1-36: 2019, 2019, p. 97, http://www.iea-pvps.org/?id=256, retrieved December 19, 2019; Wang, Bohua, "Review of China's PV Industry in 2019 and Outlook in 2020," February 2020, https://mp.weixin.qq.com/s/1ufGYXwNhxJ8zMb30APOiw, retrieved March 2, 2020.

Feed-in-tariff[118]

China's feed-in tariff ("FIT") is one of the main policies that the government used to encourage domestic solar PV installations. China released a nationwide FIT in July 2011. China's FIT established a rate for PV-generated electricity, with this rate varying by region and type of installation (distributed and ground mounted).[119] The initial policy set a FIT rate for projects completed in 2011, and a lower rate for projects completed after 2011. Rates were revised downward in 2013, 2016, 2017, and 2018. In May 2018, the Chinese government ordered a stop to further approval of utility-scale projects under the FIT, and capped 2018 distributed installations under the FIT at 10 GW (though any distributed project completed by the end of May would be eligible).

China released new policies in 2019 that were designed to start transitioning from subsidized PV installations to non-subsidized installations. The first policy is for grid parity projects. Projects that can provide electricity at a cost that is at or below the coal benchmark

[118] Unless otherwise noted, this information is based on Monitoring publication, p. F-52.
[119] The initial FIT only had one rate nationwide.

price will not receive direct compensation for electricity generation (though they may receive other support related to land prices or financing). They will receive 20 year power purchase agreements and there is no limit on the number of such projects that can be completed. Projects that are not competitive with the coal benchmark price can be forwarded by the local governments to be included in a national reverse auction (and will be eligible for FIT). The results of the first such auction were released in July 2019, with 22.8 GW of projects receiving approval. These projects must be completed by the end of 2019, or face a small penalty. Projects not completed by the end of June 2020 will be cancelled.

Top Runner Program[120]

The Top Runner Program, which was introduced in 2015, is a reverse auction designed to support the installation, and therefore the development and production, of more advanced solar technologies. Modules installed as part of the program must meet certain minimum energy efficiency levels. The first phase in 2015 totaled 1 GW, the second phase in 2016 was for 5.5 GW, and the third phase in 2017 was for 6.5 GW, with 1.5 GW of that going to the Super Top Runner program (which required even higher efficiency modules). The top runner program has helped drive the adoption of more advanced technologies among Chinese manufacturers, including PERC and bifacial, and contributed to the shift toward monocrystalline production. In the third phase (applications in 2017), 52 percent of the winning bids planned to use bifacial modules, 33 percent mono PERC (including some with Metal Wrap Through ("MWT")) and 14 percent multi PERC (including some with MWT).[121]

[120] Unless otherwise noted, this information is based on Monitoring publication, p. F-55. Citations to data and direct quotes were retained.

[121] MWT is an approach in "which holes are drilled in cells and metal contacts are wrapped through, allowing electricity to be evacuated off the back of the cell." Lions Shih, "Bid Winners of China's Top Runner Program (3rd phase) Have Been Announced, Mono-Si Products Account for More than 60%, Says TrendForce," TrendForce, May 24, 2018, https://press.trendforce.com/press/20180524-3107.html, retrieved December 26, 2019; Roselund, Christian, "Silfab Says It Will Bring Metal Wrap Through Solar to the United States," PV Magazine, March 8, 2019, https://pv-magazine-usa.com/2019/03/08/silfab-say-it-will-bring-metal-wrap-through-solar-to-the-united-states/, retrieved December 30, 2019.

Other policies[122]

China has implemented a number of other policies to encourage PV installations. For example, the Solar Poverty Alleviation program provides financial support for low-income households to purchase solar modules and guarantees a set rate for excess electricity sent to the electric grid. In 2013, the government provided a 50 percent reduction in the VAT for PV electricity sales.

Local governments also often have their own policies to incentivize the installation of PV systems. ***.

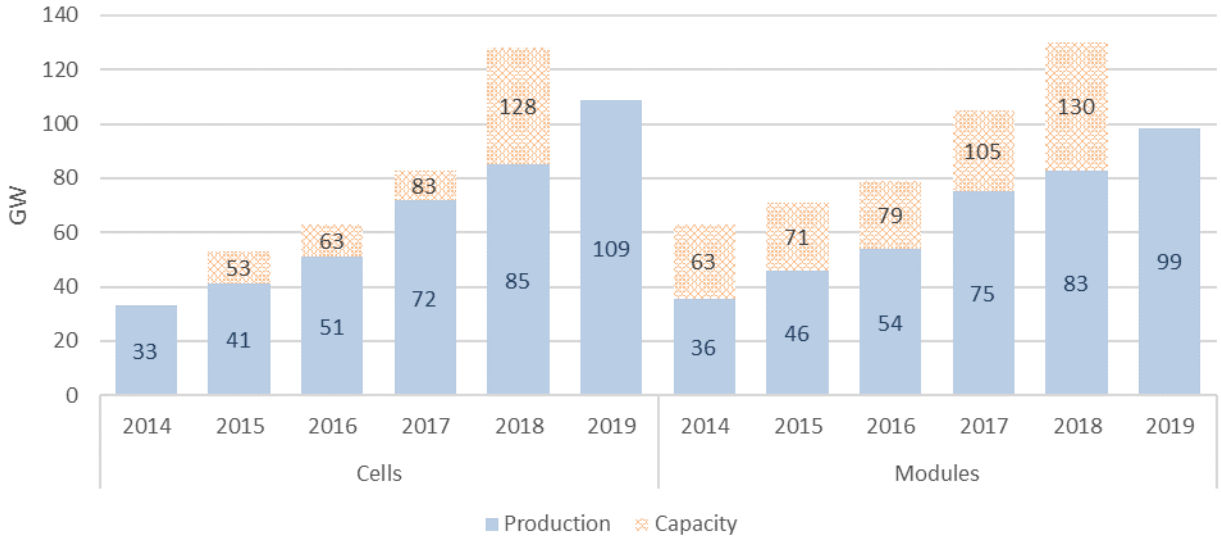
CSPV production and capacity

China's CSPV cell production (including nonsubject thin film products) increased from 33 GW in 2015 to 109 GW in 2019, while its cell production capacity increased from 53 GW in 2015 to 128 GW in 2018 (figure I-22). China's capacity utilization rate for cell manufacturing increased from 77 percent in 2015 to 87 percent in 2017, before declining to 66 percent in 2018. China's CSPV module production (including nonsubject thin film products) increased from 36 GW in 2014 to 99 GW in 2019, while its module production capacity increased from 63 GW in 2014 to 130 GW in 2018. CSPV module capacity utilization increased from 57 percent in 2014 to 71 percent in 2017, then declined to 64 percent in 2018.[123]

[122] Unless otherwise noted, this information is based on Monitoring publication, pp. F-56—F-57; 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 (Monitoring), Confidential Report, February 2020 ("Monitoring confidential report"), pp. F-56—F-57.

[123] Cell production capacity data was not available from the IEA for 2014, and 2019 cell and module production capacity data are not yet available. Monitoring publication, pp. I-27, F-23, and F-25; IEA PVPS, Trends 2015 in Photovoltaic Applications, Report IEA-PVPS T1-27:2015, 2015, p. 41, http://www.iea-pvps.org/?id=256, retrieved March 3, 2020; Fang, Lv, Xu Honghua, Wang Sicheng, "National Survey Report of PV Power Applications in China 2015," July 3, 2017, p. 16 http://www.iea-pvps.org/?id=93, retrieved March 4, 2020; Wang, Bohua, "Review of China's PV Industry in 2019 and Outlook in 2020," February 2020, https://mp.weixin.qq.com/s/1ufGYXwNhxJ8zMb30APOiw, retrieved March 2, 2020.

Figure I-22
CSPV products: China's CSPV cell and module production and capacity, 2014–19



Note: Cell production capacity data for 2014, and cell and module production capacity data for 2019 are not available from these sources. Includes nonsubject thin film products.

Source: Monitoring publication, pp. I-27, F-23, and F-25; IEA PVPS, Trends 2015 in Photovoltaic Applications, Report IEA-PVPS T1-27:2015, 2015, p. 41, http://www.iea-pvps.org/?id=256, retrieved March 3, 2020; Fang, Lv, Xu Honghua, Wang Sicheng, "National Survey Report of PV Power Applications in China 2015," July 3, 2017, p. 16 http://www.iea-pvps.org/?id=93, retrieved March 4, 2020; Wang, Bohua, "Review of China's PV Industry in 2019 and Outlook in 2020," February 2020, https://mp.weixin.qq.com/s/1ufGYXwNhxJ8zMb30APOiw, March 2, 2020.

*** reports that CSPV cell production capacity in China increased from *** in 2014 to *** in 2019 (figure I-23). The leading cell suppliers in 2019, in terms of annual production capacity, were ***. Firms are planning extensive additional investments in cell production capacity, with *** in China.[124] Firms have also announced extensive capacity expansion plans since the start of 2020. Tongwei, for example, plans to increase annual CSPV cell production capacity to 80-100 GW in 2023, and Aiko plans to raise annual CSPV cell capacity to 45 GW in 2022 (figure I-24).[125]

[124] ***.

[125] TaiyangNews, "Tongwei Targets Up To 100 GW Cell Capacity," February 12, 2020, http://taiyangnews.info/business/tongwei-targets-up-to-100-gw-cell-capacity/, retrieved March 2, 2020; TaiyangNews, "Aiko Solar Aims For 45 GW Solar Cell Capacity," January 19, 2020, http://taiyangnews.info/business/aiko-solar-aims-for-45-gw-solar-cell-capacity/, retrieved March 2, 2020.

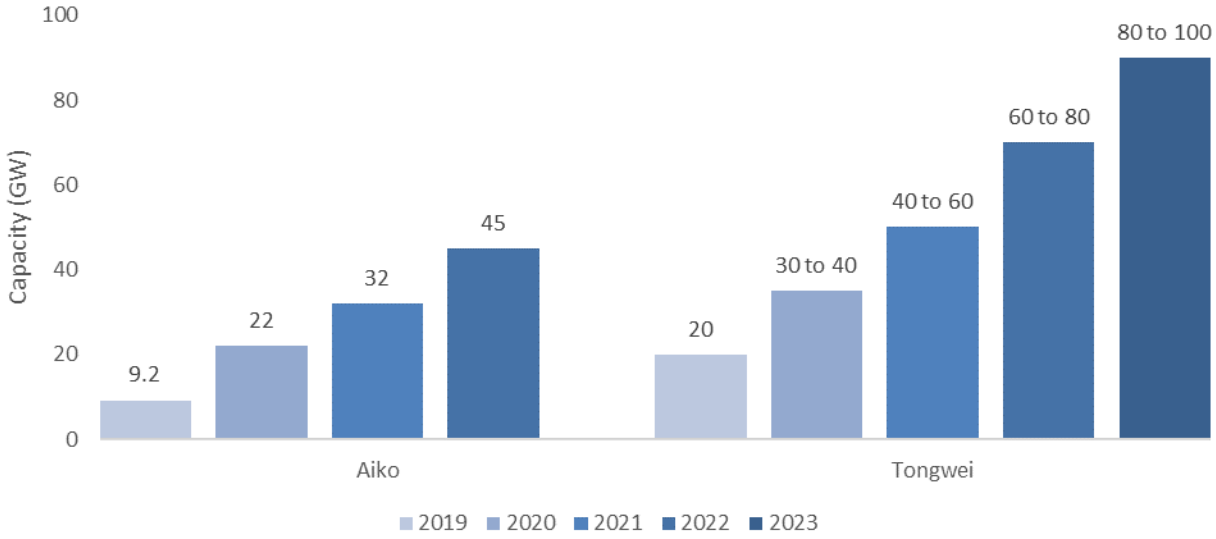
Figure I-23

CSPV products: China's CSPV cell production capacity, 2014–19 (left), and top ten firms, annual production capacity, 2019 (right)

* * * * * * *

Figure I-24

CSPV products: Planned cell production capacity increases by Chinese producers Aiko and Tongwei



Note: For Tongwei, height of the column is the median of the low and high forecasts. Tongwei's 2019 capacity ***.

Source: TaiyangNews, "Tongwei Targets Up To 100 GW Cell Capacity," February 12, 2020, http://taiyangnews.info/business/tongwei-targets-up-to-100-gw-cell-capacity/, retrieved March 2, 2020; TaiyangNews, "Aiko Solar Aims For 45 GW Solar Cell Capacity," January 19, 2020, http://taiyangnews.info/business/aiko-solar-aims-for-45-gw-solar-cell-capacity/, retrieved March 2, 2020.

Chinese CSPV module production capacity, according to ***, increased from *** in 2014 to *** in 2019 (figure I-25). The leading module producers, as of ***, were ***. CSPV module producers are also planning extensive expansions in production capacity, with ***.[126]

[126] ***.

Figure I-25
CSPV products: China's CSPV module production capacity, 2014–19 (left), and top ten firms, annual production capacity, 2019 (right)

* * * * * * *

CSPV exports

Chinese exports of PV cells and modules, which include out-of-scope thin film products, increased from $12.3 billion in 2014 to $12.9 billion in 2015, before declining to $11.3 billion in 2016 (table I-7). Exports then increased to $13.6 billion in 2018 and $19.2 billion in 2019.[127] The largest export destinations during 2014-19 were Japan (20 percent of exports), India (14 percent), the United States (7 percent), the Netherlands (7 percent), and Australia (5 percent). The increase in exports from 2018 to 2019 was largely driven by a rise in exports to Europe, (which removed antidumping duties on Chinese CSPV products in September 2018), Vietnam, and Brazil.[128] The leading exporting companies in 2019 were ***

[127] Declines in export values do not necessarily mean that export volumes also declined, as prices for CSPV cell and modules declined during this time period.

[128] Global Trade Information Services, Inc., Global Trade Atlas, subheading 8541.40.20.

***.[129]

Table I-7
CSPV products: Exports of PV cells and modules from China, by export destination, 2014–19

Export destination	Calendar year					
	2014	2015	2016	2017	2018	2019
	Value (1,000 dollars)					
Japan	4,395,596	3,341,568	2,558,643	2,065,221	1,825,262	1,828,578
India	488,652	1,356,333	2,448,109	3,359,141	2,195,413	1,528,568
United States	1,816,973	1,634,309	1,342,504	620,880	40,831	193,186
Netherlands	1,037,245	945,463	576,655	252,044	426,546	2,250,769
Australia	397,404	366,473	354,404	668,840	1,288,059	1,235,135
Mexico	31,518	72,367	91,981	556,360	1,233,313	958,507
Korea	416,780	378,369	357,115	412,554	362,674	787,767
Brazil	4,969	34,309	341,121	435,822	577,840	1,131,293
Vietnam	18,735	31,292	37,400	67,379	466,042	1,647,024
Pakistan	188,939	366,794	328,211	275,031	320,261	371,365
All other	3,523,332	4,371,813	2,900,906	2,621,857	4,842,147	7,249,451
Total	12,320,143	12,899,089	11,337,050	11,335,128	13,578,389	19,181,643
	Share of value (percent)					
Japan	35.7	25.9	22.6	18.2	13.4	9.5
India	4.0	10.5	21.6	29.6	16.2	8.0
United States	14.7	12.7	11.8	5.5	0.3	1.0
Netherlands	8.4	7.3	5.1	2.2	3.1	11.7
Australia	3.2	2.8	3.1	5.9	9.5	6.4
Mexico	0.3	0.6	0.8	4.9	9.1	5.0
Korea	3.4	2.9	3.1	3.6	2.7	4.1
Brazil	0.0	0.3	3.0	3.8	4.3	5.9
Vietnam	0.2	0.2	0.3	0.6	3.4	8.6
Pakistan	1.5	2.8	2.9	2.4	2.4	1.9
All other	28.6	33.9	25.6	23.1	35.7	37.8
Total	100.0	100.0	100.0	100.0	100.0	100.0

Notes: Countries listed separately are the top 10 export destinations during 2014–19. Because of rounding, figures may not add to totals shown.

Source: Global Trade Information Services, Inc., Global Trade Atlas, HTS subheading 8541.40.20.

[129] ***.

The industry in Taiwan

Producers in Taiwan

During the final phase of the original investigations, the Commission received foreign producer/exporter questionnaires from 12 producers of CSPV cells in Taiwan, which accounted for approximately 82.5 percent of 2013 total shipments of CSPV cells in Taiwan. The Commission also received questionnaire responses from 15 producers of CSPV modules in Taiwan, which accounted for approximately *** percent of 2013 total production of CSPV modules in Taiwan.[130] Although the Commission did not receive responses from any foreign producers in these five-year reviews, the domestic interested parties provided a list of 15 possible producers of CSPV products in Taiwan in their responses to the notice of institution.[131]

Recent developments

Installations and policies

PV installations in Taiwan increased from 271 MW in 2014 to about 1.6 GW in 2019 (figure I-26).[132] One of the main policies that the Taiwanese government uses to encourage PV installations is a FIT, which is periodically revised downward. Projects that use high efficiency

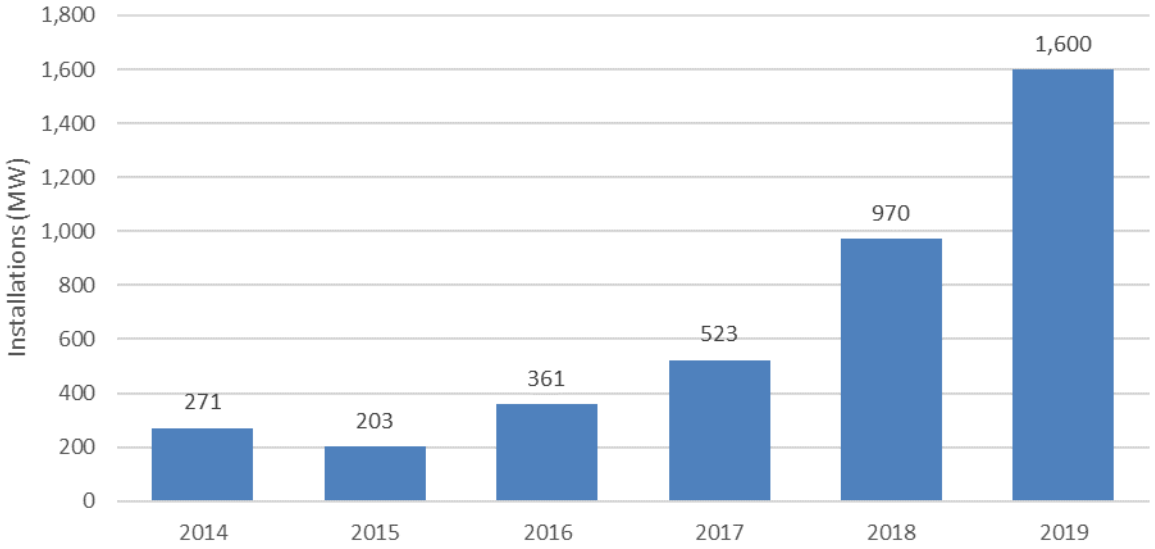
[130] Original confidential report, pp. VII-15—VII-16.

[131] Hanwha's response to the notice of institution, February 3, 2020, exh. 3; SunPower's response to the notice of institution, February 3, 2020, exh. 2.

[132] Taiwan Bureau of Energy, Ministry of Economic Affairs, "Energy Statistical Annual Report," 2019, https://www.moeaboe.gov.tw/ECW/english/content/ContentLink.aspx?menu_id=1540, retrieved March 6, 2020; Bellini, Emiliano, "Taiwan to Add 2.2 GW of New Solar this Year," PV Magazine, February 25, 2020, https://www.pv-magazine.com/2020/02/25/taiwan-to-add-2-2-gw-of-new-solar-this-year/, retrieved March 6, 2020.

modules manufactured in Taiwan are eligible for a 6 percent higher FIT rate.[133] In June 2016, the government set a goal of 20 GW of PV installations by 2025.[134]

Figure I-26
CSPV products: PV installations in Taiwan, 2014–19



Source: Taiwan Bureau of Energy, Ministry of Economic Affairs, Energy Statistical Annual Report, Installed Capacity Table, 2019, https://www.moeaboe.gov.tw/ECW/english/content/ContentLink.aspx?menu_id=1540, retrieved March 6, 2020; Bellini, Emiliano, "Taiwan to Add 2.2 GW of New Solar this Year," PV Magazine, February 25, 2020, https://www.pv-magazine.com/2020/02/25/taiwan-to-add-2-2-gw-of-new-solar-this-year/, retrieved March 6, 2020.

[133] Taiwan Bureau of Energy, Ministry of Economic Affairs, "2020 Feed-In Tariffs of Renewable Energy," attachment 2, n.d., https://www.moeaboe.gov.tw/ECW/main/content/wHandMenuFile.ashx?file_id=6803, retrieved March 6, 2020; Bellini, Emiliano, "Taiwan to Add 2.2 GW of New Solar this Year," PV Magazine, February 25, 2020, https://www.pv-magazine.com/2020/02/25/taiwan-to-add-2-2-gw-of-new-solar-this-year/, retrieved March 6, 2020; PV Magazine, "Your Guide to Solar Market Growth in the Global 'Gigawatt Club,'" January 18, 2020, https://pv-magazine-usa.com/2020/01/18/your-guide-to-solar-market-growth-in-the-global-gigawatt-club/, retrieved March 6, 2020.

[134] Jäger-Waldau, A., PV Status Report 2019, European Commission, Joint Research Center, p. 29, https://publications.jrc.ec.europa.eu/repository/handle/JRC118058, retrieved March 6, 2020; GlobalData Energy, "Taiwan Marching Towards Record Installation of 20GW Solar PV by 2025," Power Technology, February 4, 2020, https://www.power-technology.com/comment/taiwan-marching-towards-record-installation-of-20gw-solar-pv-by-2025/, retrieved March 6, 2020.

CSPV production and capacity[135]

Taiwan's CSPV cell production capacity totaled *** in 2018, which was *** than 2014 production capacity.[136] Since the start of 2019, however, production capacity in Taiwan has substantially decreased with a number of firms closing plants and reducing production capacity. For example, Motech announced in November 2018 that it would close a 1.1 GW CSPV cell plant in Taiwan by the end of January 2019, reducing its CSPV cell capacity in Taiwan from 1.9 GW to 800 MW. Tainergy Tech, which had 300 MW of CSPV cell production capacity in Taiwan, announced that it would close its plant and move production to Vietnam. In April 2019, E-Ton Solar announced plans to close its 800 MW CSPV cell plant in Taiwan and auction the plant along with two idle facilities. United Renewable Energy announced in June 2019 that it was idling half of its 5 GW in cell manufacturing capacity, though the firm indicated that it could bring that capacity back online in response to an increase in demand.[137]

Taiwan's CSPV module production capacity totaled *** in 2018, which was *** from the 3.0 GW that existed in 2016 and the *** reported by *** for 2014.[138] United Renewable Energy ("URE") supplied 48 percent of Taiwan's domestic demand in 2018.[139] URE and TSEC combined accounted for 50 percent of shipments to the domestic market in 2019.[140]

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[135] Unless otherwise noted, this information is based on Monitoring confidential report, pp. I-31–I-32.

[136] According to questionnaire data, cell production capacity in Taiwan was 7.1 GW in 2014. Firms providing questionnaire responses accounted for 82 percent of 2016 cell production capacity. *** reported *** of cell production capacity in Taiwan in 2014. ***; Safeguard publication, pp. I-5 and IV-62.

[137] Bellini, Emiliano, "URE Lowers Solar Cell Production in Response to Declining Demand," PV Magazine, June 4, 2019, https://www.pv-magazine.com/2019/06/04/ure-lowers-solar-cell-production-in-response-to-declining-demand/, retrieved September 4, 2019.

[138] Module capacity for 2016 is calculated by dividing questionnaire data on capacity by the share of capacity accounted for by firms that responded to the questionnaire. Safeguard publication, pp. I-5 and IV-63; ***.

[139] Bellini, Emiliano, "Taiwan Becomes a GW Solar Market," PV Magazine, April 10, 2019, https://www.pv-magazine.com/2019/04/10/taiwan-becomes-a-gw-solar-market/, retrieved March 6, 2020; Chen, Sharon, "Taiwan's Solar PV Market Continued to Grow in 2018 and Surpassed 1GW in Installations for the First Time, Says TrendForce," TrendForce, News release, April 10, 2019, https://press.trendforce.com/node/view/3229.html, retrieved March 6, 2020.

[140] Chen, Sharon, "TrendForce Releases the 2019 Rankings of Taiwanese PV Module and Inverter Manufacturers," TrendForce, News release, https://press.trendforce.com/press/20200212-3332.html, retrieved March 6, 2020.

There has been some recent consolidation in the CSPV industry in Taiwan. For example, in October 2017, three solar companies (Gintech, Neo Solar Power, and Solartech) in Taiwan announced plans to merge into United Renewable Energy. In October 2017, Motech and Gigasolar announced that they signed a joint venture agreement to form Taiwan Solar Module Manufacturing Co. ("TSMMC") to manufacture modules.

CSPV exports

Taiwan's CSPV cell and module exports decreased from $3.7 billion in 2014 to $409 million in 2019 (table I-8). Taiwan's exports to China declined by $1.3 billion, while exports to Japan fell by $680 million during 2014–19. The leading export destinations in 2019 were Vietnam (21 percent of exports), China (13 percent), the Netherlands (12 percent), the United States (11 percent), and Japan (11 percent).[141]

[141] Official exports statistics under HS subheadings 8541.40.30 and 8541.40.40 from Taiwan's Directorate General of Customs reported by the Global Trade Atlas database, retrieved March 2, 2020.

Table I-8:
CSPV products: Exports of PV cells and modules from Taiwan, by export destination, 2014–19

Export destination	Calendar year					
	2014	2015	2016	2017	2018	2019
	Value (1,000 dollars)					
China	1,383,605	1,071,635	884,957	716,094	260,057	52,976
Vietnam	8,802	261,710	587,722	370,335	170,808	86,699
Japan	725,597	329,629	176,934	113,965	72,790	45,942
Germany	263,494	283,046	238,848	134,574	76,933	15,810
Netherlands	127,532	160,349	128,016	88,406	65,897	47,773
Turkey	58,456	57,249	59,995	219,159	100,467	13,506
Malaysia	240,454	187,959	56,554	7,015	333	605
Singapore	95,666	148,394	111,374	59,214	33,142	9,602
Canada	135,500	178,836	64,217	11,631	3,692	11,383
United States	85,618	109,040	79,458	13,978	25,267	46,201
All other	567,377	517,863	440,648	439,536	346,408	78,453
Total	3,692,102	3,305,709	2,828,722	2,173,907	1,155,796	408,949
	Share of value (percent)					
China	37.5	32.4	31.3	32.9	22.5	13.0
Vietnam	0.2	7.9	20.8	17.0	14.8	21.2
Japan	19.7	10.0	6.3	5.2	6.3	11.2
Germany	7.1	8.6	8.4	6.2	6.7	3.9
Netherlands	3.5	4.9	4.5	4.1	5.7	11.7
Turkey	1.6	1.7	2.1	10.1	8.7	3.3
Malaysia	6.5	5.7	2.0	0.3	0.0	0.1
Singapore	2.6	4.5	3.9	2.7	2.9	2.3
Canada	3.7	5.4	2.3	0.5	0.3	2.8
United States	2.3	3.3	2.8	0.6	2.2	11.3
All other	15.4	15.7	15.6	20.2	30.0	19.2
Total	100.0	100.0	100.0	100.0	100.0	100.0

Note: Countries listed separately are the top 10 export destinations during 2014-19. Because of rounding, figures may not add to totals shown.

Source: Official exports statistics under HS subheadings 8541.40.30 and 8541.40.40 from Taiwan's Directorate General of Customs reported by the Global Trade Atlas database, retrieved March 2, 2020.

Antidumping or countervailing duty orders in third-country markets

Antidumping or countervailing duties on polysilicon, CSPV cells, and CSPV modules in third-country markets are summarized in table I-9.

Table I-9
Polysilicon, CSPV cells, and CSPV modules: Timeline of changes in antidumping and countervailing duty orders in third country markets

Date	Country	Description
January 2014	China	Imposed AD/CVD orders on imports of polysilicon from Korea and the United States.
May 2014	Australia	Initiated an AD investigation on CSPV modules from China.
May 2014	China	Imposed AD/CVD orders on imports of polysilicon from the EU. Wacker Chemie, the largest European producer, was exempted due to an agreement not to sell below a minimum price.
May 2014	India	The Indian Directorate General of Anti-Dumping and Allied Duties (“DGAD”) recommended imposing duties on solar cells imported from the United States, China, Malaysia, and Taiwan.
September 2014	China	China suspended applications to import polysilicon duty free under processing trade regimes (goods imported and used in exported goods), though imports under existing contracts were allowed to continue.
September 2014	India	The Indian Ministry of Commerce announced that the government would not impose the duties and let the DGAD recommendation lapse.
December 2014	Canada	Initiated AD/CVD investigations on CSPV products from China.
July 2015	Canada	The Canadian International Trade Tribunal (“CITT”) determined that the dumping and subsidizing of the CSPV products from China threatened to cause injury to the Canadian industry.
February 2016	European Union	Conclusion of EU anti-circumvention investigation and extension of duties to certain companies in Malaysia and Taiwan.
October 2016	Australia	Australia terminated AD investigation on imports from China.
April 2017	Turkey	Turkey imposed AD duties on modules from China.
July 2017	India	DGAD initiated an AD investigation on cells and modules from China, Malaysia, and Taiwan.
September 2017	European Union	EU announced that it would progressively reduce minimum import prices.
November 2017	China	China adjusted antidumping duties on polysilicon from Korea.
March 2018	India	Indian Solar Manufactures Association withdrew antidumping petition.
July 2018	India	Effective date of Indian safeguard duties. Developing countries except China and Malaysia are exempt.
September 2018	European Union	End of EU measures on cells and modules from China.
November 2018	China	China's duties on polysilicon imports from EU expired.
January 2019	China	China sunset review of polysilicon imports initiated.

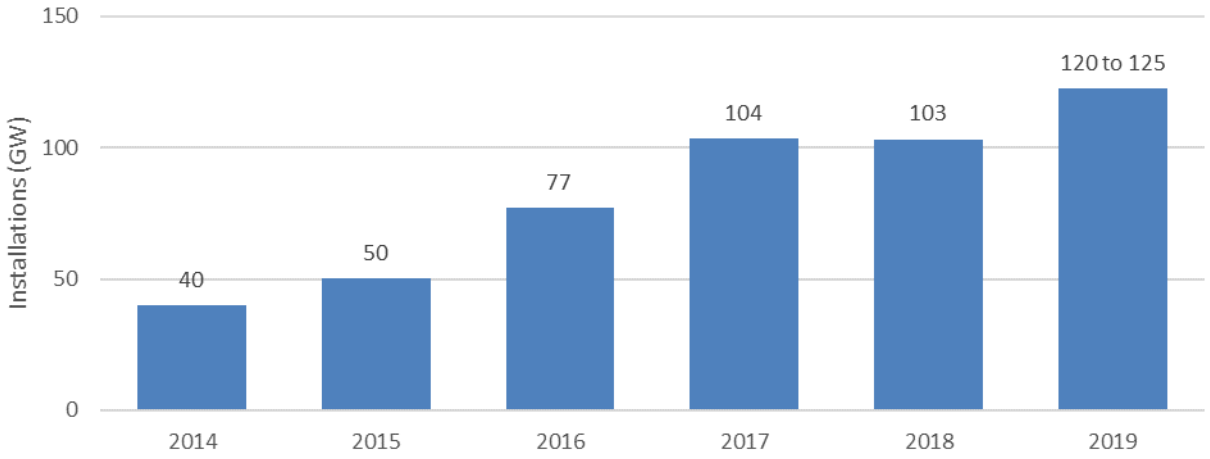
Source: Monitoring publication, pp. I-36 and F-18; CSPV 1 first review publication, pp. IV-18—IV-25.

The global market

Global installations

Global PV installations, including nonsubject thin film products, increased from 40 GW in 2014 to between 120 GW and 125 GW in 2019 (figure I-27).[142] The largest markets in 2018 were China (44.3 GW, 43 percent of installations), India (10.8 GW, 10 percent), the United States (10.7 GW, 10 percent), and Japan (6.7 GW, 6 percent).[143]

Figure I-27
CSPV products: Global PV installations, 2014-19



Source: IEA PVPS, Trends in Photovoltaic Applications 2019, Report IEA PVPS T1-36: 2019, 2019, p. 97, http://www.iea-pvps.org/?id=256, retrieved December 19, 2019; McCrone, Angus, "Energy, Vehicles, Sustainability – 10 Predictions for 2020," BloombergNEF, January 16, 2020; https://about.bnef.com/blog/energy-vehicles-sustainability-10-predictions-for-2020/, retrieved March 4, 2020; Osborne, Mark, "IHS Markit Remains Bullish on Global Solar Demand Hitting 142GW in 2020," PV Tech, January 7, 2020, https://www.pv-tech.org/news/ihs-markit-remains-bullish-on-global-solar-demand-hitting-142gw-in-2020, retrieved March 4, 2020; Jäger-Waldau, Arnulf, "Snapshot of Photovoltaics—February 2020," Energies, February 19, 2020, https://www.mdpi.com/1996-1073/13/4/930/htm, retrieved March 2, 2020.

[142] IEA PVPS, Trends in Photovoltaic Applications 2019, Report IEA PVPS T1-36: 2019, 2019, p. 97, http://www.iea-pvps.org/?id=256, retrieved December 19, 2019; McCrone, Angus, "Energy, Vehicles, Sustainability – 10 Predictions for 2020," BloombergNEF, January 16, 2020, https://about.bnef.com/blog/energy-vehicles-sustainability-10-predictions-for-2020/, retrieved March 4, 2020; Osborne, Mark, "IHS Markit Remains Bullish on Global Solar Demand Hitting 142GW in 2020," PV Tech, January 7, 2020, https://www.pv-tech.org/news/ihs-markit-remains-bullish-on-global-solar-demand-hitting-142gw-in-2020; Jäger-Waldau, Arnulf, "Snapshot of Photovoltaics—February 2020," Energies, February 19, 2020, https://www.mdpi.com/1996-1073/13/4/930/htm, retrieved March 2, 2016.

[143] IEA PVPS, 2019 in Photovoltaic Applications, IEA PVPS T1-36:2019, pp. 15 and 97, http://www.iea-pvps.org/index.php?id=trends, retrieved December 12, 2019.

*** was the largest global PV market during 2014–19, accounting for *** of installations during this time period, followed by ***. There was some diversification of the global market, particularly in 2019. The number of countries with installations of 1 GW or more increased from *** in 2014 to *** in 2019. At the same time, the share of the market accounted for by the top five countries (in each calendar year) was *** in 2019, its *** level in the five-year period.[144]

Global production

Global CSPV cell production increased from 52 GW in 2014 to 116 GW in 2018 (figure I-28).[145] The largest CSPV cell producers in 2018 were China (74 percent of global production), Taiwan (7 percent), Malaysia (6 percent), and Korea (5 percent).[146] Global CSPV cell capacity, according to ***, increased from *** in 2014 to *** 2019.[147]

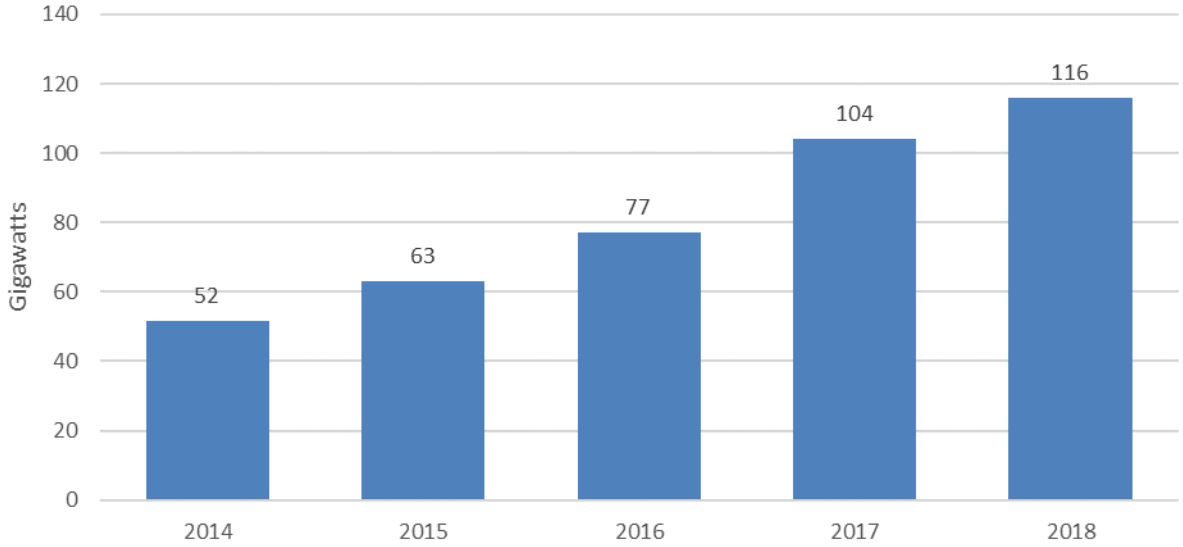
[144] Data for 2019 are *** projections, and are not yet final data. ***.

[145] Monitoring publication, p. I-22; CPIA, "China Photovoltaic Industry Development Roadmap," 2019, p. 3, http://www.chinapv.org.cn/road_map.html, retrieved November 4, 2019; IEA PVPS, Trends 2015 in Photovoltaic Applications, Report IEA-PVPS T1-27:2015, 2015, p. 41, http://www.iea-pvps.org/?id=256, retrieved March 3, 2020.

[146] IEA PVPS, Trends in Photovoltaic Applications 2019, Report IEA PVPS T1-36: 2019, 2019, p. 63, http://www.iea-pvps.org/?id=256, retrieved December 19, 2019.

[147] ***.

Figure I-28
CSPV products: Global PV cell production, 2014–18, and share of global production, 2018

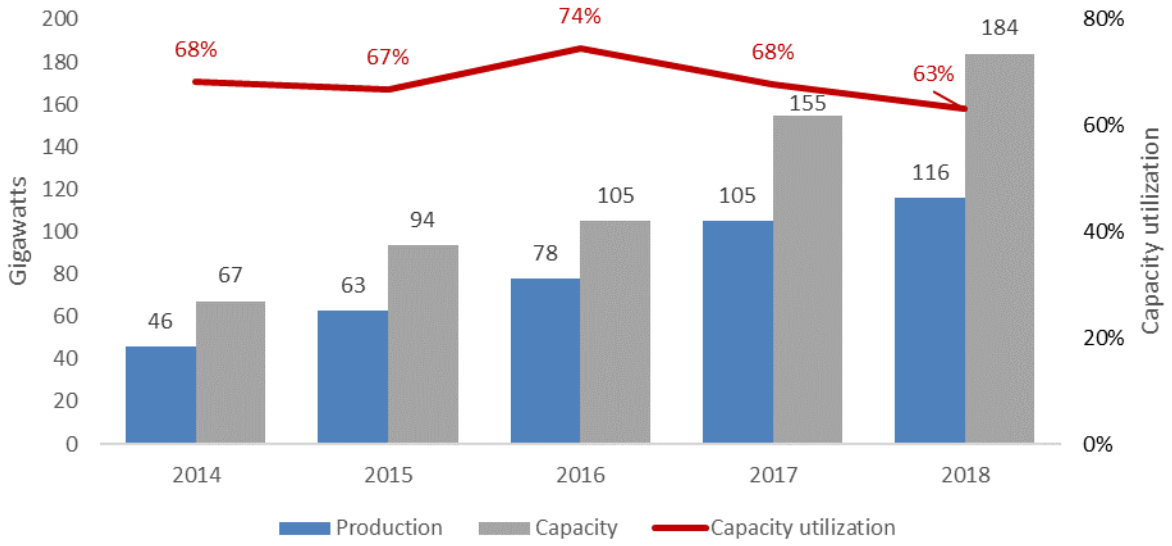


Note: 2014 data are adjusted from the data published in the original IEA report to account for subsequent upward revisions in China's manufacturing capacity.

Source: Monitoring publication, p. I-22; IEA PVPS, Trends 2016 in Photovoltaic Applications, Report IEA PVPS T1-30:2016, 2017, p. 47, http://www.iea-pvps.org/?id=256, retrieved December 19, 2019; CPIA, "China Photovoltaic Industry Development Roadmap," 2019, p. 3, http://www.chinapv.org.cn/road_map.html, retrieved November 4, 2019; IEA PVPS, Trends 2015 in Photovoltaic Applications, Report IEA-PVPS T1-27:2015, 2015, p. 41, http://www.iea-pvps.org/?id=256, retrieved March 3, 2020.

Global production of PV modules (including nonsubject products), according to the IEA, increased from 46 GW in 2014 to 116 GW in 2018, while PV module production capacity increased from 67 GW in 2014 to 184 GW in 2018 (figure I-29).[148] *** reports that CSPV module production capacity increased from *** in 2014 to *** in 2019.[149] Capacity utilization increased from 68 percent in 2014 to 74 percent in 2016, then declined to 63 percent in 2019.[150] China was the leading producer in 2018, accounting for 73 percent of global production. Among other large producers, Korea accounted for 6 percent of production, and Malaysia for 5 percent.[151]

Figure I-29
CSPV products: Global CSPV module production and capacity, 2014–18



Source: IEA PVPS, Trends in Photovoltaic Applications 2019, Report IEA PVPS T1-36: 2019, 2019, p. 67, http://www.iea-pvps.org/?id=256, retrieved December 19, 2019.

[148] IEA PVPS, *Trends in Photovoltaic Applications 2019*, Report IEA PVPS T1-36: 2019, 2019, p. 67, http://www.iea-pvps.org/?id=256, retrieved December 19, 2019.

[149] ***.

[150] IEA PVPS, Trends in Photovoltaic Applications 2019, Report IEA PVPS T1-36: 2019, 2019, p. 67, retrieved December 19, 2019.

[151] The IEA does not break out some large producers such as Vietnam separately. IEA PVPS, Trends in Photovoltaic Applications 2019, Report IEA PVPS T1-36: 2019, 2019, p. 63, http://www.iea-pvps.org/?id=256, retrieved December 19, 2019.

The leading global cell and module producers and suppliers are listed in table I-10, and are primarily firms headquartered in China. Combined shipments by the top ten module suppliers totaled about 80 GW in 2019, accounting for 65 percent of global shipments. The top five module exporters accounted for 33 to 34 GW of module exports in 2019.[152]

Table I-10
CSPV products: Leading global firms, by production capacity, shipments, and exports, 2019

	Cells		Modules		
	Production capacity	**Shipments**	**Production capacity**	**Shipments**	**Exports**
1	***	Tongwei (China)	***	Jinko (China)	Jinko (China)
2	***	Aiko (China)	***	JA Solar (China)	JA Solar (China)
3	***	SolarSpace (China)	***	Trina (China)	Canadian Solar (Canada/China)
4	***	Uniex (China)	***	Longi (China)	Trina (China)
5	***	Runergy (China)	***	Canadian Solar (Canada/China)	Risen Energy (China)
6	***		***	Hanwha (Korea)	
7	***		***	Risen Energy (China)	
8	***		***	Suntech (China)	
9	***		***	Astronergy (China)	
10	***		***	Talesun (China)	

Note: Headquarters location in parentheses. For cells, shipments are commercial shipments and do not include cells used in internal module production. Production capacity data are as of ***. Data for *** are included with the Tongwei total.

Source: PV InfoLink, "2019 Module Shipment Ranking: Jinko Maintains Leading Position," January 21, 2021, https://en.pvinfolink.com/post-view.php?ID=291, retrieved March 5, 2020; PV InfoLink, "2019 Solar Cell Shipment Ranking: Tongwei Takes Top Spot," January 30, 2020, https://en.pvinfolink.com/post-view.php?ID=293, retrieved March 5, 2020; ***.

[152] PV InfoLink, "2019 Module Shipment Ranking: Jinko Maintains Leading Position," January 21, 2021, https://en.pvinfolink.com/post-view.php?ID=291, retrieved March 5, 2020.

Global exports

China was the largest global exporter of CSPV products, with exports increasing from $12.3 billion in 2014 to $19.2 billion in 2019 (table I-11). Korea's exports increased from $1.0 billion in 2014 to $1.9 billion in 2016, then declined to $1.6 billion in 2019. Vietnam's exports increased from $70 million in 2014 to $2.6 billion in 2017. Exports declined to $1.5 billion in 2018, before rebounding in 2019. Malaysia exported $1.3 billion in 2018, while Taiwan's exports declined from $3.7 billion in 2014 to $409 million in 2019.

Table I-11
CSPV products: Exports, 2014-19, by top five global exporters in 2018

	2014	2015	2016	2017	2018	2019
China	12,320,143	12,899,089	11,337,050	11,335,128	13,578,389	19,181,643
Korea	973,365	1,318,173	1,885,451	1,840,262	1,604,816	1,592,065
Vietnam	70,361	415,752	1,013,196	2,589,277	1,460,972	2,058,129
Malaysia	See note	See note	See note	See note	1,332,540	Not available
Taiwan	3,692,102	3,305,709	2,828,722	2,173,907	1,155,796	408,949

Note: Includes out-of-scope thin film products. For Vietnam, data were not available below the HS 6-digit level. Malaysia data prior to 2018 are not included, as some data were not available at the 10-digit level. Data for Vietnam may be overstated or understated as subheading 8541.40 may contain products outside the scope of these reviews, and not all trading partners have reported 2019 trade data.

Source: Official exports statistics under HS subheading 8541.40.20 for China from China's customs; Korea under HS statistical reporting numbers 8541.40.9020, 8541.40.9021 and 8541.40.9022 from Korea's customs and Trade Development Institution; Malaysia under HS statistical reporting numbers 8541.40.2100 and 8541.40.2200 from Department of Statistics Malaysia; Taiwan under HS statistical reporting numbers 8541.40.3000 and 8541.40.4000 from Taiwan's Directorate General of Customs; and mirror import data in HS subheading 8541.40 for Vietnam reported by the Global Trade Atlas database, accessed March 2, 2020.

APPENDIX A

FEDERAL REGISTER NOTICES

The Commission makes available notices relevant to its investigations and reviews on its website, www.usitc.gov. In addition, the following tabulation presents, in chronological order, *Federal Register* notices issued by the Commission and Commerce during the current proceeding.

Citation	Title	Link
85 FR 67, January 2, 2020	*Initiation of Five-Year (Sunset) Reviews*	https://www.govinfo.gov/content/pkg/FR-2020-01-02/pdf/2019-28344.pdf
85 FR 120, January 2, 2020	*Certain Crystalline Silicon Photovoltaic Products From China and Taiwan; Institution of Five-Year Reviews*	https://www.govinfo.gov/content/pkg/FR-2020-01-02/pdf/2019-28080.pdf

APPENDIX B

COMPANY-SPECIFIC DATA

* * * * * * *

APPENDIX C

SUMMARY DATA COMPILED IN PRIOR PROCEEDING

Table C-4
CSPV modules: Summary data concerning the U.S. market based on Commerce's December 16 revised scope, w/ exclusions *, 2011-13, January to June 2013, and January to June 2014**
(Quantity=kilowatts; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per kilowatts; Period changes=percent--exceptions noted)

	Reported data					Period changes			
	Calendar year			January to June		Calendar year			Jan-Jun
	2011	2012	2013	2013	2014	2011-13	2011-12	2012-13	2013-14
U.S. consumption quantity:									
Amount	***	***	***	***	***	***	***	***	***
Producers' share (fn1)	***	***	***	***	***	***	***	***	***
Importers' share (fn1):									
China subject	***	***	***	***	***	***	***	***	***
Taiwan	***	***	***	***	***	***	***	***	***
Subtotal, subject	***	***	***	***	***	***	***	***	***
China nonsubject	***	***	***	***	***	***	***	***	***
All other sources	***	***	***	***	***	***	***	***	***
Subtotal, nonsubject	***	***	***	***	***	***	***	***	***
Total imports	***	***	***	***	***	***	***	***	***
U.S. consumption value:									
Amount	***	***	***	***	***	***	***	***	***
Producers' share (fn1)	***	***	***	***	***	***	***	***	***
Importers' share (fn1):									
China subject	***	***	***	***	***	***	***	***	***
Taiwan	***	***	***	***	***	***	***	***	***
Subtotal, subject	***	***	***	***	***	***	***	***	***
China nonsubject	***	***	***	***	***	***	***	***	***
All other sources	***	***	***	***	***	***	***	***	***
Subtotal, nonsubject	***	***	***	***	***	***	***	***	***
Total imports	***	***	***	***	***	***	***	***	***
U.S. importers' U.S. Imports:									
China subject:									
Quantity	75,356	629,593	2,217,072	808,275	1,865,759	2,842.1	735.5	252.1	130.8
Value	100,328	500,073	1,465,188	533,611	1,241,156	1,360.4	398.4	193.0	132.6
Unit value	$1,331	$794	$661	$660	$665	(50.4)	(40.3)	(16.8)	0.8
Taiwan:									
Quantity	70,665	247,722	282,689	148,908	214,556	300.0	250.6	14.1	44.1
Value	125,175	252,335	254,898	134,939	172,578	103.6	101.6	1.0	27.9
Unit value	$1,771	$1,019	$902	$906	$804	(49.1)	(42.5)	(11.5)	(11.2)
Subject Total:									
Quantity	146,021	877,315	2,499,761	957,183	2,080,315	1,611.9	500.8	184.9	117.3
Value	225,503	752,408	1,720,086	668,550	1,413,734	662.8	233.7	128.6	111.5
Unit value	$1,544	$858	$688	$698	$680	(55.4)	(44.5)	(19.8)	(2.7)
China nonsubject:									
Quantity	959,684	682,010	65,199	7,261	172,908	(93.2)	(28.9)	(90.4)	2,281.3
Value	1,279,489	620,776	40,521	8,329	144,477	(96.8)	(51.5)	(93.5)	1,634.6
Unit value	$1,333	$910	$622	$1,147	$836	(53.4)	(31.7)	(31.7)	(27.2)
All other sources:									
Quantity	79,732	92,432	109,001	54,998	37,132	36.7	15.9	17.9	(32.5)
Value	138,150	112,338	109,487	57,700	30,552	(20.7)	(18.7)	(2.5)	(47.1)
Unit value	$1,733	$1,215	$1,004	$1,049	$823	(42.0)	(29.9)	(17.4)	(21.6)
Non-subject Total:									
Quantity	1,039,416	774,442	174,200	62,259	210,040	(83.2)	(25.5)	(77.5)	237.4
Value	1,417,639	733,114	150,008	66,029	175,029	(89.4)	(48.3)	(79.5)	165.1
Unit value	$1,364	$947	$861	$1,061	$833	(36.9)	(30.6)	(9.0)	(21.4)
Total imports:									
Quantity	1,185,437	1,651,757	2,673,961	1,019,442	2,290,355	125.6	39.3	61.9	124.7
Value	1,643,142	1,485,522	1,870,094	734,579	1,588,763	13.8	(9.6)	25.9	116.3
Unit value	$1,386	$899	$699	$721	$694	(49.5)	(35.1)	(22.2)	(3.7)
U.S. producers':									
Average 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	***	***	***	***	***	***	***	***	***
Productivity (kilowatts per hour)	***	***	***	***	***	***	***	***	***
Unit labor costs (dollars per killowatt)	***	***	***	***	***	***	***	***	***
Net Sales:									
Quantity	***	***	***	***	***	***	***	***	***
Value	***	***	***	***	***	***	***	***	***
Unit value	***	***	***	***	***	***	***	***	***
Cost of goods sold (COGS)	***	***	***	***	***	***	***	***	***
Gross profit of (loss)	***	***	***	***	***	***	***	***	***
SG&A expenses	***	***	***	***	***	***	***	***	***
Operating income or (loss)	***	***	***	***	***	***	***	***	***
Capital expenditures	***	***	***	***	***	***	***	***	***
Unit COGS	***	***	***	***	***	***	***	***	***
Unit SG&A expenses	***	***	***	***	***	***	***	***	***
Unit operating income or (loss)	***	***	***	***	***	***	***	***	***
COGS/sales (fn1)	***	***	***	***	***	***	***	***	***
Operating income or (loss)/sales (fn1)	***	***	***	***	***	***	***	***	***

Notes:

fn1.--Reported data are in percent and period changes are in percentage points.
fn2.--Undefined.

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

APPENDIX D

PURCHASER QUESTIONNAIRE RESPONSES

As part of their response to the notice of institution, interested parties were asked to provide a list of three to five leading purchasers in the U.S. market for the domestic like product. A response was received from domestic interested parties and it named the following four firms as the top purchasers of CSPV products: ***. Purchaser questionnaires were sent to these four firms and one firm (***) provided responses which are presented below.

1. Have there been any significant changes in the supply and demand conditions for certain crystalline silicon photovoltaic products that have occurred in the United States or in the market for certain crystalline silicon photovoltaic products in China and/or Taiwan since January 1, 2015?

Purchaser	Changes that have occurred
***	***

2. Do you anticipate any significant changes in the supply and demand conditions for CSPV products in the United States or in the market for CSPV products in China and/or Taiwan within a reasonably foreseeable time?

Purchaser	Anticipated changes
***	***