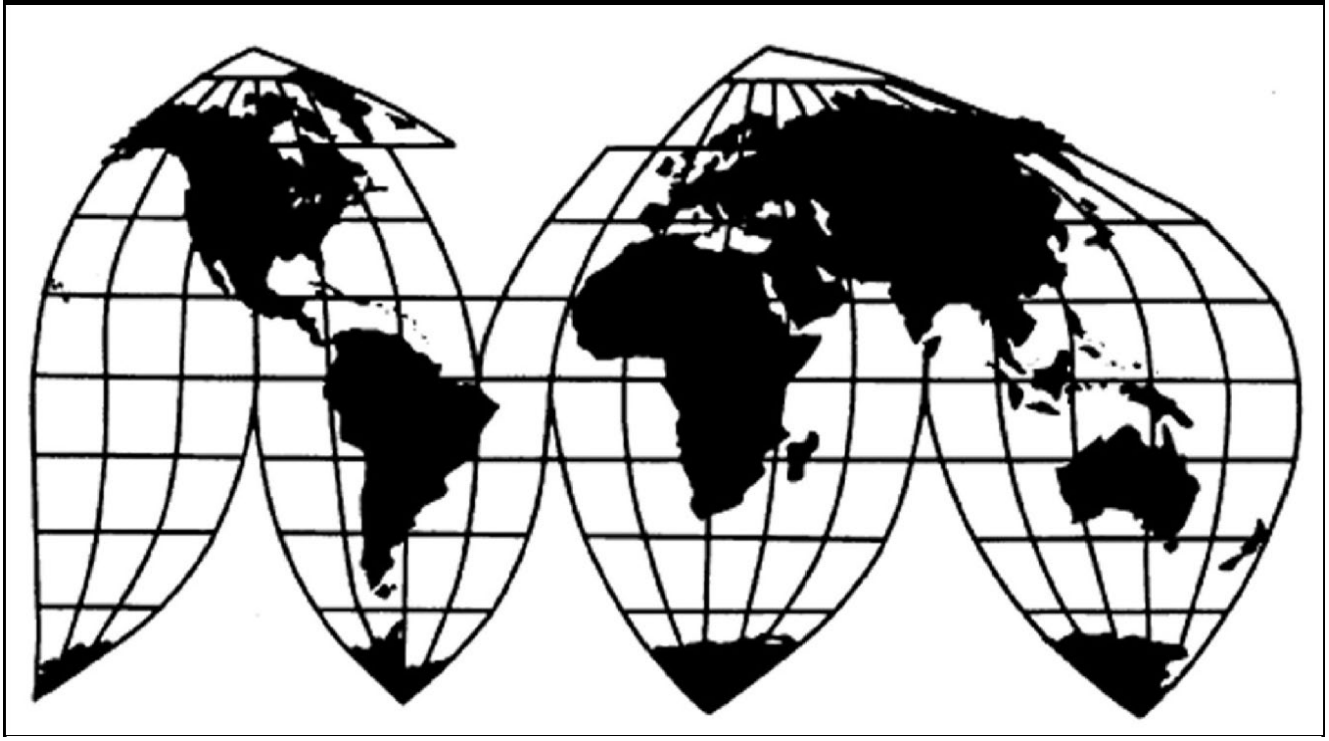
Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules from India, Indonesia, and Laos

Investigation Nos. 701-TA-772–774 and 731-TA-1756–1758 (Preliminary)

Publication 5665 **September 2025**

U.S. International Trade Commission



Washington, DC 20436

U.S. International Trade Commission

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UNITED STATES INTERNATIONAL TRADE COMMISSION

Investigation Nos. 701-TA-772-774 and 731-TA-1756-1758 (Preliminary)

Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules from India, Indonesia, and Laos

DETERMINATIONS

On the basis of the record[1] developed in the subject investigations, the United States International Trade Commission ("Commission") determines, pursuant to the Tariff Act of 1930 ("the Act"), that there is a reasonable indication that an industry in the United States is materially injured by reason of imports of crystalline silicon photovoltaic cells, whether or not assembled into modules, from India, Indonesia, and Laos, provided for in subheadings 8541.42.00 and 8541.43.00 of the Harmonized Tariff Schedule of the United States, that are alleged to be sold in the United States at less than fair value ("LTFV") and alleged to be subsidized by the governments of India, Indonesia, and Laos.[2]

COMMENCEMENT OF FINAL PHASE INVESTIGATIONS

Pursuant to section 207.18 of the Commission's rules, the Commission also gives notice of the commencement of the final phase of its investigations. The Commission will issue a final phase notice of scheduling, which will be published in the *Federal Register* as provided in § 207.21 of the Commission's rules, upon notice from the U.S. Department of Commerce ("Commerce") of affirmative preliminary determinations in the investigations under §§ 703(b) or 733(b) of the Act, or, if the preliminary determinations are negative, upon notice of affirmative final determinations in those investigations under §§ 705(a) or 735(a) of the Act. Parties that filed entries of appearance in the preliminary phase of the investigations need not enter a separate appearance for the final phase of the investigations. Any other party may file an entry of appearance for the final phase of the investigations after publication of the final phase notice of scheduling. Industrial users, and, if the merchandise under investigation is sold at the retail level, representative consumer organizations have the right to appear as parties in Commission antidumping and countervailing duty investigations. The Secretary will prepare a

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

[2] 90 FR 38736 and 90 FR 38745 (August 12, 2025).

public service list containing the names and addresses of all persons, or their representatives, who are parties to the investigations. As provided in section 207.20 of the Commission's rules, the Director of the Office of Investigations will circulate draft questionnaires for the final phase of the investigations to parties to the investigations, placing copies on the Commission's Electronic Document Information System (EDIS, https://edis.usitc.gov), for comment.

BACKGROUND

On July 17, 2025, the Alliance for American Solar Manufacturing and Trade[3] filed petitions with the Commission and Commerce, alleging that an industry in the United States is materially injured or threatened with material injury by reason of LTFV and subsidized imports of crystalline silicon photovoltaic cells, whether or not assembled into modules, from India, Indonesia, and Laos. Accordingly, effective July 17, 2025, the Commission instituted countervailing duty investigation Nos. 701-TA-772-774 and antidumping duty investigation Nos. 731-TA-1756-1758 (Preliminary).

Notice of the institution of the Commission's investigations and of a public conference to be held in connection therewith was given by posting copies of the notice in the Office of the Secretary, U.S. International Trade Commission, Washington, DC, and by publishing the notice in the *Federal Register* of July 22, 2025 (90 FR 34518). The Commission conducted its conference on August 7, 2025. All persons who requested the opportunity were permitted to participate.

[3] Members include Hanwha Q CELLS USA Inc., First Solar, and Mission Solar.

Views of the Commission

Based on the record in the preliminary phase of these investigations, we determine that there is a reasonable indication that an industry in the United States is materially injured by reason of imports of crystalline silicon photovoltaic cells, whether or not assembled into modules, from India, Indonesia, and Laos, that are allegedly sold in the United States at less than fair value and that allegedly subsidized by the governments of India, Indonesia, and Laos.

I. The Legal Standard for Preliminary Determinations

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

II. Background

Parties to the Investigation. The American Alliance for Solar Manufacturing and Trade (the "Alliance" or "Petitioner") filed the petitions in these investigations on July 17, 2025, with respect to imports of crystalline silicon photovoltaic ("CSPV") cells, whether or not assembled into module*s* ("CSPV products").[3] The Alliance consists of Hanwha Q Cells USA, Inc. ("Hanwha") and Mission Solar Energy LLC ("Mission"), U.S. producers of CSPV products, as well as First Solar, Inc. ("First Solar"), a U.S. producer of thin film solar products, which are expressly excluded from the scope of these investigations.[4] Hanwha and Mission appeared at the staff conference with counsel and the Alliance submitted a postconference brief.[5] A representative of Talon PV, a domestic producer of CSPV products that is not a member of the Alliance, appeared at the staff conference, but did not submit a postconference brief.[6] T1 Energy Inc.

[1] 19 U.S.C. §§ 1671b(a), 1673b(a) (2000); *see also American Lamb Co. v. United States*, 785 F.2d 994, 1001-04 (Fed. Cir. 1986); *Aristech Chem. Corp. v. United States, 2*0 CIT 353, 354-55 (1996). No party argues that the establishment of an industry in the United States is materially retarded by the allegedly unfairly traded imports.

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

[3] Petition, EDIS Doc. 857032 (July 17, 2025).

[4] The petitions are also supported by domestic producers Talon PV, ***. Petition at 1.

[5] Petitioner's Postconference Brief, EDIS Doc. 859419 (Aug. 12, 2025) ("Petitioner's Postconference Brief") at 1.

[6] *See* Transcript of Staff Conference on August 7, 2025, EDIS Doc. 859057 ("Conference Tr.").

("T1 Energy"), a U.S. producer of CSPV modules, submitted a postconference declaration in support of the petitions.[7]

No respondent parties appeared at the staff conference, but several respondents submitted postconference briefs. Canadian Solar US Module Manufacturing Corporation, Heliene USA Inc., and Silfab Solar WA Inc. (collectively "Domestic Respondents"), domestic producers of CSPV products, submitted a joint postconference letter.[8] Mundra Solar PV Limited ("MSPVL"), Mundra Solar Energy Limited ("MSEL"), Waaree Energies, Ltd., and Waaree Solar Americas (collectively "Indian Respondents") submitted a joint postconference brief.[9] The Solar Energy Industries Association ("SEIA"), an industry association including importers and purchasers of subject merchandise, submitted a postconference brief.[10]

Data Coverage. U.S. industry data are based on the questionnaire responses of 15 domestic producers, accounting for virtually all U.S. production of CSPV cells and the vast majority of CSPV modules in 2024.[11] U.S. import data are based on official Commerce import statistics (under HTS subheadings 8541.42.00 and 8541.43.00)[12] and usable questionnaire responses from 45 companies, accounting for *** percent of subject imports from the three subject countries and *** percent of nonsubject imports in 2024.[13] The Commission received responses to its questionnaires from 24 foreign producers of subject merchandise: ten producers/exporters in India, which appear to have accounted for *** of subject cells and modules in India in 2024; 13 producers/exporters in Indonesia, estimated to have accounted for essentially all subject cell production and *** percent of subject module production in Indonesia in 2024; and one producer/exporter in Laos, estimated to have accounted for ***

[7] *See* T1 Energy's Postconference Declaration, EDIS Doc. 859404 (Aug. 12, 2025).

[8] Domestic Respondents' Postconference Letter, EDIS Doc. 859389 (Aug. 12, 2025).

[9] Indian Respondents' Postconference Brief, EDIS Doc. 859378 (Aug. 12, 2025). MSPVL and MSEL are foreign producers/exporters of subject merchandise. *See* CR/PR at 1.4. Waaree Energies Ltd. is a foreign manufacturer and U.S. importer of subject merchandise. Waaree Solar Americas is a U.S. producer of CSPV products.

[10] SEIA Postconference Brief, EDIS Doc. 859423 (Aug. 12, 2025).

[11] Confidential Staff Report ("CR"), INV-XX-115, EDIS Doc. 860366 (August 25, 2025) and *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules from India, Indonesia, and Laos,* Inv. Nos. 701-TA-772-774 and 731-TA-1756-58 (Preliminary), USITC Pub. 5665 (Sep. 2025) ("PR") at 1.5, 3.1, Table 3.1; Petition, Volume I at 2. Suniva, which began production in the United States in the fourth quarter of 2024, was the only responding domestic producer of CSPV cells. CR/PR at 1.4 n.8. U.S. producer ES Foundry also commenced cell production in early 2025. CR/PR at 3.1.

[12] CR/PR at 4.1.

[13] CR/PR at 1.5, 4.1. Questionnaire responses covered *** percent of subject imports from India, *** percent of subject imports from Indonesia, and *** percent of subject imports from Laos in 2024. Importer questionnaire data are supplemented using proprietary, Census-edited Customs' import records to account for non-responding firms. *See* CR/PR at 4.1, n.2.

percent of subject cell production and *** percent of subject module production in Laos in 2024.[14]

III. Domestic Like Product

In determining whether there is a reasonable indication that an industry in the United States is materially injured or threatened with material injury by reason of imports of the subject merchandise, the Commission first defines the "domestic like product" and the "industry."[15] Section 771(4)(A) of the Tariff Act of 1930, as amended ("the Tariff Act"), defines the relevant domestic industry as the "producers as a whole of a domestic like product, or those producers whose collective output of a domestic like product constitutes a major proportion of the total domestic production of the product."[16] In turn, the Tariff Act defines "domestic like product" as "a product which is like, or in the absence of like, most similar in characteristics and uses with, the article subject to an investigation."[17]

By statute, the Commission's "domestic like product" analysis begins with the "article subject to an investigation," *i.e.*, the subject merchandise as determined by Commerce.[18] Therefore, Commerce's determination as to the scope of the imported merchandise that is subsidized and/or sold at less than fair value is "necessarily the starting point of the Commission's like product analysis."[19] The Commission then defines the domestic like product in light of the imported articles Commerce has identified.[20] The decision regarding the

[14] CR/PR at 7.3, Table 7.1. The ten responding firms in India reported a volume of exports equal to *** percent of U.S. imports of CSPV cells and modules from India in 2024; exports to the United States reported by the 13 responding firms in Indonesia accounted for *** percent of U.S. imports of CSPV cells and modules from Indonesia in 2024; and exports to the United States reported by the one responding firm in Laos accounted for *** percent of U.S. imports of CSPV cells and modules from Laos in 2024. CR/PR at 7.3, Table 7.1. *** and *** each reported an estimate of *** percent, which likely resulted in overstate data coverage. Several responding firms also submitted their questionnaire responses too late for inclusion in the Staff Report for the preliminary phase of these investigations.

[15] 19 U.S.C. § 1677(4)(A).

[16] 19 U.S.C. § 1677(4)(A).

[17] 19 U.S.C. § 1677(10).

[18] 19 U.S.C. § 1677(10). The Commission must accept Commerce's determination as to the scope of the imported merchandise that is subsidized and/or sold at less than fair value. *See*, *e.g.*, *USEC, Inc. v. United States*, 34 Fed. App'x 725, 730 (Fed. Cir. 2002) ("The ITC may not modify the class or kind of imported merchandise examined by Commerce."); *Algoma Steel Corp. v. United States,* 688 F. Supp. 639, 644 (Ct. Int'l Trade 1988), *aff'd*, 865 F.3d 240 (Fed. Cir.), *cert. denied*, 492 U.S. 919 (1989).

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

[20] *Cleo*, 501 F.3d at 1298 n.1 ("Commerce's {scope} finding does not control the Commission's {like product} determination."); *Hosiden Corp. v. Advanced Display Mfrs.,* 85 F.3d 1561, 1568 (Fed. Cir. 1996) (the Commission may find a single like product corresponding to several different classes or kinds defined by Commerce); *Torrington Co. v. United States*, 747 F. Supp. 744, 748–52 (Ct. Int'l Trade 1990),

appropriate domestic like product(s) in an investigation is a factual determination, and the Commission has applied the statutory standard of "like" or "most similar in characteristics and uses" on a case-by-case basis.[21] No single factor is dispositive, and the Commission may consider other factors it deems relevant based on the facts of a particular investigation.[22] The Commission looks for clear dividing lines among possible like products and disregards minor variations.[23] The Commission may, where appropriate, include domestic articles in the domestic like product in addition to those described in the scope.[24]

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

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

aff'd, 938 F.2d 1278 (Fed. Cir. 1991) (affirming the Commission's determination defining six like products in investigations where Commerce found five classes or kinds).

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

In a semi-finished products analysis, the Commission examines the following: (1) the significance and extent of the processes used to transform the upstream into the downstream articles; (2) whether the upstream article is dedicated to the production of the downstream article or has independent uses; (3) differences in the physical characteristics and functions of the upstream and downstream articles; (4) whether there are perceived to be separate markets for the upstream and downstream articles; and (5) differences in the costs or value of the vertically differentiated articles. *See*, *e.g.*, *Glycine from India*, *Japan*, *and Korea*, Inv. Nos. 731-TA-1111-1113 (Preliminary), USITC Pub. No. 3921 at 7 (May 2007); *Artists' Canvas from China*, Inv. No. 731-TA-1091 (Final), USITC Pub. No. 3853 at 6 (May 2006); *Live Swine from Canada*, Inv. No. 731-TA-1076 (Final), US1TC Pub. 3766 at 8 n.40 (Apr. 2005); *Certain Frozen Fish Fillets from Vietnam*, Inv. No. 731-TA-1012 (Preliminary), USITC Pub. No. 3533 at 7 (Aug. 2002).

[22] *See*, *e.g.*, S. Rep. No. 96-249 at 90-91 (1979).

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

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

products, including, but not limited to, modules, laminates, panels and building integrated materials.

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

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

Excluded from the scope of the 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 the investigation are crystalline silicon photovoltaic cells, not exceeding 10,000 mm2 in surface area, that are permanently integrated into a consumer good whose function is other than power generation and that consumes the electricity generated by the integrated crystalline silicon photovoltaic cell. Where more than one cell is permanently integrated into a consumer good, the surface area for purposes of this exclusion shall be the total combined surface area of all cells that are integrated into the consumer good.

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

Also excluded from the scope of the investigation are:

(1) Off grid CSPV panels in rigid form with a glass cover, with the following characteristics: (A) a total power output of 100 watts or less per panel; (B) a maximum surface area of 8,000 cm2 per panel; (C) do not include a built-in inverter; (D) must include a permanently connected wire that terminates in either an 8 mm male barrel connector, or a two-port rectangular connector with two pins in square housings of different colors; (E) must include visible parallel

grid collector metallic wire lines every 1-4 millimeters across each solar cell; and (F) must be in individual retail packaging (for purposes of this provision, retail packaging typically includes graphics, the product name, its description and/or features, and foam for transport); and

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

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

Additionally excluded from the scope of these investigations are off-grid small portable crystalline silicon photovoltaic panels, with or without a glass cover, with the following characteristics: (1) a total power output of 200 watts or less per panel; (2) a maximum surface area of 16,000 cm2 per panel; (3) no built-in inverter; (4) an integrated handle or a handle attached to the package for ease of carry; (5) one or more integrated kickstands for easy installation or angle adjustment; and (6) a wire of not less than 3 meters either permanently connected or attached to the package that terminates in an 8 mm diameter male barrel connector.

Also excluded from the scope of these investigations are off-grid crystalline silicon photovoltaic panels in rigid form with a glass cover, with each of the following physical characteristics, whether or not assembled into a fully completed off-grid hydropanel whose function is conversion of water vapor into liquid water: (A) a total power output of no more than 180 watts per panel at 155 degrees Celsius; (B) a surface area of less than 16,000 square centimeters (cm2) per panel; (C) include a keep-out area of approximately 1,200 cm2 around the edges of the panel that does not contain solar cells; (D) do not include a built-in inverter; (E) do not have a frame around the edges of the panel; (F)

include a clear glass back panel; (G) must include a permanently connected wire that terminates in a two-port rounded rectangular, sealed connector; (H) include a thermistor installed into the permanently connected wire before the twoport connector; and (I) include exposed positive and negative terminals at opposite ends of the panel, not enclosed in a junction box.

Further excluded from the scope of the investigations are:

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

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

Also excluded from the scope of the investigation are:

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

(2) Small off-grid panels with glass cover, with the following characteristics: (A) surface area from 3,450 mm2 to 33,782 mm2 , (B) with one black wire and one red wire (each of type 22AWG or 28 AWG not more than 350 mm in length when

measured from panel extrusion), (C) not exceeding 10 volts, (D) not exceeding 1.1 amps, (E) not exceeding 6 watts, and (F) for the purposes of this exclusion, no panel shall contain an internal battery or external computer peripheral ports.

Additionally excluded from the scope of the investigation are:

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

(2) Off grid CSPV panels without a glass cover, with the following characteristics, (A) a total power output of 220 watts or less per panel, (B) a maximum surface area of 16,000 cm2 per panel, (C) do not include a built-in inverter, (D) must include visible parallel grid collector metallic wire lines every 1-4 millimeters across each solar cell, and (E) each panel is encased in a 4 laminated material without stitching.

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

(1) a total power output of 20 watts or less per panel;

(2) a maximum surface area of 1,000 cm2 per panel;

(3) does not include a built-in inverter for powering third party devices.

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

Also excluded from the scope of these investigations are all products covered by the scope of the antidumping and countervailing duty orders *on Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules, from the People's Republic of China: Amended Final Determination of Sales at Less Than*

Fair Value, and Antidumping Order, 77 FR 73018 (December 7, 2012); and *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules, from the People's Republic of China: Countervailing Duty Order*, 77 FR 73017 (December 7, 2012).

Also excluded from the scope of these investigations are all products covered by the scope of the antidumping and countervailing duty orders on *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules from the Socialist Republic of Vietnam: Amended Final Antidumping Duty Determination; Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules from Cambodia, Malaysia, Thailand, and the Socialist Republic of Vietnam: Antidumping duty Orders*, 90 FR 26786 (June 24, 2025); *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules from the Socialist Republic of Vietnam: Amended Final Antidumping Duty Determination; Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules from Cambodia, Malaysia, Thailand, and the Socialist Republic of Vietnam: Antidumping Duty Orders; Correction*, 90 FR 29843 (July 7, 2025); and *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules, from Malaysia and Thailand: Amended Final Countervailing Duty Determinations; Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules, from Cambodia, Malaysia, Thailand, and the Socialist Republic of Vietnam: Countervailing Duty Orders*, 90 FR 26791 (June 24, 2025).

Merchandise covered by the investigations is currently classified in the Harmonized Tariff System of the United States (HTSUS) under subheadings 8541.42.0010 and 8541.43.0010. Imports of the subject merchandise may enter under HTSUS subheadings 8501.71.0000, 8501.72.1000, 8501.72.2000, 8501.72.3000, 8501.72.9000, 8501.80.1000, 8501.80.2000, 8501.80.3000, 8501.80.9000, 8507.20.8010, 8507.20.8031, 8507.20.8041, 8507.20.8061, and 8507.20.8091. These HTSUS subheadings are provided for convenience and customs purposes; the written description of the scope of the investigations is dispositive.[25]

A. Product Description

CSPV cells are the essential element in CSPV modules (also commonly referred to as panels), which in turn are the main components of CSPV systems that convert sunlight into

[25] *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From India, Indonesia, and the Lao People's Democratic Republic: Initiation of Less-Than-Fair-Value Investigations*, 90 Fed. Reg. 38737 (Dep't of Comm. Aug. 12, 2025) ("AD Initiation Notice"); *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From India, Indonesia, and the Lao People's Democratic Republic: Initiation of Countervailing Duty Investigations*, 90 Fed. Reg. 38745, 38749-50 (Dep't of Comm. Aug. 12, 2025) ("CVD Initiation Notice").

electricity.[26] There are four main market segments: off-grid applications and residential, non-residential, and utility on-grid applications.[27] Off-grid solar products are excluded from the scope of these investigations.

CSPV cells use either monocrystalline or multicrystalline silicon to convert sunlight to electricity and may be fully square or slightly rounded.[28] CSPV cells have a positive layer, a negative layer, and a positive-negative ("p/n") junction, and vary in size depending on the size of the wafer used to produce the cell.[29] Cells generate electricity when sunlight strikes the cell, knocking electrons loose and causing them to travel between the layers. CSPV cells can be monofacial, with a materialized opaque back layer, or bifacial, with a transparent or translucent back that allows the cell to convert light that hits both the front and back of the cell into electricity.[30]

CSPV modules consist of CSPV cells that are soldered together, placed on a matrix, and laminated.[31] The laminate is then typically framed in aluminum and attached to one or more junction boxes.[32] CSPV modules can be used in both ground-mounted and rooftop mounted systems, both on and off the electrical grid.[33] As monofacial and bifacial modules have moved closer to cost parity, manufacturers have adjusted their product lines, including by purchasing bifacial cells as inputs and replacing opaque back sheets with glass.[34] The most common on-grid CSPV modules have 60 cells (or 120 half-cut cells) or 72 cells (or 144 half-cut cells).[35] There are five principal stages in manufacturing CSPV products: (1) refining of polysilicon; (2) forming of ingots; (3) slicing of wafers; (4) conversion into cells; and (5) assembly into modules.[36]

[26] CR/PR at 1.18.

[27] CR/PR at 1.26.

[28] CR/PR at 1.24. Monocrystalline cells are made from a single grown crystal and tend to have a higher conversion efficiency than multicrystalline cells, which have a random crystal structure. CR/PR 1.24. Conversion efficiency is the percent of sunlight that is converted to electricity. CR/PR at 1.24 n.38. The record in these investigations shows that producers have shifted away from manufacturing multicrystalline cells, and all of the pricing data relate to products containing monocrystalline cells. *See generally*, CR/PR at Part 5.

[29] CR/PR at 1.20. Common sizes of wafers range from 156 to 210 mm in side length. *See* CR/PR at Figure 1.2.

[30] CR/PR at 1.20.

[31] CR/PR at 1.32-33.

[32] CR/PR at 1.33.

[33] CR/PR at 1.27.

[34] CR/PR at 1.22. Domestic producers of CSPV products have reported that monofacial and bifacial modules have reached cost parity. CR/PR at 1.22. At the conference, witnesses from domestic producers testified that producers use bifacial cells in a lot of cases for a monofacial product, knowing that there is some capability that is wasted by covering the back of the module with aluminum instead of glass, but forgoing the extra expense of running a different production line of monofacial cells. *See* Conference Tr. at 73-78, 97 (Moskowitz).

[35] CR/PR at 1.27. Half-cut cells result in lower cell current, which reduces power losses and increases cell efficiency and overall module output. CR/PR at 1.25-26.

[36] CR/PR at 1.27-28.

B. Arguments of the Parties

Petitioner's Arguments. Petitioner argues that the Commission should apply its semi-finished product analysis and define a single domestic like product consisting of CSPV cells and modules, coextensive with the scope, as it asserts the Commission has done for more than a decade in prior proceedings involving similar products.[37] Petitioner states that the purpose of the semi-finished product analysis is to address situations where unfair trade in the market for the upstream product affects the market for the finished product, and vice versa.[38] Petitioner argues that cells are the primary downstream input for modules, and there have been no significant changes in the characteristics of cells, modules, or the production process that would warrant a definition of the domestic like product in these investigations that is different from the definition used in *CSPV I*, *CSPV II*, and most recently in June of this year in *CSPV III*, in which the Commission defined a single domestic like product consisting of cells and modules.[39]

Respondents' Arguments. Domestic Respondents urge the Commission to define CSPV cells and CSPV modules as separate domestic like products, under either the traditional six-factor test or the semi-finished product analysis.[40] They argue that CSPV cells and modules compete in distinct markets and have different characteristics and functions. In addition, they assert that assembling CSPV cells into modules is a transformative and capital-intensive process that adds significant value to the end product, and that CSPV cells have other applications beyond use in CSPV modules.[41]

C. Analysis and Conclusion

Based on the current record, we define a single domestic like product consisting of CSPV cells and modules, coextensive with Commerce's scope.

Dedication for Use. The Commission recently explained in *CSPV III* that

> the greater the extent to which an upstream article of any kind is "dedicated for use" to the production of a particular downstream article, the more likely it is that producers of both products will be in the same position with respect to the imports of the articles. In such a case, it would therefore be more reasonable to consider the two articles as a single product.[42]

[37] Petitioner's Postconference Brief at 3. *See Crystalline Silicon Photovoltaic Cells and Modules from China*, Inv. Nos. 701-TA-481 and 731-TA-1190 (Final), USITC Pub. 4360 (Nov. 2012) at 6 ("*CSPV I*"); *Certain Crystalline Silicon Photovoltaic Products from China and Taiwan*, Inv. Nos. 701-TA-511 and 731-TA-1246-1247 (Final), USITC Pub. 4519 (Feb. 2015) ("*CSPV II*"); *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules from Cambodia, Malaysia, Thailand, and Vietnam*, Inv. Nos. 701-TA-722-725 and 731-TA-1690-1693 (Final), USITC Pub. 5631 (June 2025) at 28 ("*CSPV III*").

[38] *See* Petitioner's Postconference Brief at 3.

[39] Petitioner's Postconference Brief at 3-4.

[40] Domestic Respondents' Postconference Letter at 4.

[41] Domestic Respondents' Postconference Letter at 4-8.

[42] *CSPV III,* USITC Pub. 5631 at 23 (quoting *Stainless Steel Bar from Brazil, India, Italy, Japan, and Spain*, Inv. Nos. 731-TA-687-682 (Preliminary), USITC Pub. 2734 (Feb. 1994) at I-11).

The record shows that, as the Commission recently found and has been the case in prior proceedings involving CSPV products,[43] the vast majority of CSPV cells covered by these investigations are used for CSPV module production.[44] Furthermore, 11 out of 13 responding U.S. producers, and 34 out of 39 responding U.S. importers indicated that there are no uses for CSPV cells other than for assembly into CSPV modules.[45] At the staff conference, the CEO of Talon testified that "cells are entirely dedicated for use in solar modules."[46]

Several responding producers and importers report that CSPV cells can be used for building-integrated photovoltaic ("BIPV") applications.[47] While there is no dispute that CSPV cells are used to some extent in BIPV applications such as roof shingles and ***,[48] the record does not contain any evidence that the significance or volume of these applications has changed since the Commission recently decided this issue in *CSPV III*.[49] Moreover, as the Commission found in *CSPV III*, "the existence of some alternative uses does not detract from the bulk of evidence indicating that the predominant use for domestically produced CSPV cells is in the production of domestically produced CSPV modules, which is indicative of a single domestic like product."[50] In addition, there is no evidence that domestically produced cells are currently used in BIPV applications, as the record shows that *** domestically produced cells during the POI were shipped to module assemblers.[51]

Separate Markets. It is undisputed that in the United States CSPV cells are almost exclusively sold by cell manufacturers to module manufacturers, some of whom may be related to the cell manufacturer, while modules are sold by module manufacturers to a wide variety of distributors and end users for generation of solar energy.[52] Along these lines, ten of 14 responding U.S. producers and 22 of 39 responding importers indicated that there are separate markets for CSPV cells and CSPV modules.[53] However, it is also undisputed that, for the most part, these initial sales to manufacturers lead invariably to the sales to distributors and end users for the generation of solar energy.[54]

The Commission has previously concluded that there is not a separate market for a semifinished product merely because it is sold to an intermediate processor for conversion to

[43] *CSPV III,* USITC Pub. 5631 at 23, *see also CSPV II*, USITC Pub. 4519 at 13.

[44] *See CSPV II*, USITC Pub. 4519 at 13.

[45] CR/PR at Table D.1.

[46] Conference Tr. at 32 (Tesanovich).

[47] *See* CR/PR at Table D.2.

[48] CR/PR at Table D.2. U.S. producers, *** listed ***. *See* CR/PR at Tables D.2, D.4. Several importers also reported that ***. *See* CR/PR at Table D.3.

[49] *See* CR/PR at Table D.1.

[50] *CSPV III,* USITC Pub. 5631 at 23-24.

[51] CR/PR at 2.3 n.7.

[52] *See* CR/PR at 2.2, 2.4.

[53] CR/PR at Table D.1. For example, in its U.S. producer questionnaire response *** stated that "***." Furthermore, *** reports that as "***." *Id*. In its U.S. importer response *** stated that the "***." CR/PR at Table D.3. Similarly, *** reported that "***."

[54] *See generally* CR/PR at Tables D.2, D.3.

the finished product.[55] The Commission has also acknowledged that "{e}ven if an upstream article is 'dedicated for use in a particular downstream market, there can be independent markets for the two articles."[56] It explained that this applies where "there is an independent group of producers who process the upstream product, having purchased it in an open, competitive market" because in that situation, "the articles are more likely to comprise separate like products than if production is integrated or performed under some form of tolling arrangements."[57]

In *CSPV III*, the Commission found that the evidence with respect to this factor was mixed. It recognized that the fact that the then sole domestic cell producer, Suniva, sold only CSPV cells and not modules suggested that cells are a separate like product. The Commission, however, "found that this {was} outweighed by the fact that the U.S. cell market is almost entirely focused on the production of products for sale in the module market, which continues to indicate that domestically produced cells and modules form a single domestic like product."[58] The record in these investigations does not indicate any differently.

Differences in Physical Characteristics and Functions of the Upstream and Downstream Articles. Nearly all responding U.S. producers indicated that cells and modules have different physical characteristics and functions,[59] but the Commission in *CSPV III* found that these largely stem from CSPV cells and modules being at different stages of processing.[60] The Commission has previously recognized that "{s}emi-finished products dedicated for use in downstream products do not necessarily encompass all attributes or functions of the finished products."[61]

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

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

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

[58] *CSPV III*, USITC Pub. 5631 at 25.

[59] *See* CR/PR at Table D.1.

[60] *CSPV III*, USITC 5613 at 25.

[61] *CSPV III*, USITC 5613 at 25; *see also Live Swine from Canada*, Inv. No. 701-TA-438, 731-TA-1076 (Preliminary), USITC Pub. 3693 (May 2004) at 7 ("Swine at different stages of production are not . . . interchangeable because they have not reached their optimal market weight. However, the Commission has found that it would not be expected that a semifinished product that is dedicated for use as a finished product would possess the attributes of and encompass all the functions of a finished product.").

The record shows that cells and modules are physically different in that cells are small, ***.[62] Unfinished cells cannot transmit usable electricity until they are assembled into modules, which are a connected group of cells laminated with special glass or other materials to protect the cells and facilitate electricity generation.[63]

As the Commission stated in *CSPV III*, the "characteristics, however, that enable the conversion of sunlight to electricity are embodied in the cells."[64] The module assembly process does not affect that characteristic, but adds equipment to facilitate the orientation of the constituent cells toward the sun, aggregate their electrical output, and transmit it for use. Indeed, CSPV cells cannot serve their intended function of converting sunlight into usable electricity without being assembled into some product, which in the U.S. market is almost invariably a CSPV module.[65] Furthermore, "the product updates . . . such as the shift from PERC cells to TOPCon, largely relate to technological improvements to the cells, which are developments that have enhanced their ability to produce electricity, rather than alter the ultimate function that cells and modules share."[66] Thus, we consider that physical characteristics and function weigh in favor of finding that domestically produced cells and modules form a single domestic like product.

Differences in Value. The record shows that CSPV cells and modules differ in value. Eleven out of 13 responding U.S. producers, and 33 out of 37 responding U.S. importers indicated that CSPV cells and CSPV modules differ in costs.[67] Some U.S. producers and importers indicated that there are production and material costs beyond the cost of cells, and that cells have little value unless they are assembled into modules.[68] U.S. module producer ***.[69] Canadian Solar asserts that solar modules "are substantially more expensive than cells, demonstrating that the module production process imparts significant value."[70] It argues that according to the U.S. Department of Energy's National Renewable Energy Laboratory, in 2024, the cost of manufacturing a solar module is $0.20/W-dc, of which $0.0846 was due to module assembly and only $0.0474 was due to the cost of the cells.[71]

On the other hand, CSPV cells account for a significant portion of a module's value. U.S. producers' questionnaire responses indicate that CSPV cells accounted for between *** to *** percent of the total raw material costs for CSPV module production from 2022 to 2024,[72] and U.S. producers and importers reported that CSPV cells' share of the cost of finished modules

[62] CR/PR at Table D.3.
[63] *See* CR/PR at 1.26-1.27, 1.33.
[64] *CSPV III*, USITC Pub. 5631 at 26.
[65] *See CSPV III*, USITC Pub. 5631 at 26.
[66] *CSPV III*, USITC Pub. 5631 at 26.
[67] CR/PR at Table D.1.
[68] CR/PR at Tables D.2, D.3.
[69] CR/PR at Table D.2.
[70] Domestic Respondents' Postconference Letter at 6.
[71] Domestic Respondents' Postconference Letter at 6.
[72] CR/PR at Table 6.6. Cells from all sources accounted for *** percent of U.S. producers' raw material costs in 2022, *** percent in 2023, and *** percent in 2024; they accounted for *** percent of U.S. module producers' raw material costs in interim 2025 and *** percent in interim 2024. *Id*.

ranged from 20 to 67 percent.[73] By their nature, semifinished products will represent some fraction of the value of a finished product. As the Commission found in *CSPV III*, that fraction appears to be substantial with respect to cells and finished modules.[74] We consider that on balance, this factor weighs somewhat in favor of finding that domestically produced cells and modules form a single domestic like product.

Extent of Processes Used to Transform Downstream Product into Upstream Product. The record shows that the process of assembling cells into modules is generally the most labor-intensive part of the manufacturing process.[75] Eleven out of 13 U.S. producers, and 27 out of 37 responding U.S. importers indicated that the process for transforming cells into modules is capital and labor intensive.[76] Furthermore, the record shows that module assembly generally occurs in separate facilities or production lines, and with separate employees, which weighs against finding a single domestic like product.[77]

However, the Commission has previously found that the "processes used to manufacture CSPV modules from CSPV cells are technologically sophisticated, more labor intensive than manufacturing CSPV cells, and add value to the product, but they enhance rather than change the basic function of CSPV cells, which is to convert sunlight into electricity."[78] The record in these investigations does not indicate differently. The five principal stages of the manufacture of CSPV products are (1) refining of polysilicon, (2) formation of ingots, (3) slicing of wafers, (4) conversion to CSPV cells, (5) assembly into the finished product, CSPV modules,[79] and four of those five steps relate to the production of cells.[80] The process of assembling cells into modules involves significant costs and labor, but on balance module assembly enhances CSPV cells' function to create electricity.[81]

[73] CR/PR at 2.11.

[74] *CSPV III*, USITC Pub. 5631 at 27.

[75] CR/PR at 1.32-1.33; *see also* Domestic Respondents' Postconference Letter at 7.

[76] CR/PR at Table D.1.

[77] Domestic Respondents' Postconference Letter at 6-7. The Commission has explained the "significance of the activity necessary to transform the unfinished product to the finished product is important" and that if the "process requires separate facilities or entirely separated production lines, it is more likely to be significant than if it is merely one additional station on a single line." *See Stainless Steel Bar from Brazil, India, Italy, Japan, & Spain*, USITC Inv. No. 731-TA-678-682 (Preliminary), USITC Pub. 2734 (Feb. 1994) at I-12.

[78] *CSPV III*, USITC Pub. 5631 at 27 (quoting *CSPV II*, USITC Pub. 4519 at 15).

[79] CR/PR at 1.27. The production steps may be done in different plants or locations. The ingot and wafer production process differs for monocrystalline and multicrystalline cells. *Id*. at 1.29-30.

[80] CR/PR at 1.27-28. The Commission has previously defined a single like product in cases where conversion into the downstream product added substantial value. *See Carbazole Violet Pigment 23 from China and India*, Inv. Nos. 701-TA-437 and 731-TA-1060 and 1061 (Final), USITC Pub. 3744 at 5-7 (Dec. 2004) (finding one domestic like product where conversion into downstream product added substantial value, but the upstream product was the costliest input used to make the downstream product.).

[81] *See* CR/PR at 1.31-33.

Conclusion. As the Commission recently found in *CSPV III*, many of the differences between CSPV cells and modules stem from them being at different stages of production.[82] The evidence demonstrates that cells are dedicated to the production of CSPV modules, and that, although there are differences in size, weight, and finishing, CSPV cells and modules share the same essential characteristics and functions that allow for the conversion of sunlight into electricity. The cell also accounts for a substantial portion of the finished value of the module. The record is mixed on the significance and extent of the processes used to transform cells into modules, as module assembly is a labor-intensive and costly operation. On balance, however, module assembly enhances, rather than alters, CSPV's cells' essential functions. The record is also mixed on the degree to which domestically produced cells and modules compete in separate markets, but considered with the other four factors, the record weighs towards treating cells and modules as a single domestic like product.

In light of the above, including the absence of any new information since *CSPV III* pertaining to the domestic like product definition, we define a single domestic like product consisting of CSPV cells and modules.[83]

[82] *CSPV III*, USITC 5613 at 25. The Commission recognized that "semi-finished products for use in downstream products do not necessarily encompass all attributes or functions of the finished products."

[83] In *CSPV III*, the Commission did not define the domestic like product to include out-of-scope thin film solar products, which was consistent with prior investigations involving these products. *See CSPV III*, USITC Pub. 5631 at 28 n.113 The record in the preliminary phase of *CSPV III* indicated that thin film solar products were produced using different raw materials, manufacturing facilities, manufacturing processes, and production employees, and that thin film solar products differed significantly in physical characteristics, conversion efficiency, and output from CSPV solar cells and modules. *Id*.

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

Petitioner argues that the Commission should again decline to define the domestic like product to include out-of-scope thin-film products. *See* Petitioner's Postconference Brief at 3-4. SEIA argues that the Commission must consider imports of out-of-scope thin-film solar modules by First Solar, a member of the Alliance. SEIA asserts that thin-film solar products are directly competitive with CSPV solar products, and that imports of thin-film products surged during the POI. SEIA Postconference Brief at 7-10. We note that in *CSPV III*, no party advocated to include thin-film solar products in the definition and the Commission declined to do so. The Commission found that the record in those investigations "indicated that thin film solar products are produced using different raw materials, manufacturing facilities, manufacturing processes, and production employees, and that thin film solar products differ significantly in physical characteristics, conversion efficiency, and output from CSPV solar cells and modules." *CSPV III*, USITC Pub. 5631 at 28-29 n.113. The record in the preliminary phase of these investigations does not indicate differently, and thus, we do not include out-of-scope thin film solar products in the definition of the domestic like product.

We intend to further investigate these domestic like product issues in any final phase investigations. Parties wishing to raise domestic like product arguments should address any data collection issues in their comments on the final phase draft questionnaires. 19 C.F.R. § 207.20(b).

IV. Domestic Industry

The domestic industry is defined as the domestic "producers as a whole of a domestic like product, or those producers whose collective output of a domestic like product constitutes a major proportion of the total domestic production of the product."[84] In defining the domestic industry, the Commission's general practice has been to include in the industry producers of all domestic production of the like product, whether toll-produced, captively consumed, or sold in the domestic merchant market. These preliminary investigations raise the issue of whether appropriate circumstances exist to exclude any domestic producers from the domestic industry pursuant to the related parties provision.[85]

A. Related Parties

We must determine whether any producer of the domestic like product should be excluded from the domestic industry pursuant to Section 771(4)(B) of the Tariff Act. This provision allows the Commission, if appropriate circumstances exist, to exclude from the domestic industry producers that are related to an exporter or importer of subject merchandise or which are themselves importers.[86] Exclusion of such a producer is within the Commission's discretion based upon the facts presented in each investigation.[87]

[84] 19 U.S.C. § 1677(4)(A).

[85] The Commission has previously determined that U.S. CSPV module assemblers engage in sufficient production-related activities to include them in the domestic industry as domestic producers of the domestic like product. *See, e.g.*, *CSPV III*, USITC Pub. 5631 at 29-30. Because domestic cell production began late in the January 2022 to March 2025 period of investigation ("POI") and remains quite low (*** kW in 2024, and *** kW in interim 2025), virtually all domestic module production between 2022 and 2024, and the interim periods, required imported cells. *See* CR/PR at 2.9; Table 3.5. Although Domestic Respondents advocate that the Commission find two separate domestic like products, consisting of CSPV cells and CSPV modules, no party has argued that if the Commission defines a single domestic like product, it should not include module assemblers in the domestic industry. In the absence of any contrary arguments and new information concerning the production activities of U.S. module assemblers on this record, we continue to include U.S. module assemblers in the domestic industry definition.

[86] *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).

[87] 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;

1. Arguments of the Parties

Petitioner argues that the Commission should define the domestic industry to include all domestic producers of CSPV cells and modules.[88] It asserts that although certain parties are related to subject producers or exporters, appropriate circumstances do not exist to exclude any party from the domestic industry at the preliminary phase. No respondent party addressed the definition of the domestic industry in their postconference submissions.

2. Analysis and Conclusion

Because U.S. production of CSPV cells began late in the January 2022 to March 2025 period of investigation ("POI"), U.S. producers of CSPV modules had to import or purchase foreign-produced CSPV cells for almost all domestic module assembly.[89] The record shows that eight U.S. producers are subject to possible exclusion from the domestic industry under the related parties provision because they imported subject merchandise during the POI, or are affiliated with subject producers, exporters, or importers of CSPV cells and modules from subject countries.[90] Furthermore, three U.S. producers, including two that also imported subject merchandise, purchased subject merchandise from U.S. importers of CSPV products from subject sources.[91]

We consider whether appropriate circumstances exist to exclude any domestic producer subject to the related parties provision from the domestic industry. In considering this issue, we recall that in relation to domestic producers' reliance on subject imports of CSPV cells in *CSPV III*, the Commission stated that "we do not find that importation of subject merchandise, by itself, even in appreciable quantities, necessarily warrants excluding a related party."[92] The Commission concluded in that determination that even if module producers rely on imported inputs, the CSPV module assembly process adds sufficient value to the product and requires sufficient capital investment, R&D expenses, technical expertise, automation, and skilled labor to treat that cell production as part of the domestic industry.[93]

Potential related parties in these investigations are in much the same position with respect to subject merchandise and subject foreign producers as they were in the *CSPV III*

(4) the ratio of import shipments to U.S. production for the imported product; and

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

[88] Petitioner's Postconference Brief at 4-5; Petition at 26-27.

[89] CR/PR at 3.27.

[90] CR/PR at 3.5. The eight producers are ***. CR/PR at 3.27.

[91] The three producers are ***. CR at Tables 3.25-27. The Commission has previously concluded that a purchaser may be treated as a related party if it controls large volumes of subject imports. The Commission has found such control to exist, for example, when the domestic producer was responsible for a predominant proportion of an importer's purchases and these purchases were substantial. *See Iron Construction Castings from Brazil, Canada, and China*, Inv. Nos. 701-TA-249, 731-TA-262-263 and 265 (Fourth Review), USITC Pub. 4655 (Dec. 2016) at 11.

[92] *CSPV III*, USITC Pub. 5631 at 33 (quoting *CSPV II*, USITC Pub. 4519 at 17).

[93] *CSPV III*, USITC Pub. 5631 at 33 (citing *CSPV II*, USITC Pub. 4519 at 17).

investigations. In particular, they all relied on imports of CSPV cells due to the low level or nonexistence of domestic cell production during the POI.[94] As much of the industry relied on imports of cells from subject countries, any benefit these producers' domestic operations received from such imports was not unique, and thereby inclusion of any one domestic producer would not have the effect of skewing domestic industry data. In the absence of any contrary arguments and new information about the domestic producers' reasons for importing or purchasing subject imports during the POI since *CSPV III*, we find that appropriate circumstances do not exist to exclude ***.[95] We consider *** separately given that it ceased domestic production in favor of importing during the POI.

***. *** is subject to possible exclusion because it imported subject merchandise *** throughout the POI.[96] It ***. *** domestic production was *** kW in 2022, *** in 2023, 2024, or the interim periods, and ***. Its subject imports from *** were *** kW in 2022, *** kW in 2023, and *** kW in 2024, *** kW in interim 2024, and *** kW in interim 2025.[97] The ratio of its subject imports to U.S. production was accordingly extremely high in 2022 ***.[98] *** financial data ***.[99] *** did not provide a reason for ceasing domestic production after 2022, although its complete shift to importation in the subsequent years suggests that it was more profitable for *** to use imports than to produce the domestic like product. In any event, *** relatively small share of domestic production in 2022 indicates that its inclusion in the domestic industry would not skew domestic industry data.[100] In light of these considerations, and the fact that no party supports its exclusion from the domestic industry, we find that appropriate circumstances do not exist to exclude *** from the domestic industry.

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

[94] *See* CR/PR at 3.27.

[95] We note that *** also imported modules from *** in interim 2025. The ratio of its subject imports of modules to its domestic production was *** percent in interim 2025. CR/PR at Table 3.16. ***. Given that *** is currently the *** U.S. producer and has made substantial investments in future domestic production of CSPV products, its primary interest appears to be in domestic production. Furthermore, its ratio of subject imports to domestic production was low. In addition, *** had *** in 2024 and in interim 2025. Thus, it does not appear that *** subject imports of modules benefited its domestic production operations in such a way that would skew the domestic industry data or mask injury to the domestic industry if *** were included in the domestic industry.

[96] CR/PR at Table 3.19.

[97] CR/PR at Table 3.19.

[98] CR/PR at Table 3.19.

[99] CR/PR at 6.4.

[100] *** also purchased subject merchandise in interim 2025 from ***, a U.S. importer of subject merchandise from ***CR/PR at Table 3.25. The record shows that ***'s purchased *** kW of *** U.S. imports in interim 2025. *** imported *** kW in interim 2025, which accounted for *** percent of total subject imports from Indonesia in interim 2025. CR/PR at Table 3.25. We note that *** status as a related party will be moot if the period of any final phase investigations no longer includes calendar year 2022.

V. Negligible Imports

Pursuant to Section 771(24) of the Tariff Act, imports from a subject country of merchandise corresponding to a domestic like product that account for less than 3 percent of all such merchandise imported into the United States during the most recent 12 months for which data are available preceding the filing of the petition shall be deemed negligible.[101]

The statute further provides that subject imports from a single country which comprise less than 3 percent of total such imports of the product may not be considered negligible if there are several countries subject to investigation with negligible imports and the sum of such imports from all those countries collectively accounts for more than 7 percent of the volume of all such merchandise imported into the United States.[102] In the case of countervailing duty investigations involving developing countries (as designated by the United States Trade Representative), the statute indicates that the negligibility limits are 4 percent and 9 percent, rather than 3 percent and 7 percent.[103]

A. Arguments of the Parties

As a preliminary matter, Petitioner argues that official import statistics are the most accurate data available to calculate negligibility because there are omissions in the questionnaire response data.[104] Nevertheless, Petitioner argues that both official import statistics and questionnaire response data show that subject imports from India, Indonesia, and Laos are not negligible for purposes of present material injury.[105]

No respondent interested party addressed negligibility in its postconference submissions.

B. Analysis

Imports from each of the three subject countries are above the statutory negligibility thresholds. Based on questionnaire response data, as supplemented by Commission staff with proprietary Census-edited Customs records for firms that did not respond to Commission questionnaires, during the 12-month period preceding the filing of the petitions (July 2024-June 2025), subject imports from India accounted for *** percent of total imports, subject imports from Indonesia accounted for *** percent of total imports, and subject imports from Laos

[101] 19 U.S.C. §§ 1671b(a), 1673b(a), 1677(24)(A)(i), 1677(24)(B); *see also* 15 C.F.R. § 2013.1 (developing countries for purposes of 19 U.S.C. § 1677(36)).

[102] 19 U.S.C. § 1677(24)(A)(ii).

[103] 19 U.S.C. § 1677(24)(B). Laos, a source of imports subject to the countervailing duty investigations, is on USTR's list of least-developed countries and therefore is subject to the 4 percent negligibility limit. *See Designations of Developing Countries and Least-Developed Countries Under the Countervailing Duty Law,* 85 Fed. Reg. 7613 (Feb. 10, 2020).

[104] Petitioner's Postconference Brief at 5.

[105] Petition at 33; Petitioner's Postconference Brief at 5-6.

accounted for *** percent of total imports.[106] Consequently, we find that imports of CSPV products from India, Indonesia, and Laos subject to the antidumping and countervailing duty investigations are not negligible.

VI. Cumulation

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

(1) the degree of fungibility between subject imports from different countries and between subject imports and the domestic like product, including consideration of specific customer requirements and other quality related questions;

(2) the presence of sales or offers to sell in the same geographic markets of subject imports from different countries and the domestic like product;

(3) the existence of common or similar channels of distribution for subject imports from different countries and the domestic like product; and

(4) whether the subject imports are simultaneously present in the market.[107]

While no single factor is necessarily determinative, and the list of factors is not exhaustive, these factors are intended to provide the Commission with a framework for determining whether the subject imports compete with each other and with the domestic like product.[108] Only a "reasonable overlap" of competition is required.[109]

[106] CR/PR at Table 4.6. The volume of imports from each of these countries subject to the antidumping and countervailing duty investigations is the same. *Id.*

[107] *See Certain Cast-Iron Pipe Fittings from Brazil, the Republic of Korea, and Taiwan*, Inv. Nos. 731-TA-278-80 (Final), USITC Pub. 1845 (May 1986), *aff'*d, *Fundicao Tupy, S.A. v. United States*, 678 F. Supp. 898 (Ct. Int'l Trade), *aff'd*, 859 F.2d 915 (Fed. Cir. 1988).

[108] *See*, *e.g.*, *Wieland Werke, AG v. United States*, 718 F. Supp. 50 (Ct. Int'l Trade 1989).

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

Petitioner argues that cumulation is mandatory in these investigations. Petitioner asserts that the petitions for all three countries were filed on the same day, that none of the statutory exceptions to cumulation apply, and that there is a reasonable overlap in competition between and among subject imports India, Indonesia, and Laos and the domestic like product.[110]

The Indian Respondents argue that subject imports from India should not be cumulated because they compete under different conditions than subject imports from Laos and Indonesia. Specifically, they argue that (1) Indian solar producers are not affiliated with Chinese solar companies, (2) imports of subject merchandise from India were stable, unlike imports from Laos and Indonesia, (3) subject imports from India had different pricing trends than subject imports from Laos and Indonesia, and (4) India has a large and growing home market for CSPV cells and modules, which make Indian producers less export-oriented than producers in Indonesia or Laos.[111]

As an initial matter, Petitioner filed the antidumping and/or countervailing duty petitions with respect to the three subject countries on the same day, July 17, 2025. As discussed below, we find that there is a reasonable overlap of competition between subject imports from India, Indonesia, and Laos, and between subject imports from each source and the domestic like product.

Fungibility. The record indicates that domestically produced CSPV products and imports from each subject country are generally fungible. Most responding U.S. producers reported that subject imports from each subject country were "always" or "frequently" interchangeable with each other as well as with the domestic like product.[112] Most responding importers reported that subject imports from each subject country were either "always" or "frequently" interchangeable with each other as well as with the domestic like product.[113]

Their sales of bifacial modules using bifacial cells represent an area of significant overlap among the sources, as they represented the almost all shipments of U.S. shipments of the domestic like product and of subject imports from Indonesia and Laos in 2024, and a substantial share of subject impots from Indonesia.[114] Additionally, the pricing data for product 4 show that, in the three consecutive quarters from the third quarter of 2024 to the first quarter of

[110] Petitioner's Postconference Brief, Responses to Staff Questions at 7-10.

[111] *See* Indian Respondents' Postconference Brief at 3-15.

[112] *See* CR/PR at Table 2.10. At least six of 11 producers reported that imports from each subject country were "always" interchangeable with each other as well as with the domestic like product. *Id*.

[113] CR/PR at Table 2.11.

[114] CR/PR at Table 4.7. In 2024, *** percent of U.S. producers' U.S. shipments consisted of bifacial modules using bifacial cells, *** percent of U.S. importers' U.S. shipments of subject imports from India consisted of bifacial modules using bifacial cells, *** percent of U.S. importers' U.S. shipments of subject imports from Indonesia consisted of bifacial modules using bifacial cells, and *** percent of U.S. importers' U.S. shipments of subject imports from Laos consisted of bifacial modules using bifacial cells. CR/PR at Table 4.7.

2025, sales of the domestic like product were reported along with comparable sales by responding U.S. importers of subject merchandise from all subject countries.[115]

In response to questions concerning how often differences other than price were significant in sales of CSPV products from different sources, a plurality of U.S. producers and U.S. importers reported that differences other than price between the domestic like product and subject imports from each country, and among subject imports from each country, were "sometimes" or "never" significant.[116] Thus, on balance, the record indicates that there was a sufficient degree of fungibility between subject imports and the domestic like product for purposes of cumulation.

Channels of Distribution. The record shows that domestic producers mainly sold to distributors and residential installers from during 2022 and 2023, and then shifted to utilities/developers and commercial installers in 2024.[117] Domestic producers reported no shipments to module assemblers during 2022 and 2023, and a small amount in 2024. Almost all U.S. shipments of CSPV products from India went to residential installers and utilities/developers in 2022, and shifted almost *** to utilities/developers in 2023 and 2024.[118] Most U.S. shipments of CSPV products from Indonesia went to distributors and module installers throughout the POI, and most U.S. shipments from Laos went to utilities/developers in 2024, and shifted more to module assemblers in interim 2025.[119] Domestic producers and importers of subject merchandise from countries eligible for cumulation substantially overlapped in their sales to utilities customers in the U.S. market in interim 2025.[120] In 2024, the channels of distribution for U.S. producers' U.S. shipments and U.S. shipments of subject imports from India and Laos demonstrated an overlap of competition, especially in the utilities/developers channel. Further, throughout the POI, U.S. producers' U.S. shipments and U.S. shipments of subject imports from Indonesia exhibited significant competitive overlap in the distributors channel.[121]

[115] CR/PR at Table 5.8. To the extent there were a limited number of quarterly comparisons between subject imports in the pricing product data, we note that subject imports from Laos did not enter the U.S. market until December 2023.

[116] CR/PR at Table 2.12, Table 2.13.

[117] CR/PR at Table 2.4. The share of domestic producers' shipments that went to utilities/developers was *** percent in 2022, *** percent in 2023, and *** percent in 2024; it was *** percent in interim 2025 compared to *** percent in interim 2024. The share of domestic producers' U.S. shipments that went to distributors was *** percent in 2022, *** percent in 2023, and *** percent in 2024; it was *** percent in interim 2025 compared to *** percent in interim 2024. The share of domestic producers' U.S. shipments that went to commercial installers was *** percent in 2022, *** percent in 2023, and *** percent in 2024; it was *** percent in interim 2025 compared to *** percent in interim 2024.

[118] CR/PR at 2.3.

[119] CR/PR at 2.4.

[120] *See* CR/PR at Table 2.4.

[121] CR/PR at Table 2.4. The share of domestic producers' U.S. shipments to utilities/developers was *** percent in 2022, *** percent in 2023, and *** percent in 2024; it was *** percent in interim 2024 and *** percent in interim 2025. Importers sold *** percent of their U.S. shipments of CSPV

Geographic Overlap. In 2024, U.S. producers and importers of subject merchandise each reported selling CSPV products to all areas of the contiguous United States, as well as to other U.S. markets, including Alaska, Hawaii, Puerto Rico, and the U.S. Virgin Islands.[122] Official import statistics indicate that imports from subject countries entered the United States through ports located at all four borders of the United States in 2024.[123]

Simultaneous Presence in Market. The domestic like product was present in the U.S. market in every month of the POI. Beginning in December 2023, imports from Laos were present in every month for the remainder of the POI, except May 2024.[124]

Conclusion. The record in the preliminary phase of these investigations indicates that subject imports from India, Indonesia, and Laos are generally fungible with the domestic like product and each other, and overlapped in channels of distribution, with particularly significant overlap in the utilities/developers distribution channel in interim 2025. The record further indicates that imports from each of the subject countries and the domestic like product were generally sold in overlapping geographic markets in 2024, and were simultaneously present in the U.S. market for essentially all of the period from December 2023 through June 2025. In light of these considerations, we recommend that the Commission find that there is a reasonable overlap of competition between the like product and imports from each subject country and between imports from each subject country eligible for cumulation.[125]

products from India to utilities in 2022, *** percent in 2023, and *** percent in 2024; their share of shipments to utilities was *** percent in interim 2024 and *** percent in interim 2025. Importers sold *** percent of their U.S. shipments of CSPV products from Indonesia to utilities in 2022, *** percent in 2023, and *** percent in 2024; their share of shipments to utilities was *** percent in interim 2024 and *** percent in interim 2025. Importers sold *** percent of their U.S. shipments of CSPV products from Laos to utilities in 2022, *** percent in 2023, and *** percent in 2024; their share of shipments to utilities was *** percent in interim 2024 and *** percent in interim 2025. Importers sold *** percent of their U.S. shipments of CSPV products from nonsubject sources to utilities in 2022, *** percent in 2023, and *** percent in 2024; their share of shipments to utilities was *** percent in interim 2024 and *** percent in interim 2025.

[122] CR/PR at Table 2.5.

[123] CR/PR at 4.8. The largest share of CSPV cells and modules from India (69.8 percent) entered the United States through ports in the South. The largest share of CSPV cells and modules from Indonesia (43.4 percent) entered the United States through ports in the West. The largest share of CSPV cells and modules from Laos (39.9 percent) entered the United States through ports in the North. *See id.*

[124] CR/PR at Table 4.9.

[125] Although Indian Respondents oppose cumulation of imports from India, they do not argue that subject imports from India are not fungible with the domestic like product, nor do they contest that subject imports from India overlapped with the domestic like product and imports from other subject sources in the utilities channel of distribution, that they were simultaneously present in the U.S. market, and that they overlapped geographically in sales in the U.S. market. *See generally* Indian Respondents' Postconference Brief at 3-15. We intend to further investigate this issue in any final phase investigations.

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

A. Legal Standard

In the preliminary phase of antidumping and countervailing duty investigations, the Commission determines whether there is a reasonable indication that an industry in the United States is materially injured or threatened with material injury by reason of the imports under investigation.[126] In making this determination, the Commission must consider the volume of subject imports, their effect on prices for the domestic like product, and their impact on domestic producers of the domestic like product, but only in the context of U.S. production operations.[127] The statute defines "material injury" as "harm which is not inconsequential, immaterial, or unimportant."[128] In assessing whether there is a reasonable indication that the domestic industry is materially injured by reason of subject imports, we consider all relevant economic factors that bear on the state of the industry in the United States.[129] No single factor is dispositive, and all relevant factors are considered "within the context of the business cycle and conditions of competition that are distinctive to the affected industry."[130]

Although the statute requires the Commission to determine whether there is a reasonable indication that the domestic industry is "materially injured or threatened with material injury by reason of" unfairly traded imports,[131] it does not define the phrase "by reason of," indicating that this aspect of the injury analysis is left to the Commission's reasonable exercise of its discretion.[132] In identifying a causal link, if any, between subject imports and material injury to the domestic industry, the Commission examines the facts of record that relate to the significance of the volume and price effects of the subject imports and any impact of those imports on the condition of the domestic industry. This evaluation under the "by reason of" standard must ensure that subject imports are more than a minimal or

[126] 19 U.S.C. §§ 1671b(a), 1673b(a).

[127] 19 U.S.C. § 1677(7)(B). The Commission "may consider such other economic factors as are relevant to the determination" but shall "identify each {such} factor ... and explain in full its relevance to the determination." 19 U.S.C. § 1677(7)(B).

[128] 19 U.S.C. § 1677(7)(A).

[129] 19 U.S.C. § 1677(7)(C)(iii).

[130] 19 U.S.C. § 1677(7)(C)(iii).

[131] 19 U.S.C. §§ 1671b(a), 1673b(a).

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

tangential cause of injury and that there is a sufficient causal, not merely a temporal, nexus between subject imports and material injury.[133]

In many investigations, there are other economic factors at work, some or all of which may also be having adverse effects on the domestic industry. Such economic factors might include nonsubject imports; changes in technology, demand, or consumer tastes; competition among domestic producers; or management decisions by domestic producers. The legislative history explains that the Commission must examine factors other than subject imports to ensure that it is not attributing injury from other factors to the subject imports, thereby inflating an otherwise tangential cause of injury into one that satisfies the statutory material injury threshold.[134] In performing its examination, however, the Commission need not isolate the injury caused by other factors from injury caused by unfairly traded imports.[135] Nor does

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

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

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

the "by reason of" standard require that unfairly traded imports be the "principal" cause of injury or contemplate that injury from unfairly traded imports be weighed against other factors, such as nonsubject imports, which may be contributing to overall injury to an industry.[136] It is clear that the existence of injury caused by other factors does not compel a negative determination.[137]

Assessment of whether material injury to the domestic industry is "by reason of" subject imports "does not require the Commission to address the causation issue in any particular way" as long as "the injury to the domestic industry can reasonably be attributed to the subject imports."[138] The Commission ensures that it has "evidence in the record" to "show that the harm occurred 'by reason of' the LTFV imports," and that it is "not attributing injury from other sources to the subject imports." [139] The Federal Circuit has examined and affirmed various Commission methodologies and has disavowed "rigid adherence to a specific formula."[140]

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

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

[136] S. Rep. 96-249 at 74-75; H.R. Rep. 96-317 at 47.

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

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

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

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

evidence standard.[141] Congress has delegated this factual finding to the Commission because of the agency's institutional expertise in resolving injury issues.[142]

B. Conditions of Competition and the Business Cycle

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

1. Demand Conditions

U.S. demand for CSPV products derives from demand for solar-generated electricity, which is influenced by factors such as cost competitiveness with traditional nonrenewable energy sources, environmental concerns, a desire for national energy independence, total energy consumption, and the availability of federal, state, and local incentives to produce or install CSPV products.[143] While most electricity demand in the United States is supplied by conventional sources, the share of electricity generated from renewable sources has been steadily increasing.[144] Solar generated-electricity's share of U.S. net electricity generation increased from 3.4 percent in 2022 to 4.0 percent in 2023 and 5.1 percent in 2024.[145] There are three on-grid market segments that drive demand for CSPV products: residential, commercial, and utilities.[146] Over the POI, the U.S. producers and importers of subject merchandise shipped a significant share of their U.S. shipments to utilities.[147]

Most domestic producers and U.S. importers reported that demand for CSPV products increased during the POI.[148] Most domestic producers (11 of 13) and a majority of importers (22 of 43) indicated that the U.S. CSPV market is subject to business cycles, with installations tending to increase in the warmer spring and summer months and decline in the winter months.[149] The availability of government incentives was also a significant demand condition during the POI. The Inflation Reduction Act ("IRA"), enacted on August 16, 2022, updated and

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

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

[143] CR/PR at 2.1.

[144] CR/PR at 2.9.

[145] CR/PR at Table 2.7.

[146] CR/PR at 2.1.

[147] U.S. shipments to utilities accounted for *** percent of domestic producers' U.S. shipments in 2022, *** percent in 2022, and *** percent in 2024; the share of U.S. producers shipments to utilities was *** percent in interim 2025 compared to *** percent in interim 2024. CR/PR at Table 2.4. U.S. shipments to utilities accounted *** percent of importers' U.S. shipments in 2022, *** percent in 2023, and *** percent in 2024; the share of importers' shipments to utilities was *** percent in interim 2025 compared to *** percent in interim 2024. CR/PR at Table 2.4.

[148] CR/PR at Table 2.8.

[149] CR/PR at 2.11.

extended the Investment Tax Credit ("ITC") and the Manufacturing Production Tax Credit ("MPTC"), two of the major policies that promote solar energy.[150] The IRA also provided a bonus to existing incentives for the deployment of solar power projects that utilize domestic content.[151] However, the passage of Public Law No. 119-21 in July 2025 placed restrictions on the energy tax credits enacted under the IRA.[152]

Apparent U.S. consumption of CSPV cells and modules increased from *** GW in 2022 to *** GW in 2023, and to *** GW in 2024, for an overall increase of *** percent.[153] Apparent U.S. consumption of CSPV cells and modules was *** percent lower in interim 2025, at *** GW than in interim 2024 at *** GW.[154]

2. Supply Conditions

The domestic industry was the second smallest source of supply, by value, of CSPV cells and modules to the U.S. market in 2022, and the smallest source in 2023 and 2024. However, its share of apparent U.S. consumption increased overall by *** percentage points.[155] Its market share fell from *** percent in 2022 to *** percent in 2023 and increased to *** percent in 2024; it was higher in interim 2025, at *** percent, compared to interim 2024, at *** percent.[156] The domestic industry's share of apparent U.S. consumption of CSPV modules by quantity increased irregularly, decreasing from *** percent in 2022 to *** in 2023 and then increasing to *** percent in 2024, for an overall increase of *** percentage points.[157]

There were several changes to the domestic industry during the period of investigation. In 2022, domestic producer LG Electronics closed its 550 MW CSPV module facility in Alabama and ***.[158] Domestic producers Canadian Solar, Elin Energy, Illuminate, Imperial Star Solar, Meyer Burger, Runergy, SEG Solar, and Waaree Energies opened domestic module facilities and

[150] CR/PR at 2.10.

[151] The IRA updated and extended the ITC and the PTC. In addition, the IRA established the Clean Electricity Investment Tax Credit and the Clean Energy Production Tax Credit CEPTC, and added "bonus credits" in all for programs for electricity generation projects that meet domestic content requirements. CR/PR at 2.10. However, Public Law 119-21 shortened the deadlines for projects to qualify for tax credits and restricted the qualifications for some types of foreign ownership, but continued the IRA's bonus credits. CR/PR at 2.10; *see also* CR/PR at 3.5-3.6.

[152] CR/PR at 3.6.

[153] CR/PR at Table 4.11; Table C.1.

[154] CR/PR at Table 4.11; Table C.1. Because there was no domestic cell production until late 2024, the data for U.S. producers' share of apparent U.S. consumption of CSPV cells and modules by value are based on U.S. producers' value added to imports of cells in U.S. production of modules. CR/PR at Table 4.11.

Apparent U.S. consumption for only CSPV modules showed a similar trend during the POI. Apparent U.S. consumption of CSPV modules increased from *** GW in 2022 to *** GW in 2023 and *** GW in 2024, for an overall increase of *** percent. *Calculated from* Staff Worksheet, EDIS Doc. 860689. It was *** percent lower in interim 2025 at *** GW, than in interim 2024 at *** GW. *Id*.

[155] CR/PR at Table C.1.

[156] CR/PR at Table C.1.

[157] *See* Staff Worksheet, EDIS Doc. 860689.

[158] CR/PR at Tables 3.3 and 3.4.

began commercial operations.[159] Domestic producers Hanwha and Heliene expanded their domestic facilities and added module production capacity.[160] In late 2024, Suniva started domestic production of CSPV cells at its facility in Georgia,[161] and ES Foundry began cell production in early 2025 at its facility in South Carolina.[162] In May 2025, Meyer Burger announced that it ceased U.S. operations at its Arizona module assembly plant, which had opened in June 2024.[163] Overall, the domestic industry's practical capacity for modules increased *** percent over the POI, from *** GW in 2022 to *** GW in 2023 and *** GW in 2024; it was *** percent higher in interim 2025 at *** GW than in interim 2024 at *** GW.[164]

Cumulated subject imports from India, Indonesia, and Laos were the smallest source of supply to the U.S. market for cells and modules by value in 2022, but were the second largest source of supply in 2023 and 2024. Cumulated subject imports' share of apparent U.S. consumption of cells and modules by value increased from *** percent in 2022 to *** percent in 2023 and *** percent in 2024, for an overall increase of *** percentage points; it was *** percentage points higher in interim 2025 at *** percent than in interim 2024 at *** percent.[165] Cumulated subject imports' share of apparent U.S. consumption of cells and modules by quantity increased from *** percent in 2022 to *** percent in 2023 and *** percent in 2024, for an overall increase of *** percentage points; it was *** percentage points higher in interim 2025 at *** percent than in interim 2024 at *** percent. Cumulated subject imports' share of apparent U.S. consumption of CSPV modules by quantity increased from 2022 to 2024, from *** percent in 2022 to *** in 2023 and to *** percent in 2024, for an overall increase of *** percentage points; it was *** percentage points higher in interim 2025 at *** percent than in interim 2024 at *** percent. [166]

Nonsubject imports were the largest source of supply to the U.S. market for cells and modules by value throughout the POI but their market share decreased each year from 2022 to 2024.[167] Nonsubject imports' share of apparent U.S. consumption of cells and modules by value decreased from *** percent in 2022 to *** percent in 2023 and *** percent in 2024, for an overall decrease of *** percentage points; it was *** percentage points lower in interim 2025 at *** percent than in interim 2024 at *** percent.[168] The primary sources of nonsubject imports were Vietnam, Thailand, and Malaysia.[169]

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

[160] CR/PR at Table 3.3. Information from questionnaire responses indicates that ***. CR/PR at Table 3.4.

[161] CR/PR at Table 3.3.

[162] CR/PR at Table 3.3.

[163] CR/PR at Table 3.3.

[164] CR/PR at Table C.1. The domestic industry's practical capacity for cell production was *** MW in 2024 and *** GW in interim 2025. *Id*.

[165] CR/PR at Table C.1.

[166] *See* Staff Worksheet, EDIS Doc. 860689.

[167] CR/PR at Table C.1.

[168] CR/PR at Table C.1.

[169] CR/PR at 4.4.

Nonsubject imports were also the largest source of supply to the U.S. market for modules by quantity throughout the POI but their market share decreased each year from 2022 to 2024. Their share of apparent U.S. consumption of modules by quantity decreased from *** percent in 2022 to *** percent in 2023 and to *** percent in 2024, for an overall decrease of *** percentage points; it was *** percentage points lower in interim 2025 at *** percent compared to interim 2024 at *** percent.[170]

Nonsubject imports in these investigations include imports of CSPV from Cambodia, Malaysia, Thailand, and Vietnam that were subject to the Commission's *CSPV III* investigations. The petitions for those investigations were filed in April 2024, and provisional antidumping and countervailing orders for imports of CSPV from those countries were imposed in October and December 2024, and the final orders were imposed in June 2025.[171]

Furthermore, on August 23, 2023, Commerce made a final determination that certain imports of CSPV products exported from Cambodia, Malaysia, Thailand, and Vietnam using parts and components produced in China were circumventing the *CSPV I* orders on China.[172] On June 6, 2022, before Commerce made a preliminary determination in the anticircumvention proceeding, the President issued a proclamation declaring an emergency and authorizing the Secretary of Commerce to take action to permit, for a 24-month period, imports of CSPV products from Cambodia, Malaysia, Thailand, and Vietnam to be free of any antidumping or countervailing duties resulting from the anticircumvention proceeding (the "tariff holiday").[173] Circumventing imports, which would have been assessed the duties under the *CSPV I* orders on CSPV products from China since the time those orders were issued but for the tariff holiday, became subject to the applicable duties under those orders upon expiration of the two-year tariff holiday on June 6, 2024.[174]

[170] *See* Staff Worksheet, EDIS Doc. 860689.

[171] *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules from the Socialist Republic of Vietnam: Amended Final Antidumping Duty Determination; Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules from Cambodia, Malaysia, Thailand, and the Socialist Republic of Vietnam: Antidumping duty Orders*, 90 Fed. Reg. 26786 (June 24, 2025); *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules from the Socialist Republic of Vietnam: Amended Final Antidumping Duty Determination; Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules from Cambodia, Malaysia, Thailand, and the Socialist Republic of Vietnam: Antidumping Duty Orders; Correction*, 90 Fed. Reg. 29843 (July 7, 2025); and *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules, from Malaysia and Thailand: Amended Final Countervailing Duty Determinations; Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules, from Cambodia, Malaysia, Thailand, and the Socialist Republic of Vietnam: Countervailing Duty Orders*, 90 Fed. Reg. 26791 (June 24, 2025).

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

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

[174] *See* CR/PR at 1.14-1.15.

A small minority of domestic producers (four of 14) reported supply constraints over the POI.[175] One producer reported supply constraints in 2022 related to undersupply of polysilicon.[176] In 2024, one producer reported that it *** of CSPV cells and one reported delaying new solar shingle certification due to pending tariffs.[177] U.S. producer *** reported labor shortages and raw material supply constraints.[178]

A minority of importers (eight of 42) reported supply constraints during the POI.[179] U.S. importer *** reported experiencing supply chain disruptions due to the COVID-19 pandemic in 2022 and 2023, and extended Customs holds for some shipments in 2024.[180] Importer *** reported shipping delays due to global conflicts and lack of available containers caused by a shipping rush to beat reciprocal tariffs.[181]

3. Substitutability and Other Conditions

We find that there is a moderate-to-high degree of substitutability between the domestic like product and cumulated subject imports from India, Indonesia, and Laos.[182] The majority of domestic producers and U.S. importers reported that the domestic like product and imports of CSPV products from each subject country are always or frequently interchangeable.[183] Factors that may limit the substitutability of domestically produced CSPV cells and modules and subject imports include differences in lead times, as well as significant non-price factors that some firms consider.[184] Given that domestic cell production began only in late 2024, and thus the availability of domestic cells was very limited, we find that substitutability is closer to moderate for cells and closer to high for modules.[185]

The record in the preliminary phase of these investigations also indicates that price is an important factor in purchasing decisions. Most U.S. producers reported that differences other than price were sometimes or never significant, while U.S. importers' responses were mixed, as most importers reported that differences other than price were sometimes or always significant.[186]

Domestic producers reported that 59.4 percent of their commercial shipments were from inventories with lead times averaging 33 days. The remaining 40.6 percent of their commercial shipments were produced to order, with lead times averaging 78 days.[187] U.S.

[175] CR/PR at 2.9.
[176] CR/PR at 2.9.
[177] CR/PR at 2.9.
[178] CR/PR at 2.9.
[179] CR/PR at 2.9.
[180] CR/PR at 2.9.
[181] CR/PR at 2.9.
[182] CR/PR at 2.12.
[183] CR/PR at 2.12.
[184] CR/PR at 2.12. Responding purchasers reported quality and availability as significant non-price factors that they consider in purchasing decisions. CR/PR at 2.12.
[185] *See* CR/PR at 2.12.
[186] CR/PR at 2.14.
[187] CR/PR at 2.18.

importers reported that 99.7 percent of their commercial shipments were produced to order, with lead times averaging 149 days. U.S. importers sold 0.3 percent of their commercial shipments from US inventories, with average lead times of 23 days.[188]

In 2024, most U.S. producers reported selling their CSPV products under short term contracts (*** percent), with lesser quantities sold under annual contracts (*** percent) and long-term contracts (*** percent).[189] In 2024, responding U.S. importers of subject merchandise reported selling their commercial shipments primarily through short term contracts (*** percent).[190] The majority of U.S. producers and U.S. importers reported that they set their prices using transaction-by-transaction negotiations.[191]

The main raw material for CSPV cells is polysilicon, which is used to make the ingots and wafers that are processed into cells.[192] CSPV cells are then assembled, along with other components, including solar glass, aluminum frames, junction boxes, and backsheets, into CSPV modules.[193] The record indicates that the global average price for monocrystalline wafers fluctuated downwards from 2022 to 2024, decreasing overall by *** to *** percent depending on the wafer type, with larger wafers tending to be more expensive than smaller wafers.[194] Similarly, the global average price for monocrystalline cells decreased from 2022 to 2024.[195] Raw materials as a share of the domestic industry's total COGS increased from *** percent in 2022 to *** percent in 2023 and to *** percent in 2024; it was *** percent in interim 2025 compared to *** percent in interim 2024.[196] The average unit raw material costs for CSPV products declined *** percent from 2022 to 2024, from $*** per kW in 2022 to $*** per kW in 2023 and to $*** per kW in 2024; it was *** percent lower in interim 2025 at $*** per kW compared to $*** per kW in interim 2024.[197]

The United States imposed a global safeguard measure on imports of CSPV products under section 201 of the Trade Act of 1974 for a period of four years beginning on February 7, 2018, in the form of (1) a tariff-rate quota on imports of CSPV cells not partially or fully assembled into other products, and (2) an increase in duties on imports of CSPV modules.[198] The safeguard measure was extended and remains in effect through February 6, 2026.[199] Imports of CSPV products from India and Laos have been subject to the safeguard measure

[188] CR/PR at 2.13.

[189] CR/PR at Table 5.4. The duration of short-term contracts reported by U.S. producers ranged from 10 to 270 days. CR/PR at 5.5.

[190] CR/PR at Table 5.4. The duration of short-term contracts reported by U.S. importers ranged from 30 days to almost a year. CR/PR at 5.5.

[191] CR/PR at 5.5.

[192] CR/PR at 1.27, 5.1.

[193] CR/PR at 5.1.

[194] CR/PR at 5.1.

[195] CR/PR at Table 5.2.

[196] *See* CR/PR at Table 6.1.

[197] CR/PR at Tables 6.1, 6.2.

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

[199] CR/PR at 1.14.

since its inception, while imports from Indonesia have not been subject to the safeguard measure, under the exception for certain developing counties.[200]

While imports of bifacial panels were excluded from the safeguard measure when it was extended in February 2022, Presidential Proclamation 10779 of June 21, 2024, revoked that exclusion, and provided that imports of bifacial panels would be subject to the safeguard measure.[201]

Effective April 5, 2025, CSPV cells and modules originating in India, Indonesia, and Laos became subject to an additional 10 percent ad valorem duties under the International Emergency Economic Powers Act (IEEPA). Effective April 9, 2025, India was assigned an individualized additional duty rate of 26 percent, Indonesia was assigned an individualized additional rate of 32 percent, and Laos was assigned an individualized additional rate of 48 percent. Effective April 10, 2025, the individualized country duties were suspended and the additional duty rate for CSPV cells and modules originating India, Indonesia, and Laos returned to the rate of 10 percent.[202] Effective August 7, 2025, India was assigned an individualized additional duty rate of 25 percent, Indonesia was assigned an individualized additional rate of 19 percent, and Laos was assigned an individualized additional rate of 40 percent.[203] Effective August 6, 2025, India was assigned an additional 25 percent ad valorem duty under IEEPA that was scheduled to go into effect on August 27, 2025.[204]

C. Volume of Subject Imports

Section 771(7)(C)(i) of the Tariff Act provides that the "Commission shall consider whether the volume of imports of the merchandise, or any increase in that volume, either in absolute terms or relative to production or consumption in the United States, is significant."[205]

The volume of cumulated subject imports of CSPV cells and modules from India, Indonesia, and Laos, by quantity, increased *** percent from 2022 to 2024, increasing from *** GW in 2022, to *** GW in 2023, and *** GW in 2024; they were *** GW in interim 2025 compared to *** GW in interim 2024.[206] Cumulated subject imports, by value, increased *** percent from 2022 to 2024, going from $*** in 2022, to $*** in 2023, to $*** in 2024; they were $*** in interim 2025 compared to $*** in interim 2024.[207] As a share of apparent U.S. consumption by quantity, cumulated subject imports of CSPV cells and modules increased by *** percentage points from 2022 to 2024, increasing from *** percent in 2022 to *** percent in 2023 and to *** in 2024; subject imports' share was *** percentage points higher in interim 2025 at *** percent than in interim 2024 at *** percent.[208]

[200] *See* CR/PR at 1.15.
[201] CR/PR at 1.16.
[202] CR/PR at 1.16.
[203] CR/PR at Tables 1.16, 1.17.
[204] CR/PR at 1.17.
[205] 19 U.S.C. § 1677(7)(C)(i).
[206] CR/PR at Table C.1.
[207] CR/PR at Table C.1.
[208] CR/PR at Table C.1.

Based on the foregoing, we find that the volume of subject imports from India, Indonesia, and Laos is significant in absolute terms and relative to apparent U.S. consumption, and that the increase in the volume of cumulated subject imports is significant in absolute terms and relevant to apparent U.S. consumption.

D. Price Effects of the Subject Imports

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

> (I) there has been significant price underselling by the imported merchandise as compared with the price of domestic like products of the United States, and (II) the effect of imports of such merchandise otherwise depresses prices to a significant degree or prevents price increases, which otherwise would have occurred, to a significant degree.[209]

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

We have examined pricing data in our underselling analysis. The Commission requested U.S. producers and importers to provide quarterly data for the total quantity and f.o.b. value of the four CSPV module products shipped to unrelated U.S. customers during January 2022 through March 2025.[210] Seven U.S. producers and 15 importers provided usable pricing data, although not all firms reported pricing for all products for all quarters.[211] Pricing data reported by these firms accounted for approximately *** percent of reported U.S. producers' shipments of CSPV products, *** percent of reported U.S. shipments of subject imports from India, *** percent of reported U.S. shipments from Indonesia, and *** percent of reported U.S. shipments of subject imports from Laos in 2024.[212]

[209] 19 U.S.C. § 1677(7)(C)(ii).

[210] CR/PR at 5.7. The four pricing products were as follows:

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

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

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

Product 4.-- Monocrystalline silicon bifacial module that generates power on both sides of the panel with front-side area of greater than or equal to 1.9 square meters and a peak power wattage between 485w and 585w, inclusive, P-max or Wp as measured under STC. *Id*.

[211] CR/PR at 5.7.

[212] CR/PR at 5.7.

The pricing data show that subject imports undersold the domestic like product in 26 of 48 quarterly comparisons, or 54.2 percent of comparisons, at margins ranging from *** to *** percent, and averaging *** percent.[213] Subject imports oversold the domestic like product in the remaining 22 instances, or 45.8 percent of the comparisons, at margins ranging from *** to *** percent, and averaging *** percent.[214]

There were *** GW of reported subject import sales in quarters with underselling, or *** percent of total reported subject import pricing sales volume, compared to *** GW in quarters with overselling, or *** percent of total reported import sales volume. As reviewed in detail below, in 2022 and 2023 cumulated subject imports undersold the domestic like product in the majority of instances and for over *** percent of subject import volume, while in 2024 and interim 2025 subject imports undersold the domestic like product in a minority of instances and for *** percent and *** percent of subject import volume respectively.[215]

In 2022, cumulated subject imports undersold the domestic like product in eight of 12 comparisons, with underselling margins ranging up to *** percent, and averaging *** percent.[216] Cumulated subject imports oversold the domestic like product in four of 12 comparisons, with overselling margins averaging *** percent.[217] Over 2022, the volume of subject import sales in quarters with underselling was *** MW, representing *** percent of subject import sales volume that year, compared to *** MW in the quarters with overselling, representing *** percent of total reported subject import sales volume.[218]

In 2023, cumulated subject imports undersold the domestic like product in 7 of 12 comparisons, with underselling margins ranging up to *** percent, and averaging *** percent.[219] Cumulated subject imports oversold the domestic like product in 5 of 12 instances, with overselling margins ranging averaging *** percent.[220] Over 2023, the volume of subject import sales in quarters with underselling was *** GW, representing *** percent of subject import sales volume that year, compared to *** GW in the quarters with overselling, representing *** percent of total reported subject import sales volume.[221]

In 2024, cumulated subject imports undersold the domestic like product in 9 of 19 instances, with underselling margins ranging up to *** percent, and averaging *** percent.[222] Cumulated subject imports oversold the domestic like product in 10 of 19 instances, with overselling margins ranging averaging *** percent.[223] Over 2024, the volume of subject import sales in quarters with underselling was *** GW, representing *** percent of subject import sales volume that year, compared to *** GW in the quarters with overselling, representing ***

[213] CR/PR at Table 5.10.
[214] CR/PR at Table 5.10.
[215] *Derived from* CR/PR at Table 5.12.
[216] CR/PR at Table 5.12.
[217] CR/PR at Table 5.12 .
[218] CR/PR at Table 5.12; *derived from* CR/PR at Table 5.12.
[219] CR/PR at Table 5.12.
[220] CR/PR at Table 5.12.
[221] CR/PR at Table 5.12; *derived from* CR/PR at Table 5.12.
[222] CR/PR at Table 5.12.
[223] CR/PR at Table 5.12.

percent of total reported subject import sales volume.[224] Most of the volume of overselling by subject imports is attributable to this year of the POI, a period in which we determined in *CSPV III* that U.S. producers' domestic prices were depressed by imports of CSPV from Malaysia and Vietnam.[225] [226]

Based on the moderate-to-high degree of substitutability between subject imports and the domestic like product, the importance of price in purchasing decisions, and the evidence of underselling by subject reviewed above, we find that subject import underselling was significant during the POI. In 2022 and 2023, when subject imports predominantly undersold the domestic like product, subject imports of modules gained approximately four percentage points of market share in the U.S. modules market, approximately half of which was at the expense of the domestic industry (and the other half at the expense of nonsubject imports).[227] [228] As such, we find that significant underselling by subject imports in 2022 and 2023 led to a market share shift at the expense of the domestic industry during that period. While the domestic industry gained market share in interim 2024 and in interim 2025, it did so by reducing prices more than costs decreased, as explained further below. In addition, as discussed above, the volume and shipments of nonsubject imports declined in the later part of the POI, a likely result of the *CSPV III* investigations and the expiration of the tariff holiday, which further contributed to the domestic industry's market share gains in 2024 and interim 2025.[229]

[224] CR/PR at Table 5.12; *derived from* CR/PR at Table 5.12.

[225] In *CSPV III*, the Commission found that imports subject to those investigations "depressed prices for the domestic like product to a significant degree in 2023 and 2024. *CSPV III*, USITC Pub. 5631 at 71, 94.

[226] The data also indicate that there were some instances of subject import underselling that occurred in interim 2025, which was not covered by the period of investigation in CSPV III. In interim 2025 (from January through March 2025), cumulated subject imports undersold the domestic like product in two of five instances, with underselling margins ranging up to *** percent, and averaging *** percent. CR/PR at Table 5.12. Cumulated subject imports oversold the domestic like product in three of five instances, with overselling margins ranging averaging *** percent. CR/PR at Table 5.12. Over interim 2025, the volume of subject import sales in quarters with underselling was *** MW, representing *** percent of subject import sales volume that year, compared to *** MW in the quarters with overselling, representing *** percent of total reported subject import sales volume. CR/PR at Table 5.12; *derived from* CR/PR at Table 5.12.

[227] U.S. producers' share of apparent U.S. consumption of CSPV modules decreased from *** percent in 2022, to *** percent in 2023, and increased to *** percent in 2024; it was *** percent in interim 2025 compared to *** percent in interim 2024. Staff Worksheet, EDIS Doc. 860689.

Subject imports' share of apparent U.S. consumption of CSPV modules increased from *** percent in 2022, to *** percent in 2023, and to *** percent in 2024; it was *** percent in interim 2025 compared to *** percent in interim 2024. Staff Worksheet, EDIS Doc. 860689.

[228] As previously mentioned, the domestic industry did not produce cells domestically in 2022 or 2023, meaning that the industry's market share loss during that period was limited to the module segment of the U.S. market.

[229] We have also considered U.S. purchasers' responses concerning lost sales. Four of five purchasers contacted by Commission staff reported purchasing subject imports instead of U.S. produced

We have also examined whether subject imports depressed or suppressed domestic producer prices. From January 2022 through March 2025, U.S. producers' sales prices for CSPV modules decreased by *** percent for product 1, *** percent for product 2, and *** percent for product 3. For pricing product 4, the available data show that U.S. producers' highest quarterly sales price in the period was $*** per kW, and their lowest price was $***, which was also the last quarter in which they reported prices for product 4. Thus, the available data indicate that U.S. producers' sales prices decreased for all four pricing products.

The price trends of imports from India, Indonesia, and Laos for which there are pricing data available are more mixed, but there were decreases over the POI for some pricing products. From January 2022 to March 2025, sales prices for subject imports of product 4 from India decreased by *** percent while the prices for imports of that product from Indonesia and Laos in the first quarter of 2025 are significantly lower than the peaks for either source.[230]

As the domestic industry's prices generally declined over the POI, the domestic industry's net sales AUVs decreased to a greater degree than its per-unit COGS, even as apparent U.S. consumption increased *** percent by quantity (and *** percent by value) from 2022 to 2024.[231] The domestic industry's net sales AUV was $*** per kW in 2022, $*** in 2023, and $*** per kW in 2024, for an overall decrease of $*** per kW or *** percent; it was $*** per kW or *** percent higher in interim 2025 at $*** per kW than in interim 2024 at $*** per kW.[232] Per-unit COGS was $*** per kW in 2022, $*** per kW in 2023, and $*** per kW in 2024, for an overall decrease of $*** per kW or *** percent; it was $*** per kW or *** percent lower in interim 2025 at $*** per kW than in interim 2024 at $*** per kW.[233] The domestic

product. CR/PR at 5.20. *** reported that subject import prices were not lower than U.S.-produced product and indicated that ***. *Id*. *** purchasers reported that U.S. producers had reduced prices to compete with lower-priced imports from India, Indonesia, or Laos. *Id*. The probative value of these data, however, are limited because the quantities reported by responding purchasers appear overstated, which may be due to an error in the units of measure that responding purchasers used. For example, *** reported purchasing *** GW in 2024, which exceeds apparent U.S. consumption of CSPV modules for that year. *See* Staff Worksheet, EDIS Doc. 860689.

[230] CR/PR at Table 5.9. The highest reported price of product 4 for subject imports from Indonesia between January 2022 and March 2025 was $*** per kW, the lowest reported price was $*** per kW, and the last quarter price was $*** per kW. *Id*. The highest reported price of product 4 for subject imports from Laos between January 2022 and March 2025 was $*** per kW, the lowest reported price was $*** per kW, and the last quarter price was $*** per kW. *Id*. On the other hand, subject imports from India increased in price from January 2022 and March 2025 by *** percent for product 1, and subject imports from Indonesia increased by *** percent over the same period for product 3. CR/PR at Table 5.9.

[231] CR/PR at Table C.1. From 2022 to 2023, the domestic industry's net sales AUV decreased by *** per kW, or by *** percent, while unit COGS declined by only *** per kW, or by only *** percent. From 2023 to 2024, the domestic industry's net sales AUV decreased by *** per kW, or by *** percent, while unit COGS declined by only *** per kW, or by only *** percent.

Over the interim periods, the domestic industry's net sales AUV increased by *** per kW while unit COGS declined by *** per kW. *Id.*

[232] CR/PR at Table C.1.

[233] CR/PR at Table C.1.

industry's COGS-to-net-sales-ratio increased *** percentage points from 2022 to 2024, from *** percent in 2022 to *** percent in 2023 and to *** percent in 2024.[234] Although it was lower in interim 2025, at *** than in interim 2024 at *** percent, the domestic industry's COGS-to-net-sales ratio still remained higher at the end of the POI than when the POI began.[235]

We acknowledge that we previously determined that imports of CSPV from Malaysia and Vietnam "depressed prices for the domestic like product to a significant degree in 2023 and 2024 as domestic producers lower{ed} prices to regain sales and market share."[236] At the same time, the statute defines "material injury" as "harm which is not inconsequential, immaterial, or unimportant" and the existence of injury caused by other factors such as non-subject imports does not compel a finding that subject imports are not also a cause of injury. We also observe that the pricing data for the first quarter of 2025, which was after the POI in *CSPV III*, also show declines in the U.S. prices from the previous quarter for product 1,[237] product 3,[238] and product 4.[239] It is noteworthy that imports covered by the *CSPV III* investigations substantially receded from the market in interim 2025, accounting for *** GW as opposed to *** GW in interim 2024,[240] while subject imports of *** GW in interim 2025 were substantially higher than the *** GW total in interim 2024.[241] Subject imports' AUVs in both periods were comparable to nonsubject imports', albeit slightly higher in interim 2025. We intend to further investigate the impact of cumulated subject import pricing on domestic industry prices in any final phase of these investigations.

Given the declines in domestic producer prices over the POI at a time of rising costs and demand, the moderate-to-high degree of substitutability between subject imports and the domestic like product and the importance of price, as well as the significant subject import underselling during the period, and in consideration of the Commission's prior finding in *CSPV III* that certain nonsubject imports in these investigations had a depressive effect on domestic prices, we cannot conclude that cumulated subject imports did not depress domestic prices to a significant degree during the POI.

In sum, based on the record in the preliminary phase of these investigations, we find that there was significant underselling by cumulated subject imports during the POI. The predominant underselling by subject imports in 2022 and 2023 led to a market share shift from

[234] CR/PR at Table C.1.

[235] CR/PR at Table C.1.

[236] *CSPV III*, USITC Pub. 5631 at 71-72.

[237] U.S. producers' domestic price for product 1 decreased from $*** per kW in the fourth quarter of 2024 to $*** in the first quarter of 2025. CR/PR at Table 5.5.

[238] U.S. producers' domestic price for product 3 decreased from $*** per kW in the fourth quarter of 2024 to $*** in the first quarter of 2025. CR/PR at Table 5.7.

[239] U.S. producers' domestic price for product 4 decreased from $*** per kW in the fourth quarter of 2024 to $*** in the first quarter of 2025. CR/PR at Table 5.8. U.S. producers' domestic price for product 3 increased slightly from $*** per kW in the fourth quarter of 2024 to $*** per kW hour in the first quarter of 2025, but the sales volume of product 3 was much lower than products 1, 2, and 4 in those quarters. *See* CR/PR at Table 5.6.

[240] CR/PR at Table C.1.

[241] CR/PR at Table C.1.

the domestic industry to subject imports in the modules segment of the U.S. market over that period (though the domestic industry gained market share over the full POI), and we cannot conclude for purposes of these preliminary phase investigations that subject imports did not depress domestic prices. Accordingly, we cannot conclude that cumulated subject imports did not have significant price effects.

E. Impact of the Subject Imports[242]

Section 771(7)(C)(iii) of the Tariff Act provides that the Commission, in examining the impact of the subject imports on the domestic industry, "shall evaluate all relevant economic factors which have a bearing on the state of the industry." These factors include output, sales, inventories, capacity utilization, market share, employment, wages, productivity, gross profits, net profits, operating profits, cash flow, return on investment, return on capital, ability to raise capital, ability to service debt, research and development, and factors affecting domestic prices. No single factor is dispositive and all relevant factors are considered "within the context of the business cycle and conditions of competition that are distinctive to the affected industry."[243]

As described above, we concluded in *CSPV III* that imports from Malaysia and Vietnam materially injured the domestic industry from 2022 to 2024, and that cumulated imports from Cambodia, Malaysia, Thailand, and Vietnam threatened the domestic industry with material injury. Nevertheless, as discussed further below, the domestic industry's performance remained weak in interim 2025, which was not covered by the period of investigation in *CSPV III*.

The domestic industry's practical capacity for modules increased by *** percent from 2022 to 2024, from *** GW in 2022 to *** GW in 2023, and *** GW in 2024; it was *** percent higher in interim 2025 at *** GW than in interim 2024 at *** GW.[244] The domestic industry's module production increased by *** percent from 2022 to 2024, from *** GW in 2022 to *** GW in 2023, and *** GW in 2024; it was *** percent higher in interim 2025 at *** GW than in interim 2024 at *** GW.[245] The industry's practical capacity utilization declined irregularly by *** percentage points from 2022 to 2024, declining from *** percent in 2022 to *** percent in 2023, and then increasing slightly to *** percent in 2024; it was *** percentage points higher in interim 2025 at *** percent than in interim 2024 at *** percent.[246]

The industry's number of production and related workers ("PRWs") increased by *** percent from 2022 to 2024, from *** PRWs in 2022 to *** PRWs in 2023, and *** in 2024; they were *** percent higher in interim 2025 at *** PRWs than in interim 2024 at *** PRWs.[247]

[242] Commerce initiated the antidumping duty investigations based on estimated dumping margins of Commerce initiated investigations based on estimated dumping margins of 123.04 percent for imports from India, 94.36 percent for imports from Indonesia, and 123.12 percent for imports from Laos. *AD Initiation Notice*, 90 Fed. Reg. at 38738.

[243] 19 U.S.C. § 1677(7)(C)(iii). This provision was amended by the Trade Preferences Extension Act of 2015, Pub. L. 114-27.

[244] CR/PR at Tables 3.9, C.1.

[245] CR/PR at Tables 3.9, C.1.

[246] CR/PR at Tables 3.9, C.1.

[247] CR/PR at Tables 3.30, C.1.

Hours worked rose by *** percent overall from 2022 to 2024, decreasing from *** hours in 2022 to *** hours in 2023, and increasing to *** hours in 2024; hours worked were *** percent higher in interim 2025, at *** hours, than in interim 2024, at *** hours.[248] Wages paid increased by *** percent overall from 2022 to 2024, decreasing slight from $*** in 2022 to $*** in 2022, and increasing to $*** in 2024; wages paid were *** percent higher in interim 2025, at $***, than in interim 2024 at $***.[249] Productivity increased by *** percent from 2022 to 2024, increasing from *** kilowatts per 1,000 hours in 2022 to *** kilowatts per 1,000 hours in 2023 and *** kilowatts per 1,000 hours in 2024; productivity was *** percent higher in interim 2025 at *** kilowatts per 1,000 hours than in interim 2024 at *** kilowatts per 1,000 hours.[250]

The domestic industry's U.S. shipments of modules increased by *** percent from 2022 to 2024, from *** GW in 2022 to *** GW in 2023 and *** GW in 2024; U.S. producers' U.S. shipments were *** percent higher in interim 2025 at *** GW than in interim 2024 at *** GW.[251]

The domestic industry's market share for CSPV modules increased irregularly by *** percentage points from 2022 to 2024, decreasing from *** percent in 2022 to *** percent in 2023 and increasing to *** percent in 2024; the domestic industry's market share was higher in interim 2025 at *** percent than in interim 2024 at *** percent.[252] The domestic industry's market share for CSPV cells and modules, by value, increased irregularly by *** percentage points, decreasing from *** percent in 2022 to *** percent in 2023, and then increasing to *** percent in 2024; the domestic industry's market share was higher in interim 2025 at *** percent than in interim 2024 at *** percent.[253]

The domestic industry's end-of-period inventories of modules increased by *** percent from 2022 to 2024, increasing from *** kW in 2022 to *** kW in 2023 and *** kW in 2024; end-of period inventories were *** percent higher in interim 2025 at *** kW than in interim 2024 at *** kW.[254] Its end-of-period inventories as a share of total shipments increased irregularly by *** percentage points from 2022 to 2024, increasing from *** percent in 2022 to *** percent in 2023 and ***; it was *** percentage points higher in interim 2025 at *** percent than in interim 2024 at *** percent.[255]

The industry's net sales value increased irregularly by *** percent from 2022 to 2024, declining from $*** in 2022 to $*** in 2023 before increasing to $*** in 2024; its net sales value was *** percent higher in interim 2025 at $*** than in interim 2024 at $***.[256] The industry's gross profit worsened from $*** in 2022 to *** in 2023, and then declined to *** in 2024; the domestic industry had a gross profit of $*** in interim 2025 compared to a gross

[248] CR/PR at Tables 3.30, C.1.
[249] CR/PR at Tables 3.30, C.1.
[250] CR/PR at Tables 3.30, C.1.
[251] CR/PR at Tables 3.12, C.1.
[252] *See* Staff Worksheet, EDIS Doc. 860689.
[253] CR/PR at Tables 4.11, C.1.
[254] CR/PR at Tables 3.15, C.1.
[255] CR/PR at Tables 3.15, C.1.
[256] CR/PR at Tables 6.1, C.1.

profit of *** in interim 2024.[257] The industry's operating income worsened from *** in 2022 to *** in 2023 and *** in 2024, The domestic industry's operating income in interim 2025, ***, showed only a slight improvement over interim 2024's ***.[258] The industry's ratio of operating income to net sales declined by *** percentage points from 2022 to 2024, decreasing from *** percent in 2022 to *** percent in 2023, and to *** percent in 2024; it improved in interim 2025 at *** compared to *** percent in interim 2024.[259] The industry's net income worsened from 2022 to 2024, declining from *** in 2022 to *** in 2023, and *** in 2024; it was better in interim 2025 at $*** compared to *** in interim 2024.[260] The industry's net income margin decreased overall and *** from 2022 to 2024, decreasing from *** percent in 2022 to *** percent in 2023, and slightly improving to *** percent in 2024; the domestic industry's net income margin was *** percent in interim 2025 compared to *** percent in interim 2024.[261]

The domestic industry's capital expenditures increased *** from 2022 to 2024, rising from $*** in 2022 to $*** in 2023 and $*** in 2024, as several new producers started module production and existing producers expanded their module production and capacity.[262] The domestic industry's capital expenditures were *** percent higher in interim 2025 at $*** than in interim 2024 at $***.[263] The domestic industry's research and development ("R&D") expenses decreased by *** percent from 2022 to 2024, decreasing from $*** in 2022 to $*** in 2023 and $*** in 2024; the industry's R&D expenses were *** percent lower in interim 2025 at $*** than in interim 2024 at $***.[264] The industry's total net assets increased ***, rising from $*** in 2022 to $*** in 2023 and $*** in 2024.[265] The industry's return on assets declined; it was *** percent in 2022, *** percent in 2023 and *** percent in 2024.[266] Several U.S. producers reported negative effects on their investments that they attributed to subject imports, including cancellation or postponement of expansion projects.[267]

At this preliminary phase, we have found that cumulated subject import volume and the increase in that volume were significant. We have also found that predominant underselling by subject imports in 2022 and 2023 led to a market share shift at the expense of the domestic industry in the modules market from 2022 to 2023 (although the industry gained market share over the full POI) and we cannot conclude that subject imports did not have a depressive effect on domestic prices. Given this, as well as the lower-than-expected performance of the domestic industry in interim 2025 despite the imposition of the *CSPV III* orders, we cannot

[257] CR/PR at Tables 6.1, C.1.
[258] CR/PR at Tables 6.1, C.1.
[259] CR/PR at Tables 6.1, C.1.
[260] CR/PR at Tables 6.1, C.1.
[261] CR/PR at Tables 6.1, C.1.
[262] CR/PR at Table 3.4.
[263] CR/PR at Tables 6.7, C.1.
[264] CR/PR at Tables 6.9, C.1.
[265] CR/PR at Tables 6.11, C.1. Interim period data regarding the domestic industry's total assets were not collected.
[266] CR/PR at Table 6.12. Interim period data regarding the domestic industry's return on assets were not available.
[267] CR/PR at Tables 6.14, 6.15.

conclude for purposes of these preliminary phase investigations that cumulated subject imports did not have a significant adverse impact on the domestic industry.

We have also considered whether there are other factors that may have had an impact on the domestic industry, to ensure that we are not attributing injury from such other factors to subject imports. We recognize that in *CSPV III*, for the period of investigation covering 2022 to 2024, we determined that the domestic industry was materially injured by reason of imports from Malaysia and Vietnam, and threatened with material injury from Cambodia, Malaysia, Thailand, and Vietnam (all of which are nonsubject imports in the instant investigations). We also note that in these investigations nonsubject import market share declined throughout the POI. At this preliminary phase, we cannot conclude that subject imports did not also have a material impact on the domestic industry during the POI.

In sum, the record as a whole in the preliminary phase of these investigations does not contain clear and convincing evidence that there is no reasonable indication of material injury to the domestic industry by reason of cumulated subject imports. We have therefore reached affirmative preliminary determinations.

VIII. Conclusion

For the reasons stated above, we determine that the record in these preliminary investigations does not contain clear and convincing evidence that there is no material injury, and cannot conclude that no likelihood exists that contrary evidence will arise in any final investigations Therefore, we determine that there is a reasonable indication that an industry in the United States is materially injured by reason of subject imports of CSPV cell and modules from India, Indonesia, and Laos that are allegedly sold in the United States at less than fair value and that are allegedly subsidized by the governments of India, Indonesia, and Laos.

Part 1: Introduction

Background

These investigations result from petitions filed with the U.S. Department of Commerce ("Commerce") and the U.S. International Trade Commission ("USITC" or "Commission") by the Alliance for American Solar Manufacturing and Trade ("the Alliance")[1] on July 17, 2025, alleging that an industry in the United States is materially injured and threatened with material injury by reason of subsidized and less-than-fair-value ("LTFV") imports of crystalline silicon photovoltaic cells, whether or not assembled into modules ("CSPV cells and modules" or "CSPV products")[2] from India, Indonesia, and Laos. Table 1.1 presents information relating to the background of these investigations.[3] [4]

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

Effective date	Action
July 17, 2025	Petitions filed with Commerce and the Commission; institution of the Commission's investigations (90 FR 34518, July 22, 2025)
August 6, 2025	Commerce's notice of initiation, AD investigations (90 FR 38736, August 12, 2025), and CVD investigations (90 FR 38745, August 12, 2025).
August 7, 2025	Commission's conference
August 29, 2025	Commission's vote
September 2, 2025	Commission's determinations
September 9, 2025	Commission's views

Statutory criteria

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

[1] The Alliance is comprised of Hanwha Q CELLS USA, Inc.; First Solar, Inc.; and Mission Solar Energy LLC.

[2] See the section entitled "The subject merchandise" in Part 1 of this report for a complete description of the merchandise subject in this proceeding.

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

[4] A list of witnesses appearing at the conference is presented in appendix B of this report.

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

Section 771(7)(C) of the Act (19 U.S.C. § 1677(7)(C)) further provides that—[5]

> In evaluating the volume of imports of merchandise, the Commission shall consider whether the volume of imports of the merchandise, or any increase in that volume, either in absolute terms or relative to production or consumption in the United States is significant.. . .In evaluating the effect of imports of such merchandise on prices, the Commission shall consider whether. . .(I) there has been significant price underselling by the imported merchandise as compared with the price of domestic like products of the United States, and (II) the effect of imports of such merchandise otherwise depresses prices to a significant degree or prevents price increases, which otherwise would have occurred, to a significant degree.. . . In examining the impact required to be considered under subparagraph (B)(i)(III), the Commission shall evaluate (within the context of the business cycle and conditions of competition that are distinctive to the affected industry) all relevant economic factors which have a bearing on the state of the industry in the United States, including, but not limited to. . . (I) actual and potential decline in output, sales, market share, gross profits, operating profits, net profits, ability to service debt, productivity, return on investments, return on assets, and utilization of capacity, (II) factors affecting domestic prices, (III) actual and potential negative effects on cash flow, inventories, employment, wages, growth, ability to raise capital, and investment, (IV) actual and potential negative effects on the existing development and production efforts of the domestic industry, including efforts to develop a derivative or more advanced version of the domestic like product, and (V) in {an antidumping investigation}, the magnitude of the margin of dumping.
>
> In addition, Section 771(7)(J) of the Act (19 U.S.C. § 1677(7)(J)) provides that—[6]

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

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

Organization of report

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

Market summary

CSPV cells, which are made from crystalline silicon, are the building blocks of solar photovoltaic power-generation systems.[7] CSPV cells typically form the basic element of solar panels or modules but can be utilized in other products as well. The resulting system of solar panels or modules are often installed on or above the roofs of residential and non-residential buildings, as free field installations, or as stand-alone units.

The only responding U.S. producer of CSPV cells is Suniva, Inc. ("Suniva")[8] and the leading U.S. producer of CSPV modules is ***, while leading producers of CSPV cells and modules outside the United States include *** of India, *** of Laos. The leading U.S. importer of CSPV cells and modules from India is ***, while the leading importer of CSPV cells and modules from Indonesia is ***, and the leading U.S. importer of CSPV cells and modules from Laos is ***. The leading importers of CSPV cells and modules from nonsubject countries (primarily Thailand and Malaysia) include ***, ***, and ***. U.S. purchasers of CSPV products include utility companies/developers, distributors, module assemblers, residential installers, and utility installers. The four purchasers responding to the Commission's Lost Sales Lost Revenue Survey in this phase of the investigations were ***.

Apparent U.S. consumption of CSPV cells and modules totaled approximately *** megawatts ($***) in 2024. Currently, two firms are known to produce CSPV cells, and fifteen are known to produce CSPV modules in the United States.[9] U.S. producers' value added to CSPV cells through module assembly and production of CSPV cells was $*** in 2024 and accounted for *** percent of apparent U.S. consumption by value. U.S. shipments of imports from subject sources totaled *** megawatts ($***) in 2024 and accounted for *** percent of apparent U.S. consumption by quantity and *** percent by value. U.S.

[7] Petition, pp. 12 to 13.

[8] Scott Moskowitz of Hanwha Q Cells USA testified during the preliminary conference that ES Foundry is producing and shipping CSPV cells and noted that Hanwha, Mission Solar, Heliene, Silfab, and Canadian Solar have cell factories under construction. Conference transcript, p. 100 (Moskowitz).

[9] Non-responding U.S. producers of CSPV modules include ***. Petition, exhibit I.4.

shipments of imports from nonsubject sources totaled *** megawatts ($***) in 2024 and accounted for *** percent of apparent U.S. consumption by quantity and *** percent by value.

Summary data and data sources

A summary of data collected in these investigations is presented in appendix C, table C.1. The Commission's questionnaires collected data for the years 2022 to 2024 and interim periods January through March of 2024 ("interim 2024") and January through March of 2025 ("interim 2025"). Except as noted, U.S. industry data are based on questionnaire responses of fifteen firms that accounted for *** U.S. production of CSPV cells[10] and the vast majority of CSPV modules during 2024. U.S. imports are based on questionnaire data.[11]

Previous and related investigations

The Commission has conducted a number of previous import relief investigations on CSPV cells and modules or similar merchandise, as presented in table 1.2.[12]

[10] *** began CSPV cell production in the U.S. in the fourth quarter of 2024. *** U.S. producer questionnaire response, section 3.12b.

[11] Where noted, importer questionnaire data have been supplemented with proprietary, Census-edited Customs' import records.

[12] The global safeguard measure on CSPV products (TA-201-075) is in the form of (1) a TRQ on imports of CSPV cells not partially or fully assembled into other products and (2) an increase in duties on imports of CSPV modules. Crystalline Silicon Photovoltaic Cells, Whether or Not Partially or Fully Assembled Into Other Products, Monitoring Developments in the Domestic Industry, Inv. No. TA-201-075 (Second Monitoring), USITC Publication 5494, February 2024 ("Second monitoring publication"), pp. 1.8 to 1.10. The safeguard measure is applicable to imports from all countries, except for imports from certain developing countries that are members of the WTO, as long as such a country's share of total imports of the product, based on imports during a recent representative period, does not exceed 3 percent, provided that imports that are the product of all such countries with less than 3 percent import share collectively account for not more than 9 percent of total imports of the product. Laos is subject to the safeguard measures, as is India, which was removed from the list of beneficiary developing countries as of June 5, 2019. Indonesia, however, is on the excepted list. Id. at pp. 1.7 to 1.8, n.22. For a full list of countries exempt from the safeguard measure, see U.S. Customs and Border Protection, "QB 25-507 2025 Solar Cells and Modules," January 27, 2025, https://www.cbp.gov/trade/quota/bulletins/qb-25-507-2025.

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

Date	Number	Country	ITC original determination	Status
2011	701-481	China	Affirmative	Order continued after second review, September 20, 2024
2011	731-1190	China	Affirmative	Order continued after second review, September 20, 2024
2013	701-TA-511	China	Affirmative	Order continued after first review, effective September 11, 2020
2013	731-TA-1246	China	Affirmative	Order continued after first review, effective September 11, 2020
2013	731-TA-1247	Taiwan	Affirmative	Order continued after first review, effective September 11, 2020
2017	TA-201-075	—	Affirmative	Safeguard measure in effect from February 7, 2018, through February 6, 2026
2025	701-TA-722	Cambodia	Affirmative	Order issued on June 24, 2025
2025	701-TA-723	Malaysia	Affirmative	Order issued on June 24, 2025
2025	701-TA-724	Thailand	Affirmative	Order issued on June 24, 2025
2025	701-TA-725	Vietnam	Affirmative	Order issued on June 24, 2025
2025	731-TA-1690	Cambodia	Affirmative	Order issued on June 24, 2025
2025	731-TA-1691	Malaysia	Affirmative	Order issued on June 24, 2025, corrected July 7, 2025
2025	731-TA-1692	Thailand	Affirmative	Order issued on June 24, 2025
2025	731-TA-1693	Vietnam	Affirmative	Order issued on June 24, 2025, corrected July 7, 2025

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

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

Note: Investigations 701-TA-481 and 731-TA-1190 do not include U.S. imports of CSPV modules assembled in China from CSPV cells made in a country other than China. Investigations 701-TA-511 and 731-TA-1246-1247 include U.S. imports of the following: (1) CSPV modules assembled in China from CSPV cells made in Taiwan and (2) CSPV modules assembled in China from CSPV cells made in third countries. Commerce defined the subject merchandise from Taiwan to include U.S. imports of: (1) CSPV cells made in Taiwan; (2) CSPV modules assembled in Taiwan from CSPV cells made in Taiwan; and (3) CSPV modules assembled in third countries other than China from CSPV cells made in Taiwan. Therefore, the module assembly location determined the country of origin for U.S. imports of modules from China, except for modules covered by the prior CSPV 1 orders (which were considered nonsubject merchandise from China in the CSPV 2 investigations); the cell manufacture location determined the country of origin for U.S. imports of cells and modules from Taiwan. 79 FR 76962 and 76970, December 23, 2014.

Nature and extent of alleged subsidies and sales at LTFV

Alleged subsidies

On August 12, 2025, Commerce published a notice in the Federal Register of the initiation of its countervailing duty investigation on CSPV cells and modules from India, Indonesia, and Laos.[13]

Alleged sales at LTFV

On August 12, 2025, Commerce published a notice in the Federal Register of the initiation of its antidumping duty investigations on CSPV cells and modules from India, Indonesia, and Laos.[14] Commerce has initiated antidumping duty investigations based on estimated dumping margins of 123.04 percent for CSPV cells and modules from India, 94.36 percent from Indonesia, and 123.12 percent from Laos.

[13] For further information on the alleged subsidy programs see Commerce's notice of initiation and related CVD Initiation Checklist. 90 FR 38745, August 12, 2025.

[14] 90 FR 38736, August 12, 2025.

The subject merchandise

Commerce's scope

In the current proceeding, Commerce has defined the scope as follows:[15]

> The merchandise covered by these investigations is crystalline silicon photovoltaic cells, and modules, laminates, and panels, consisting of crystalline silicon photovoltaic cells, whether or not partially or fully assembled into other products, including, but not limited to, modules, laminates, panels and building integrated materials.
>
> These investigations cover crystalline silicon photovoltaic cells of thickness equal to or greater than 20 micrometers, having a p/n junction formed by any means, whether or not the cell has undergone other processing, including, but not limited to, cleaning, etching, coating, and/or addition of materials (including, but not limited to, metallization and conductor patterns) to collect and forward the electricity that is generated by the cell.
>
> Merchandise under consideration may be described at the time of importation as parts for final finished products that are assembled after importation, including, but not limited to, modules, laminates, panels, building-integrated modules, building integrated panels, or other finished goods kits. Such parts that otherwise meet the definition of merchandise under consideration are included in the scope of the investigation.
>
> Excluded from the scope of the 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 the investigation are crystalline silicon photovoltaic cells, not exceeding 10,000 mm2 in surface area, that are permanently integrated into a consumer good whose function is other than power generation and that consumes the electricity generated by the integrated crystalline silicon photovoltaic cell. Where more than one cell is permanently integrated into a consumer good, the surface area for purposes of this exclusion shall be the total combined surface area of all cells that are integrated into the consumer good.
>
> Additionally, excluded from the scope of the investigation are panels with surface area from 3,450 mm2 to 33,782 mm2 with one black wire and

[15] 90 FR 38736, August 12, 2025.

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

Also excluded from the scope of the investigation are:

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

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

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

Additionally excluded from the scope of these investigations are off-grid small portable crystalline silicon photovoltaic panels, with or without a glass cover, with the following characteristics: (1) a total power output of 200 watts or less per panel; (2) a maximum surface area of 16,000 cm2 per panel; (3) no built-in inverter; (4) an integrated handle or a handle attached to the package for ease of carry; (5) one or more integrated kickstands for easy installation or angle adjustment; and (6) a wire of not less than 3 meters either permanently connected or attached to the package that terminates in an 8 mm diameter male barrel connector.

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

Further excluded from the scope of the investigations are:

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

(2) Off-grid small portable crystalline silicon photovoltaic panels, with or without a glass cover, with the following characteristics: (A) a total power output of 200 watts or less per panel, (B) a maximum surface area of

16,000 cm2 per panel, (C) no built-in inverter, (D) an integrated handle or a handle attached to the package for ease of carry, (E) one or more integrated kickstands for easy installation or angle adjustment, and (F) a wire either permanently connected or attached to the package terminates in waterproof connector with a cylindrical positive electrode and a rectangular negative electrode with the positive and negative electrodes having an interlocking structure.

Also excluded from the scope of the investigation are:

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

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

Additionally excluded from the scope of the investigation are:

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

(2) Off grid CSPV panels without a glass cover, with the following characteristics, (A) a total power output of 220 watts or less per panel, (B) a maximum surface area of 16,000 cm2 per panel, (C) do not include a built-in inverter, (D) must include visible parallel grid collector metallic wire lines every 1-4 millimeters across each solar cell, and (E) each panel is encased in a 4 laminated material without stitching.

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

(1) a total power output of 20 watts or less per panel;

(2) a maximum surface area of 1,000 cm2 per panel;

(3) does not include a built-in inverter for powering third party devices.

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

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

Also excluded from the scope of these investigations are all products covered by the scope of the antidumping and countervailing duty orders on Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules from the Socialist Republic of Vietnam: Amended Final Antidumping Duty Determination; Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules from Cambodia, Malaysia, Thailand, and the Socialist Republic of Vietnam: Antidumping duty Orders, 90 FR 26786 (June 24, 2025); Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules from the Socialist Republic of Vietnam: Amended Final Antidumping Duty Determination; Crystalline

Silicon Photovoltaic Cells, Whether or Not Assembled into Modules from Cambodia, Malaysia, Thailand, and the Socialist Republic of Vietnam: Antidumping Duty Orders; Correction, 90 FR 29843 (July 7, 2025); and Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules, from Malaysia and Thailand: Amended Final Countervailing Duty Determinations; Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules, from Cambodia, Malaysia, Thailand, and the Socialist Republic of Vietnam: Countervailing Duty Orders, 90 FR 26791 (June 24, 2025).

Tariff treatment

Based upon the scope set forth by Commerce, information available to the Commission indicates that the merchandise subject to these investigations are imported under statistical reporting numbers 8541.42.0010 ("crystalline silicon photovoltaic cells not assembled in modules or made up into panels") and 8541.43.0010 ("crystalline silicon photovoltaic cells assembled in modules or made up into panels") of the Harmonized Tariff Schedule of the United States ("HTS").[16] [17] The 2025 general rate of duty is free for HTS subheadings 8541.42.00 and 8541.43.00. These articles may also be imported as parts or subassemblies of goods provided for in HTS subheadings 8501.71, 8501.72, 8501.80, and 8507.20.80.[18] Decisions on the tariff classification and treatment of imported goods are within the authority of U.S. Customs and Border Protection.

The United States imposed a global safeguard measure on CSPV products, effective February 7, 2018, in the form of a tariff-rate quota ("TRQ") on imports of CSPV cells not partially or fully assembled into other products and an increase in duties on imports of CSPV modules.[19] The safeguard measure was extended and remains in effect through February 6, 2026.[20] Imports from nonexempt countries of CSPV cells not partially or fully assembled into other products in excess of the TRQ enter under HTS subheading 9903.45.22 and are subject to

[16] For the purposes of HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010, the term "crystalline silicon photovoltaic cells" means crystalline silicon photovoltaic cells of a thickness equal to or greater than 20 micrometers, having a p/n junction (or variant thereof) formed by any means, whether or not the cell imported under statistical reporting number 8541.42.0010 (or subassemblies thereof imported under HTS statistical reporting number 8541.43.0010) has undergone other processing, including, but not limited to, cleaning, etching, coating, and/or addition of materials (including, but not limited to, metallization and conductor patterns) to collect and forward the electricity that is generated by the cell. Such cells include photovoltaic cells that contain crystalline silicon in addition to other photovoltaic materials. This includes, but is not limited to, passivated emitter rear contact cells, heterojunction with intrinsic thin-layer cells, and other so-called hybrid cells. USITC, HTS (2025) Revision 19, Publication 5659, August 2025, p. XVI 85-7.

[17] HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 were established effective January 27, 2022. Prior to this, CSPV cells and modules were imported under HTS statistical reporting numbers 8541.40.6025 and 8541.40.6015, respectively. USITC, HTS (2022) Basic Edition, Publication 5277, January 2022, p. XVI 85-76.

[18] The subject cells may be presented as integral elements of subassemblies of components or of goods of these headings and subheadings, even if not treated as "parts" for tariff purposes. USITC, HTS (2025) Revision 19, Publication 5659, August 2025, pp. XVI 85-14 to XVI 85-15, XVI 85-24

[19] 83 FR 3541, January 25, 2018.

[20] 87 FR 7357, February 9, 2022.

duty rates that vary based on the entry period.[21] Imports from nonexempt countries of CSPV modules enter under HTS subheading 9903.45.25 and are subject to duty rates that vary based on the entry period.[22] Imports of CSPV products from India and Laos are subject to the safeguard measure, while imports from Indonesia are not subject to the safeguard measure, under the exception for certain developing countries that are WTO members.[23] While imports of bifacial panels were excluded from the safeguard measure when it was extended in February 2022, Presidential Proclamation 10779 of June 21, 2024 revoked that exclusion, and provided that imports of bifacial panels would be subject to the safeguard measure.[24]

Effective August 23, 2018, CSPV cells and modules originating in China are subject to an additional 25 percent ad valorem duty under section 301 of the Trade Act of 1974.[25] Effective September 27, 2024, following a four-year review of actions taken in the section 301 investigation of China's acts, policies, and practices related to technology transfer, intellectual property, and innovation, duty rates for CSPV cells and modules originating in China were increased to 50 percent ad valorem.[26]

On April 1, 2022, Commerce initiated an inquiry into whether Chinese-manufactured CSPV cells and modules circumvented U.S. antidumping and countervailing duty orders.[27] The

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

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

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

[24] 89 FR 53333, June 26, 2024.

[25] 83 FR 40823, August 16, 2018. See also HTS subheading 9903.88.02 and U.S. notes 20(c) and 20(d) to subchapter III of chapter 99 and related tariff provisions for this duty treatment. USITC, *Harmonized Tariff Schedule (2024) Revision 1*, U.S. Notes, pp. 99-III-24–99-III-27, 99-III-301, January 2024.

[26] 89 FR 76581, September 18, 2024. Effective January 1, 2025, duty rates for wafers and polysilicon originating in China increased from 25 percent to 50 percent ad valorem. 89 FR 101682, December 16, 2024. See also HTS subheading 9903.91.02 and U.S. note 31(c) to subchapter III of chapter 99 and related tariff provisions for this duty treatment.

[27] 87 FR 19071, April 1, 2022.

inquiry was initiated in response to a petition filed by Auxin Solar alleging that CSPV cells and modules imported from Cambodia, Malaysia, Thailand, and Vietnam used CSPV cells and other inputs from China to avoid existing antidumping and countervailing duty orders. On August 23, 2023, Commerce issued its final determination in the circumvention inquiries, finding that CSPV cells and modules exported from, and produced in, Cambodia, Malaysia, Thailand, and Vietnam by certain producers were circumventing the orders. Commerce also made country-wide circumvention findings with respect to all four countries.[28] However, pursuant to the Presidential Proclamation on June 6, 2022, duties were not collected on imports of CSPV cells and modules from these four countries subject to Commerce's final determination where appropriate certifications were filed with Customs and those imports were used in the United States no later than 180 days after June 6, 2024, the Proclamation's termination date.[29]

Tariffs initiated under the International Emergency Economic Powers Act ("IEEPA")[30]

Effective April 5, 2025, CSPV cells and modules originating in India, Indonesia, and Laos were subject to an additional 10 percent ad valorem reciprocal duty under IEEPA. Effective April 9, 2025, the following individualized country reciprocal duty rates were assigned: 26 percent for imports from India; 32 percent for imports from Indonesia; and 48 percent for imports from Laos.[31] Effective April 10, 2025, individualized country reciprocal duties were suspended and the reciprocal duty rate for CSPV cells and modules originating in India, Indonesia, and Laos was returned to 10 percent.[32] Effective August 7, 2025, the following individualized country duty

[28] 88 FR 57419, August 23, 2023.

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

[30] Multiple tariffs have been enacted under the authority of the International Emergency Economic Powers Act ("IEEPA"). Tariffs specific to Canada, China, and Mexico were initiated in February 2025. Tariffs initiated in April 2025 under IEEPA were applied globally. Tariffs under IEEPA have been amended over time.

[31] 90 FR 15041, April 7, 2025.

[32] 90 FR 15625, April 15, 2025. See also HTS subheadings 9903.01.25, 9903.01.55, 9903.01.61, 9903.01.74 and U.S. note 2(v) to subchapter III of chapter 99 and related tariff provisions for this duty treatment. USITC, HTS (2025) Revision 8, Publication 5613, April 2025, pp. 99-III-1, 99-III-278.

rates were assigned: 25 percent for imports from India; 19 percent for imports from Indonesia; and 40 percent for imports from Laos.[33] On August 6, 2025, the White House announced an additional 25 percent ad valorem duty under IEEPA on products originating in India, scheduled to go into effect on August 27, 2025.[34]

[33] 90 FR 37963, August 6, 2025.

[34] The White House, "Addressing Threats to the United States by the Government of the Russian Federation, August 6, 2025," https://www.whitehouse.gov/presidential-actions/2025/08/addressing-threats-to-the-united-states-by-the-government-of-the-russian-federation/.

The product

Description and applications[35]

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

CSPV cells

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

[35] Unless otherwise noted, information in this section is based on Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules from Cambodia, Malaysia, Thailand, and Vietnam, Inv. Nos. 701-TA-722-725 and 731-TA-1690-1693 (Final), USITC Publication 5631, June 2025, pp. 1.20-1.29.

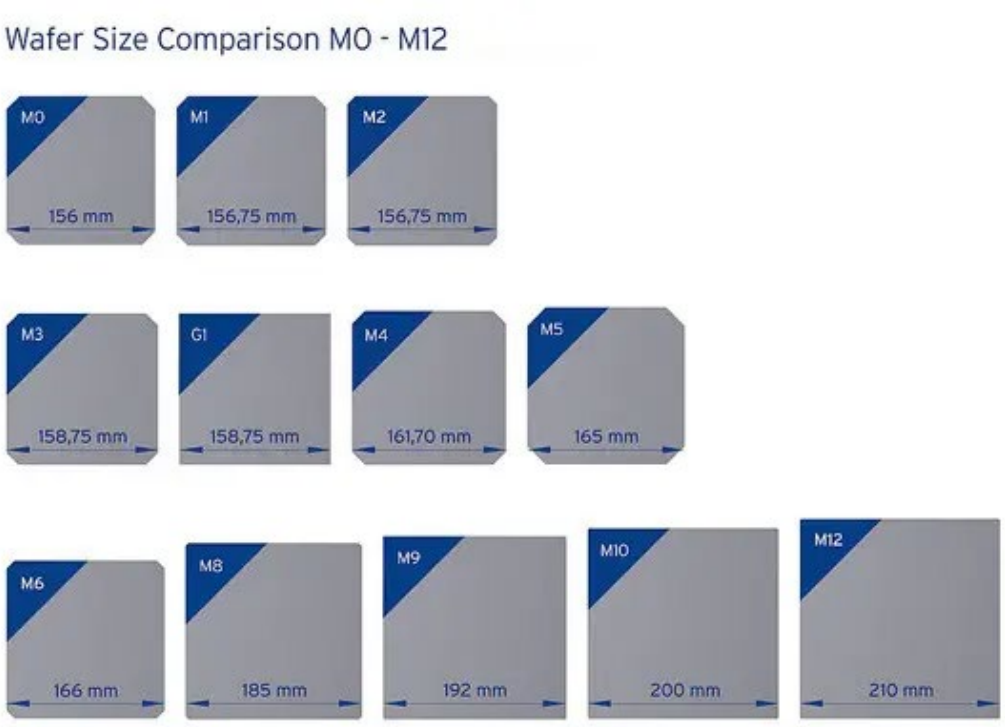
Figure 1.1 CSPV cells and modules: CSPV cells



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

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

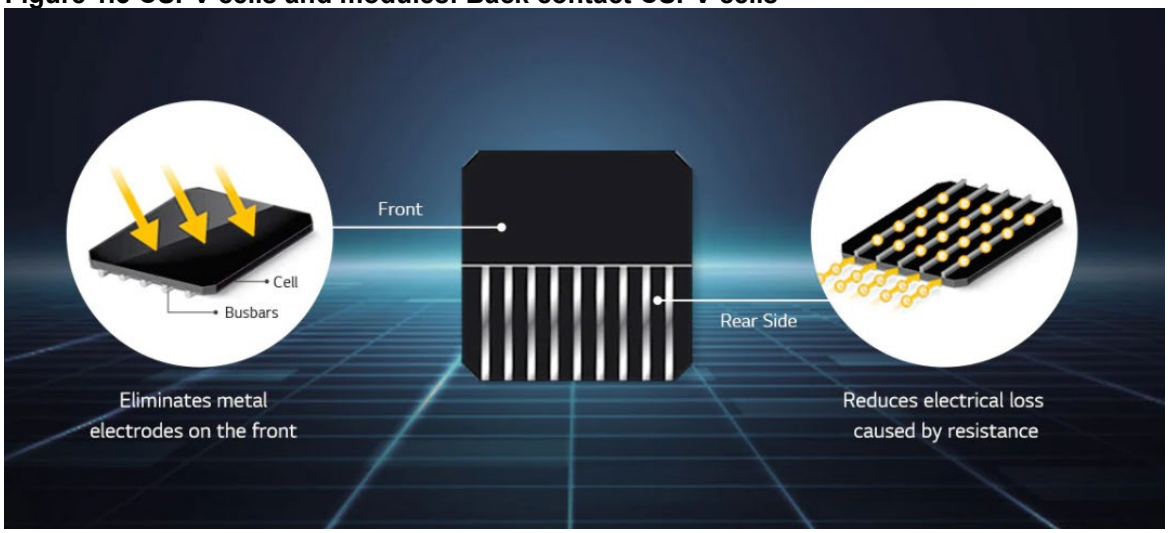
Figure 1.2 CSPV cells and modules: Examples of wafer sizes used in monocrystalline cell production



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

CSPV cells have a positive layer, a negative layer, and a positive-negative junction (p/n junction). Electricity is generated when sunlight strikes the CSPV cell, knocking electrons loose that flow onto thin metal "fingers" that run across the CSPV cell and conduct electricity to the busbars.[36] The number of busbars in cells varies, and has increased over time as more busbars improve efficiency and power output. Further, some cells contain no busbars, which can provide benefits such as reducing electrical losses and increasing the surface area of the CSPV cell that can absorb sunlight. Alternatively, some cells have metal contacts on the rear side of the CSPV cell, creating back (or rear contact) cells (including interdigitated back contact (IBC) cells) (figure 1.3). This provides several advantages such as reduced shading, improved cell interconnection, and better aesthetics.

Figure 1.3 CSPV cells and modules: Back contact CSPV cells

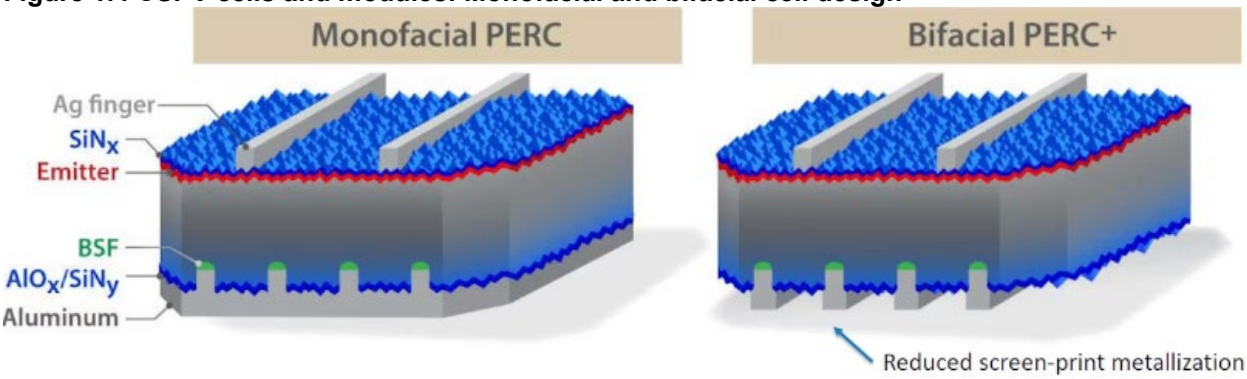


Source: Solar Analytica, "Report: LG Neon R," May 6, 2023, https://solaranalytica.com/lg-neon-r-report/.

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

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

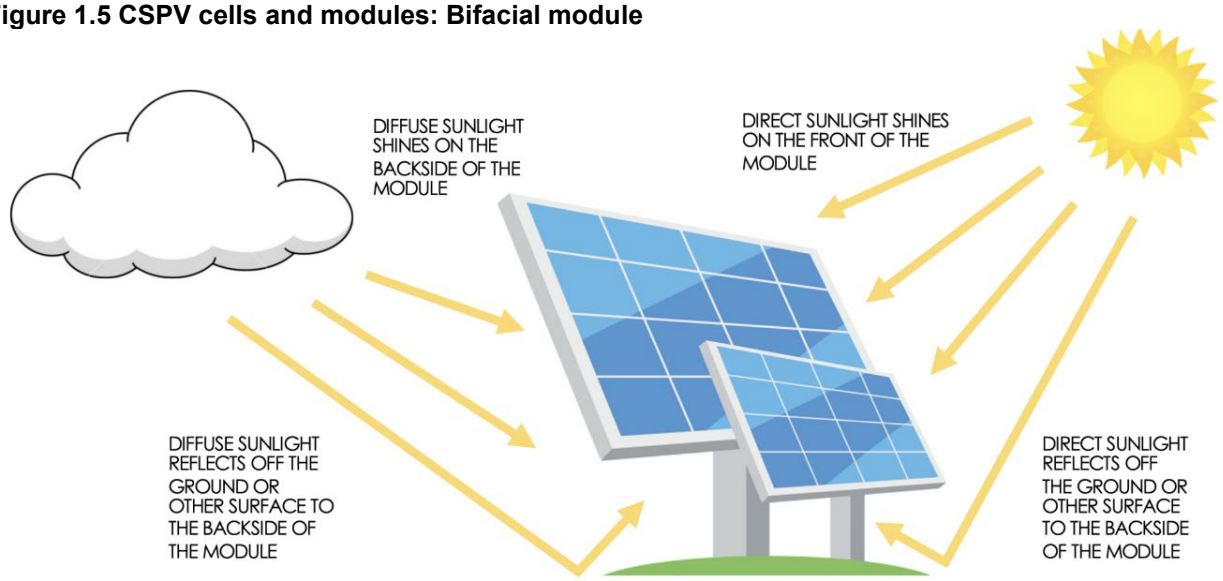
Figure 1.4 CSPV cells and modules: Monofacial and bifacial cell design



Source: RatedPower, "Bifacial modules," January 24, 2022, https://ratedpower.com/blog/bifacial-modules/.

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

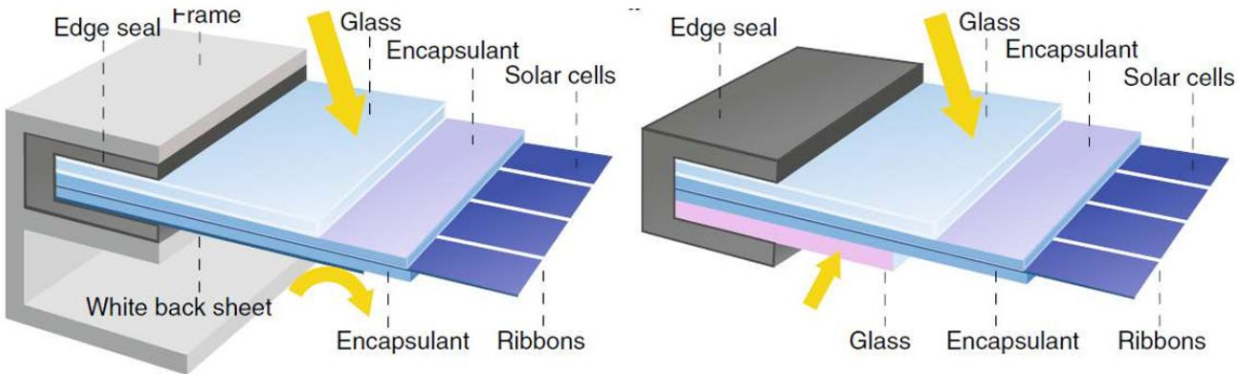
Figure 1.5 CSPV cells and modules: Bifacial module



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

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

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

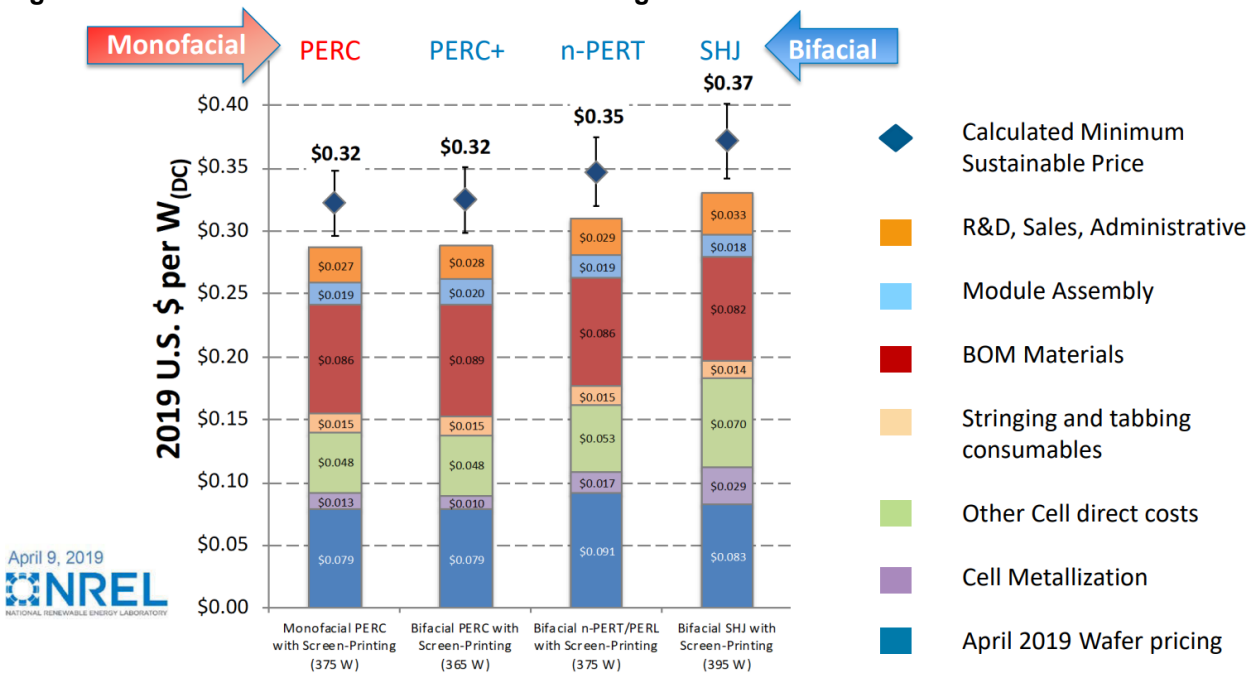


Source: IEA, Bifacial Photovoltaic Modules and Systems: Experience and Results from International Research and Pilot Applications, 2021, p. 28, https://iea-pvps.org/wp-content/uploads/2021/04/IEA-PVPS-T13-14_2021-Bifacial-Photovoltaic-Modules-and-Systems-report.pdf.

Monofacial and bifacial modules have moved closer to cost parity in recent years (figure 1.7), and manufacturers who have switched from assembling monofacial modules to bifacial modules have had to make a few adjustments to their production lines, such as replacing the traditional back sheet with glass and sourcing bifacial cells.[37] Figure 1.8 also presents the historical cost model results for solar PV module manufacturing in Asia in 2024 U.S. dollars per watt.

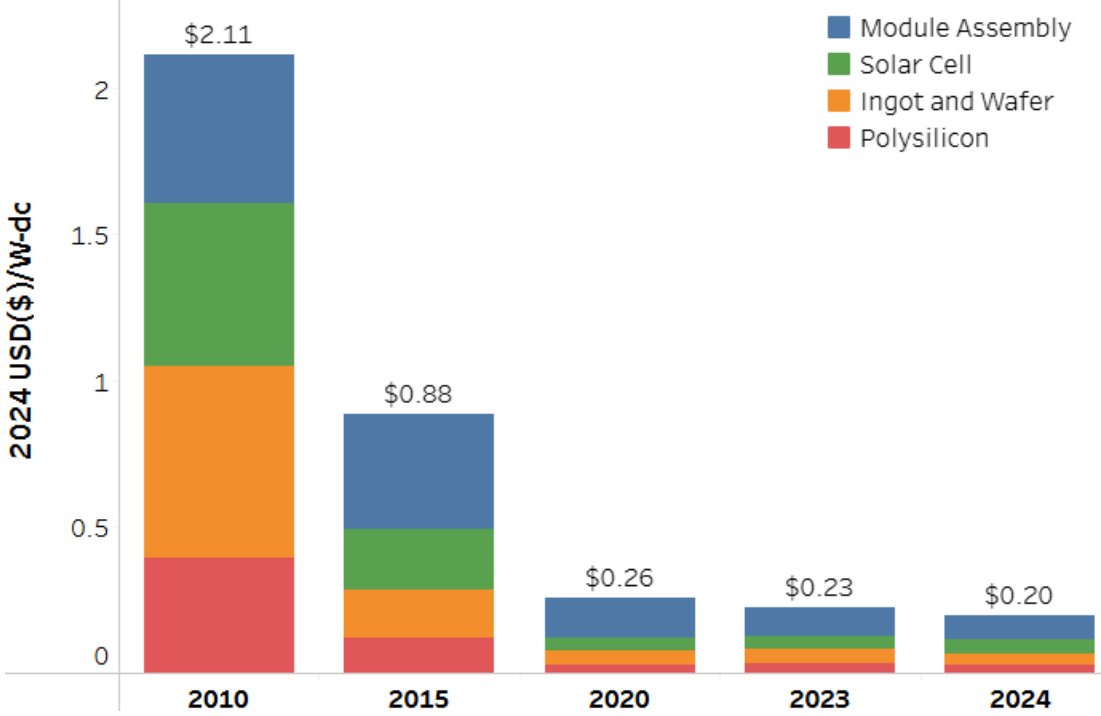
[37] While NREL does not have data comparing manufacturing costs between monofacial and bifacial modules more recent than 2019, domestic producers of CSPV products reported that monofacial and bifacial modules have reached cost parity since then. Producers use bifacial cells in a lot of cases for a monofacial module product, knowing that there's some capability being wasted by covering the back of the module with aluminum instead of glass, but forgoing the extra expense of making a different production line of monofacial cells. Conference transcript, pp. 73 to 78, 97 (Moskowitz).

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



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

Figure 1.8 CSPV cells and modules: Historical Cost Model Results for Solar PV Module Manufacturing



Source: NREL, "Solar Manufacturing Cost Analysis," July 26, 2024, https://www.nrel.gov/solar/market-research-analysis/solar-manufacturing-cost.

Note: The calculated overall minimum sustainable price is based on factory gate minimum sustainable price for each subcomponent. Results reflect production in Asia.

The two main types of CSPV cells are monocrystalline and multicrystalline (or polycrystalline) silicon, though there are various subtypes within these two categories, as discussed below. Monocrystalline cells are made from a single grown crystal and tend to convert sunlight into electricity more efficiently. Multicrystalline cells have a random crystal structure and tend to have a lower conversion efficiency, though there are a range of conversion efficiencies for monocrystalline and multicrystalline CSPV modules.[38]

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

Monocrystalline and multicrystalline cells commonly use PERC and related technologies.[39] PERC cells incorporate an additional rear dielectric layer that reflects light that did not generate electricity as it initially passed through the CSPV cell back into the CSPV cell. There is, therefore, another opportunity for the CSPV cell to absorb this light. PERC cells have a higher efficiency and improved performance in certain conditions, such as low light and high heat conditions.

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

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

CSPV laminates

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

[39] Related technologies include Passivated Emitter Rear Totally Diffused (PERT) and Passivated Emitter Rear Locally Diffused (PERL).

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

CSPV modules

CSPV modules typically consist of the laminate that is typically framed in aluminum, and then attached to one or more junction boxes (figure 1.9).[40] 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.[41] The junction box can be connected to other modules, an inverter (which converts the direct current generated by the system to alternating current), or a battery and a charge controller (which controls battery charging).

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

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

Figure 1.9 CSPV cells and modules: CSPV modules with half-cut cells



Source: PV Magazine webinars, "Filling in the gaps: The evolution of high-density module design," June 25, 2020, https://www.pv-magazine.com/wp-content/uploads/2020/06/03-pv-magazine-Webinar_Q-Cells-Presentation.pdf.

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

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

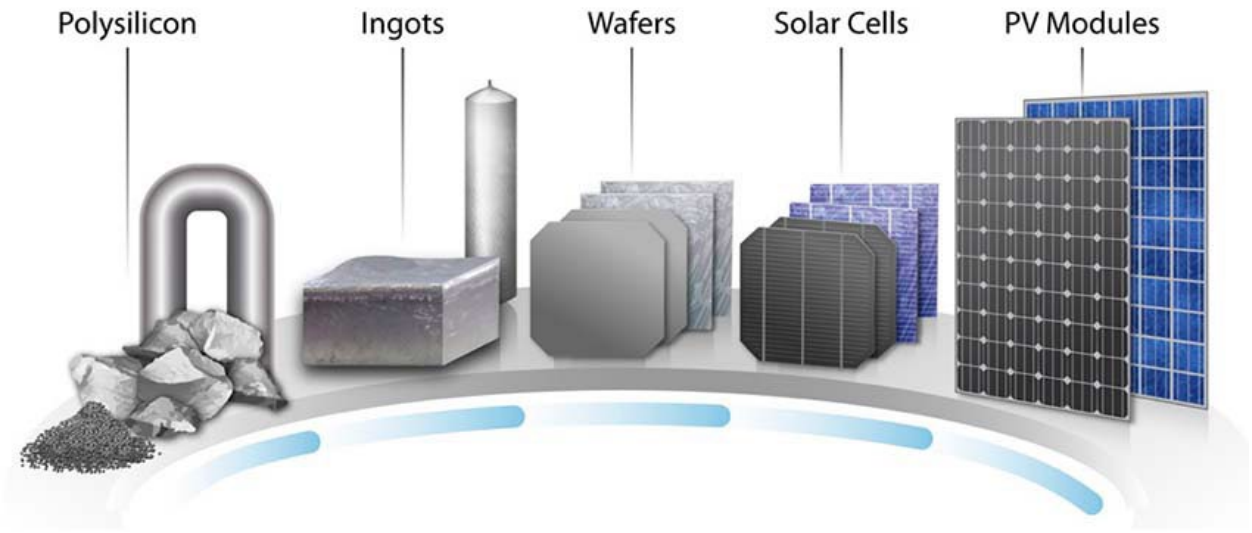
Manufacturing processes[42]

There are five principal stages involved in the manufacture of CSPV products. First, polysilicon is refined, then it is formed into ingots, which are sliced into wafers, converted to CSPV cells, and assembled into the finished product, modules (figure 1.10). These are discrete production steps that may be done in different plants or locations. Companies may source

[42] Unless otherwise noted, information in this section is based on Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules from Cambodia, Malaysia, Thailand, and Vietnam, Inv. Nos. 701-TA-722-725 and 731-TA-1690-1693 (Final), USITC Publication 5631, June 2025, pp. 1.29-1.34.

products at each stage of the value chain or produce the products in-house. CSPV cells are tested and inspected during the production process. The ingot and wafer production process differs for monocrystalline and multicrystalline cells, as discussed below.

Figure 1.10 CSPV cells and modules: Production process



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

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

Polysilicon

The first step in the CSPV value chain is refining polysilicon. There are multiple approaches to polysilicon refining. This discussion will focus on the Siemens method, which accounted for approximately 84 percent of total global polysilicon production in 2023, and fluidized bed reactor ("FBR") technology, which accounts for most of the remaining market.[43]

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

Next, heated silicon rods are inserted into a Siemens reactor, where they are further heated to 1,000 degrees Celsius or more. Hydrogen and trichlorosilane gas are fed into the

[43] IEA, Trends in Photovoltaic Applications 2024, retrieved August 4, 2025, p. 51, https://iea-pvps.org/wp-content/uploads/2024/10/IEA-PVPS-Task-1-Trends-Report-2024.pdf.

reactor. The silicon from the trichlorosilane is deposited onto the rods, which steadily increase in size until they are removed from the reactor about a week later. The resulting products are high purity polysilicon chunks or rocks.

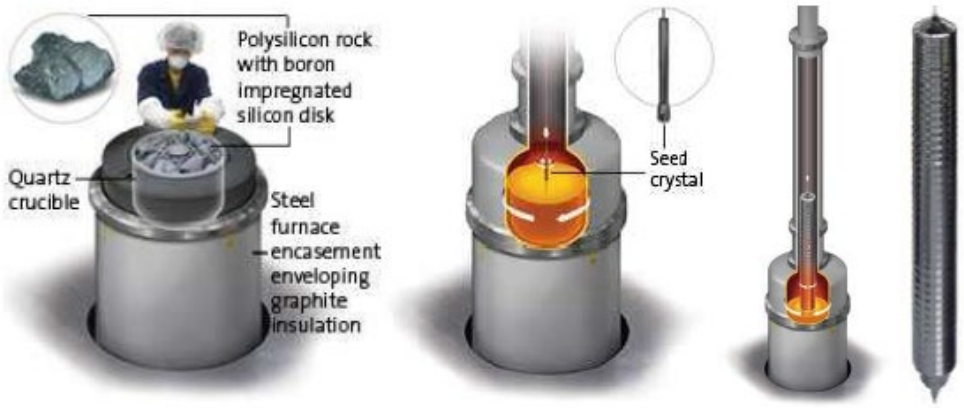
Instead of inserting rods, FBR uses seed granules of purified silicon. The seed granules are fed into a chamber that has heated silane gas entering from below and exiting above. The flow of gas 'fluidizes' the silicon granules, causing them to flow like a liquid, as the silane gas breaks down and deposits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

Ingots and wafers for monocrystalline cells

In the Czochralski process for producing crystals used in monocrystalline wafers, polysilicon rocks are first placed into a quartz crucible along with a small amount of boron, which is used to provide a positive electric orientation (figure 1.11). The crucible is then loaded into a Czochralski furnace and heated to about 2,500 degrees Fahrenheit. Once the polysilicon is melted, a seed crystal is lowered into the material and rotated, with the crucible rotated in the opposite direction. The melt starts to solidify on the seed and the seed is slowly raised out of the melt—creating a single long crystal. The crystal is then cooled before it is moved onto the next step. The process of growing the crystal takes about 2.5 days.

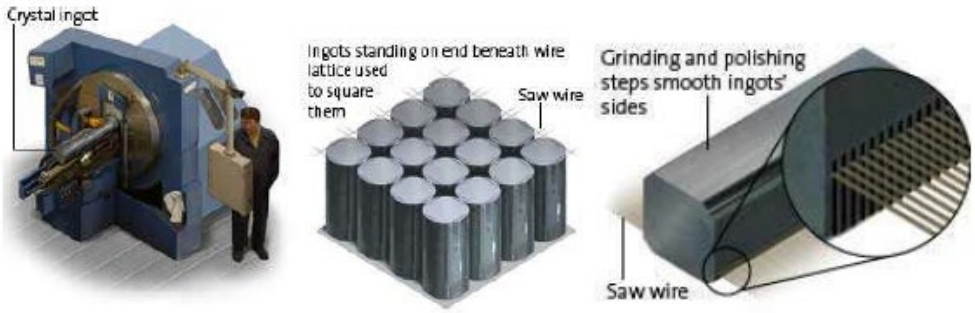
Once the crystal has cooled, it is processed into wafers. The top and tail (each end of the cylindrical crystal) are cut off (figure 1.12). The remaining portion of the crystal (or ingot) is cut into equal length pieces and then it is squared. In squaring, the rounded sides of the ingot are cut into four flat sides, leaving only rounded corners. A wire saw then slices the ingots into wafers. A majority of global manufacturers have switched to diamond wire saws for monocrystalline wafer slicing, which has several benefits including increasing the speed of the production process. The wafers are then cleaned, dried, and inspected.

Figure 1.11 Czochralski process, crucible loading/charging (left), seed crystal (second from left), crystal growing (second from right), and finished crystal (right)



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

Figure 1.12 Wafer production: Cutting off the top and tail (left), squaring (middle), and slicing into wafers (right)



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

Ingots and wafers for multicrystalline cells

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

CSPV cells

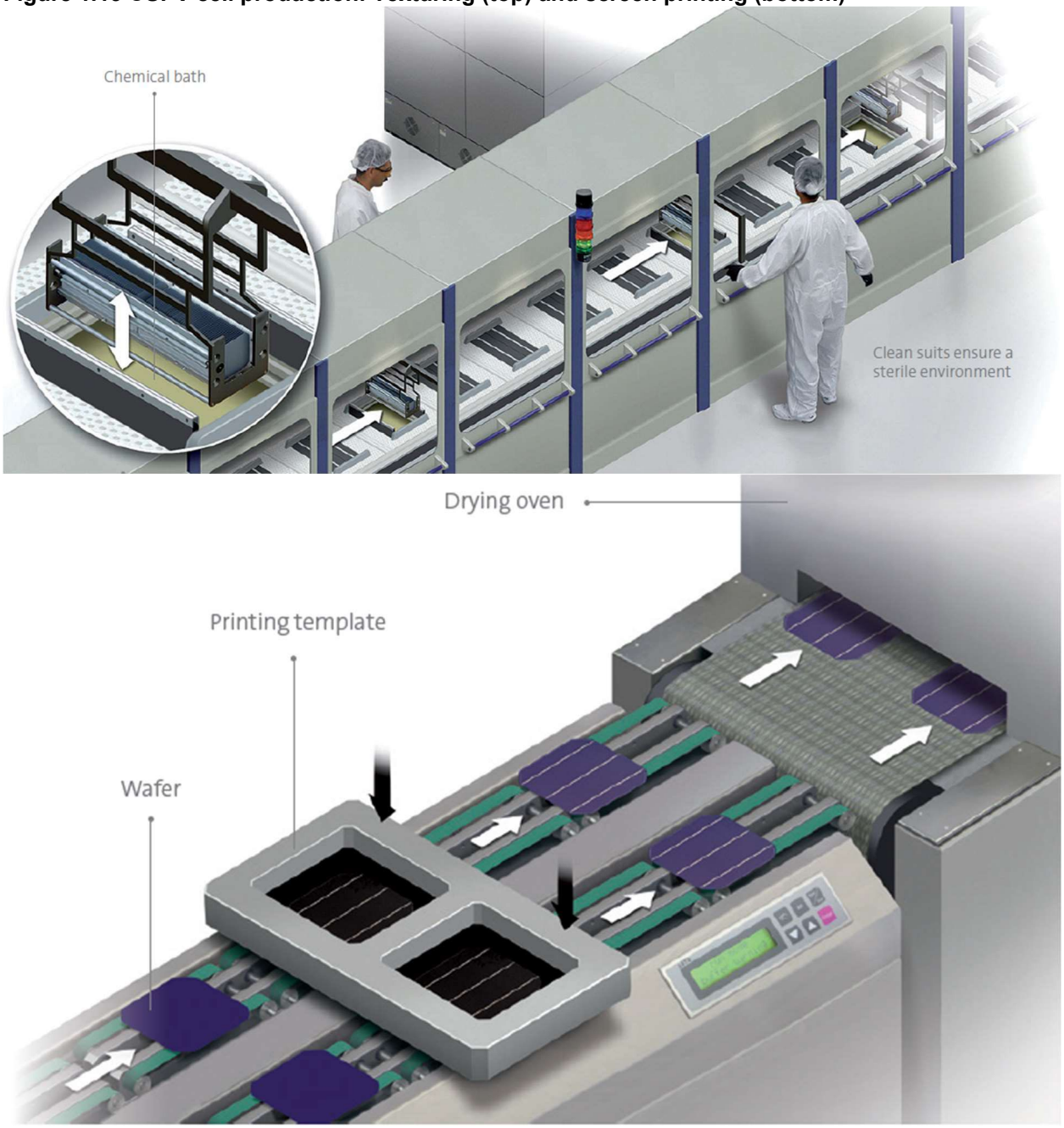
The monocrystalline and multicrystalline wafers, which are 180 to 200 micrometers thick, are next processed into CSPV cells.[44] CSPV cell production is capital intensive and requires a skilled workforce. Some firms use a highly automated manufacturing process, while others mix automation and manual labor in their production processes. The main steps in CSPV cell production are as follows:[45]

- **Cleaning and texturing:** First, the wafers are cleaned, then the surface of the wafer undergoes a chemical treatment that reduces the reflection of sunlight and increases light absorption (figure 1.13).
- **Diffusion:** Wafers are then moved into oven-like chambers where phosphorous is diffused into a thin layer of the surface, which gives the surface a negative potential electrical orientation. The combination of this layer and the boron-doped layer below creates a p/n junction.
- **Edge isolation:** A thin layer of silicon is then removed from the edge of the CSPV cell to separate the positive and negative layers.
- **Coating:** Next, a silicon nitride antireflective coating is added to the PV cells to increase the absorption of sunlight.
- **Printing:** Metals are then printed on the solar CSPV cell to collect the electricity. On the front of the CSPV cell, these metals are printed in thin metal strips called fingers, which are connected to the rest of the module via busbars. A metal layer, typically aluminum, is also printed on the back of the CSPV cell.
- **Testing and sorting:** The final step in the process is the testing and sorting of the CSPV cells based on their characteristics and efficiency.

[44] The cell manufacturing process varies by company and technology.

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

Figure 1.13 CSPV cell production: Texturing (top) and screen printing (bottom)



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

CSPV modules

The CSPV cells are next assembled into modules. The extent of automation and manual labor involved in module assembly varies depending on the company, though it is generally the most labor-intensive part of the manufacturing process. First, a string of CSPV cells is soldered together. A piece of glass is placed on the production line, on top of which is added a piece of ethyl vinyl acetate ("EVA"). The CSPV cells are laid out in a rectangular matrix that will provide the appropriate wattage and power requirements. Typically, a sealant is added, often EVA, and a back sheet is added. The CSPV cells are then laminated in a vacuum and are cured. At this stage, the CSPV cells are referred to as a "laminate." Frames are then usually attached to the laminate, and a junction box is attached to the back. In the final step, modules are cleaned and inspected. CSPV modules are tested and inspected throughout the production process.

Domestic like product issues

The petitioner proposed that the Commission should define a single like product coextensive with the scope, including both cells and modules.[46] Canadian Solar US Module Manufacturing Corporation ("Canadian Solar"), Heliene USA Inc. ("Heliene"), and Silfab Solar WA Inc. ("Silfab"), all U.S. producers of the domestic like product, argued that the Commission should recognize that CSPV solar cells and modules constitute separate domestic like products because 1) CSPV solar cells and modules support distinct markets, 2) CSPV solar cells and modules have distinct physical characteristics and functionality, 3) the transformation of a CSPV cell into a module adds significant value, 4) creating CSPV modules is a transformative and capital-intensive process, and 5) CSPV solar cells are not entirely dedicated to in-scope CSPV solar modules and have other applications.[47]

For more information on U.S. producers' and importers' responses on factor comparisons regarding differences and similarities between the intermediate and downstream products, see appendix D.

[46] Petition, pp. 3 to 4, and 22 to 26 and petitioners' postconference brief, p. 3.
[47] Canadian Solar, Heliene, and Silfab's joint postconference comments, pp. 1 to 8.

Part 2: Conditions of competition in the U.S. market

U.S. market characteristics

There are three primary on-grid market segments for CSPV products – residential, nonresidential (commercial), and utility. These segments account for the vast majority of CSPV modules sold in the United States while the vast majority of CSPV cells ("cells") are used in the production of CSPV modules ("modules"). Modules vary in size, nominal power output, and output efficiency. The current solar industry is characterized by regulations on imports, including the Withhold Release Order ("WRO") pursuant to the Uyghur Forced Labor Prevention Act ("UFLPA"); the Section 301, Section 232, and AD/CVD tariffs on CSPV products and certain inputs; the Section 201 safeguard measure on cells and modules; and tariffs initiated under the International Emergency Economic Powers Act ("IEEPA"). It is also characterized by policies to encourage domestic electricity generation and/or the use of domestic CSPV products in domestic electricity generation projects. These policies include the Investment Tax Credit ("ITC"), the Production Tax Credit ("PTC"), the Inflation Reduction Act ("IRA"); and the One Big Beautiful Bill Act ("OBBBA").[1]

Petitioners described the global market for CSPV products as supplied primarily by China, the world's largest CSPV products producer. For example, U.S. producer QCells stated that even in subject countries, CSPV products purchased for projects within those countries would likely come from China, while subject product would be for export.[2] This dynamic is largely driven by China's dominant global market position, persistent overcapacity, and strategic circumvention of U.S. trade measures.[3] Concerns exist regarding potential export controls on Chinese PV cell equipment and the difficulty in sourcing non-Chinese polysilicon. However, industry analysts report that import data shows controls on equipment have not been imposed.[4]

Both U.S. supply of CSPV products and U.S. demand for CSPV products increased over 2022 to 2024, as discussed in more detail below. According to data from Commission questionnaire responses, apparent U.S. consumption of CSPV products by quantity in 2024 was *** percent higher than in 2022, increasing by *** percent between 2022 and 2023, and then further increasing by *** percent between 2023 and 2024. Petitioners described the

[1] See Part 3 for more information.
[2] Conference transcript, pp. 67 to 68 (Moskowitz).
[3] Petitioners' postconference brief, pp. 17 to 18.
[4] Canadian Solar, Heliene, Silfab Joint postconference brief, attachment 5, p. 37.

U.S. CSPV market as currently having "irrationally high" inventory levels at multiple channels of distribution, including U.S. producers, importers, and purchasers.[5]

Eleven of 13 responding U.S. producers and 28 of 44 responding importers indicated that the CSPV cells and/or modules market was subject to distinctive conditions of competition. Specifically, U.S. producers and importers indicated that cells are almost always internally consumed by an affiliated module producer and are typically only sold to unaffiliated firms if the cell producer is not also participating in the modules market. Some U.S. producers and importers also stated that global capacity continues to outpace global demand, resulting in price declines and buildup of inventories. Firms also noted that tariffs and other policies, such as the UFLPA, have limited availability and/or increased costs for cells and raw materials, while government incentives such as the IRA have increased demand for domestic product. Additionally, producers and importers reported increasing global capacity has resulted in price declines and oversupply. Several firms also stated that oversupply combined with difficulties in accessing raw materials due to tariffs and other trade policies have resulted in price fluctuations for modules, while government incentives such as the IRA have increased demand. Multiple firms also reported that frequent improvements in technology are occurring within the industry, with one firm specifically noting shortened life cycles and another firm stating that cost pressures are increasingly pushing producers to address customer needs in efficient and reliable ways.

Impact of Section 301 tariffs, Section 232 tariffs, and new and modified tariffs

U.S. producers and importers were asked to report the impact of Section 301 tariffs, Section 232 tariffs, and 2025 new and modified tariffs on overall demand, supply, prices, or raw material costs. Most firms reported that the Section 301 tariffs had an impact on the market for CSPV products, with several firms specifically reporting increased costs for raw materials and machinery used to manufacture CSPV products. With respect to the Section 232 tariffs, most firms reported that the tariffs did not have an impact on the market for CSPV products or that they did not know if the tariffs had an impact. Additionally, almost all firms reported that tariff announcements and tariff changes associated with Presidential actions since January 1, 2025 have impacted the CSPV cells and modules market in the United States. These firms mostly described higher prices for CSPV cells and modules and higher costs for the inputs into

[5] Petitioners' postconference brief, pp. 20 to 21 and conference transcript, p. 76 (Moskowitz).

producing CSPV cells and modules. Others described the effects as difficult to determine in the short run.

Table 2.1 CSPV cells and modules: Count of firms' responses regarding the impact of the section 301 tariffs on Chinese origin products

Count in number of firms

Firm type	No	Yes	Don't know
U.S. producers	2	8	4
Importers	6	24	12

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

Table 2.2 CSPV cells and modules: Count of firms' responses regarding the impact of the section 232 tariffs on steel and aluminum imports

Count in number of firms

Firm type	No	Yes	Don't know
U.S. producers	4	4	5
Importers	14	12	18

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

Table 2.3 CSPV cells and modules: Count of firms' responses regarding the impact of new or modified tariffs since January 1, 2025

Count in number of firms

Firm type	No	Yes	Don't know
U.S. producers	0	8	4
Importers	0	30	12

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

Channels of distribution

U.S. shipments from U.S. producers were primarily sold to distributors and residential installers during 2022 and 2023, and then shifted to primarily utilities and developers, and distributors in 2024.[6] U.S. producers reported no U.S. shipments to module assemblers during 2022 and 2023, and a small amount in 2024.[7]

Almost all shipments of CSPV products from India went to residential installers and utilities/developers in 2022 with a greater shift to utilities/developers in 2023 and 2024. A

[6] The vast majority of U.S. shipments from U.S. producers to utilities and developers in 2024 were from *** and ***.

[7] U.S. producer shipments to module assemblers in 2024 ***. *** U.S. producer questionnaire response, sections 2.2 and 2.9.

majority of shipments of CSPV products from Indonesia went to distributors and module assemblers throughout the period of investigation. No U.S. shipments of imports from Indonesia or Laos were reported as sold to residential and very little to commercial installers. A majority of the shipments of CSPV products from nonsubject countries went to utilities/developers.

Table 2.4 CSPV cells and modules: Share of U.S. shipments by source, channel of distribution, and period

Shares in percent; interim is January through March

Source	Channel	2022	2023	2024	Interim 2024	Interim 2025
United States	Distributors	***	***	***	***	***
United States	Module assemblers	***	***	***	***	***
United States	Residential installers	***	***	***	***	***
United States	Commercial installers	***	***	***	***	***
United States	Utilities/developers	***	***	***	***	***
India	Distributors	***	***	***	***	***
India	Module assemblers	***	***	***	***	***
India	Residential installers	***	***	***	***	***
India	Commercial installers	***	***	***	***	***
India	Utilities/developers	***	***	***	***	***
Indonesia	Distributors	***	***	***	***	***
Indonesia	Module assemblers	***	***	***	***	***
Indonesia	Residential installers	***	***	***	***	***
Indonesia	Commercial installers	***	***	***	***	***
Indonesia	Utilities/developers	***	***	***	***	***
Laos	Distributors	***	***	***	***	***
Laos	Module assemblers	***	***	***	***	***
Laos	Residential installers	***	***	***	***	***
Laos	Commercial installers	***	***	***	***	***
Laos	Utilities/developers	***	***	***	***	***
Subject	Distributors	***	***	***	***	***
Subject	Module assemblers	***	***	***	***	***
Subject	Residential installers	***	***	***	***	***
Subject	Commercial installers	***	***	***	***	***
Subject	Utilities/developers	***	***	***	***	***
Nonsubject	Distributors	***	***	***	***	***
Nonsubject	Module assemblers	***	***	***	***	***
Nonsubject	Residential installers	***	***	***	***	***
Nonsubject	Commercial installers	***	***	***	***	***
Nonsubject	Utilities/developers	***	***	***	***	***
All imports	Distributors	***	***	***	***	***
All imports	Module assemblers	***	***	***	***	***
All imports	Residential installers	***	***	***	***	***
All imports	Commercial installers	***	***	***	***	***
All imports	Utilities/developers	***	***	***	***	***

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

Geographic distribution

U.S. producers and importers reported selling CSPV cells and modules to all regions in the United States (table 2.5). For U.S. producers, *** percent of sales were within 100 miles of their production facility, *** percent were between 101 and 1,000 miles, and *** percent were over 1,000 miles. Importers sold *** percent within 100 miles of their U.S. point of shipment, *** percent between 101 and 1,000 miles, and *** percent over 1,000 miles.

Table 2.5 CSPV cells and modules: Count of U.S. producers' and U.S. importers' geographic markets

Count in number of firms reporting

Region	U.S. producers	India	Indonesia	Laos	Subject sources
Northeast	9	6	6	2	12
Midwest	10	7	5	2	12
Southeast	12	5	5	3	10
Central Southwest	12	7	9	4	16
Mountains	9	4	3	2	7
Pacific Coast	10	6	8	4	14
Other	5	0	2	2	2
All regions (except Other)	7	3	3	2	6
Reporting firms	14	12	10	4	22

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

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

Supply and demand considerations

U.S. supply

Table 2.6 provides a summary of the supply factors regarding CSPV cells and modules from U.S. producers and from producers in India, Indonesia, and Laos. During 2022 to 2024, capacity for both cells and modules generally increased for both the United States and subject countries. For 2024, capacity utilization for cells was high in Laos, but lower in India and Indonesia. For modules, the utilization rate decreased for producers in the United States and Indonesia but increased in India. No subject cell producers reported being able to shift production, and for modules, all but a few producers in the United States, India, and Indonesia reported being unable to shift production.

Table 2.6 CSPV cells and modules: Supply factors that affect the ability to increase shipments to the U.S. market, by country

Quantity in kilowatts; ratio and share in percent

Factor	Measure	United States	India	Indonesia	Laos	Subject sources
Cells: Capacity 2022	Quantity	***	***	***	***	***
Cells: Capacity 2024	Quantity	***	***	***	***	***
Cells: Capacity utilization 2022	Ratio	***	***	***	***	***
Cells: Capacity utilization 2024	Ratio	***	***	***	***	***
Cells: Inventories to total shipments 2022	Ratio	***	***	***	***	***
Cells: Inventories to total shipments 2024	Ratio	***	***	***	***	***
Cells: Home market shipments 2024	Share	***	***	***	***	***
Cells: Non-US export market shipments 2024	Share	***	***	***	***	***
Cells: Ability to shift production	Count	***	***	***	***	***
Modules: Capacity 2022	Quantity	***	***	***	***	***
Modules: Capacity 2024	Quantity	***	***	***	***	***
Modules: Capacity utilization 2022	Ratio	***	***	***	***	***
Modules: Capacity utilization 2024	Ratio	***	***	***	***	***
Modules: Inventories to total shipments 2022	Ratio	***	***	***	***	***
Modules: Inventories to total shipments 2024	Ratio	***	***	***	***	***
Modules: Home market shipments 2024	Share	***	***	***	***	***
Modules: Non-US export market shipments 2024	Share	***	***	***	***	***
Modules: Ability to shift production	Count	***	***	***	***	***

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

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Counts equal the number of firms reporting "yes". Zeroes, null values, and undefined calculations are suppressed and shown as “—“.

Note: Responding U.S. producers accounted for all known U.S. production of CSPV cells and a large majority of known U.S. production of CSPV modules in 2024. Responding foreign producer/exporter firms accounted for *** percent of known production of CSPV cells and modules in India, *** percent of cells and modules production in Indonesia, and *** percent of cells and modules production in Laos. For additional data on the number of responding firms and their share of U.S. production and of U.S. imports from each subject country, please refer to Parts 3 and 7.

Domestic production

Based on available information, U.S. producers of CSPV products have the ability to respond to changes in demand with small changes in the quantity of shipments of U.S. produced cells and large changes in the quantity of shipments of U.S.-produced modules to the U.S. market. The main factor mitigating responsiveness of supply in cells is the limited capacity of CSPV cells, as domestic commercial production did not restart until late 2024.[8] The main contributing factors to the high degree of responsiveness of supply in modules include the high availability of unused capacity, increased availability of inventories, and ability to ship to all regions of the United States.[9] Factors mitigating responsiveness of supply of modules include the inability to shift shipments from alternate markets or inventories and limited ability to shift to or from alternate products.

Domestic modules capacity increased by *** percent between 2022 and 2024, while inventories increased by *** percent, leading capacity utilization to decrease by *** percentage points. All but two firms reported that they were not able to switch production to other products. U.S. producer, ***, reported that some of its equipment can be used for production of amorphous silicon modules as well. U.S. producer *** reported that it can switch production to other PV products (such as modules with different nameplate capacities) as long as those products use the same technology (e.g., N-type) and manufacturing processes.

Subject imports from India

Based on available information, producers of CSPV cells and modules from India have the ability to respond to changes in demand with large changes in the quantity of shipments of CSPV cells and modules to the U.S. market. The main contributing factors to this degree of responsiveness of supply are the availability of unused capacity for both cells and modules and the ability to shift shipments of cells from alternate markets.

Production capacity for both cells and modules increased in India from 2022 to 2024 by *** percent and *** percent respectively. While the capacity utilization rate increased for cells, by *** percentage points, the capacity utilization rate for modules increased by ***

[8] Suniva, the only responding U.S. producer with production of CSPV cells, reported ***. See Suniva's U.S. producer questionnaire response, section 4.19b.

[9] See Part 3 for data on U.S. producers' reported inventories. See table 2.5 for U.S. producers' reported geographic distribution of sales.

percentage points. A large majority of shipments of modules reported by producers in India were reported as home market shipments with the remaining reported as exports to the U.S.

Subject imports from Indonesia

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

Production capacity for both cells and modules increased in Indonesia, however the capacity utilization rates declined to *** percent for cells and decreased *** percent for modules. During 2022 to 2024, a large share (*** percent) of CSPV cell shipments from Indonesia were reported as internal consumption while the vast majority (*** percent) of shipments of CSPV modules were reported as exports to the U.S.

Subject imports from Laos

Based on available information, producers of CSPV cells and modules from Laos have the ability to respond to changes in demand with large changes in the quantity of shipments of CSPV cells and modules to the U.S. market. The main contributing factors to this degree of responsiveness of supply are demonstrated ability to add large amounts of capacity during 2022 to 2024.

Production capacity and the capacity utilization rates for both cells and modules increased significantly in Laos going from being *** in 2022 to *** percent in 2024. During 2022 to 2024, a large share (*** percent) of CSPV cell shipments from Laos was reported as non-U.S. export market shipments, while a portion of shipments, *** percent, of CSPV modules reported by producers in Laos were reported as exports to the United States.[10]

Imports from nonsubject sources

Nonsubject imports accounted for *** percent of total U.S. imports by quantity in 2024. The majority of nonsubject imports in 2024 came from Cambodia, Malaysia, Thailand, and/or Vietnam. See Part 4 for more information on nonsubject imports.

[10] See Part 7 for additional data on foreign producers' reported shipments.

Supply constraints

Ten U.S. producers and 36 importers reported that they had not experienced supply constraints since January 1, 2022. Four U.S. producers and eight importers indicated that there were supply constraints. Among U.S. producers, *** reported polysilicon undersupply in 2022 which shifted to oversupply in 2023. In 2024, U.S. producer *** resumed production of CSPV cells but quickly reached ***, while *** delayed new solar shingle certification due to pending tariffs. U.S. producer *** struggled with labor and raw material supply constraints. Among U.S. importers, *** reported experiencing supply chain disruptions due to the COVID-19 pandemic in both 2022 and 2023, followed by extended custom holds for some shipments in 2024. In 2024 and 2025, importer *** reported shipping route delays due to global conflicts and container availability issues caused by a shipping rush to beat reciprocal tariffs.

U.S. demand

Based on available information, the overall demand for CSPV products is likely to experience moderate changes in response to changes in price. The main contributing factors are the somewhat limited range of substitute products and the moderate-to-large cost share of CSPV products in most of their end-use products.

Demand for CSPV products is derived from the demand for solar electricity, which is influenced by factors such as cost competitiveness with traditional energy sources, environmental concerns, a desire for national energy independence, total energy consumption, and the availability of federal, state, and local incentives to produce and/or install CSPV products.[11] According to the EIA, 37 GW of solar power capacity was added to the electric power sector in 2024, almost double solar capacity additions in 2023, and an additional 26 GW of solar capacity is expected to be added in 2025, and 22 GW in 2026.[12]

Electricity demand in the United States is supplied primarily by conventional sources, but the share of electricity generated from renewable energy sources has been steadily increasing. As shown in table 2.7, solar energy grew from 3.4 percent to 5.1 percent of utility-scale electricity generation between 2022 and 2024.

[11] Crystalline Silicon Photovoltaic Cells, Whether or Not Partially or Fully Assembled Into Other Products: Monitoring Developments in the Domestic Industry, Investigation No. TA-201-075 (Second Monitoring), USITC Publication 5494, February 2024, p. 2.12.

[12] Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules from Cambodia, Malaysia, Thailand, and Vietnam Investigation No 701-TA-722–725 and 731-TA-1690–1693 (Final) prehearing brief, exh. 5.

Table 2.7 CSPV cells and modules: Share of net electricity generation in the United States, by type and year

Share in percent

Electricity generation type	2022	2023	2024
Natural gas	39.9	43.2	43.3
Nuclear	18.2	18.5	18.2
Coal	19.7	16.1	15.2
Wind	10.3	10.1	10.5
Solar	3.4	4.0	5.1
All other	8.6	8.1	7.7
All electricity generation types	100.0	100.0	100.0

Source: EIA, http://www.eia.gov/electricity/data/browser/, retrieved August 20, 2025.

For decades prior to 2022, domestic electricity generation from "clean" sources have been eligible for tax credits from the ITC and PTC. In 2022, the IRA extended these programs and added two new ones, the clean electricity investment tax credit ("CEITC") and the clean electricity production tax credit ("CEPTC"). Additionally, the IRA added "bonus credits" (in all four programs) for electricity generation projects that meet domestic content requirements.[13] However, the OBBBA of 2025 shortened the deadlines for projects to qualify for tax credits as well as restricting qualifications for some types of foreign ownership. The OBBBA continued the IRA's bonus credits.[14]

Additionally, Federal programs such as the Weatherization Assistance Program ("WAP") and the Low Income Home Energy Assistance Program ("LIHEAP") provide funds that can be applied to using solar energy. The WAP, for example, provides funding to states to help low-income households reduce energy costs by increasing their home's energy efficiency, and explicitly includes solar as such a method.[15]

End uses and cost share

The majority of reported end uses for CSPV cells were for assembly into CSPV modules, while the majority of reported end uses for CSPV modules include residential, commercial, and utility systems.[16]

[13] See Congressional Research Service, Domestic Content Requirements for Electricity Tax Credits in the Inflation Reduction Act (IRA), January 16, 2025.

[14] See https://www.thomsonreuters.com/en-us/posts/sustainability/one-big-beautiful-bill-act-clean-energy/, downloaded August 15, 2025.

[15] See https://www.energy.gov/eere/solar/energy-related-federal-financial-assistance-programs , accessed August 15, 2025.

[16] Other reported end uses for cells include solar roofing shingles, off-grid trucks, off-grid RVs, and off-grid trailers, while other reported end uses for modules include solar panels, commercial & utility systems, electric fence chargers, residential systems, solar shingles, tonneau covers, and utility systems.

CSPV products account for a moderate-to-large share of the cost of the end-use products in which they are used. U.S. producers' and importers' reported cost shares for CSPV cells used for modules ranged from 20 to 67 percent. Reported cost shares for CSPV modules varied widely, but most responding U.S. producers and importers estimated that CSPV modules were 5 to 60 percent of the cost of a commercial system, 19 to 60 percent of the cost of a utility system, and 10-13 percent of the cost of a residential system.

Business cycles

Eleven of 13 U.S. producers and 22 of 43 importers indicated that the CSPV products market was subject to business cycles. Specifically, responding U.S. producers and importers cited seasonal trends due to weather, with some firms specifying that winter weather slows down installations and that summer months are more active. Two U.S. producers/importers reported a surge in demand for closing projects by the end of the year, while another reported stronger market demand due to incentives to promote solar installation in the United States. Two U.S. producers (***) reported that the solar industry is subject to the broader macroeconomic cycles of expansion and recession along with factors such as interest rates, economic growth (energy demand), and inflation.

Demand trends

Most U.S. producers and importers reported that U.S. and foreign demand for CSPV products increased, either steadily or with fluctuations, since January 1, 2022 (table 2.8). In additional comments, multiple firms described large increases in demand, sometimes attributing the increases to Federal subsidies and desires to generate more "clean" energy.

Table 2.8 CSPV cells and modules: Count of firms' responses regarding overall domestic and foreign demand, by firm type

Count in number of firms reporting

Market	Firm type	Steadily Increase	Fluctuate Up	No change	Fluctuate Down	Steadily Decrease
Domestic demand	U.S. producers	8	4	1	0	0
Domestic demand	Importers	18	15	4	4	3
Foreign demand	U.S. producers	6	0	3	0	0
Foreign demand	Importers	26	2	3	0	0

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

Substitute products

Most responding U.S. producers (10 of 12) and importers (35 of 38) reported that there were no substitutes for CSPV cells. Regarding CSPV modules, (8 of 13) U.S. producers and (35 of 40) importers reported that there were no substitutes. Those firms listing substitutes identified other types of thin film modules in utility scale applications. U.S. producer *** identified amorphous silicon solar and CIGS solar as substitutes for battery maintenance.

Substitutability issues

This section assesses the degree to which U.S.-produced CSPV and imports of CSPV from subject countries can be substituted for one another by examining the importance of certain purchasing factors and the comparability of CSPV from domestic and imported sources based on those factors. Based on available data, staff believes that there is a moderate-to-high degree of substitutability between domestically produced CSPV and CSPV imported from subject sources.[17] Factors contributing to the moderate-to-high level of substitutability include the high degree of interchangeability between domestic and subject sources. Factors reducing substitutability include different lead times from domestic and subject sources and significant factors other than price that firms consider. Due to differences in availability, substitutability is likely to be closer to moderate for cells and closer to high for modules.

Factors affecting purchasing decisions

Most important purchase factors

Purchasers responding to lost sales lost revenue allegations[18] were asked to identify the main purchasing factors their firm considered in their purchasing decisions for CSPV.

The most often cited top three factors firms consider in their purchasing decisions for CSPV were quality (four firms), availability/supply (three firms), and price/cost (two firms) as shown in table 2.9. Quality was the most frequently cited first-most important factor (cited by all four firms), followed by availability/supply (one firm).

[17] The degree of substitution between domestic and imported CSPV depends upon the extent of product differentiation between the domestic and imported products and reflects how easily purchasers can switch from domestically produced CSPV to the CSPV imported from subject countries (or vice versa) when prices change. The degree of substitution may include such factors as quality differences (e.g., grade standards, defect rates, etc.), and differences in sales conditions (e.g., lead times between order and delivery dates, reliability of supply, product services, etc.).

[18] This information is compiled from responses by purchasers identified by Petitioners to the lost sales lost revenue allegations. See Part 5 for additional information.

Table 2.9 CSPV modules: Count of ranking of factors used in purchasing decisions as reported by purchasers, by factor

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

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

Note: Other factors include supplier bankability, commercial terms, and long-term relationships.

Lead times

U.S. producers reported the majority (59.4 percent) of their CSPV cells and modules as sold from inventory, with lead times averaging 33 days. The remaining 40.6 percent of their commercial shipments were produced-to-order with lead times averaging 78 days.[19] U.S. importers reported most (99.7 percent) of their CSPV products as produced-to-order, with lead times averaging 149 days. The remaining 0.3 percent of their commercial shipments were sold from U.S. inventories, with lead times averaging 23 days.

Comparison of U.S.-produced and imported CSPV

In order to determine whether U.S.-produced CSPV products can generally be used in the same applications as imports from India, Indonesia, and Laos, U.S. producers and importers were asked whether the products can always, frequently, sometimes, or never be used interchangeably. As shown in tables 2.10 and 2.11, most responding U.S. producers and importers reported that CSPV products were always or frequently interchangeable across all sources. U.S. importers were more likely than U.S. producers to report that products from different sources were sometimes or never interchangeable. U.S. producer *** reported that ***. Importers *** add that the interchangeability restriction can also be based on the power output of the panels, as most panels have higher output then what is used for solar-powered pumps. Importer *** described CSPV cell and module specifications, quality, and consistency as affecting interchangeability among imported CSPV products.

[19] More firms reported lead times for CSPV products sold from inventory than produced-to-order.

Table 2.10 CSPV cells and modules: Count of U.S. producers reporting the interchangeability between product produced in the United States and in other countries, by country pair

Count in number of firms reporting

Country pair	Always	Frequently	Sometimes	Never
United States vs. India	6	1	2	0
United States vs. Indonesia	7	2	2	0
United States vs. Laos	6	2	1	0
India vs. Indonesia	6	1	1	0
India vs. Laos	6	1	1	0
Indonesia vs. Laos	6	2	1	0
United States vs. Other	6	2	3	0
India vs. Other	6	1	1	0
Indonesia vs. Other	6	2	1	0
Laos vs. Other	6	2	1	0

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

Table 2.11 CSPV cells and modules: Count of importers reporting the interchangeability between product produced in the United States and in other countries, by country pair

Count in number of firms reporting

Country pair	Always	Frequently	Sometimes	Never
United States vs. India	6	7	4	3
United States vs. Indonesia	9	6	6	2
United States vs. Laos	6	6	3	2
India vs. Indonesia	7	5	4	0
India vs. Laos	7	3	5	0
Indonesia vs. Laos	7	7	4	0
United States vs. Other	9	8	4	2
India vs. Other	9	4	4	0
Indonesia vs. Other	10	6	4	0
Laos vs. Other	9	5	5	0

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

In addition, U.S. producers and importers were asked to assess how often differences other than price were significant in sales of CSPV products from the United States, subject, or nonsubject countries. As seen in tables 2.12 and 2.13, most U.S. producers reported that differences other than price were sometimes or never significant while importers' responses were mixed; the majority of importers reported that differences other than price were sometimes or always significant. Importers reported several non-price factors influencing purchasing decisions, including shorter delivery lead times (as reported by ***) and differences in product quality and technical support. U.S. importer *** reported that U.S.-origin products have more consistent quality control and

broader certifications. Other importers also identified domestic content, quality, service, reliability, customer relationships, end-use application requirements, and supply chain considerations as important non-price factors.

Table 2.12 CSPV cells and modules: Count of U.S. producers reporting the significance of differences other than price between product produced in the United States and in other countries, by country pair

Count in number of firms reporting

Country pair	Always	Frequently	Sometimes	Never
United States vs. India	2	2	2	3
United States vs. Indonesia	2	2	4	3
United States vs. Laos	2	1	3	3
India vs. Indonesia	2	1	2	3
India vs. Laos	2	1	2	3
Indonesia vs. Laos	2	1	3	3
United States vs. Other	2	2	3	4
India vs. Other	2	1	2	3
Indonesia vs. Other	2	1	3	3
Laos vs. Other	2	1	3	3

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

Table 2.13 CSPV cells and modules: Count of importers reporting the significance of differences other than price between product produced in the United States and in other countries, by country pair

Count in number of firms reporting

Country pair	Always	Frequently	Sometimes	Never
United States vs. India	8	3	4	3
United States vs. Indonesia	5	1	13	2
United States vs. Laos	5	2	6	2
India vs. Indonesia	5	2	4	3
India vs. Laos	5	2	3	3
Indonesia vs. Laos	3	1	9	3
United States vs. Other	5	5	6	4
India vs. Other	5	4	2	4
Indonesia vs. Other	3	2	8	4
Laos vs. Other	3	2	7	4

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

Part 3: U.S. producers' production, shipments, and employment

The Commission analyzes a number of factors in making injury determinations (see 19 U.S.C. §§ 1677(7)(B) and 1677(7)(C)). Information on the subsidies and dumping margins was presented in Part 1 of this report and information on the volume and pricing of imports of the subject merchandise is presented in Part 4 and Part 5. Information on the other factors specified is presented in this section and/or Part 6 and (except as noted) is based on the questionnaire responses of fifteen firms that accounted for the *** of U.S. production of CSPV modules during 2024 and one firm, Suniva that accounted for virtually all known U.S. production of CSPV cells during 2024.[1] [2] [3]

U.S. producers

The Commission issued a U.S. producer questionnaire to 23 firms based on information contained in the petition, and outside sources. Fifteen firms provided usable data on their operations.[4] Table 3.1 lists U.S. producers of CSPV cells and modules, their production locations, positions on the petition, and shares of total production.

[1] ***. ***'s U.S. producer questionnaire response, section 2.2.

The Commission received a letter on behalf of ***, a U.S. manufacturer of solar modules in Tolleson, Arizona, and wholly owned subsidiary of *** since April 2025. The firm began operations since it was acquired by *** and during January to March 2025, *** reported the following: 1) installed capacity, *** kilowatts; 2) practical CSPV module capacity, *** kilowatts; 3) production of CSPV modules, *** kilowatts; 4) transfers to related firms, *** kilowatts; and 5) *** inventories. Letter from ***, July 31, 2025.

[2] Domestic industry representatives testified that ES Foundry in Greenwood, South Carolina is also commercially active producing and shipping CSPV cells in the U.S., while several other cell factories are under construction. Conference transcript, p. 100 (Moskowitz).

[3] Four U.S. producers of CSPV modules, *** were issued questionnaires but did not provide a response. One U.S. producer, *** submitted a late questionnaire which is not included in the report.

[4] One firm, ***, certified that it did not produce CSPV cells and modules in the United States since January 1, 2022. ***'s U.S. producer questionnaire response.

Table 3.1 CSPV cells and modules: U.S. producers, their positions on the petition, production locations, and shares of reported production, 2024

Firm	Position on petition	Production location(s)	Share of module production	Share of cell production
Canadian Solar	***	Mesquite, TX	***	***
GAF Energy	***	San Jose, CA Georgetown, TX	***	***
Hanwha GA	Petitioner	Dalton, GA Cartersville, GA	***	***
Hounen	***	Orangeburg, SC	***	***
Illuminate	***	Pataskala, Ohio	***	***
Merlin	***	San Jose, CA	***	***
Meyer Burger	***	Goodyear, AZ	***	***
Mission	Petitioner	San Antonio, TX	***	***
PowerFilm	***	Ames, IA	***	***
Runergy	***	Huntsville, AL	***	***
SEG Manufacturing	***	Houston, Texas	***	***
Silfab	***	Bellingham WA Burlington WA	***	***
Suniva	***	Norcross, GA	***	***
SunTegra	***	Larchmont, NY Endicott, NY	***	***
Trina/T1	***	Wilmer, Texas	***	***
All firms	Various	Various	100.0	100.0

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

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as “—“. ***.

Table 3.2 presents information on U.S. producers' ownership, related and/or affiliated firms.

Table 3.2 CSPV cells and modules: U.S. producers' ownership, related and/or affiliated firms

Reporting firm	Relationship type and related firm	Details of relationship
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***

Table continued.

Reporting firm	Relationship type and related firm	Details of relationship
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***

Table continued.

Reporting firm	Relationship type and related firm	Details of relationship
***	***	***
***	***	***
***	***	***
***	***	***
***	***	***

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

As indicated in table 3.2, thirteen U.S. producers responded that they are owned by another firm and five are related to a U.S. importer or exporter of subject merchandise, while eight firms are related to a foreign producer of the subject merchandise.

In addition, as discussed in greater detail below, eight[5] U.S. producers directly import the in-scope merchandise from subject sources and three (***) purchase CSPV modules from U.S. importers.

Table 3.3 presents events in the U.S. industry since January 1, 2022. Many industry events and announcements for new facilities took place after the passing of the Inflation Reduction Act ("IRA") of 2022. The IRA updated and extended the Investment Tax Credit ("ITC") and the Production Tax Credit ("PTC"), two of the major federal policies that promote solar energy. The IRA increased the ITC back to 30 percent and extended it through 2034, and extended the PTC of 2.75 cents/kWh through at least 2025 for systems that meet the prevailing wage and apprenticeship requirements or are under 1 MW in size.[6] In addition, the IRA established the Advanced Manufacturing Production Tax Credit (45X) and expanded the Advanced Energy Project Investment Tax Credit (48C) for manufacturers of eligible components. After January 1, 2025, the ITC and PTC were replaced by the Clean Electricity Investment Tax Credit (48E) and the Clean Energy Production Tax Credit (45Y), which are

[5] ***. U.S. producer's questionnaire, section 2.22.

[6] U.S. Environmental Protection Agency, "Summary of Inflation Reduction Act provisions related to renewable energy," July 29, 2025, https://www.epa.gov/green-power-markets/summary-inflation-reduction-act-provisions-related-renewable-energy.

generally calculated in the same way as the traditional ITC and PTC and function similarly to the traditional ITC and PTC but are not technology specific.[7]

The passage of the One Big Beautiful Bill Act ("OBBBA") in July 2025 places new restrictions on energy tax credits that were enacted under the IRA. Under the legislation, to qualify for the 48E and 45Y tax credits, projects must be placed in service by December 31, 2027. However, a safe harbor is available to solar projects that begin construction on or before July 4, 2026.[8] In addition, the OBBBA places Foreign Entities of Concern (FEOC) restrictions on the eligibility to qualify for 45Y, 48E and 45X credits. Specifically, starting in 2026, any projects claiming these tax credits must adhere to limits on materials or components with "material assistance" from specified foreign entities (SFEs) or foreign-influenced entities (FIEs).[9] Additional restrictions were also placed on projects claiming the 45X tax credit. To qualify for the 45X credit, eligible components incorporated into another eligible components, such as solar cells used to produce a solar module, must be 1) manufactured in the same facility; 2) the final product (solar module) must be sold to an unrelated party; and 3) the final product must contain at least 65 percent of domestic-manufactured content, by cost.[10]

According to an industry report, domestic capacity to produce CSPV modules and cells experienced strong growth in recent years. U.S. module production capacity increased from 14.5 GW in 2023 to 42.1 GW in 2024 and exceeded 50.0 GW in early 2025.[11] Additionally, U.S. cell production capacity came back online for the first time since 2019 – Suniva restarted cell production in 2024, and ES Foundry commenced cell production in early 2025.[12]

[7] U.S. Department of Treasury, "U.S. Department of the Treasury Releases Final Rules for Technology-Neutral Clean Electricity Credits," January 7, 2025, https://home.treasury.gov/news/press-releases/jy2774.

[8] On July 7, 2025, an Executive Order was issued directing the Secretary of the Treasury to "strictly enforce the termination of the clean electricity production and investment tax credits under sections 45Y and 48E of the Internal Revenue Code for wind and solar facilities." The White House, "Ending Market Distorting Subsidies for Unreliable, Foreign Controlled Energy Sources," July 7, 2025, https://www.whitehouse.gov/presidential-actions/2025/07/ending-market-distorting-subsidies-for-unreliable-foreign%E2%80%91controlled-energy-sources/; Jackson Walker, "Clean Energy Tax Credit Changes under the One Big Beautiful Bill Act," August 1, 2025, https://www.jw.com/news/insights-clean-energy-tax-credit-obbba/.

[9] SFEs are governments or businesses enumerated as threats in the text of the bill and FIEs are businesses with significant control or ownership by such entities.

[10] SEIA, "EXPLAINED: The Clean Energy Provisions in the "One Big Beautiful Bill." July 21, 2025, https://seia.org/research-resources/clean-energy-provisions-big-beautiful-bill/.

[11] Solar Energy Industries Association, "Solar Market Insight Report 2024 Year in Review," March 11, 2025, https://seia.org/research-resources/solar-market-insight-report-2024-year-in-review/.

[12] Ibid.

Table 3.3 CSPV cells and modules: Important industry events since 2022

Item	Firm	Event
Plant closure	LG Electronics	In June 2022, LG Electronics ceased production at its 550 MW module assembly plant in Huntsville, Alabama, citing supply constraints and increased material and logistics costs.
Plant closing	Meyer Burger	In May 2025, Meyer Burger ceased operations and laid off over 900 workers at its new module production facility in Goodyear, Arizona. Meyer Burger had planned to produce 1.4 GW of heterojunction solar modules in its Arizona facility.
Acquisition	T1 Energy (formerly FREYER Battery)	In December 2024, FREYR (now T1 Energy) completed the $380 million acquisition of Trina/T1 Solar's 5 GW solar module manufacturing facility located in Wilmer, Texas. The company renamed the factory T1 Dallas and the facility began production in late 2024 is now fully online and employs more than 1,000 people. T1 Energy also announced its plan to build a $850 million 5 GW solar cell facility in Texas. It is expected to begin producing cells by the end of 2026 and employ up to 1,800 workers. T1 plans to use TOPCon technology for the cell and module manufacturing.
Funding	Silfab Solar	In November 2024, Silfab Solar announced it had secured $100 million in funding to scale its manufacturing facility in Fort Mill, South Carolina. Once operational, the facility will produce 1 GW of solar cells and 1.3 GW of solar modules.
Plant expansion	Hanwha Q Cells	In October 2023, Hanwha Q Cells completed the expansion of its plant in Dalton, Georgia. This expansion increased its solar capacity by 2 GW, bringing the plant's total capacity to 5.1 GW.
Plant expansion	Heliene	In late 2023, Heliene expanded its module production line in Mountain Iron, Minnesota, which increased capacity to 300 MW.
Plant opening	Canadian Solar	During Q4 of 2023, Canadian Solar began commercial production at its 5 GW module assembly plant located in Mesquite, Texas. This is Canadian Solar's first U.S. production facility.
Plant opening	Illuminate	In February 2024, Illuminate began commercial operations at its 5 GW solar panel manufacturing facility located in Pataskala, Ohio.
Plant opening	Elin Energy	In March 2024, Elin Energy began production at its 2 GW solar panel assembly facility located in Waller County, Texas.
Plant opening	Meyer Burger	In June 2024, Meyer Burger started production at its 2 GW module assembly plant located in Goodyear, Arizona.

Item	Firm	Event
Plant opening	SEG Solar	In August 2024, SEG Solar began production at its 2 GW solar module facility in Texas. The facility operates two production lines for 182 mm and 210 mm N-type modules.
Plant opening	First Solar	In September 2024, First Solar opened its 3.5 GW thin-film solar manufacturing facility in Lawrence County, Alabama.
Plant opening	Runergy	In October 2024, Runergy began commercial production at its 2 GW solar panel facility in Huntsville, Alabama.
Plant opening	Imperial Star Solar	In December 2024, Imperial Star Solar began production at its 2 GW module manufacturing facility in Tomball, Texas.
Plant opening	Waaree Energies	In January 2025, Waaree Energies started commercial production at its 1.6 GW module manufacturing facility in Brookshire, Texas.
Plant opening	ES Foundry	In early 2025, ES Foundry began production of PERC solar cells at its plant located in South Carolina. The plant is expected to reach shipment capacity of 3 GW by Q3 2025.
Production restart	Suniva	In late 2024, Suniva restarted solar cell production at its facility located in Gwinnett County, Georgia. The firm announced that the revamped facility has the capacity to produce 1 GW of solar cells annually, with plans to expand to 2.5 GW in the future.
Supply chain agreement	Suniva and Heliene	In March 2024, Heliene and Suniva announced a three-year sourcing contract, under which Heliene will produce solar modules using solar cells produced domestically by Suniva.
Supply chain agreement	Suniva and Heliene	In March 2025, Suniva and Heliene announced an agreement with chipmaker Corning to domestically produce solar modules using polysilicon, wafers, and cells manufactured in the United States.

Source: PV Magazine, “Meyer Burger files for insolvency, lays off over 900 workers,” June 2, 2025, https://pv-magazine-usa.com/2025/06/02/meyer-burger-files-for-insolvency-lays-off-over-900-workers/; Electrek, “T1 Energy’s (FKA FREYR) new 5 GW US solar factory leaps forward,” June 16, 2025 https://electrek.co/2025/06/16/t1-energy-freyr-5-gw-us-solar-factory; T1 Energy, “T1 Energy Advances $850 Million Planned 5G Solar Cell Plant,” June 16, 2025, https://ir.t1energy.com/news-releases/news-release-details/t1-energy-advances-850-million-planned-5-gw-solar-cell-plant; Qcells, “Qcells North America Completes Dalton Factory Expansion,” October 18, 2023, https://us.qcells.com/blog/qcells-north-america-completes-dalton-factory-expansion; PV Tech, “Canadian Solar launches 5GW TOPCon module assembly plant in Texas,” June 12, 2024, https://www.pv-tech.org/canadian-solar-launches-5gw-topcon-module-assembly-plant-texas/; Power Technology, “First Solar opens $1.1bn solar facility, adds 3.5GW to US manufacturing capacity,” September 27, 2024, https://www.power-technology.com/news/first-solar-opens-1-1bn-solar-facility-adds-3-5gw-to-us-manufacturing-capacity/?cf-view; Energy Tech, “Illuminate USA Begins Operations at Solar Panel Manufacturing Facility in Ohio,” February 27, 2024, https://www.energytech.com/renewables/article/21283538/illuminate-usa-begins-operations-at-solar-panel-manufacturing-facility-in-ohio; Solar Builder, “Elin Energy opens U.S. solar module manufacturing facility,” April 12, 2024, https://solarbuildermag.com/news/elin-energy-opens-u-s-solar-module-manufacturing-facility/; PV Tech, “Meyer Burger starts module production in Arizona, secures 600MW PV supply,” June 25, 2024, https://www.pv-tech.org/meyer-burger-starts-module-production-in-arizona-

secures-600mw-pv-supply/; Power Technology, "SEG Solar opens 2GW PV module plant in Texas," August 14, 2024, https://www.power-technology.com/news/seg-solar-opens-2gw-pv-module-plant-in-texas/?cf-view; PV Tech, "SEG Solar ships first N-Type modules from Houston factory," November 24, 2024, https://www.pv-tech.org/industry-updates/seg-solar-ships-first-n-type-modules-from-houston-factory/; Imperial Star, "Imperial Star Solar Kicks Off Domestic Production at New Houston Manufacturing Facility," December 20, 2024, https://www.imperialstar.com/post/imperial-star-kicks-off-domestic-production-at-houston; PV Tech, "ES Foundry begins producing PERC cells at US manufacturing plant," February 3, 2025, https://www.pv-tech.org/es-foundry-begins-producing-perc-cells-at-us-manufacturing-plant/; Electrek, "The US's largest solar cell factory is now online in South Carolina," February 3, 2025, https://electrek.co/2025/02/03/us-largest-solar-cell-factory-south-carolina/; AJC News, "Once-shuttered solar factory resumes production outside Atlanta," November 13, 2024, https://www.ajc.com/news/business/suniva-once-filed-bankruptcy-its-producing-solar-panels-again/UVX5DKR6QJGHTLTTJEJJH2QHKE/; Utility Dive, "Corning, Suniva and Heliene form US solar supply chain," March 11, 2025, https://www.utilitydive.com/news/corning-suniva-heliene-hemlock-semiconductor-form-us-solar-supply-chain/742155/; Renewables Now, "Waaree Energies powers up 1.6-GW solar module line in Texas," January 27, 2025, https://renewablesnow.com/news/waaree-energies-powers-up-1-6-gw-solar-module-line-in-texas-1269854/; Solar Power World, "Runergy opens solar panel assembly factory in Alabama," October 3, 2024, https://www.solarpowerworldonline.com/2024/10/runergy-opens-solar-panel-assembly-factory-in-alabama/; PV Tech, "Heliene expands Minnesota TOPCon module line to 300MW," December 6, 2023, https://www.pv-tech.org/heliene-expands-minnesota-topcon-module-line-to-300mw/; PV Magazine, "Suniva, Heliene to jointly produce US-made solar modules," March 28, 2024, https://www.pv-magazine.com/2024/03/28/suniva-heliene-to-jointly-produce-us-made-solar-modules/; Silfab Solar, "Silfab Solar Raises $100 million to Scale its Cell Manufacturing Facility in Fort Mill, S.C.," November 21, 2024, https://silfabsolar.com/silfab-solar-raises-100-million-to-scale-its-cell-manufacturing-facility-in-fort-mill-s-c/.

Producers in the United States were asked to report any change in the character of their operations or organization relating to the production of CSPV cells and modules since 2022. Fourteen of fifteen producers indicated in their questionnaires that they had experienced such changes. Table 3.4 presents the changes identified by these producers.

Table 3.4 CSPV cells and modules: U.S. producers' reported changes in operations, since January 1, 2022, by reported change category and firm

Change category	Firm name and narrative response on changes in operations
Plant openings	***
Plant openings	***
Plant openings	***
Plant openings	***

Table continued.

Change category	Firm name and narrative response on changes in operations
Plant openings	***
Plant openings	***
Plant openings	***
Plant openings	***
Plant openings	***
Plant openings	***
Plant closings	***
Plant closings	***
Plant closings	***
Production curtailments	***
Relocations	***

Table continued.

Change category	Firm name and narrative response on changes in operations
Relocations	***
Expansions	***
Expansions	***
Expansions	***
Expansions	***
Expansions	***
Expansions	***
Acquisitions	***
Other	***
Other	***
Other	***

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

U.S. production, capacity, and capacity utilization

Table 3.5 presents U.S. producers' installed overall and practical capacity, production, and utilization on the same equipment as subject production of CSPV cells. During the period of data collection, domestic production of CSPV cells began after interim 2024. Suniva, the sole responding U.S. producer of CSPV cells,[13] reported higher installed overall, practical overall, and practical CSPV production levels interim 2025 than in 2024.

Table 3.5 CSPV cells: U.S. producer's installed and practical capacity, production, and utilization on the same equipment as in-scope production, by period

Capacity and production in kilowatts; utilization in percent; interim is January through March

Item	Measure	2022	2023	2024	Interim 2024	Interim 2025
Installed overall	Capacity	***	***	***	***	***
Installed overall	Production	***	***	***	***	***
Installed overall	Utilization	***	***	***	***	***
Practical overall	Capacity	***	***	***	***	***
Practical overall	Production	***	***	***	***	***
Practical overall	Utilization	***	***	***	***	***
Practical CSPV cells	Capacity	***	***	***	***	***
Practical CSPV cells	Production	***	***	***	***	***
Practical CSPV cells	Utilization	***	***	***	***	***

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

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—".

[13] The other known CSPV cell producer, ES Foundry, did not participate in these preliminary investigations.

Figure 3.1 presents U.S. producers' practical capacity, production, and capacity utilization pertaining to CSPV cells. Suniva, the sole responding U.S. producer of CSPV cells, commenced production in ***.

Figure 3.1: CSPV cells: U.S. producer's practical capacity, production, and capacity utilization, by period

* * * * * * *

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

Table 3.6 presents U.S. producers' reported installed overall and practical capacity, production, and utilization on the same equipment as subject production of CSPV modules, by period. Installed overall capacity and production increased between 2022 and 2024 but installed overall capacity utilization decreased 2022 to 2024 because the growth of installed overall capacity outpaced production.[14] In the same way, although practical overall capacity, practical overall production, and practical CSPV module capacity and production grew between 2022 and 2024, since capacity levels nearly *** from 2023 to 2024, capacity utilization decreased between 2022 and 2024 for both practical overall and practical CSPV modules. Except for practical overall capacity utilization, all CSPV module capacity and production measures were higher in interim 2025 than in interim 2024.

Table 3.6 CSPV modules: U.S. producers' installed and practical capacity, production, and utilization on the same equipment as subject production, by period

Capacity and production in kilowatts; utilization in percent; interim period is January to March

Item	Measure	2022	2023	2024	Interim 2024	Interim 2025
Installed overall	Capacity	***	***	***	***	***
Installed overall	Production	***	***	***	***	***
Installed overall	Utilization	***	***	***	***	***
Practical overall	Capacity	***	***	***	***	***
Practical overall	Production	***	***	***	***	***
Practical overall	Utilization	***	***	***	***	***
Practical CSPV modules	Capacity	***	***	***	***	***
Practical CSPV modules	Production	***	***	***	***	***
Practical CSPV modules	Utilization	***	***	***	***	***

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

Note: Staff adjusted ***'s data for practical overall capacity for interim 2024 and 2025.

[14] All but three responding U.S. producers increased capacity between 2022 and 2024, with five of the fourteen module producers commencing production in 2024.

Tables 3.7 and 3.8 present U.S. producers' reported narratives regarding practical overall capacity constraints for CSPV cells and modules since January 1, 2022, respectively.

Table 3.7 CSPV cells: U.S. producers' reported constraints to practical overall capacity since January 1, 2022, by firm and type of constraint

Type of constraint	Firm name and narrative response on constraints to practical overall capacity
Production bottlenecks	***
Existing labor force	***
Supply of material inputs	***

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

Table 3.8 CSPV modules: U.S. producers' reported constraints to practical overall capacity since January 1, 2022, by firm and type of constraint

Type of constraint	Firm name and narrative response on constraints to practical overall capacity
Production bottlenecks	***
Production bottlenecks	***
Production bottlenecks	***
Production bottlenecks	***
Existing labor force	***
Existing labor force	***
Existing labor force	***
Existing labor force	***
Existing labor force	***
Existing labor force	***
Existing labor force	***
Existing labor force	***
Existing labor force	***
Supply of material inputs	***

Table continued.

Type of constraint	Firm name and narrative response on constraints to practical overall capacity
Supply of material inputs	***
Supply of material inputs	***
Supply of material inputs	***
Supply of material inputs	***
Supply of material inputs	***
Supply of material inputs	***
Logistics/transportation	***
Logistics/transportation	***
Logistics/transportation	***
Other constraints	***
Other constraints	***
Other constraints	***

Table continued.

Type of constraint	Firm name and narrative response on constraints to practical overall capacity
Other constraints	***
Other constraints	***
Other constraints	***
Other constraints	***
Other constraints	***
Other constraints	***
Other constraints	***
Other constraints	***
Other constraints	***
Other constraints	***

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

Table 3.9 and figure 3.2 present U.S. producers' production, capacity, and capacity utilization pertaining to CSPV modules.[15] During 2022 to 2024, U.S. producers' practical CSPV modules capacity increased by *** percent and was higher in interim 2025 than in interim 2024 by *** percent.[16] Similarly, ***, production of CSPV modules increased from 2022 to 2024 by *** percent and was higher in interim 2025 than in interim 2024 by *** percent.[17] [18] CSPV modules capacity utilization decreased by *** percentage points between 2022 and 2024 but was higher in interim 2025 than in interim 2024 by *** percentage points.

Table 3.9 CSPV modules: U.S. producers' output, by firm and period

Practical capacity

Capacity in kilowatts; interim is January through March

Firm	2022	2023	2024	Interim 2024	Interim 2025
Canadian Solar	***	***	***	***	***
GAF Energy	***	***	***	***	***
Hanwha GA	***	***	***	***	***
Hounen	***	***	***	***	***
Illuminate	***	***	***	***	***
Merlin	***	***	***	***	***
Meyer Burger	***	***	***	***	***
Mission	***	***	***	***	***
PowerFilm	***	***	***	***	***
Runergy	***	***	***	***	***
SEG Manufacturing	***	***	***	***	***
Silfab	***	***	***	***	***
SunTegra	***	***	***	***	***
Trina/T1	***	***	***	***	***
All firms	***	***	***	***	***

Table continued.

[15] U.S. producer *** is not included because it reported producing only *** during the period of data collection.

[16] *** accounted for most of the increase in CSPV module capacity from 2022 to 2024.

[17] *** accounted for the largest increase in production between 2022 and 2024, *** drove the higher production levels in interim 2025.

[18] ***.

Table 3.9 Continued CSPV modules: U.S. producers' output, by firm and period

Production

Production in kilowatts; interim is January through March

Firm	2022	2023	2024	Interim 2024	Interim 2025
Canadian Solar	***	***	***	***	***
GAF Energy	***	***	***	***	***
Hanwha GA	***	***	***	***	***
Hounen	***	***	***	***	***
Illuminate	***	***	***	***	***
Merlin	***	***	***	***	***
Meyer Burger	***	***	***	***	***
Mission	***	***	***	***	***
PowerFilm	***	***	***	***	***
Runergy	***	***	***	***	***
SEG Manufacturing	***	***	***	***	***
Silfab	***	***	***	***	***
SunTegra	***	***	***	***	***
Trina/T1	***	***	***	***	***
All firms	***	***	***	***	***

Table continued.

Table 3.9 Continued CSPV modules: U.S. producers' output, by firm and period

Capacity utilization

Capacity utilization in percent; interim is January through March

Firm	2022	2023	2024	Interim 2024	Interim 2025
Canadian Solar	***	***	***	***	***
GAF Energy	***	***	***	***	***
Hanwha GA	***	***	***	***	***
Hounen	***	***	***	***	***
Illuminate	***	***	***	***	***
Merlin	***	***	***	***	***
Meyer Burger	***	***	***	***	***
Mission	***	***	***	***	***
PowerFilm	***	***	***	***	***
Runergy	***	***	***	***	***
SEG Manufacturing	***	***	***	***	***
Silfab	***	***	***	***	***
SunTegra	***	***	***	***	***
Trina/T1	***	***	***	***	***
All firms	***	***	***	***	***

Table continued.

Note: Capacity utilization ratio represents the ratio of the U.S. producer's production to its production capacity.

Table 3.9 Continued CSPV modules: U.S. producers' output, by firm and period

Share of production

Share in percent; interim is January through March

Firm	2022	2023	2024	Interim 2024	Interim 2025
Canadian Solar	***	***	***	***	***
GAF Energy	***	***	***	***	***
Hanwha GA	***	***	***	***	***
Hounen	***	***	***	***	***
Illuminate	***	***	***	***	***
Merlin	***	***	***	***	***
Meyer Burger	***	***	***	***	***
Mission	***	***	***	***	***
PowerFilm	***	***	***	***	***
Runergy	***	***	***	***	***
SEG Manufacturing	***	***	***	***	***
Silfab	***	***	***	***	***
SunTegra	***	***	***	***	***
Trina/T1	***	***	***	***	***
All firms	100.0	100.0	100.0	100.0	100.0

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

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—".

Figure 3.2 CSPV modules: U.S. producers' output, by period

* * * * * * *

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

Alternative products

As shown in table 3.10, *** of the product produced during January 1, 2022, through interim 2025 by U.S. producers was CSPV cells and modules. One firm, ***, reported producing *** in the same line as CSPV modules. The firm added that the ***. See table 3.8 in this report for more information.

Table 3.10 CSPV modules: U.S. producers' overall production on the same equipment as in-scope production, by period

Quantity in kilowatts; ratio and share in percent; interim is January through March

Product type	Measure	2022	2023	2024	Interim 2024	Interim 2025
CSPV modules	Quantity	***	***	***	***	***
Other products	Quantity	***	***	***	***	***
All products	Quantity	***	***	***	***	***
CSPV modules	Share	***	***	***	***	***
Other products	Share	***	***	***	***	***
All products	Share	100.0	100.0	100.0	100.0	100.0

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

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—".

U.S. producers' U.S. shipments and exports

Tables 3.11 and 3.12 present U.S. producers' U.S. shipments, export shipments, and total shipments of CSPV cells and modules, respectively.[19] Domestic production and shipments of CSPV cells began in 2024. During 2022 to 2024, U.S. producers' U.S. shipments of CSPV modules increased overall by *** percent, in terms of quantity, and by *** percent, in terms of value. U.S. shipments of CSPV modules were higher in interim 2025 compared to interim 2024 both by quantity and value. As a result of shipments increasing greater by quantity compared to value, the unit value of U.S. shipments decreased by *** percent from 2022 to 2024 but were slightly higher in interim 2025 compared to interim 2024. Export shipments *** during the period of data collection.

Table 3.11 CSPV cells: U.S. producers' total shipments, by destination and period

Quantity in kilowatts; value in 1,000 dollars; unit value in dollars per kilowatts; shares in percent; interim is January through March

Item	Measure	2022	2023	2024	Interim 2024	Interim 2025
U.S. shipments	Quantity	***	***	***	***	***
Export shipments	Quantity	***	***	***	***	***
Total shipments	Quantity	***	***	***	***	***
U.S. shipments	Value	***	***	***	***	***
Export shipments	Value	***	***	***	***	***
Total shipments	Value	***	***	***	***	***
U.S. shipments	Unit value	***	***	***	***	***
Export shipments	Unit value	***	***	***	***	***
Total shipments	Unit value	***	***	***	***	***
U.S. shipments	Share of quantity	***	***	***	***	***
Export shipments	Share of quantity	***	***	***	***	***
Total shipments	Share of quantity	—	—	100.0	—	100.0
U.S. shipments	Share of value	***	***	***	***	***
Export shipments	Share of value	***	***	***	***	***
Total shipments	Share of value	—	—	100.0	—	100.0

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

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—".

[19] *** internal consumption or transfers to related firms of CSPV cells. Regarding CSPV modules, *** firm reported internal consumption in 2023, and *** firms reported transfers to related firms during the period examined. Collectively, internal consumption and transfers to related firms accounted for approximately *** percent of U.S. shipments during the period for which the data were collected.

Table 3.12 CSPV modules: U.S. producers' total shipments, by destination and period

Quantity in kilowatts; value in 1,000 dollars; unit value in dollars per kilowatts; shares in percent; interim is January through March

Item	Measure	2022	2023	2024	Interim 2024	Interim 2025
U.S. shipments	Quantity	***	***	***	***	***
Export shipments	Quantity	***	***	***	***	***
Total shipments	Quantity	***	***	***	***	***
U.S. shipments	Value	***	***	***	***	***
Export shipments	Value	***	***	***	***	***
Total shipments	Value	***	***	***	***	***
U.S. shipments	Unit value	***	***	***	***	***
Export shipments	Unit value	***	***	***	***	***
Total shipments	Unit value	***	***	***	***	***
U.S. shipments	Share of quantity	***	***	***	***	***
Export shipments	Share of quantity	***	***	***	***	***
Total shipments	Share of quantity	100.0	100.0	100.0	100.0	100.0
U.S. shipments	Share of value	***	***	***	***	***
Export shipments	Share of value	***	***	***	***	***
Total shipments	Share of value	100.0	100.0	100.0	100.0	100.0

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

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—".

Table 3.13 presents U.S. producers' U.S. shipments by type. U.S. shipments of CSPV cells started post interim 2024 and increased was more than tenfold higher in interim 2025 by quantity. U.S. producers' U.S. shipments of modules doubled between 2022 and 2024 by value and were higher in interim 2025 compared to interim 2024.

Table 3.13 CSPV cells and modules: U.S. producers' U.S. shipments for use in apparent consumption, by period

Quantity in kilowatts; value in 1,000 dollars; interim is January through March

Item	Measure	2022	2023	2024	Interim 2024	Interim 2025
Cells: U.S. shipments	Quantity	***	***	***	***	***
Cells: U.S. shipments	Value	***	***	***	***	***
Modules: Value added to domestic cells	Value	***	***	***	***	***
Cells and modules: Fully domestic value	Value	***	***	***	***	***
Modules: Value added to imported cells	Value	***	***	***	***	***
Cells and modules: Total value from domestic operations	Value	***	***	***	***	***

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

Note: Zeroes, null values, and undefined calculations are suppressed and shown as "—". Quantity for U.S. producers' U.S. shipments only reflects domestically produced cells. Value for U.S. producers' U.S. shipments reflects domestically produced cells, the value added to domestically manufactured cells by responding U.S. module assemblers, and the value added to imported cells by responded U.S. module assemblers. In measuring consumption and market share this methodology avoids reclassifying and/or double counting merchandise already reported once as an import.

U.S. producers' inventories

Table 3.14 and 3.15 present U.S. producers' end-of-period inventories and the ratio of these inventories to U.S. producers' production, U.S. shipments, and total shipments of CSPV cells and modules, respectively. The sole responding domestic producer of CSPV cells, Suniva, reported growing inventories with quantities nearly double in interim 2025, compared to full year 2024 levels. Ten of 15 U.S. producers reported end-of-period inventories during the period of data collection. U.S. producers' end-of-period inventories of CSPV modules increased by *** percent during 2022 to 2024, with most of the increase taking place from 2023 to 2024. Of the *** U.S. CSPV modules producers that reported end-of-period inventories, *** U.S. producers' end-of-period inventories increased during 2022 to 2024. During 2022 to 2024, U.S. producers of CSPV modules' end-of period inventories as a ratio to U.S. production, U.S. shipments, and total shipments increased, with the three ratios ending *** percentage points, *** percentage points, and *** percentage points higher, respectively, in 2024 compared to 2022. Relative inventory ratios were also higher in interim 2025 compared to interim 2024.

Table 3.14 CSPV cells: U.S. producers' inventories and their ratio to select items, by period

Quantity in kilowatts; ratio in percent; interim is January through March

Item	2022	2023	2024	Interim 2024	Interim 2025
End-of-period inventory quantity	***	***	***	***	***
Inventory ratio to U.S. production	***	***	***	***	***
Inventory ratio to U.S. shipments	***	***	***	***	***
Inventory ratio to total shipments	***	***	***	***	***

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

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—".

Table 3.15 CSPV modules: U.S. producers' inventories and their ratio to select items, by period

Quantity in kilowatts; ratio in percent; interim is January through March

Item	2022	2023	2024	Interim 2024	Interim 2025
End-of-period inventory quantity	***	***	***	***	***
Inventory ratio to U.S. production	***	***	***	***	***
Inventory ratio to U.S. shipments	***	***	***	***	***
Inventory ratio to total shipments	***	***	***	***	***

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

U.S. producers' imports from subject sources

U.S. producers' imports of CSPV cells and modules from subject sources are presented in tables 3.16 through 3.22, and reasons for these imports are presented in table 3.23. CSPV cells are used as inputs to produce CSPV modules and domestic U.S. production did not commence until 2024. Therefore, during the period of data collection, U.S. producers of CSPV modules either imported or purchased imports of CSPV cells to assemble CSPV modules.[20] *** reported imports from subject sources and the ratios of these firms' imports relative to U.S. production ranged from *** to *** percent during the period of data collection.

Table 3.16 CSPV cells and modules: *'s U.S. production, subject imports, and ratio of subject imports to production, by source and period**

Quantity in kilowatts; ratio in percent; interim is January through March

Item	Measure	2022	2023	2024	Interim 2024	Interim 2025
U.S. production	Quantity	***	***	***	***	***
Imports from Laos	Quantity	***	***	***	***	***
Imports from Laos to U.S. production	Ratio	***	***	***	***	***

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

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—".

Table 3.17 CSPV cells and modules: *'s U.S. production, subject imports, and ratio of subject imports to production, by source and period**

Quantity in kilowatts; ratio in percent; interim is January through March

Item	Measure	2022	2023	2024	Interim 2024	Interim 2025
U.S. production	Quantity	***	***	***	***	***
Imports from Indonesia	Quantity	***	***	***	***	***
Imports from Indonesia to U.S. production	Ratio	***	***	***	***	***

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

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—".

[20] In addition, *** reported imports of *** kilowatts of modules from Laos in interim 2025. *** reported imports of modules from India in all periods, and *** reported imports of *** kilowatts of modules in interim 2025.

Table 3.18 CSPV cells and modules: *'s U.S. production, subject imports, and ratio of subject imports to production, by source and period**

Quantity in kilowatts; ratio in percent; interim is January through March

Item	Measure	2022	2023	2024	Interim 2024	Interim 2025
U.S. production	Quantity	***	***	***	***	***
Imports from India	Quantity	***	***	***	***	***
Imports from India to U.S. production	Ratio	***	***	***	***	***

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

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—".

Table 3.19 CSPV cells and modules: *'s U.S. production, subject imports, and ratio of subject imports to production, by source and period**

Quantity in kilowatts; ratio in percent; interim is January through March

Item	Measure	2022	2023	2024	Interim 2024	Interim 2025
U.S. production	Quantity	***	***	***	***	***
Imports from India	Quantity	***	***	***	***	***
Imports from India to U.S. production	Ratio	***	***	***	***	***

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

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—".

Table 3.20 CSPV cells and modules: *'s U.S. production, subject imports, and ratio of subject imports to production, by source and period**

Quantity in kilowatts; ratio in percent; interim is January through March

Item	Measure	2022	2023	2024	Interim 2024	Interim 2025
U.S. production	Quantity	***	***	***	***	***
Imports from Indonesia	Quantity	***	***	***	***	***
Imports from Indonesia to U.S. production	Ratio	***	***	***	***	***

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

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—".

Table 3.21 CSPV cells and modules: *'s U.S. production, subject imports, and ratio of subject imports to production, by source and period**

Quantity in kilowatts; ratio in percent; interim is January through March

Item	Measure	2022	2023	2024	Interim 2024	Interim 2025
U.S. production	Quantity	***	***	***	***	***
Imports from Indonesia	Quantity	***	***	***	***	***
Imports from Indonesia to U.S. production	Ratio	***	***	***	***	***

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

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—".

Table 3.22 CSPV cells and modules: *'s U.S. production, subject imports, and ratio of subject imports to production, by source and period**

Quantity in kilowatts; ratio in percent; interim is January through March

Item	Measure	2022	2023	2024	Interim 2024	Interim 2025
U.S. production	Quantity	***	***	***	***	***
Imports from Indonesia	Quantity	***	***	***	***	***
Imports from Laos	Quantity	***	***	***	***	***
Imports from Indonesia to U.S. production	Ratio	***	***	***	***	***
Imports from Laos to U.S. production	Ratio	***	***	***	***	***
Imports from subject sources to U.S. production	Ratio	***	***	***	***	***

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

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—".

Table 3.23 CSPV cells and modules: *'s U.S. production, subject imports, and ratio of subject imports to production, by source and period**

Quantity in kilowatts; ratio in percent; interim is January through March

Item	Measure	2022	2023	2024	Interim 2024	Interim 2025
U.S. production	Quantity	***	***	***	***	***
Imports from Laos	Quantity	***	***	***	***	***
Imports from Laos to U.S. production	Ratio	***	***	***	***	***

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

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—".

Table 3.24 CSPV cells and modules: U.S. producers' reasons for importing, by firm

Item	Narrative response on reasons for importing
***'s reason for importing	***
***'s reason for importing	***
***'s reason for importing	***
***'s reason for importing	***
***'s reason for importing	***
***'s reason for importing	***
***'s reason for importing	***
***'s reason for importing	***
***'s reason for importing	***

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

Note: *** responded to this question, they did not import from subject sources and therefore are not included in the table. U.S. importer questionnaire, section 2.4.

U.S. producers' purchases of imports from subject sources

U.S. producers' purchases of imports from subject sources are presented in tables 3.25 through 3.27.

Table 3.25 CSPV cells and modules: *'s purchases of imports from subject sources, by source, importer of record, and period**

Quantity in kilowatts; ratio in percent; interim is January through March

Item	Measure	2022	2023	2024	Interim 2024	Interim 2025
Modules: ***'s U.S. production	Quantity	***	***	***	***	***
Modules: ***'s purchases of U.S. imports from Indonesia imported by ***	Quantity	***	***	***	***	***
Modules: ***'s U.S. imports from Indonesia	Quantity	***	***	***	***	***
Modules: Ratio 1: ***'s purchases of U.S. imports from Indonesia imported by *** relative to ***'s U.S. imports from Indonesia	Ratio	***	***	***	***	***
Modules: Overall U.S. imports from Indonesia	Quantity	***	***	***	***	***
Modules: Ratio 2: ***'s U.S. imports from Indonesia relative to overall U.S. imports from Indonesia	Ratio	***	***	***	***	***
Modules: Ratio 3: ***'s U.S. imports from Indonesia relative to ***'s U.S. production	Ratio	***	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010, accessed August 12, 2025.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—". Data related to the additional importers of record identified using proprietary, Census-edited Customs records that did not respond to the Commission questionnaire are included in overall U.S. imports from Indonesia.

Table 3.26 CSPV cells and modules: *'s purchases of imports from subject sources, by source, importer of record, and period**

Quantity in kilowatts; ratio in percent; interim is January through March

Item	Measure	2022	2023	2024	Interim 2024	Interim 2025
Cells: ***'s U.S. production	Quantity	***	***	***	***	***
Cells: ***'s purchases of U.S. imports from Indonesia produced by ***	Quantity	***	***	***	***	***
Cells: U.S. importers' U.S. imports from Indonesian producer ***	Quantity	***	***	***	***	***
Cells: Ratio 1: ***'s purchases of U.S. imports from Indonesia produced by *** relative to U.S. importers' U.S. imports from ***	Ratio	***	***	***	***	***
Cells: Overall U.S. imports from Indonesia	Quantity	***	***	***	***	***
Cells: Ratio 2: U.S. importers' U.S. imports from Indonesian producer *** relative to overall U.S. imports from Indonesia	Ratio	***	***	***	***	***
Cells: Ratio 3: U.S. importers' U.S. imports from Indonesian producer *** relative to ***'s U.S. production	Ratio	***	***	***	***	***
Modules: ***'s U.S. production	Quantity	***	***	***	***	***
Modules: ***'s purchases of U.S. imports from Indonesia imported by ***	Quantity	***	***	***	***	***
Modules: ***'s U.S. imports from Indonesia	Quantity	***	***	***	***	***

Table continued.

Item	Measure	2022	2023	2024	Interim 2024	Interim 2025
Modules: Ratio 1: ***'s purchases of U.S. imports from Indonesia imported by *** relative to ***'s U.S. imports from Indonesia	Ratio	***	***	***	***	***
Modules: Overall U.S. imports from Indonesia	Quantity	***	***	***	***	***
Modules: Ratio 2: ***'s U.S. imports from Indonesia relative to overall U.S. imports from Indonesia	Ratio	***	***	***	***	***
Modules: Ratio 3: ***'s U.S. imports from Indonesia relative to ***'s U.S. production	Ratio	***	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires. questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010, accessed August 12, 2025.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—". Data related to the additional importers of record identified using proprietary, Census-edited Customs records that did not respond to the Commission questionnaire are included in overall U.S. imports from Indonesia.

Table 3.27 CSPV cells and modules: *'s purchases of imports from subject sources, by source, importer of record, and period**

Quantity in kilowatts; ratio in percent; interim is January through March

Item	Measure	2022	2023	2024	Interim 2024	Interim 2025
Cells: ***'s U.S. production	Quantity	***	***	***	***	***
Cells: ***'s purchases of U.S. imports from Indonesia and Laos imported by ***	Quantity	***	***	***	***	***
Cells: ***'s U.S. imports from Indonesia and Laos	Quantity	***	***	***	***	***

Table continued.

Item	Measure	2022	2023	2024	Interim 2024	Interim 2025
Cells: Ratio 1: ***'s purchases of U.S. imports from Indonesia and Laos imported by *** relative to ***'s U.S. imports from Indonesia and Laos	Ratio	***	***	***	***	***
Cells: Overall U.S. imports from Indonesia and Laos	Quantity	***	***	***	***	***
Cells: Ratio 2: ***'s U.S. imports from Indonesia and Laos relative to overall U.S. imports from Indonesia and Laos	Ratio	***	***	***	***	***
Cells: Ratio 3: ***'s U.S. imports from Indonesia and Laos relative to ***'s U.S. production	Ratio	***	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires. questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010, accessed August 12, 2025.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—". Data related to the additional importers of record identified using proprietary, Census-edited Customs records that did not respond to the Commission questionnaire are included in overall U.S. imports from Indonesia and Laos.

Table 3.28 CSPV cells and modules: U.S. producers' reasons for purchasing

Item	Narrative response on reasons for importing
***'s reason for purchasing	***
***'s reason for purchasing	***
***'s reason for purchasing	***

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

U.S. employment, wages, and productivity

Tables 3.29 through 3.31 show U.S. producers' employment-related data regarding CSPV cells, CSPV modules, and CSPV cells and modules, respectively. CSPV cell production started in 2024, therefore, there are no changes to labor indicators during the full year period. All labor indicators for CSPV modules had an upward trend between 2022 and 2024, except for hours worked per PRWs. Compared to interim 2024, all employment trends were higher in interim 2025.[21]

Table 3.29 CSPV cells: U.S. producers' employment related information, by period

Interim is January through March

Item	2022	2023	2024	Interim 2024	Interim 2025
Production and related workers (PRWs) (number)	***	***	***	***	***
Total hours worked (1,000 hours)	***	***	***	***	***
Hours worked per PRW (hours)	***	***	***	***	***
Wages paid ($1,000)	***	***	***	***	***
Hourly wages (dollars per hour)	***	***	***	***	***
Productivity (kilowatts per 1,000 hours)	***	***	***	***	***
Unit labor costs (dollars per kilowatt)	***	***	***	***	***

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

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—".

Table 3.30 CSPV modules: U.S. producers' employment related information, by period

Interim is January through March

Item	2022	2023	2024	Interim 2024	Interim 2025
Production and related workers (PRWs) (number)	***	***	***	***	***
Total hours worked (1,000 hours)	***	***	***	***	***
Hours worked per PRW (hours)	***	***	***	***	***
Wages paid ($1,000)	***	***	***	***	***
Hourly wages (dollars per hour)	***	***	***	***	***
Productivity (kilowatts per 1,000 hours)	***	***	***	***	***
Unit labor costs (dollars per kilowatt)	***	***	***	***	***

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

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—".

[21] *** accounted for the vast majority of the upward trends besides unit labor costs, which was lower in interim 2025 compared to interim 2024.

Table 3.31 CSPV cells and modules: U.S. producers' employment related information, by period

Interim is January through March

Item	2022	2023	2024	Interim 2024	Interim 2025
Production and related workers (PRWs) (number)	***	***	***	***	***
Total hours worked (1,000 hours)	***	***	***	***	***
Hours worked per PRW (hours)	***	***	***	***	***
Wages paid ($1,000)	***	***	***	***	***
Hourly wages (dollars per hour)	***	***	***	***	***

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

Part 4: U.S. imports, apparent U.S. consumption, and market shares

U.S. importers

The Commission issued importer questionnaires to 165 firms believed to be importers of subject CSPV cells and modules, as well as to all U.S. producers of CSPV cells and modules.[1] Usable questionnaire responses were received from 45 companies, representing *** percent of U.S. imports from India, *** percent of U.S. imports from Indonesia, *** percent of U.S. imports from Laos, in 2024 under HTS subheadings 8541.42.00 and 8541.43.00, "basket" categories.[2] [3] [4]

[1] The Commission issued questionnaires to those firms identified in the petitions; staff research; and proprietary, Census-edited Customs' import records. Petitioners' counsel stated that the majority of CSPV cells and modules are being imported under the two main statistical reporting numbers, 8541.42.0010 and 8541.43.0010, and that they are representative of imports in the CSPV cells and modules marketplace. Conference transcript, p. 44 (Brightbill).

[2] Importer questionnaire data is supplemented throughout part 4 using proprietary, Census-edited Customs' import records, (except for fungibility tables), to account for non-responding firms.

***, U.S. importers which accounted for approximately *** of U.S. imports under HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010 from Laos and *** of U.S. imports from Indonesia during the period of data collection, provided a late response, which was not incorporated into the dataset. ***, a U.S. importer from subject and nonsubject sources, also confirmed receipt of the questionnaire but did not provide a response. Email from ***, August 5, 2025. *** provided a late response to the questionnaire, which is not incorporated in the report.

Staff made several attempts to obtain responses from U.S. importers *** and *** which together account for approximately a *** of imports from Indonesia during the period, but the firms did not respond. See Staff telephone log of August 5, 2025. *** a U.S. importer from Laos, confirmed receipt of the Commission questionnaire but did not provide a response, stating the company intends to participate in the final phase of investigations instead due to current limited resources. Email from ***, August 3, 2025. *** headquartered in Cambodia, reported that the firm has ceased operations and will not be able to participate in the investigations. Email from ***, July 31, 2025.

[3] *** certified that they did not import the in-scope product during the period of data collection.

[4] Questionnaire responses also represented *** percent of U.S. imports from subject sources and *** percent of U.S. imports from nonsubject sources in 2024.

Table 4.1 lists all responding U.S. importers of CSPV cells and modules from India, Indonesia, Laos, and other sources, their locations, and their shares of U.S. imports, in 2024.

Table 4.1 CSPV cells and modules: U.S. importers, their headquarters, and share of imports within each source, 2024

Share in percent

Firm	Headquarters	India	Indonesia	Laos	Subject sources	Nonsubject sources	All import sources
Acciona	Chicago, IL	***	***	***	***	***	***
American Wire	Aventura, FL	***	***	***	***	***	***
B.I. Manufacturing	Madison, GA	***	***	***	***	***	***
BYD	Pasadena, CA	***	***	***	***	***	***
Canadian (USA)	Walnut Creek, CA	***	***	***	***	***	***
Cantex	Houston, TX	***	***	***	***	***	***
Energon	Houston, TX	***	***	***	***	***	***
First Solar	Tempe, AZ	***	***	***	***	***	***
GAF Energy	San Jose, CA	***	***	***	***	***	***
Hanwha America	Irvine, CA	***	***	***	***	***	***
Hanwha Dalton	Dalton, GA	***	***	***	***	***	***
Hanwha USA	Irvine, CA	***	***	***	***	***	***
Hanwha White	White, GA	***	***	***	***	***	***
Hounen CA	Chino, CA	***	***	***	***	***	***
Hounen SC	Orangeburg, SC	***	***	***	***	***	***
Hyundai	Seongnam-Si, Korea Gyeonggi-Do, Korea	***	***	***	***	***	***
Illuminate	Pataskala, OH	***	***	***	***	***	***
Invenergy	Chicago, IL	***	***	***	***	***	***
JerryP	Albany, OR	***	***	***	***	***	***
LONGi	San Ramon, CA	***	***	***	***	***	***
Merlin	San Jose, CA	***	***	***	***	***	***
Mundra Solar Energy	Mundra, GJ, India	***	***	***	***	***	***
Mundra Solar PV	Mundra, GJ, India	***	***	***	***	***	***

Table continued.

Table 4.1 Continued CSPV cells and modules: U.S. importers, their headquarters, and share of imports within each source, 2024

Share in percent

Firm	Headquarters	India	Indonesia	Laos	Subject sources	Nonsubject sources	All import sources
New Energy Imports	Pleasanton, CA	***	***	***	***	***	***
NextEra	Juno Beach, FL	***	***	***	***	***	***
Nusa Solar	Middle Town, DE	***	***	***	***	***	***
Omni Pro	Addison, TX	***	***	***	***	***	***
PowerFilm	Ames, IA	***	***	***	***	***	***
Premier Energies	Hyderabad, TS, India	***	***	***	***	***	***
REC Americas	San Luis Obispo, CA	***	***	***	***	***	***
ReNew	Dover, DE	***	***	***	***	***	***
Runergy	Huntsville, AL	***	***	***	***	***	***
Runergy Trading	City Of Industry, CA	***	***	***	***	***	***
SEG Manufacturing	Houston, TX	***	***	***	***	***	***
Silfab	Burlington, WA	***	***	***	***	***	***
SunTegra	Larchmont, NY	***	***	***	***	***	***
Trina (U.S.)	Fremont, CA	***	***	***	***	***	***
Trina/T1 Energy	Austin, TX	***	***	***	***	***	***
TXAM Pumps	Houston, TX	***	***	***	***	***	***
Vietnam Sunergy	Bac Ninh, BAC NINH, Vietnam	***	***	***	***	***	***
Vikram	Massachusetts, MA	***	***	***	***	***	***
Waaree Energies	Navsari, GJ, India	***	***	***	***	***	***
Worksport	West Seneca, NY	***	***	***	***	***	***
Yingli	Malvern, PA	***	***	***	***	***	***
Yuncheng	Fremont, CA	***	***	***	***	***	***
All other firms	Various	***	***	***	***	***	***
All firms	Various	100.0	100.0	100.0	100.0	100.0	100.0

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010, accessed August 12, 2025.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as “—“. Data for all other firms are related to the additional importers of record identified using proprietary, Census-edited Customs records that did not respond to the Commission questionnaire.

U.S. imports

Tables 4.2 through 4.5 and figure 4.1 present data for U.S. imports of CSPV cells and modules from India, Indonesia, and Laos and all other sources. Between 2022 and 2024, imports of CSPV cells and modules from aggregated subject sources increased overall by *** percent by quantity, with most of the growth occurring from 2023 to 2024, and were higher in interim 2025 by *** percent compared to interim 2024. Subject imports accounted for *** percent of total CSPV cells and modules imports in 2024, shared almost evenly among the three subject countries. While U.S. imports from India increased *** percent in 2023[5] and decreased *** percent in 2024, imports from Indonesia increased *** percent in 2023 and *** percent in 2024, and Laos entered the market after interim 2024 . U.S. imports from Indonesia and Laos were higher in interim 2025 than in interim 2024 and drove up the share of subject imports in interim 2025 to *** percent. In contrast, India's imports were lower in interim 2025 compared to interim 2024 by *** percent. Imports of CSPV cells and modules from subject sources by value had similar trends. Overall, U.S. imports of CSPV cells and modules from nonsubject sources, primarily Vietnam, Thailand, and Malaysia, increased from 2022 to 2024 by quantity and were lower by *** percent in interim 2025 than in interim 2024, although remained the largest source throughout the period. Nonsubject imports increased irregularly by value for the same period and were lower in interim 2025 than in interim 2024.

The unit values of imports of CSPV cells and modules from subject sources decreased overall between 2022 and 2024 and were lower in interim 2025 than in interim 2024. Unit values for nonsubject sources were highest in 2023 but decreased overall between 2022 and 2024 and were also lower in interim 2025 than in interim 2024. The unit value for imports of CSPV cells and modules from all sources were lowest in interim 2025. In addition, nonsubject unit values were the lowest in of any source 2022, 2023, and 2024 and Laos' unit values were the lowest in interim 2025, while India had the highest unit values in all periods.

The ratio of subject imports to U.S. production increased from *** percent in 2022 to *** percent in 2023, but decreased to *** percent in 2024, and was lower in interim 2025 than in interim 2024. The ratio of nonsubject imports to U.S. production increased from *** percent in 2022 to *** percent in 2023, but decreased to *** percent in 2024, and was lower in interim 2025 than in interim 2024.

[5] *** accounted for the vast majority of CSPV modules imports from India in 2023, while *** accounted for the majority of CSPV cells imports from India in the same year.

Table 4.2 CSPV cells and modules: U.S. imports by source and period

Quantity in kilowatts; value in 1,000 dollars; unit value in dollars per kilowatts; interim is January through March

Source	Measure	2022	2023	2024	Interim 2024	Interim 2025
India	Quantity	***	***	***	***	***
Indonesia	Quantity	***	***	***	***	***
Laos	Quantity	***	***	***	***	***
Subject sources	Quantity	***	***	***	***	***
Nonsubject sources	Quantity	***	***	***	***	***
All import sources	Quantity	***	***	***	***	***
India	Value	***	***	***	***	***
Indonesia	Value	***	***	***	***	***
Laos	Value	***	***	***	***	***
Subject sources	Value	***	***	***	***	***
Nonsubject sources	Value	***	***	***	***	***
All import sources	Value	***	***	***	***	***
India	Unit value	***	***	***	***	***
Indonesia	Unit value	***	***	***	***	***
Laos	Unit value	***	***	***	***	***
Subject sources	Unit value	***	***	***	***	***
Nonsubject sources	Unit value	***	***	***	***	***
All import sources	Unit value	***	***	***	***	***

Table continued.

Table 4.2 Continued CSPV cells and modules: Share of U.S. imports by source and period

Shares and ratio in percent; interim is January through March

Source	Measure	2022	2023	2024	Interim 2024	Interim 2025
India	Share of quantity	***	***	***	***	***
Indonesia	Share of quantity	***	***	***	***	***
Laos	Share of quantity	***	***	***	***	***
Subject sources	Share of quantity	***	***	***	***	***
Nonsubject sources	Share of quantity	***	***	***	***	***
All import sources	Share of quantity	100.0	100.0	100.0	100.0	100.0
India	Share of value	***	***	***	***	***
Indonesia	Share of value	***	***	***	***	***
Laos	Share of value	***	***	***	***	***
Subject sources	Share of value	***	***	***	***	***
Nonsubject sources	Share of value	***	***	***	***	***
All import sources	Share of value	100.0	100.0	100.0	100.0	100.0
India	Ratio	***	***	***	***	***
Indonesia	Ratio	***	***	***	***	***
Laos	Ratio	***	***	***	***	***
Subject sources	Ratio	***	***	***	***	***
Nonsubject sources	Ratio	***	***	***	***	***
All import sources	Ratio	1,411.0	1,889.3	603.2	1,166.6	212.9

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records, using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010, accessed August 12, 2025.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as “—“. Data related to the additional importers of record identified using proprietary, Census-edited Customs records that did not respond to the Commission questionnaire are included.

Note: ***’s U.S. import and U.S. shipment data were adjusted for reconciliation purposes.

Figure 4.1 CSPV cells and modules: U.S. import quantities and average unit values, by source and period

* * * * * * *

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records, using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010, accessed August 12, 2025.

Note: Data related to the additional importers of record identified using proprietary, Census-edited Customs records that did not respond to the Commission questionnaire are included.

Table 4.3 CSPV cells and modules: Changes in U.S. imports, by source and period

Changes (Δ) in percent (%)

Source	Measure	2022 to 2024	2022 to 2023	2023 to 2024	Interim 2024 to 2025
India	%Δ Quantity	▲***	▲***	▼***	▼***
Indonesia	%Δ Quantity	▲***	▲***	▲***	▲***
Laos	%Δ Quantity	▲***	***	▲***	▲***
Subject sources	%Δ Quantity	▲***	▲***	▲***	▲***
Nonsubject sources	%Δ Quantity	▲***	▲***	▲***	▼***
All import sources	%Δ Quantity	▲***	▲***	▲***	▼***
India	%Δ Value	▲***	▲***	▼***	▼***
Indonesia	%Δ Value	▲***	▼***	▲***	▲***
Laos	%Δ Value	▲***	***	▲***	▲***
Subject sources	%Δ Value	▲***	▲***	▲***	▲***
Nonsubject sources	%Δ Value	▲***	▲***	▼***	▼***
All import sources	%Δ Value	▲***	▲***	▼***	▼***
India	%Δ Unit value	▼***	▼***	▼***	▼***
Indonesia	%Δ Unit value	▼***	▼***	▼***	▼***
Laos	%Δ Unit value	▲***	***	▲***	▲***
Subject sources	%Δ Unit value	▼***	▼***	▼***	▼***
Nonsubject sources	%Δ Unit value	▼***	▲***	▼***	▼***
All import sources	%Δ Unit value	▼***	▲***	▼***	▼***

Table continued.

Table 4.3 Continued CSPV cells and modules: Changes in U.S. imports, by source and period

Changes (Δ) in percentage point (ppt)

Source	Measure	2022 to 2024	2022 to 2023	2023 to 2024	Interim 2024 to 2025
India	ppt Δ Quantity	▲***	▲***	▼***	▼***
Indonesia	ppt Δ Quantity	▲***	▼***	▲***	▲***
Laos	ppt Δ Quantity	▲***	***	▲***	▲***
Subject sources	ppt Δ Quantity	▲***	▲***	▲***	▲***
Nonsubject sources	ppt Δ Quantity	▼***	▼***	▼***	▼***
All import sources	ppt Δ Quantity	***	***	***	***
India	ppt Δ Value	▲***	▲***	▼***	▲***
Indonesia	ppt Δ Value	▲***	▼***	▲***	▲***
Laos	ppt Δ Value	▲***	***	▲***	▲***
Subject sources	ppt Δ Value	▲***	▲***	▲***	▲***
Nonsubject sources	ppt Δ Value	▼***	▼***	▼***	▼***
All import sources	ppt Δ Value	***	***	***	***
India	ppt Δ Ratio	▲***	▲***	▼***	▼***
Indonesia	ppt Δ Ratio	▼***	▼***	▼***	▲***
Laos	ppt Δ Ratio	▲***	***	▲***	▲***
Subject sources	ppt Δ Ratio	▲***	▲***	▼***	▼***
Nonsubject sources	ppt Δ Ratio	▼***	▲***	▼***	▼***
All import sources	ppt Δ Ratio	▼***	▲***	▼***	▼***

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records, using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010, accessed August 12, 2025.

Note: Shares and ratios shown as "0.0" percent represent non-zero values less than "0.05" percent (if positive) and greater than "(0.05)" percent (if negative). Zeroes, null values, and undefined calculations are suppressed and shown as "—". Period changes preceded by a "▲" represent an increase, while period changes preceded by a "▼" represent a decrease. Data related to the additional importers of record identified using proprietary, Census-edited Customs records that did not respond to the Commission questionnaire are included.

Table 4.4 CSPV cells and modules: U.S. imports from nonsubject sources, by source and period

Quantity in kilowatts; value in 1,000 dollars; unit values in dollars per kilowatt; share in percent; interim period is January to March

Source	Measure	2022	2023	2024	Interim 2024	Interim 2025
China and/or Taiwan	Quantity	***	***	***	***	***
Cambodia, Malaysia, Thailand, and/or Vietnam	Quantity	***	***	***	***	***
South Korea	Quantity	***	***	***	***	***
All other sources	Quantity	***	***	***	***	***
Nonsubject sources	Quantity	***	***	***	***	***
China and/or Taiwan	Value	***	***	***	***	***
Cambodia, Malaysia, Thailand, and/or Vietnam	Value	***	***	***	***	***
South Korea	Value	***	***	***	***	***
All other sources	Value	***	***	***	***	***
Nonsubject sources	Value	***	***	***	***	***

Table continued.

Table 4.4 Continued CSPV cells and modules: U.S. imports from nonsubject sources, by source and period

Quantity in kilowatts; value in 1,000 dollars; unit values in dollars per kilowatt; share in percent; interim period is January to March

Source	Measure	2022	2023	2024	Interim 2024	Interim 2025
China and/or Taiwan	Unit value	***	***	***	***	***
Cambodia, Malaysia, Thailand, and/or Vietnam	Unit value	***	***	***	***	***
South Korea	Unit value	***	***	***	***	***
All other sources	Unit value	***	***	***	***	***
Nonsubject sources	Unit value	***	***	***	***	***
China and/or Taiwan	Share of quantity	***	***	***	***	***
Cambodia, Malaysia, Thailand, and/or Vietnam	Share of quantity	***	***	***	***	***
South Korea	Share of quantity	***	***	***	***	***
All other sources	Share of quantity	***	***	***	***	***
Nonsubject sources	Share of quantity	***	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records, using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010, accessed August 12, 2025.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as “—“. Share of quantity is out of U.S. imports as shown in table 4.2. Data related to the additional importers of record identified using proprietary, Census-edited Customs records that did not respond to the Commission questionnaire are included.

Table 4.5 CSPV cells and modules: U.S. producers' and/or their affiliates' U.S. imports, by source and period

Quantity in kilowatts; ratio in percent, interim period is January to March

Source	Measure	2022	2023	2024	Interim 2024	Interim 2025
India	Quantity	***	***	***	***	***
Indonesia	Quantity	***	***	***	***	***
Laos	Quantity	***	***	***	***	***
Subject sources	Quantity	***	***	***	***	***
Nonsubject sources	Quantity	***	***	***	***	***
All import sources	Quantity	***	***	***	***	***
India	Ratio	***	***	***	***	***
Indonesia	Ratio	***	***	***	***	***
Laos	Ratio	***	***	***	***	***
Subject sources	Ratio	***	***	***	***	***
Nonsubject sources	Ratio	***	***	***	***	***
All import sources	Ratio	***	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records, using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010, accessed August 12, 2025.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—". Ratios are calculated as the quantity of imports by U.S. producers and their affiliates relative to U.S. imports as shown in table 4.2. Data related to the additional importers of record identified using proprietary, Census-edited Customs records that did not respond to the Commission questionnaire are included in table 4.2.

Negligibility

The statute requires that an investigation be terminated without an injury determination if imports of the subject merchandise are found to be negligible.[6] Negligible imports are generally defined in the Act, as amended, as imports from a country of merchandise corresponding to a domestic like product where such imports account for less than 3 percent of the volume of all such merchandise imported into the United States in the most recent 12-month period for which data are available that precedes the filing of the petition or the initiation of the investigation. However, if there are imports of such merchandise from a number of countries subject to investigations initiated on the same day that individually account for less than 3 percent of the total volume of the subject merchandise, and if the imports from those countries collectively account for more than 7 percent of the volume of all such merchandise imported into the United States during the applicable 12-month period, then imports from such countries are deemed not to be negligible.[7] Imports from India, Indonesia, and Laos accounted for *** percent, *** percent, and *** percent respectively of total imports of CSPV cells and modules by quantity from July 2024 through June 2025.

Table 4.6 CSPV cells and modules: U.S. imports in the twelve-month period preceding the filing of the petition, July 2024 through June 2025

Quantity in kilowatts; share in percent

Source of imports	Quantity	Share of quantity
India	***	***
Indonesia	***	***
Laos	***	***
All other sources	***	***
All import sources	***	100.0

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010, accessed August 12, 2025.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—". Data related to the additional importers of record identified using proprietary, Census-edited Customs records that did not respond to the Commission questionnaire are included.

[6] Sections 703(a)(1), 705(b)(1), 733(a)(1), and 735(b)(1) of the Act (19 U.S.C. §§ 1671b(a)(1), 1671d(b)(1), 1673b(a)(1), and 1673d(b)(1)).

[7] Section 771 (24) of the Act (19 U.S.C § 1677(24)).

Cumulation considerations

In assessing whether imports should be cumulated, the Commission determines whether U.S. imports from the subject countries compete with each other and with the domestic like product and has generally considered four factors: (1) fungibility, (2) presence of sales or offers to sell in the same geographical markets, (3) common or similar channels of distribution, and (4) simultaneous presence in the market. Information regarding channels of distribution, market areas, and interchangeability appear in Part 2. Additional information concerning fungibility, geographical markets, and simultaneous presence in the market is presented below.

Fungibility

Table 4.7 and figure 4.2 present U.S. producers' and U.S. importers' U.S. shipments of CSPV cells by type (bifacial and non-bifacial) and CSPV modules by type (non-bifacial using bifacial cells, non-bifacial using non-bifacial cells, and bifacial using bifacial cells) in 2024.[8] [9] In 2024, the vast majority of U.S. producers' U.S. shipments, U.S. importers' U.S. shipments from aggregate subject sources, and U.S. shipments from nonsubject sources was ***, except for U.S. importers' U.S. shipments from Indonesia, which were mostly ***. Nonsubject sources accounted for all U.S. shipments of *** in 2024, while U.S. producers' U.S. shipments accounted for the overwhelming majority of non-bifacial modules using with non-bifacial cells. U.S. producers' U.S. shipments and U.S. importers' U.S. shipments from aggregate subject sources and nonsubject sources included all three module categories in 2024.

[8] Respondents Mundra Solar PV Limited, Mundra Solar Energy Limited, Waaree Energies Ltd, and Waaree Solar Americas (collectively, Indian Joint Respondents), argued there is no reasonable overlap of competition among subject imports from India and those from Laos and Indonesia explained by (1) the lack of Chinese ownership of Indian entities; (2) the levels of imports on the basis of quantity and value; (3) the pricing trends of the imports; and (4) the existence of a vibrant and growing home market. Indian joint respondents' postconference brief, p. 3.

[9] ***'s and ***'s U.S. shipment data were adjusted for reconciliation purposes.

Table 4.7 CSPV cells and modules: U.S. producers' and U.S. importers' U.S. shipments, by source and type, 2024

Quantity in kilowatts

Source	Cells: Bifacial	Cells: Non-bifacial	Modules: Non-bifacial using bifacial cells	Modules: Non-bifacial using non-bifacial cells	Modules: Bifacial using bifacial cells	All cells and modules
U.S. producers	***	***	***	***	***	***
India	***	***	***	***	***	***
Indonesia	***	***	***	***	***	***
Laos	***	***	***	***	***	***
Subject sources	***	***	***	***	***	***
Nonsubject sources	***	***	***	***	***	***
All import sources	***	***	***	***	***	***
All sources	***	***	***	***	***	***

Table continued.

Table 4.7 Continued CSPV cells and modules: U.S. producers' and U.S. importers' U.S. shipments, by source and type, 2024

Share across in percent

Source	Cells: Bifacial	Cells: Non-bifacial	Modules: Non-bifacial using bifacial cells	Modules: Non-bifacial using non-bifacial cells	Modules: Bifacial using bifacial cells	All cells and modules
U.S. producers	***	***	***	***	***	100.0
India	***	***	***	***	***	100.0
Indonesia	***	***	***	***	***	100.0
Laos	***	***	***	***	***	100.0
Subject sources	***	***	***	***	***	100.0
Nonsubject sources	***	***	***	***	***	100.0
All import sources	***	***	***	***	***	100.0
All sources	***	***	***	***	***	100.0

Table continued.

Table 4.7 Continued CSPV cells and modules: U.S. producers' and U.S. importers' U.S. shipments, by source and type, 2024

Share down in percent

Source	Cells: Bifacial	Cells: Non-bifacial	Modules: Non-bifacial using bifacial cells	Modules: Non-bifacial using non-bifacial cells	Modules: Bifacial using bifacial cells	All cells and modules
U.S. producers	***	***	***	***	***	***
India	***	***	***	***	***	***
Indonesia	***	***	***	***	***	***
Laos	***	***	***	***	***	***
Subject sources	***	***	***	***	***	***
Nonsubject sources	***	***	***	***	***	***
All import sources	***	***	***	***	***	***
All sources	100.0	100.0	100.0	100.0	100.0	100.0

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

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—".

Figure 4.2 CSPV cells and modules: U.S. producers' and U.S. importers' U.S. shipments, by source and type, 2024

* * * * * * *

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

Geographical markets

Table 4.8 presents U.S. imports by source and border of entry in 2024. In 2024, U.S. imports of CSPV cells and modules from India, Indonesia, Laos, and nonsubject sources entered the United States through ports located in all four regions. The largest share of CSPV cells and modules from India, entered the United States through ports in the South, and for Indonesia, and nonsubject sources most of CSPV cells and modules entered the United States through ports in the West. Most of CSPV cells and modules from Laos entered through ports in the North.

Table 4.8 CSPV cells and modules: U.S. imports, by source and border of entry, 2024

Quantity in kilowatts

Source	East	North	South	West	All borders
India	445,216	80,179	1,604,506	167,405	2,297,306
Indonesia	358,219	251,585	410,506	783,512	1,803,822
Laos	300,972	761,878	698,732	146,626	1,908,208
Subject sources	1,104,407	1,093,642	2,713,744	1,097,543	6,009,337
Nonsubject sources	12,047,961	6,621,296	12,763,804	21,102,156	52,535,216
All import sources	13,152,368	7,714,938	15,477,548	22,199,699	58,544,553

Table continued.

Table 4.8 Continued CSPV cells and modules: U.S. imports, by source and border of entry, 2024

Share in percent

Source	East	North	South	West	All borders
India	19.4	3.5	69.8	7.3	100.0
Indonesia	19.9	13.9	22.8	43.4	100.0
Laos	15.8	39.9	36.6	7.7	100.0
Subject sources	18.4	18.2	45.2	18.3	100.0
Nonsubject sources	22.9	12.6	24.3	40.2	100.0
All import sources	22.5	13.2	26.4	37.9	100.0

Table continued.

Table 4.8 Continued CSPV cells and modules: U.S. imports, by source and border of entry, 2024

Share down in percent

Source	East	North	South	West	All borders
India	3.4	1.0	10.4	0.8	3.9
Indonesia	2.7	3.3	2.7	3.5	3.1
Laos	2.3	9.9	4.5	0.7	3.3
Subject sources	8.4	14.2	17.5	4.9	10.3
Nonsubject sources	91.6	85.8	82.5	95.1	89.7
All import sources	100.0	100.0	100.0	100.0	100.0

Source: Compiled from official U.S. import statistics of the U.S. Department of Commerce Census Bureau using statistical reporting numbers 8541.42.0010 and 8541.43.0010, accessed on August 13, 2025. Imports are based on the imports for consumption data series.

Presence in the market

Table 4.9 and figures 4.3 and 4.4 present monthly official U.S. import statistics for CSPV cells and modules and subject and nonsubject sources. Imports of CSPV cells and modules from India, Indonesia, and nonsubject sources were present in every month during January 2022 through June 2025. Imports of CSPV cells and modules from Laos started in December 2023 and were present in 18 months of 42 months, during January 2022 through June 2025.

Table 4.9 CSPV cells and modules: Quantity of U.S. imports, by source and month

Quantity in kilowatts

Year	Month	India	Indonesia	Laos	Subject sources	Nonsubject sources	All import sources
2022	January	7,900	15,447	—	23,347	1,156,665	1,180,011
2022	February	8,598	7,218	—	15,817	1,503,452	1,519,268
2022	March	5,438	15,805	—	21,242	1,829,656	1,850,898
2022	April	10,767	38,605	—	49,372	1,537,506	1,586,878
2022	May	14,601	30,221	—	44,822	1,904,536	1,949,358
2022	June	11,874	23,176	—	35,051	1,782,132	1,817,183
2022	July	9,119	36,924	—	46,043	1,513,384	1,559,427
2022	August	9,749	40,164	—	49,913	2,196,455	2,246,368
2022	September	29,819	57,219	—	87,038	2,316,352	2,403,390
2022	October	27,115	84,698	—	111,813	2,915,284	3,027,098
2022	November	44,772	54,348	—	99,119	2,805,058	2,904,178
2022	December	52,668	95,287	—	147,955	3,236,265	3,384,220
2023	January	71,766	102,902	—	174,668	3,370,347	3,545,015
2023	February	55,991	34,762	—	90,753	2,924,842	3,015,595
2023	March	119,672	71,793	—	191,465	3,603,249	3,794,714
2023	April	108,872	44,700	—	153,573	2,822,043	2,975,615
2023	May	132,227	34,154	—	166,381	3,575,480	3,741,861
2023	June	162,905	46,742	—	209,648	3,496,179	3,705,827
2023	July	208,259	1,723	—	209,982	4,258,208	4,468,190
2023	August	293,467	28,737	—	322,204	3,914,738	4,236,942
2023	September	386,826	18,381	—	405,207	3,832,212	4,237,419
2023	October	283,312	10,298	—	293,610	4,474,294	4,767,905
2023	November	132,184	46,323	—	178,507	3,568,851	3,747,358
2023	December	93,487	81,338	45	174,869	3,710,239	3,885,108

Table continued.

Table 4.9 Continued CSPV cells and modules: Quantity of U.S. imports, by source and month

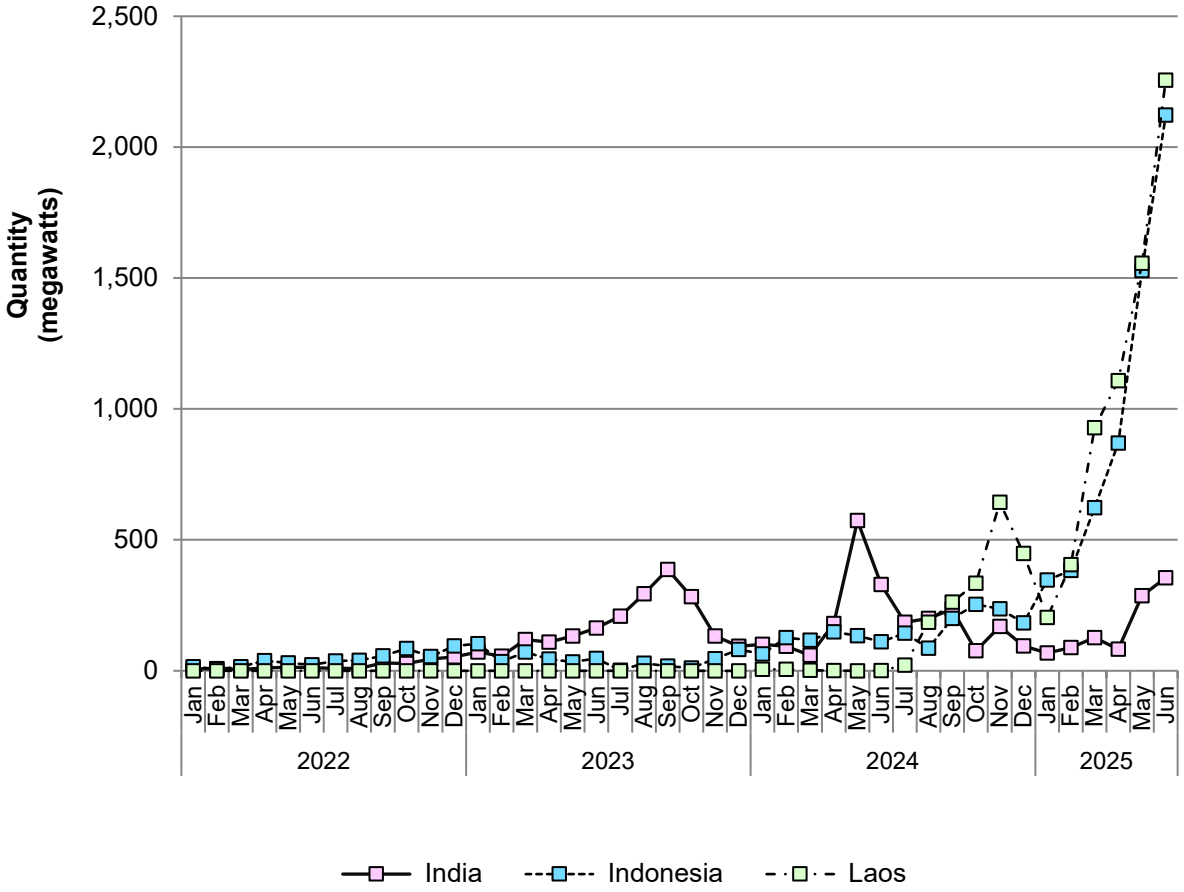
Quantity in kilowatts

Year	Month	India	Indonesia	Laos	Subject sources	Nonsubject sources	All import sources
2024	January	100,886	64,652	6,070	171,607	4,010,692	4,182,300
2024	February	93,480	126,265	5,174	224,919	3,949,662	4,174,581
2024	March	59,794	116,706	1,552	178,052	5,405,910	5,583,962
2024	April	180,175	148,078	818	329,072	5,225,359	5,554,431
2024	May	573,536	134,404	—	707,940	5,395,282	6,103,222
2024	June	329,521	110,798	95	440,414	5,454,579	5,894,993
2024	July	184,715	143,302	21,614	349,631	5,699,752	6,049,383
2024	August	199,860	86,790	185,565	472,215	5,092,116	5,564,330
2024	September	234,925	199,500	262,203	696,628	4,782,119	5,478,747
2024	October	76,648	254,056	333,966	664,669	3,340,843	4,005,513
2024	November	169,264	236,159	643,669	1,049,092	3,114,191	4,163,283
2024	December	94,502	183,114	447,482	725,097	1,064,712	1,789,809
2025	January	68,397	346,932	203,559	618,888	901,725	1,520,613
2025	February	89,199	383,432	404,802	877,433	2,516,236	3,393,668
2025	March	126,184	623,385	928,397	1,677,966	1,947,056	3,625,022
2025	April	82,962	869,575	1,107,559	2,060,095	2,452,543	4,512,638
2025	May	286,917	1,528,785	1,556,501	3,372,203	3,210,413	6,582,616
2025	June	355,195	2,122,518	2,256,116	4,733,829	1,830,195	6,564,024

Source: Compiled from official U.S. import statistics of the U.S. Department of Commerce Census Bureau using statistical reporting numbers 8541.42.0010 and 8541.43.0010, accessed on August 13, 2025. Imports are based on the imports for consumption data series.

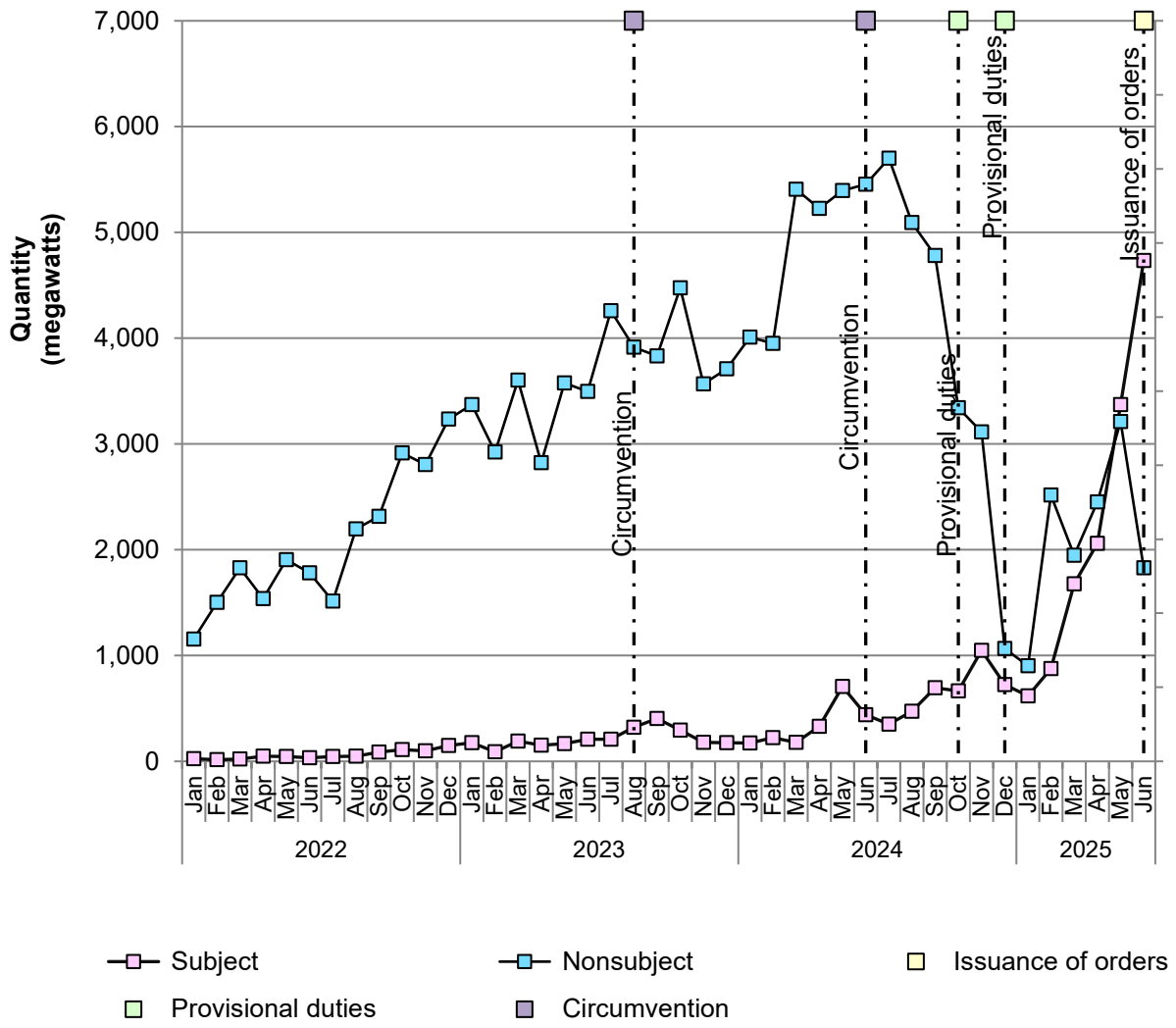
Note: Zeroes, null values, and undefined calculations are suppressed and shown as "—".

Figure 4.3 CSPV cells and modules: U.S. imports from individual subject sources, by month



Source: Compiled from official U.S. import statistics of the U.S. Department of Commerce Census Bureau using statistical reporting numbers 8541.42.0010 and 8541.43.0010, accessed on August 13, 2025. Imports are based on the imports for consumption data series.

Figure 4.4 CSPV cells and modules: U.S. imports from aggregated subject and nonsubject sources, by month



Source: Compiled from official U.S. import statistics of the U.S. Department of Commerce Census Bureau using statistical reporting numbers 8541.42.0010 and 8541.43.0010, accessed on August 13, 2025. Imports are based on the imports for consumption data series.

Note: Final determination of circumvention of the China orders for select suppliers in Cambodia, Malaysia, Thailand, and Vietnam August 23, 2023 ("circumvention" in the figure) but duties were exempted for a period through June 2024 by Presidential order; Provisional duties were applied to imports from select suppliers in Cambodia, Malaysia, Thailand, and Vietnam as a result of preliminary findings of sales at less than fair value and subsidization in the previous solar investigations December 4, 2024 for AD investigations and October 4, 2024 for CVD investigations ("provisional duties" in the figure); Antidumping duty and countervailing duty orders were issued for select suppliers in Cambodia, Malaysia, Thailand, and Vietnam as a result of final findings of sales at less than fair value and subsidization and injury (or threat of injury) to a U.S. industry June 24, 2025 ("issuance of orders" in the figure).

Apparent U.S. consumption and market shares

Quantity

Table 4.10 and figure 4.5 present data on apparent U.S. consumption and U.S. market shares by quantity for CSPV cells and modules. By quantity, apparent U.S. consumption increased by *** percent between 2022 and 2024 and was lower by *** percent in interim 2025, than in interim 2024. The market shares of subject imports steadily increased by quantity between 2022 and 2024 by *** percentage points from *** percent in 2022 to *** percent in 2024 and were higher in interim 2025 by *** percentage points, than in interim 2024. The share of quantity of nonsubject sources decreased by *** percentage points between 2022 and 2024 and was lower in interim 2025 by *** percentage points, than in interim 2024.

Table 4.10 CSPV cells and modules: Apparent U.S. consumption and market shares based on quantity, by source and period

Quantity in kilowatts; shares in percent; interim is January through March

Source	Measure	2022	2023	2024	Interim 2024	Interim 2025
U.S. producers	Quantity	***	***	***	***	***
India	Quantity	***	***	***	***	***
Indonesia	Quantity	***	***	***	***	***
Laos	Quantity	***	***	***	***	***
Subject sources	Quantity	***	***	***	***	***
Nonsubject sources	Quantity	***	***	***	***	***
All import sources	Quantity	***	***	***	***	***
All sources	Quantity	***	***	***	***	***
U.S. producers	Share	***	***	***	***	***
India	Share	***	***	***	***	***
Indonesia	Share	***	***	***	***	***
Laos	Share	***	***	***	***	***
Subject sources	Share	***	***	***	***	***
Nonsubject sources	Share	***	***	***	***	***
All import sources	Share	***	***	***	***	***
All sources	Share	100.0	100.0	100.0	100.0	100.0

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records, records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010, accessed August 12, 2025.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as “—“. Quantity for U.S. producers' U.S. shipments only reflects domestically produced cells to assemble into modules. In measuring consumption and market share this methodology avoids reclassifying and/or double counting merchandise already reported as an import. Data related to the additional importers of record identified using proprietary, Census-edited Customs records that did not respond to the Commission questionnaire are included.

Figure 4.5 CSPV cells and modules: Apparent U.S. consumption based on quantity, by source and period

* * * * * * *

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records, records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010, accessed August 12, 2025.

Note: Quantity for U.S. producers' U.S. shipments only reflects domestically produced cells to assemble into modules. In measuring consumption and market share this methodology avoids reclassifying and/or double counting merchandise already reported as an import. Data related to the additional importers of record identified using proprietary, Census-edited Customs records that did not respond to the Commission questionnaire are included.

Value

Table 4.11 and figure 4.6 present data on apparent U.S. consumption and U.S. market shares by value for CSPV cells and modules. By value, apparent U.S. consumption increased by *** percent between 2022 and 2024 and was lower by *** percent in interim 2025, than in interim 2024. The market shares of subject imports steadily increased by value between 2022 and 2024 by *** percentage points from *** percent in 2022 to *** percent in 2024 and were higher in interim 2025 by *** percentage points, than in interim 2024. The share of quantity of nonsubject sources decreased by *** percentage points between 2022 and 2024 and was lower in interim 2025 by *** percentage points, than in interim 2024.

Table 4.11 CSPV cells and modules: Apparent U.S. consumption and market shares based on value, by source and period

Value in 1,000 dollars; shares in percent; interim period is January through March

Source	Measure	2022	2023	2024	Interim 2024	Interim 2025
U.S. producers: Fully domestic value	Value	***	***	***	***	***
U.S. producers: Value added to imports	Value	***	***	***	***	***
U.S. producers: Overall value	Value	***	***	***	***	***
India	Value	***	***	***	***	***
Indonesia	Value	***	***	***	***	***
Laos	Value	***	***	***	***	***
Subject sources	Value	***	***	***	***	***
Nonsubject sources	Value	***	***	***	***	***
All import sources	Value	***	***	***	***	***
All sources	Value	***	***	***	***	***
U.S. producers: Fully domestic value	Share	***	***	***	***	***
U.S. producers: Value added to imports	Share	***	***	***	***	***
U.S. producers: Overall value	Share	***	***	***	***	***
India	Share	***	***	***	***	***
Indonesia	Share	***	***	***	***	***
Laos	Share	***	***	***	***	***
Subject sources	Share	***	***	***	***	***
Nonsubject sources	Share	***	***	***	***	***
All import sources	Share	***	***	***	***	***
All sources	Share	100.0	100.0	100.0	100.0	100.0

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records, records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010, accessed August 12, 2025.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—". Value for U.S. producers' U.S. shipments reflects domestically produced cells to assemble into modules and the incremental value added by U.S. module producers to imported CSPV cells. In measuring consumption and market share this methodology avoids reclassifying and/or double counting merchandise already reported as an import. Data related to the additional importers of record identified using proprietary, Census-edited Customs records that did not respond to the Commission questionnaire are included.

Figure 4.6 CSPV cells and modules: Apparent U.S. consumption based on value, by source and period

* * * * * * *

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records, records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010, accessed August 12, 2025.

Note: Value for U.S. producers' U.S. shipments reflects domestically produced cells to assemble into modules and the incremental value added by U.S. module producers to imported CSPV cells. In measuring consumption and market share this methodology avoids reclassifying and/or double counting merchandise already reported as an import. Data related to the additional importers of record identified using proprietary, Census-edited Customs records that did not respond to the Commission questionnaire are included.

Table 4.12 presents U.S. producers' U.S. shipments of CSPV modules and ratios to overall U.S. apparent consumption. U.S. producers' ratios of CSPV modules to overall apparent consumption increased between 2022 and 2024 by *** percentage points, by quantity, from *** percent in 2022 to *** percent in 2024, and were higher in interim 2025 by *** percentage points, than in interim 2024. By value, U.S. producers' ratios of CSPV modules to overall apparent consumption increased between 2022 and 2024 by *** percentage points, from *** percent in 2022 to *** percent in 2024, and were higher in interim 2025 by *** percentage points, than in interim 2024.

Table 4.12 CSPV cells and modules: U.S. producers' U.S. shipments of modules and ratio to overall apparent consumption of cells and modules, by period

Quantity in kilowatts; value in 1,000 dollars; ratios in percent

Product type	Measure	2022	2023	2024	Interim 2024	Interim 2025
Modules	Quantity	***	***	***	***	***
Modules	Value	***	***	***	***	***
Modules	Quantity ratio	***	***	***	***	***
Modules	Value ratio	***	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records, records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010, accessed August 12, 2025.

Note: The ratios (i.e., quantity ratio, and value ratio) represent the portion of overall apparent consumption the U.S. producers' shipments of modules account for out of the overall apparent consumption of the single domestic like product version of apparent consumption that includes both cells and modules. These are ratios, not shares since these numbers were not used to construct the apparent consumption for cells and modules together, rather the inputs into domestic production (cells) were the basis for the combined data. There are likely differences in timing and data coverage between the input used in apparent consumption (cells) and the finished good of the U.S. module producers (modules). Data related to the additional importers of record identified using proprietary, Census-edited Customs records that did not respond to the Commission questionnaire are included.

Table 4.13 presents apparent U.S. consumption and market shares based on quantity, by source and by quarter.

Table 4.13 CSPV cells and modules: Apparent U.S. consumption and market shares based on quantity data, by source and quarter

Quantity in kilowatts; shares in percent

Source	Measure	2024 Q1	2024 Q2	2024 Q3	2024 Q4	2025 Q1
U.S. producers	Quantity	***	***	***	***	***
India	Quantity	***	***	***	***	***
Indonesia	Quantity	***	***	***	***	***
Laos	Quantity	***	***	***	***	***
Subject sources	Quantity	***	***	***	***	***
Nonsubject sources	Quantity	***	***	***	***	***
All import sources	Quantity	***	***	***	***	***
All sources	Quantity	***	***	***	***	***
U.S. producers	Share	***	***	***	***	***
India	Share	***	***	***	***	***
Indonesia	Share	***	***	***	***	***
Laos	Share	***	***	***	***	***
Subject sources	Share	***	***	***	***	***
Nonsubject sources	Share	***	***	***	***	***
All import sources	Share	***	***	***	***	***
All sources	Share	100.0	100.0	100.0	100.0	100.0

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records, records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010, accessed August 12, 2025.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—". Quantity for U.S. producers' U.S. shipments only reflects domestically produced cells to assemble into modules. In measuring consumption and market share this methodology avoids reclassifying and/or double counting merchandise already reported as an import. Data related to the additional importers of record identified using proprietary, Census-edited Customs records that did not respond to the Commission questionnaire are included.

Figure 4.7 CSPV cells and modules: Market shares based on quantity data, by source and quarter

* * * * * * *

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records, records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010, accessed August 12, 2025.

Note: Quantity for U.S. producers' U.S. shipments only reflects domestically produced cells to assemble into modules. In measuring consumption and market share this methodology avoids reclassifying and/or double counting merchandise already reported as an import. Data related to the additional importers of record identified using proprietary, Census-edited Customs records that did not respond to the Commission questionnaire are included.

Table 4.14 presents U.S. producers' U.S. shipments of modules and ratios to overall apparent U.S. consumption of cells and modules, by quarter.

Table 4.14 CSPV cells and modules: U.S. producers' U.S. shipments of modules and ratio to overall apparent U.S. consumption of cells and modules, by quarter

Quantity in kilowatts; ratios in percent

Product type	Measure	2024 Q1	2024 Q2	2024 Q3	2024 Q4	2025 Q1
Modules	Quantity	***	***	***	***	***
Modules	Ratio	***	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records, records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010, accessed August 12, 2025.

Note: The ratio represents the portion of overall apparent consumption the U.S. producers' shipments of modules account for out of the overall apparent consumption of the single domestic like product version of apparent consumption that includes both cells and modules. This is a ratio, not a share, since these numbers were not used to construct the apparent consumption for cells and modules together; rather the inputs into domestic production (cells) were the basis for the combined data. There are likely differences in timing and data coverage between the input used in apparent consumption (cells) and the finished good of the U.S. module producers (modules). Data related to the additional importers of record identified using proprietary, Census-edited Customs records that did not respond to the Commission questionnaire are included.

Part 5: Pricing data

Factors affecting prices

Raw material costs

The main underlying raw material input for CSPV cells is polysilicon, which is used to make ingots and wafers. CSPV cells are in turn then assembled, along with other components, including solar glass, aluminum frames, junction boxes, and backsheet, into CSPV modules.

As shown in table 5.1 and figure 5.1, the global average price for monocrystalline wafers fluctuated downwards throughout 2022 to 2024, decreasing overall by *** to *** percent, depending on the wafer type. The prices for different wafer sizes also converged toward the end of the period, though larger wafer sizes (such as 210mm) were still more expensive than smaller ones (such as 156mm). As shown in table 5.2 and figure 5.2, the global average price for monocrystalline cells followed a similar pattern, ending lower in December 2024 than in January 2022. Cell prices showed even greater convergence over the period than wafer prices.

Table 5.1 Wafer prices: Average prices for monocrystalline wafers, by month

Prices in dollars per wafer

Year	Month	210mm N-type mono wafer	210mm mono wafer	182mm N-type mono wafer	182mm mono wafer	161.7mm N-type mono wafer	156mm N-type mono wafer	156mm P-type mono wafer
2022	January	***	***	***	***	***	***	***
2022	February	***	***	***	***	***	***	***
2022	March	***	***	***	***	***	***	***
2022	April	***	***	***	***	***	***	***
2022	May	***	***	***	***	***	***	***
2022	June	***	***	***	***	***	***	***
2022	July	***	***	***	***	***	***	***
2022	August	***	***	***	***	***	***	***
2022	September	***	***	***	***	***	***	***
2022	October	***	***	***	***	***	***	***
2022	November	***	***	***	***	***	***	***
2022	December	***	***	***	***	***	***	***
2023	January	***	***	***	***	***	***	***
2023	February	***	***	***	***	***	***	***
2023	March	***	***	***	***	***	***	***
2023	April	***	***	***	***	***	***	***
2023	May	***	***	***	***	***	***	***
2023	June	***	***	***	***	***	***	***

Table continued.

Table 5.1 Continued Wafer prices: Average prices for monocrystalline wafers, by month

Prices in dollars per wafer

Year	Month	210mm N-type mono wafer	210mm mono wafer	182mm N-type mono wafer	182mm mono wafer	161.7mm N-type mono wafer	156mm N-type mono wafer	156mm P-type mono wafer
2023	July	***	***	***	***	***	***	***
2023	August	***	***	***	***	***	***	***
2023	September	***	***	***	***	***	***	***
2023	October	***	***	***	***	***	***	***
2023	November	***	***	***	***	***	***	***
2023	December	***	***	***	***	***	***	***
2024	January	***	***	***	***	***	***	***
2024	February	***	***	***	***	***	***	***
2024	March	***	***	***	***	***	***	***
2024	April	***	***	***	***	***	***	***
2024	May	***	***	***	***	***	***	***
2024	June	***	***	***	***	***	***	***
2024	July	***	***	***	***	***	***	***
2024	August	***	***	***	***	***	***	***
2024	September	***	***	***	***	***	***	***
2024	October	***	***	***	***	***	***	***
2024	November	***	***	***	***	***	***	***
2024	December	***	***	***	***	***	***	***

Source: *** accessed March 10, 2025.

Figure 5.1 Wafer prices: Average prices for monocrystalline wafers, by month

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Source: *** accessed March 10, 2025.

Table 5.2 Cell prices: Average prices for monocrystalline cells, by month

Prices in dollars per kilowatt

Year	Month	Mono cell	N-type mono cell	PERC mono cell
2022	January	***	***	***
2022	February	***	***	***
2022	March	***	***	***
2022	April	***	***	***
2022	May	***	***	***
2022	June	***	***	***
2022	July	***	***	***
2022	August	***	***	***
2022	September	***	***	***
2022	October	***	***	***
2022	November	***	***	***
2022	December	***	***	***
2023	January	***	***	***
2023	February	***	***	***
2023	March	***	***	***
2023	April	***	***	***
2023	May	***	***	***
2023	June	***	***	***
2023	July	***	***	***
2023	August	***	***	***
2023	September	***	***	***
2023	October	***	***	***
2023	November	***	***	***
2023	December	***	***	***
2024	January	***	***	***
2024	February	***	***	***
2024	March	***	***	***
2024	April	***	***	***
2024	May	***	***	***
2024	June	***	***	***
2024	July	***	***	***
2024	August	***	***	***
2024	September	***	***	***
2024	October	***	***	***
2024	November	***	***	***
2024	December	***	***	***

Source: *** accessed March 10, 2025.

Figure 5.2 Cell prices: Average prices for monocrystalline cells, by month

* * * * * * *

Source: *** accessed March 10, 2025.

Transportation costs to the U.S. market

Transportation costs for CSPV products shipped from subject countries to the United States averaged 1.7 percent for India, 2.0 percent for Indonesia, and 7.5 percent for Laos during 2024. These estimates were derived from official import data and represent the transportation and other charges on imports.[1]

U.S. inland transportation costs

Nine responding U.S. producers and 28 importers reported that they typically arrange transportation to their customers. Most U.S. producers reported that their U.S. inland transportation costs ranged from 0.4 to 5.0 percent while most importers reported costs of 0.5 to 35.0 percent.

[1] The estimated transportation costs were obtained by subtracting the customs value from the c.i.f. value of the imports for 2024 and then dividing by the customs value based on the HTS statistical reporting number 8541.42.0010 and 8541.43.0010.

Pricing practices

Pricing methods

U.S. producers and importers reported setting prices using transaction-by-transaction negotiations, contracts, set price lists, and other methods (table 5.3). Most U.S. producers and importers reported setting prices using transaction-by-transaction negotiations and contracts.

Table 5.3 CSPV cells and modules: Count of U.S. producers' and importers' reported price setting methods

Count in number of firms reporting

Method	U.S. producers	Importers
Transaction-by-transaction	10	22
Contract	9	25
Set price list	6	10
Other	0	6
Responding firms	15	41

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

Note: The sum of responses down may not add up to the total number of responding firms as each firm was instructed to check all applicable price setting methods employed.

U.S. producers and subject U.S. importers reported mostly using short-term contracts (table 5.4). A majority of the domestic industry's reported commercial shipments were through short-term contracts with smaller shares reported for annual contracts, long-term contracts, and spot sales.[2] The average duration of a typical short-term contract for responding U.S. producers ranged from 10 to 270 days. The vast majority of responding U.S. importers' commercial shipments were through short-term contracts. The average duration of a typical short-term contract as reported by U.S. importers ranged from 30 days to almost a year.

[2] ***.

Table 5.4 CSPV cells and modules: U.S. producers' and importers' shares of commercial U.S. shipments by type of sale, 2024

Share in percent

Sale type	U.S. producers	Subject U.S. importers
Long-term contracts	***	***
Annual contract	***	***
Short-term contracts	***	***
Spot sales	***	***
All sales types	100.0	100.0

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

Note: Because of rounding, figures may not add to the totals shown.

Sales terms and discounts

U.S. producers and importers were asked whether their firm's prices of CSPV products from subject sources were usually quoted on a delivered or f.o.b. basis, and to describe their firm's discount policies. Eight U.S. producers reported they usually quote on a f.o.b. basis, and seven reported they usually quote on a delivered basis. Most responding U.S. importers (21 of 31) reported they usually quote their prices on a delivered basis (with 12 quoting on an f.o.b. basis). Most responding U.S. producers (10 of 15) and most U.S. importers (23 of 41 responding) reported offering no discount policy. Four U.S. producers and 11 importers offered quantity discounts. Two U.S. producers and 11 importers offered total volume discounts. One U.S. producer and six importers offered other discounts, usually case- or customer-specific discounts.

Price data

The Commission requested U.S. producers and importers to provide quarterly data for the total quantity and f.o.b. value of the following CSPV products shipped to unrelated U.S. customers during January 2022 to March 2025.

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

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

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

Product 4.-- Monocrystalline silicon bifacial module that generates power on both sides of the panel with front-side area of greater than or equal to 1.9 square meters and a peak power wattage between 485w and 585w, inclusive, P-max or Wp as measured under STC.

Seven U.S. producers, eight importers of Indian CSPV products, five importers of CSPV products from Indonesia, and two importers of CPSV products from Laos provided usable pricing data for sales of the requested products, although not all firms reported pricing for all products for all quarters. Pricing data reported by these firms accounted for approximately *** percent of reported U.S. producers' shipments of CSPV products, *** percent of reported U.S. shipments of subject imports from India, *** percent of reported U.S. shipments of subject imports from Indonesia, and *** percent of reported U.S. shipments of subject imports from Laos in 2024.

Price data for products 1 to 4 are presented in tables 5.5 to 5.8 and figures 5.3 to 5.6.

Table 5.5 CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 1 and margins of underselling/(overselling), by source and quarter

Price in dollars per kilowatt, quantity in kilowatts, margin in percent.

Period	U.S. price	U.S. quantity	India price	India quantity	India margin	Indonesia price	Indonesia quantity	Indonesia margin
2022 Q1	***	***	***	***	***	***	***	***
2022 Q2	***	***	***	***	***	***	***	***
2022 Q3	***	***	***	***	***	***	***	***
2022 Q4	***	***	***	***	***	***	***	***
2023 Q1	***	***	***	***	***	***	***	***
2023 Q2	***	***	***	***	***	***	***	***
2023 Q3	***	***	***	***	***	***	***	***
2023 Q4	***	***	***	***	***	***	***	***
2024 Q1	***	***	***	***	***	***	***	***
2024 Q2	***	***	***	***	***	***	***	***
2024 Q3	***	***	***	***	***	***	***	***
2024 Q4	***	***	***	***	***	***	***	***
2025 Q1	***	***	***	***	***	***	***	***

Period	Laos price	Laos quantity	Laos margin	Subject price	Subject quantity	Subject margin
2022 Q1	***	***	***	***	***	***
2022 Q2	***	***	***	***	***	***
2022 Q3	***	***	***	***	***	***
2022 Q4	***	***	***	***	***	***
2023 Q1	***	***	***	***	***	***
2023 Q2	***	***	***	***	***	***
2023 Q3	***	***	***	***	***	***
2023 Q4	***	***	***	***	***	***
2024 Q1	***	***	***	***	***	***
2024 Q2	***	***	***	***	***	***
2024 Q3	***	***	***	***	***	***
2024 Q4	***	***	***	***	***	***
2025 Q1	***	***	***	***	***	***

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

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

Figure 5.3 CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 1, by source and quarter

Price of product 1

* * * * * * *

Volume of product 1

* * * * * * *

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

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

Table 5.6 CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 2 and margins of underselling/(overselling), by source and quarter

Price in dollars per kilowatt, quantity in kilowatts, margin in percent.

Period	U.S. price	U.S. quantity	India price	India quantity	India margin	Indonesia price	Indonesia quantity	Indonesia margin
2022 Q1	***	***	***	***	***	***	***	***
2022 Q2	***	***	***	***	***	***	***	***
2022 Q3	***	***	***	***	***	***	***	***
2022 Q4	***	***	***	***	***	***	***	***
2023 Q1	***	***	***	***	***	***	***	***
2023 Q2	***	***	***	***	***	***	***	***
2023 Q3	***	***	***	***	***	***	***	***
2023 Q4	***	***	***	***	***	***	***	***
2024 Q1	***	***	***	***	***	***	***	***
2024 Q2	***	***	***	***	***	***	***	***
2024 Q3	***	***	***	***	***	***	***	***
2024 Q4	***	***	***	***	***	***	***	***
2025 Q1	***	***	***	***	***	***	***	***

Period	Laos price	Laos quantity	Laos margin	Subject price	Subject quantity	Subject margin
2022 Q1	***	***	***	***	***	***
2022 Q2	***	***	***	***	***	***
2022 Q3	***	***	***	***	***	***
2022 Q4	***	***	***	***	***	***
2023 Q1	***	***	***	***	***	***
2023 Q2	***	***	***	***	***	***
2023 Q3	***	***	***	***	***	***
2023 Q4	***	***	***	***	***	***
2024 Q1	***	***	***	***	***	***
2024 Q2	***	***	***	***	***	***
2024 Q3	***	***	***	***	***	***
2024 Q4	***	***	***	***	***	***
2025 Q1	***	***	***	***	***	***

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

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

Figure 5.4 CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 2, by source and quarter

Price of product 2

* * * * * * *

Volume of product 2

* * * * * * *

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

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

Table 5.7 CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 3 and margins of underselling/(overselling), by source and quarter

Price in dollars per kilowatt, quantity in kilowatts, margin in percent.

Period	U.S. price	U.S. quantity	India price	India quantity	India margin	Indonesia price	Indonesia quantity	Indonesia margin
2022 Q1	***	***	***	***	***	***	***	***
2022 Q2	***	***	***	***	***	***	***	***
2022 Q3	***	***	***	***	***	***	***	***
2022 Q4	***	***	***	***	***	***	***	***
2023 Q1	***	***	***	***	***	***	***	***
2023 Q2	***	***	***	***	***	***	***	***
2023 Q3	***	***	***	***	***	***	***	***
2023 Q4	***	***	***	***	***	***	***	***
2024 Q1	***	***	***	***	***	***	***	***
2024 Q2	***	***	***	***	***	***	***	***
2024 Q3	***	***	***	***	***	***	***	***
2024 Q4	***	***	***	***	***	***	***	***
2025 Q1	***	***	***	***	***	***	***	***

Period	Laos price	Laos quantity	Laos margin	Subject price	Subject quantity	Subject margin
2022 Q1	***	***	***	***	***	***
2022 Q2	***	***	***	***	***	***
2022 Q3	***	***	***	***	***	***
2022 Q4	***	***	***	***	***	***
2023 Q1	***	***	***	***	***	***
2023 Q2	***	***	***	***	***	***
2023 Q3	***	***	***	***	***	***
2023 Q4	***	***	***	***	***	***
2024 Q1	***	***	***	***	***	***
2024 Q2	***	***	***	***	***	***
2024 Q3	***	***	***	***	***	***
2024 Q4	***	***	***	***	***	***
2025 Q1	***	***	***	***	***	***

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

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

Figure 5.5 CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 3, by source and quarter

Price of product 3

* * * * * * *

Volume of product 3

* * * * * * *

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

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

Table 5.8 CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 4 and margins of underselling/(overselling), by source and quarter

Price in dollars per kilowatt, quantity in kilowatts, margin in percent.

Period	U.S. price	U.S. quantity	India price	India quantity	India margin	Indonesia price	Indonesia quantity	Indonesia margin
2022 Q1	***	***	***	***	***	***	***	***
2022 Q2	***	***	***	***	***	***	***	***
2022 Q3	***	***	***	***	***	***	***	***
2022 Q4	***	***	***	***	***	***	***	***
2023 Q1	***	***	***	***	***	***	***	***
2023 Q2	***	***	***	***	***	***	***	***
2023 Q3	***	***	***	***	***	***	***	***
2023 Q4	***	***	***	***	***	***	***	***
2024 Q1	***	***	***	***	***	***	***	***
2024 Q2	***	***	***	***	***	***	***	***
2024 Q3	***	***	***	***	***	***	***	***
2024 Q4	***	***	***	***	***	***	***	***
2025 Q1	***	***	***	***	***	***	***	***

Period	Laos price	Laos quantity	Laos margin	Subject price	Subject quantity	Subject margin
2022 Q1	***	***	***	***	***	***
2022 Q2	***	***	***	***	***	***
2022 Q3	***	***	***	***	***	***
2022 Q4	***	***	***	***	***	***
2023 Q1	***	***	***	***	***	***
2023 Q2	***	***	***	***	***	***
2023 Q3	***	***	***	***	***	***
2023 Q4	***	***	***	***	***	***
2024 Q1	***	***	***	***	***	***
2024 Q2	***	***	***	***	***	***
2024 Q3	***	***	***	***	***	***
2024 Q4	***	***	***	***	***	***
2025 Q1	***	***	***	***	***	***

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

Note: Product 4: Monocrystalline silicon bifacial module that generates power on both sides of the panel with front-side area of greater than or equal to 1.9 square meters and a peak power wattage between 485w and 585w, inclusive, P-max or Wp as measured under STC.

Figure 5.6 CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product 4, by source and quarter

Price of product 4

* * * * * * *

Volume of product 4

* * * * * * *

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

Note: Product 4: Monocrystalline silicon bifacial module that generates power on both sides of the panel with front-side area of greater than or equal to 1.9 square meters and a peak power wattage between 485w and 585w, inclusive, P-max or Wp as measured under STC.

Price trends

In general, prices generally decreased during 2022 to 2024. Table 5.9 summarizes the price trends, by country and by product. As shown in the table, domestic price decreases ranged from *** to *** percent while import price increases ranged from *** to *** percent.

Table 5.9 CSPV modules: Summary of price data, by product and source, January 2022 through March 2025

Quantity in kilowatts, price in dollars per kilowatt; change in percent

Product	Source	Number of quarters	Quantity of shipments	Low price	High price	First quarter price	Last quarter price	Quarterly Change	Percent change in price over period
Product 1	United States	13	***	***	***	***	***	***	***
Product 1	India	13	***	***	***	***	***	***	***
Product 1	Indonesia	2	***	***	***	***	***	***	***
Product 1	Laos	—	***	***	***	***	***	***	***
Product 2	United States	11	***	***	***	***	***	***	***
Product 2	India	—	***	***	***	***	***	***	***
Product 2	Indonesia	2	***	***	***	***	***	***	***
Product 2	Laos	—	***	***	***	***	***	***	***
Product 3	United States	13	***	***	***	***	***	***	***
Product 3	India	—	***	***	***	***	***	***	***
Product 3	Indonesia	13	***	***	***	***	***	***	***
Product 3	Laos	2	***	***	***	***	***	***	***
Product 4	United States	7	***	***	***	***	***	***	***
Product 4	India	13	***	***	***	***	***	***	***
Product 4	Indonesia	8	***	***	***	***	***	***	***
Product 4	Laos	3	***	***	***	***	***	***	***

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

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Quarterly change is the average quarterly change from the first observation to the last observation in the specified product and source and is only presented if there are at least two observations. Percent change in price over period is the percentage change from the first quarter to the last quarter of the data collection period and is only presented if there is data reported in those quarters.

Note: Percent change column is percentage change from the first quarter 2022 to the last quarter in 2025.

Price comparisons

As shown in table 5.10, prices for product imported from India were below those for U.S.-produced product in 2 of 20 instances (*** kilowatts); margins of underselling ranged from *** to *** percent. In the remaining 18 instances (*** kilowatts), prices for product from India were between *** and *** percent above prices for the domestic product. Prices for product imported from Indonesia were below those for U.S.-produced product in 21 of 23 instances (*** kilowatts) margins of underselling ranged from *** to *** percent. In the remaining 2 instances (*** kilowatts), prices for product from Indonesia were between *** and *** percent above prices for the domestic product. Prices for product imported from Laos were below those for U.S.-produced product in three of five instances (*** kilowatts); margins of underselling ranged from *** to *** percent. In the remaining two instances (*** kilowatts), prices for product from Laos were between *** to *** percent above prices for the domestic product.

Table 5.10 CSPV cells and modules: Instances of underselling and overselling and the range and average of margins, by product, January 2022 through March 2025

Quantity in kilowatts; margin in percent

Product	Type	Number of quarters	Quantity	Average margin	Min margin	Max margin
Product 1	Underselling	2	***	***	***	***
Product 2	Underselling	2	***	***	***	***
Product 3	Underselling	13	***	***	***	***
Product 4	Underselling	9	***	***	***	***
All products	Underselling	26	***	***	***	***
Product 1	Overselling	13	***	***	***	***
Product 2	Overselling	—	***	***	***	***
Product 3	Overselling	2	***	***	***	***
Product 4	Overselling	7	***	***	***	***
All products	Overselling	22	***	***	***	***

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

Note: These data include only quarters in which there is a comparison between the U.S. and subject product.

Table 5.11 CSPV cells and modules: Instances of underselling and overselling and the range and average of margins, by source

Quantity in kilowatts; margin in percent

Source	Type	Number of quarters	Quantity	Average margin	Min margin	Max margin
India	Underselling	2	***	***	***	***
Indonesia	Underselling	21	***	***	***	***
Laos	Underselling	3	***	***	***	***
All subject sources	Underselling	26	***	***	***	***
India	Overselling	18	***	***	***	***
Indonesia	Overselling	2	***	***	***	***
Laos	Overselling	2	***	***	***	***
All subject sources	Overselling	22	***	***	***	***

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

Note: These data include only quarters in which there is a comparison between the U.S. and subject product.

Table 5.12 CSPV cells and modules: Instances of underselling and overselling and the range and average of margins, by year

Quantity in kilowatts; margin in percent

Year	Type	Number of quarters	Quantity	Average margin	Min margin	Max margin
2022	Underselling	8	***	***	***	***
2023	Underselling	7	***	***	***	***
2024	Underselling	9	***	***	***	***
January through March 2025	Underselling	2	***	***	***	***
All periods	Underselling	26	***	***	***	***
2022	Overselling	4	***	***	***	***
2023	Overselling	5	***	***	***	***
2024	Overselling	10	***	***	***	***
January through March 2025	Overselling	3	***	***	***	***
All periods	Overselling	22	***	***	***	***

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

Note: These data include only quarters in which there is a comparison between the U.S. and subject product.

Lost sales and lost revenue

The Commission requested that U.S. producers of CSPV products report purchasers with which they experienced instances of lost sales or revenue due to competition from imports of CSPV products from India, Indonesia, and Laos during January 2022 through March 2025. Of the 14 responding U.S. producers, four reported that they had to reduce prices, two reported that

they had to roll back announced price increases, and three firms reported that they had lost sales. Two U.S. producers submitted lost sales and lost revenue allegations. The two responding U.S. producers identified five firms with which they lost sales or revenue (three consisting lost sales allegations, none consisting of lost revenue allegations, and two consisting of both types of allegations).

Staff contacted five purchasers and received responses from four purchasers. Responding purchasers reported purchasing *** million kilowatts of CSPV cells and modules during January 2022 to March 2025 (table 5.13). During the same period, responding purchasers purchased *** from U.S. producers. ***.

Table 5.13 CSPV cells and modules: Purchasers' reported purchases and imports, by firm and source

Quantity in kilowatts; Change in shares in percentage points

Purchaser	Domestic quantity	Subject quantity	All other quantity	Change in domestic share	Change in subject country share
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
All firms	***	***	***	***	***

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

Note: ***. The "all other" category includes unknown sources. Changes in shares represent the share of the firm's total purchases of domestic and/or subject country imports between first and last years and are presented in percentage points. Zeroes, null values, and undefined calculations are suppressed and shown as "—".

Purchasers were asked about changes in their purchasing patterns from different sources since 2022 (table 5.14). Purchasers *** reported increasing purchases from ***. *** reported decreased purchases from ***. Purchaser *** reported that, after initiation of the AD/CVD case, it *** purchases from ***.

Table 5.14 CSPV cells and modules: Count of changes in purchase patterns from U.S., subject, and nonsubject countries

Count in number of firms reporting

Source of purchases	Steadily Increase	Fluctuate Up	No change	Fluctuate Down	Steadily Decrease	Did not purchase
United States	0	0	0	0	0	4
India	0	1	0	0	1	2
Indonesia	1	1	0	0	0	2
Laos	0	1	0	0	0	3
All other sources	0	1	0	2	0	1
Sources unknown	0	0	1	0	0	3

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

*** responding purchasers reported that, since 2022, they had purchased imported CSPV from India, Indonesia, and/or Laos instead of U.S.-produced product (tables 5.15 and 5.16). *** of these purchasers reported that subject import prices were not lower than U.S.-produced product and indicated that ***.

Of the four responding purchasers, *** reported that U.S. producers had not reduced prices in order to compete with lower-priced imports from India, Indonesia, and/or Laos (table 5.17).

Table 5.15 CSPV cells and modules: Purchasers' responses to purchasing subject imports instead of domestic product, by firm

Quantity in kilowatts

Purchaser	Purchased subject imports instead of domestic	Imports priced lower	Choice based on price	Quantity	Explanation
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
All firms	Yes: 4; No: 0	Yes: 2; No: 2	Yes: 1; No: 3	***	NA

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

Table 5.16 CSPV cells and modules: Purchasers' responses to purchasing subject imports instead of domestic product, by source

Quantity in kilowatts

Source	Count of purchasers reporting subject instead of domestic	Count of purchasers reported that imports were priced lower	Count of purchasers reporting that price was a primary reason for shift	Quantity
India	2	1	0	***
Indonesia	3	2	1	***
Laos	1	1	0	***
Subject sources	4	2	1	***

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

Table 5.17 CSPV cells and modules: Purchasers' responses to U.S. producer price reductions, by firm

Purchaser	Reported producers lowered prices	Estimated percent of U.S. price reduction	Explanation
***	***	***	***
***	***	***	***
***	***	***	***
***	***	***	***
All firms	Yes: 0; No: 3	Yes: 0; No: 0	NA

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

Part 6: Financial experience of U.S. producers

Background[1]

Thirteen U.S. producers provided usable financial results on their CSPV cells and modules operations: ***.[2] All responding U.S. producers reported financial data on a calendar year basis and all U.S. producers but *** provided their financial data on the basis of GAAP.[3] One responding U.S. producer, ***, reported sales of CSPV cells in 2024.

As described earlier in this report, Hanwha GA is the largest CSPV module producer in the United States and accounted for *** of CSPV module sales from 2022 to March 2025. Despite six new module producers and one new cell producer, *** restarting production during the period examined, aggregated financial data for CSPV cells and modules largely reflect the operations of ***.[4] [5] Revenue primarily reflects commercial sales but also includes transfers and internal consumption. Collectively, internal consumption and transfers to related firms accounted for *** percent of net sales quantity during the period

[1] The following abbreviations are used in the tables and/or text of this section: generally accepted accounting principles ("GAAP"), profit and loss statement ("P&L"), cost of goods sold ("COGS"), selling, general, and administrative expenses ("SG&A expenses"), average unit values ("AUVs"), research and development expenses ("R&D expenses"), and return on assets ("ROA"), January 1, 2022 to March 31, 2025 ("period examined"), January 1 to March 31 ("interim"), and CSPV cells and modules ("CSPV products").

[2] ***.

[3] ***. *** producer questionnaire response, section 3.2.B.4.

[4] *** began its CSPV production in 2023 and *** began their CSPV production in 2024. ***. *** producer questionnaire responses, section 2.2. ***.

[5] Suniva's factory closed after the company declared bankruptcy in 2017. "Once-shuttered solar factory resumes production outside Atlanta", https://www.ajc.com/news/business/suniva-once-filed-bankruptcy-its-producing-solar-panels-again/UVX5DKR6QJGHTLTTJEJJH2QHKE/, retrieved August 13, 2025. The firm restarted CSPV cell production in ***, ***. Suniva's producer questionnaire response, section 2.2. In this section of the report, Suniva's CSPV cell operations are aggregated with those of CSPV module producers.

for which data were collected, and are not shown separately in this section of the report.[6] Figure 6.1 presents each responding firm's share of the total reported net sales quantity in 2024.

Figure 6.1 CSPV cells and modules: U.S. producers' share of net sales quantity in 2024, by firm

* * * * * * *

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

Operations on CSPV cells and modules

Table 6.1 presents aggregated data on U.S. producers' operations in relation to CSPV cells and modules, while table 6.2 presents corresponding changes in AUVs. Table 6.3 presents U.S. producers' net sales by origin of cells used to produce modules. Table 6.4 presents selected company-specific financial data.

[6] No transfers to related firms were reported by any U.S. producer in 2022 or 2023; four responding U.S. producers, *** reported transfers to related firms in 2024 and interim 2025. *** was the only firm that reported internal consumption in interim 2025 (no other producer reported internal consumption in 2022, 2023, 2024, or interim 2024).

Table 6.1 CSPV cells and modules: U.S. producers' results of operations, by item and period

Quantity in kilowatts; value in 1,000 dollars; ratios in percent; interim is January through March

Item	Measure	2022	2023	2024	Interim 2024	Interim 2025
Total net sales	Quantity	***	***	***	***	***
Total net sales	Value	***	***	***	***	***
COGS: Raw materials	Value	***	***	***	***	***
COGS: Direct labor	Value	***	***	***	***	***
COGS: Other factory	Value	***	***	***	***	***
COGS: Total	Value	***	***	***	***	***
Gross profit or (loss)	Value	***	***	***	***	***
SG&A expenses	Value	***	***	***	***	***
Operating income or (loss)	Value	***	***	***	***	***
45X MPTC/IRA income	Value	***	***	***	***	***
All other expense/income	Value	***	***	***	***	***
Net income or (loss)	Value	***	***	***	***	***
Depreciation/amortization	Value	***	***	***	***	***
Cash flow	Value	***	***	***	***	***
COGS: Raw materials	Ratio to NS	***	***	***	***	***
COGS: Direct labor	Ratio to NS	***	***	***	***	***
COGS: Other factory	Ratio to NS	***	***	***	***	***
COGS: Total	Ratio to NS	***	***	***	***	***
Gross profit	Ratio to NS	***	***	***	***	***
SG&A expense	Ratio to NS	***	***	***	***	***
Operating income or (loss)	Ratio to NS	***	***	***	***	***
Net income or (loss)	Ratio to NS	***	***	***	***	***

Table continued.

Table 6.1 (Continued) CSPV cells and modules: U.S. producers' results of operations, by item and period

Shares in percent; unit values in dollars per kilowatt; count in number of firms reporting; interim is January through March

Item	Measure	2022	2023	2024	Interim 2024	Interim 2025
COGS: Raw materials	Share	***	***	***	***	***
COGS: Direct labor	Share	***	***	***	***	***
COGS: Other factory	Share	***	***	***	***	***
COGS: Total	Share	100.0	100.0	100.0	100.0	100.0
Total net sales	Unit value	***	***	***	***	***
COGS: Raw materials	Unit value	***	***	***	***	***
COGS: Direct labor	Unit value	***	***	***	***	***
COGS: Other factory	Unit value	***	***	***	***	***
COGS: Total	Unit value	***	***	***	***	***
Gross profit or (loss)	Unit value	***	***	***	***	***
SG&A expenses	Unit value	***	***	***	***	***
Operating income or (loss)	Unit value	***	***	***	***	***
Net income or (loss)	Unit value	***	***	***	***	***
Operating losses	Count	3	6	11	6	10
Net losses	Count	3	4	7	5	7
Data	Count	6	6	12	7	12

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

Note: Shares represent the share of COGS. The 45X Advanced Manufacturing Production Credit ("45X MPTC") is a federal tax credit established by the Inflation Reduction Act of 2022 ("IRA"). The IRA expanded the Advanced Energy Project Investment Tax Credit (Section 48C) for manufacturers.

Table 6.2 CSPV cells and modules: Changes in AUVs between comparison periods

Changes in percent; interim is January through March

Item	2022 to 2024	2022 to 2023	2023 to 2024	Interim 2024 to interim 2025
Total net sales	***	***	***	***
COGS: Raw materials	***	***	***	***
COGS: Direct labor	***	***	***	***
COGS: Other factory	***	***	***	***
COGS: Total	***	***	***	***

Table continued.

Table 6.2 (Continued) CSPV cells and modules: Changes in AUVs between comparison periods

Changes in dollar per kilowatt; interim is January through March

Item	2022 to 2024	2022 to 2023	2023 to 2024	Interim 2024 to interim 2025
Total net sales	***	***	***	***
COGS: Raw materials	***	***	***	***
COGS: Direct labor	***	***	***	***
COGS: Other factory	***	***	***	***
COGS: Total	***	***	***	***
Gross profit or (loss)	***	***	***	***
SG&A expense	***	***	***	***
Operating income or (loss)	***	***	***	***
Net income or (loss)	***	***	***	***

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

Note: Percentages and unit values shown as "0" represent values greater than zero, but less than "0.5". Period changes preceded by a "▲" represent an increase, while period changes preceded by a "▼" represent a decrease.

Table 6.3 CSPV modules: U.S. producers' net sales, by origin of contained cells and period

Quantity in kilowatts; value in 1,000 dollars; unit values in dollars per kilowatt; shares in percent; interim period is January to March

Item	Measure	2022	2023	2024	Interim 2024	Interim 2025
Subject foreign-origin cells	Quantity	***	***	***	***	***
Nonsubject foreign-origin cells	Quantity	***	***	***	***	***
All cell origins	Quantity	***	***	***	***	***
Subject foreign-origin cells	Value	***	***	***	***	***
Nonsubject foreign-origin cells	Value	***	***	***	***	***
All cell origins	Value	***	***	***	***	***
Subject foreign-origin cells	Unit value	***	***	***	***	***
Nonsubject foreign-origin cells	Unit value	***	***	***	***	***
All cell origins	Unit value	***	***	***	***	***
Subject foreign-origin cells	Share of quantity	***	***	***	***	***
Nonsubject foreign-origin cells	Share of quantity	***	***	***	***	***
All cell origins	Share of quantity	100.0	100.0	100.0	100.0	100.0
Subject foreign-origin cells	Share of value	***	***	***	***	***
Nonsubject foreign-origin cells	Share of value	***	***	***	***	***
All cell origins	Share of value	100.0	100.0	100.0	100.0	100.0

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

Table 6.4 CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

Net sales quantity

Quantity in kilowatts; interim is January through March

Firm	2022	2023	2024	Interim 2024	Interim 2025
Canadian Solar	***	***	***	***	***
GAF Energy	***	***	***	***	***
Hanwha GA	***	***	***	***	***
Hounen	***	***	***	***	***
Illuminate	***	***	***	***	***
Merlin	***	***	***	***	***
Mission	***	***	***	***	***
PowerFilm	***	***	***	***	***
Runergy	***	***	***	***	***
SEG Manufacturing	***	***	***	***	***
Silfab	***	***	***	***	***
Suniva	***	***	***	***	***
Trina/T1	***	***	***	***	***
All firms	***	***	***	***	***

Table continued.

Table 6.4 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

Net sales value

Value in 1,000 dollars; interim is January through March

Firm	2022	2023	2024	Interim 2024	Interim 2025
Canadian Solar	***	***	***	***	***
GAF Energy	***	***	***	***	***
Hanwha GA	***	***	***	***	***
Hounen	***	***	***	***	***
Illuminate	***	***	***	***	***
Merlin	***	***	***	***	***
Mission	***	***	***	***	***
PowerFilm	***	***	***	***	***
Runergy	***	***	***	***	***
SEG Manufacturing	***	***	***	***	***
Silfab	***	***	***	***	***
Suniva	***	***	***	***	***
Trina/T1	***	***	***	***	***
All firms	***	***	***	***	***

Table continued.

Table 6.4 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

COGS

Value in 1,000 dollars; interim is January through March

Firm	2022	2023	2024	Interim 2024	Interim 2025
Canadian Solar	***	***	***	***	***
GAF Energy	***	***	***	***	***
Hanwha GA	***	***	***	***	***
Hounen	***	***	***	***	***
Illuminate	***	***	***	***	***
Merlin	***	***	***	***	***
Mission	***	***	***	***	***
PowerFilm	***	***	***	***	***
Runergy	***	***	***	***	***
SEG Manufacturing	***	***	***	***	***
Silfab	***	***	***	***	***
Suniva	***	***	***	***	***
Trina/T1	***	***	***	***	***
All firms	***	***	***	***	***

Table continued.

Table 6.4 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

Gross profit or (loss)

Value in 1,000 dollars; interim is January through March

Firm	2022	2023	2024	Interim 2024	Interim 2025
Canadian Solar	***	***	***	***	***
GAF Energy	***	***	***	***	***
Hanwha GA	***	***	***	***	***
Hounen	***	***	***	***	***
Illuminate	***	***	***	***	***
Merlin	***	***	***	***	***
Mission	***	***	***	***	***
PowerFilm	***	***	***	***	***
Runergy	***	***	***	***	***
SEG Manufacturing	***	***	***	***	***
Silfab	***	***	***	***	***
Suniva	***	***	***	***	***
Trina/T1	***	***	***	***	***
All firms	***	***	***	***	***

Table continued.

Table 6.4 (Continued)CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

SG&A expenses

Value in 1,000 dollars; interim is January through March

Firm	2022	2023	2024	Interim 2024	Interim 2025
Canadian Solar	***	***	***	***	***
GAF Energy	***	***	***	***	***
Hanwha GA	***	***	***	***	***
Hounen	***	***	***	***	***
Illuminate	***	***	***	***	***
Merlin	***	***	***	***	***
Mission	***	***	***	***	***
PowerFilm	***	***	***	***	***
Runergy	***	***	***	***	***
SEG Manufacturing	***	***	***	***	***
Silfab	***	***	***	***	***
Suniva	***	***	***	***	***
Trina/T1	***	***	***	***	***
All firms	***	***	***	***	***

Table continued.

Table 6.4 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

Operating income or (loss)

Value in 1,000 dollars; interim is January through March

Firm	2022	2023	2024	Interim 2024	Interim 2025
Canadian Solar	***	***	***	***	***
GAF Energy	***	***	***	***	***
Hanwha GA	***	***	***	***	***
Hounen	***	***	***	***	***
Illuminate	***	***	***	***	***
Merlin	***	***	***	***	***
Mission	***	***	***	***	***
PowerFilm	***	***	***	***	***
Runergy	***	***	***	***	***
SEG Manufacturing	***	***	***	***	***
Silfab	***	***	***	***	***
Suniva	***	***	***	***	***
Trina/T1	***	***	***	***	***
All firms	***	***	***	***	***

Table continued.

Table 6.4 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

Net income or (loss)

Value in 1,000 dollars; interim is January through March

Firm	2022	2023	2024	Interim 2024	Interim 2025
Canadian Solar	***	***	***	***	***
GAF Energy	***	***	***	***	***
Hanwha GA	***	***	***	***	***
Hounen	***	***	***	***	***
Illuminate	***	***	***	***	***
Merlin	***	***	***	***	***
Mission	***	***	***	***	***
PowerFilm	***	***	***	***	***
Runergy	***	***	***	***	***
SEG Manufacturing	***	***	***	***	***
Silfab	***	***	***	***	***
Suniva	***	***	***	***	***
Trina/T1	***	***	***	***	***
All firms	***	***	***	***	***

Table continued.

Table 6.4 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

COGS to net sales ratio

Ratios in percent; interim is January through March

Firm	2022	2023	2024	Interim 2024	Interim 2025
Canadian Solar	***	***	***	***	***
GAF Energy	***	***	***	***	***
Hanwha GA	***	***	***	***	***
Hounen	***	***	***	***	***
Illuminate	***	***	***	***	***
Merlin	***	***	***	***	***
Mission	***	***	***	***	***
PowerFilm	***	***	***	***	***
Runergy	***	***	***	***	***
SEG Manufacturing	***	***	***	***	***
Silfab	***	***	***	***	***
Suniva	***	***	***	***	***
Trina/T1	***	***	***	***	***
All firms	***	***	***	***	***

Table continued.

Table 6.4 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

Gross profit or (loss) to net sales ratio

Ratios in percent; interim is January through March

Firm	2022	2023	2024	Interim 2024	Interim 2025
Canadian Solar	***	***	***	***	***
GAF Energy	***	***	***	***	***
Hanwha GA	***	***	***	***	***
Hounen	***	***	***	***	***
Illuminate	***	***	***	***	***
Merlin	***	***	***	***	***
Mission	***	***	***	***	***
PowerFilm	***	***	***	***	***
Runergy	***	***	***	***	***
SEG Manufacturing	***	***	***	***	***
Silfab	***	***	***	***	***
Suniva	***	***	***	***	***
Trina/T1	***	***	***	***	***
All firms	***	***	***	***	***

Table continued.

Table 6.4 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

SG&A expenses to net sales ratio

Ratios in percent; interim is January through March

Firm	2022	2023	2024	Interim 2024	Interim 2025
Canadian Solar	***	***	***	***	***
GAF Energy	***	***	***	***	***
Hanwha GA	***	***	***	***	***
Hounen	***	***	***	***	***
Illuminate	***	***	***	***	***
Merlin	***	***	***	***	***
Mission	***	***	***	***	***
PowerFilm	***	***	***	***	***
Runergy	***	***	***	***	***
SEG Manufacturing	***	***	***	***	***
Silfab	***	***	***	***	***
Suniva	***	***	***	***	***
Trina/T1	***	***	***	***	***
All firms	***	***	***	***	***

Table continued.

Table 6.4 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

Operating income or (loss) to net sales ratio

Ratios in percent; interim is January through March

Firm	2022	2023	2024	Interim 2024	Interim 2025
Canadian Solar	***	***	***	***	***
GAF Energy	***	***	***	***	***
Hanwha GA	***	***	***	***	***
Hounen	***	***	***	***	***
Illuminate	***	***	***	***	***
Merlin	***	***	***	***	***
Mission	***	***	***	***	***
PowerFilm	***	***	***	***	***
Runergy	***	***	***	***	***
SEG Manufacturing	***	***	***	***	***
Silfab	***	***	***	***	***
Suniva	***	***	***	***	***
Trina/T1	***	***	***	***	***
All firms	***	***	***	***	***

Table continued.

Table 6.4 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

Net income or (loss) to net sales ratio

Ratios in percent; interim is January through March

Firm	2022	2023	2024	Interim 2024	Interim 2025
Canadian Solar	***	***	***	***	***
GAF Energy	***	***	***	***	***
Hanwha GA	***	***	***	***	***
Hounen	***	***	***	***	***
Illuminate	***	***	***	***	***
Merlin	***	***	***	***	***
Mission	***	***	***	***	***
PowerFilm	***	***	***	***	***
Runergy	***	***	***	***	***
SEG Manufacturing	***	***	***	***	***
Silfab	***	***	***	***	***
Suniva	***	***	***	***	***
Trina/T1	***	***	***	***	***
All firms	***	***	***	***	***

Table continued.

Table 6.4 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

Unit net sales value

Unit values in dollars per kilowatt; interim is January through March

Firm	2022	2023	2024	Interim 2024	Interim 2025
Canadian Solar	***	***	***	***	***
GAF Energy	***	***	***	***	***
Hanwha GA	***	***	***	***	***
Hounen	***	***	***	***	***
Illuminate	***	***	***	***	***
Merlin	***	***	***	***	***
Mission	***	***	***	***	***
PowerFilm	***	***	***	***	***
Runergy	***	***	***	***	***
SEG Manufacturing	***	***	***	***	***
Silfab	***	***	***	***	***
Suniva	***	***	***	***	***
Trina/T1	***	***	***	***	***
All firms	***	***	***	***	***

Table continued.

Table 6.4 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

Unit raw material costs

Unit values in dollars per kilowatt; interim is January through March

Firm	2022	2023	2024	Interim 2024	Interim 2025
Canadian Solar	***	***	***	***	***
GAF Energy	***	***	***	***	***
Hanwha GA	***	***	***	***	***
Hounen	***	***	***	***	***
Illuminate	***	***	***	***	***
Merlin	***	***	***	***	***
Mission	***	***	***	***	***
PowerFilm	***	***	***	***	***
Runergy	***	***	***	***	***
SEG Manufacturing	***	***	***	***	***
Silfab	***	***	***	***	***
Suniva	***	***	***	***	***
Trina/T1	***	***	***	***	***
All firms	***	***	***	***	***

Table continued.

Table 6.4 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

Unit direct labor costs

Unit values in dollars per kilowatt; interim is January through March

Firm	2022	2023	2024	Interim 2024	Interim 2025
Canadian Solar	***	***	***	***	***
GAF Energy	***	***	***	***	***
Hanwha GA	***	***	***	***	***
Hounen	***	***	***	***	***
Illuminate	***	***	***	***	***
Merlin	***	***	***	***	***
Mission	***	***	***	***	***
PowerFilm	***	***	***	***	***
Runergy	***	***	***	***	***
SEG Manufacturing	***	***	***	***	***
Silfab	***	***	***	***	***
Suniva	***	***	***	***	***
Trina/T1	***	***	***	***	***
All firms	***	***	***	***	***

Table continued.

Table 6.4 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

Unit other factory costs

Unit values in dollars per kilowatt; interim is January through March

Firm	2022	2023	2024	Interim 2024	Interim 2025
Canadian Solar	***	***	***	***	***
GAF Energy	***	***	***	***	***
Hanwha GA	***	***	***	***	***
Hounen	***	***	***	***	***
Illuminate	***	***	***	***	***
Merlin	***	***	***	***	***
Mission	***	***	***	***	***
PowerFilm	***	***	***	***	***
Runergy	***	***	***	***	***
SEG Manufacturing	***	***	***	***	***
Silfab	***	***	***	***	***
Suniva	***	***	***	***	***
Trina/T1	***	***	***	***	***
All firms	***	***	***	***	***

Table continued.

Table 6.4 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

Unit COGS

Unit values in dollars per kilowatt; interim is January through March

Firm	2022	2023	2024	Interim 2024	Interim 2025
Canadian Solar	***	***	***	***	***
GAF Energy	***	***	***	***	***
Hanwha GA	***	***	***	***	***
Hounen	***	***	***	***	***
Illuminate	***	***	***	***	***
Merlin	***	***	***	***	***
Mission	***	***	***	***	***
PowerFilm	***	***	***	***	***
Runergy	***	***	***	***	***
SEG Manufacturing	***	***	***	***	***
Silfab	***	***	***	***	***
Suniva	***	***	***	***	***
Trina/T1	***	***	***	***	***
All firms	***	***	***	***	***

Table continued.

Table 6.4 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

Unit gross profit or (loss)

Unit values in dollars per kilowatt; interim is January through March

Firm	2022	2023	2024	Interim 2024	Interim 2025
Canadian Solar	***	***	***	***	***
GAF Energy	***	***	***	***	***
Hanwha GA	***	***	***	***	***
Hounen	***	***	***	***	***
Illuminate	***	***	***	***	***
Merlin	***	***	***	***	***
Mission	***	***	***	***	***
PowerFilm	***	***	***	***	***
Runergy	***	***	***	***	***
SEG Manufacturing	***	***	***	***	***
Silfab	***	***	***	***	***
Suniva	***	***	***	***	***
Trina/T1	***	***	***	***	***
All firms	***	***	***	***	***

Table continued.

Table 6.4 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

Unit SG&A expenses

Unit values in dollars per kilowatt; interim is January through March

Firm	2022	2023	2024	Interim 2024	Interim 2025
Canadian Solar	***	***	***	***	***
GAF Energy	***	***	***	***	***
Hanwha GA	***	***	***	***	***
Hounen	***	***	***	***	***
Illuminate	***	***	***	***	***
Merlin	***	***	***	***	***
Mission	***	***	***	***	***
PowerFilm	***	***	***	***	***
Runergy	***	***	***	***	***
SEG Manufacturing	***	***	***	***	***
Silfab	***	***	***	***	***
Suniva	***	***	***	***	***
Trina/T1	***	***	***	***	***
All firms	***	***	***	***	***

Table continued.

Table 6.4 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

Unit operating income or (loss)

Unit values in dollars per kilowatt; interim is January through March

Firm	2022	2023	2024	Interim 2024	Interim 2025
Canadian Solar	***	***	***	***	***
GAF Energy	***	***	***	***	***
Hanwha GA	***	***	***	***	***
Hounen	***	***	***	***	***
Illuminate	***	***	***	***	***
Merlin	***	***	***	***	***
Mission	***	***	***	***	***
PowerFilm	***	***	***	***	***
Runergy	***	***	***	***	***
SEG Manufacturing	***	***	***	***	***
Silfab	***	***	***	***	***
Suniva	***	***	***	***	***
Trina/T1	***	***	***	***	***
All firms	***	***	***	***	***

Table continued.

Table 6.4 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

Unit net income or (loss)

Unit values in dollars per kilowatt; interim is January through March

Firm	2022	2023	2024	Interim 2024	Interim 2025
Canadian Solar	***	***	***	***	***
GAF Energy	***	***	***	***	***
Hanwha GA	***	***	***	***	***
Hounen	***	***	***	***	***
Illuminate	***	***	***	***	***
Merlin	***	***	***	***	***
Mission	***	***	***	***	***
PowerFilm	***	***	***	***	***
Runergy	***	***	***	***	***
SEG Manufacturing	***	***	***	***	***
Silfab	***	***	***	***	***
Suniva	***	***	***	***	***
Trina/T1	***	***	***	***	***
All firms	***	***	***	***	***

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

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—".

Net sales

As presented in table 6.1, aggregated net sales quantity and value overall increased from 2022 to 2024 and were higher in interim 2025 than in interim 2024 as new U.S. producers started manufacturing CSPV products during the period examined. As shown in tables 6.3, the large increase of net sales in 2024 was driven by *** and new module producers entering the market.[7] As shown in table 6.3, the share of CSPV module sales using cells purchased from subject countries of total CSPV module sales increased from 2022 to 2024 and was higher in interim 2025 compared to interim 2024.

Table 6.1 shows that the average net sales unit value of CSPV products consistently declined from 2022 to 2024 but was higher in interim 2025 than in interim 2024.[8] Of the five U.S. producers with sales throughout the period examined, three firms (***

[7] ***. *** U.S. producer questionnaire response, section 2.2 and email from ***, August 13, 2025.

[8] The peak of net sales AUVs in 2022 primarily reflects raw material AUVs being the highest during the period examined.

***) reported an declining net sales AUVs from 2022 to 2024 and two firms (***) reported higher net sales AUVs in interim 2025 than interim 2024 (refer to table 6.4).[9] *** reported notably higher net sales AUV during the period of examined.[10]

Cost of goods sold and gross profit or loss

As presented in table 6.1, raw material costs represented the most substantial share of total COGS from 2022 to 2024, ranging from *** percent to *** percent of total COGS. The industry's total raw material costs irregularly increased from 2022 to 2024 and were higher in interim 2025 compared to interim 2024 as new producers joined the industry during the period of examined. Raw material costs per unit declined from 2022 to 2024 and were lower in interim 2025 compared to interim 2024. Table 6.4 presents company-specific raw material cost AUVs, with variations partially attributable to the type of CSPV products sold, the volume of sales, and different raw material sourcing practices among U.S. producers. As shown in table 6.6, imported CSPV cells from non-subject foreign countries made up the majority of total raw material costs of module production during the period examined (no U.S. producer reported using internally produced cells to assemble CSPV modules) while imported CSPV cells from subject foreign countries increased constantly. Of five U.S. producers with sales throughout the period examined, three firms (***) reported an overall declining raw material costs per unit from 2022 to 2024 and two firms (***) reported a lower raw material costs per unit in interim 2025 than interim 2024 (refer to table

[9] Five firms, *** reported their financial data throughout the period examined.

[10] Differences in product mix partially explain the net sales AUV variations among the U.S. producers. *** consistently reported the highest net sales AUVs throughout the period examined. ***. Email from ***, August 13, 2025. ***. https://www.gaf.energy/timberline-solar/ retrieved August 16, 2025 and *** producer questionnaire response, section 3.4.

6.4). Raw material costs as a ratio to net sales increased from 2022 to 2024 but were lower in interim 2025 compared to interim 2024. Tables 6.5 and 6.6 present raw material cost data for CSPV cells and modules, respectively.[11]

Table 6.5 CSPV cells: U.S. producers' raw material costs in 2024, by major material inputs

Value in 1,000 dollars; share of value in percent

Item	Value	Share of value
Wafer costs	***	***
Other material input costs	***	***
All raw materials	***	100.0

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

[11] Five U.S. producers purchased inputs from related firms in 2024. ***. *** producer questionnaire responses, sections 3.6 and 3.7a.

Table 6.6 CSPV modules: U.S. producers' raw material costs in 2024, by major material inputs

Value in 1,000 dollars; unit values in dollars per kilowatt; share of value in percent

Item	Measure	2022	2023	2024	Interim 2024	Interim 2025
Purchased cells: Subject	Value	***	***	***	***	***
Purchased cells: Nonsubject	Value	***	***	***	***	***
Purchased cells: All origins	Value	***	***	***	***	***
Backsheet	Value	***	***	***	***	***
Encapsulant	Value	***	***	***	***	***
Framing	Value	***	***	***	***	***
Junction box	Value	***	***	***	***	***
Solar glass	Value	***	***	***	***	***
All other material inputs	Value	***	***	***	***	***
All non-cell costs	Value	***	***	***	***	***
All raw materials	Value	***	***	***	***	***
Purchased cells: Subject	Unit value	***	***	***	***	***
Purchased cells: Nonsubject	Unit value	***	***	***	***	***
Purchased cells: All origins	Unit value	***	***	***	***	***
Backsheet	Unit value	***	***	***	***	***
Encapsulant	Unit value	***	***	***	***	***
Framing	Unit value	***	***	***	***	***
Junction box	Unit value	***	***	***	***	***
Solar glass	Unit value	***	***	***	***	***
All other material inputs	Unit value	***	***	***	***	***
All non-cell costs	Unit value	***	***	***	***	***
All raw materials	Unit value	***	***	***	***	***
Purchased cells: Subject	Share of value	***	***	***	***	***
Purchased cells: Nonsubject	Share of value	***	***	***	***	***
Purchased cells: All origins	Share of value	***	***	***	***	***
Backsheet	Share of value	***	***	***	***	***
Encapsulant	Share of value	***	***	***	***	***
Framing	Share of value	***	***	***	***	***
Junction box	Share of value	***	***	***	***	***
Solar glass	Share of value	***	***	***	***	***
All other material inputs	Share of value	***	***	***	***	***
All non-cell costs	Share of value	***	***	***	***	***
All raw materials	Share of value	100.0	100.0	100.0	100.0	100.0

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

Note: Shares represent the share of raw materials. Zeroes, null values, and undefined calculations are suppressed and shown as "—".

Other factory costs accounted for the second largest share of total COGS ranging from *** percent to *** percent and consistently increased in total value from 2022 to 2024 and were higher in interim 2025 compared to interim 2024. On an average per unit basis, other factory costs irregularly declined from 2022 to 2024 but were higher in interim 2025 compared

to interim 2024 while other factory costs as a ratio to net sales increased irregularly from 2022 to 2024 and were higher in interim 2025 compared to interim 2024. The increase in other factory costs is driven by increased sales *** while the decreases per unit is attributable to fixed costs spread over larger sales volume (the more products sold, the lower the fixed cost per unit).[12]

Industry's total direct labor costs which accounted for the smallest share of total COGS ranging from *** percent to *** percent consistently increased from 2022 to 2024 and were higher in interim 2025 than interim 2025. Direct labor costs on a per-unit value basis and as a ratio to net sales overall increased from 2022 to 2024 and were higher in interim 2025 than interim 2025.[13]

As presented in table 6.1, total COGS irregularly increased from 2022 to 2024 and was higher in interim 2025 than interim 2025. The AUVs of total COGS consistently decreased during this period, reflecting the previously discussed decreases in per-unit raw materials and other factory costs. The ratio of COGS to net sales increased from 2022 to 2024 due to selling prices per unit declining faster than COGS per unit with the increased sales and was lower in interim 2025 than interim 2025. Of five U.S. producers with sales throughout the period examined, all firms except *** reported an overall declining COGS per unit from 2022 to 2024 and three firms (***) reported a lower raw material costs per unit in interim 2025 than interim 2024 (refer to table 6.4).

Table 6.1 shows that the increase in COGS from 2022 to 2024 exceeded the corresponding increase in net sales value, thus gross profit declined from 2022 to 2024. The industry's gross profit was higher in interim 2025 compared to the gross loss in interim 2024, as the growth in net sales value was greater than the growth in COGS. Among the five U.S. producers with consistent sales throughout the period examined, all firms except *** reported an overall declining gross profit or worsening gross loss from 2022 to 2024 and three firms, *** reported a higher gross profit or a improved gross loss in interim 2025 than interim 2024 (refer to table 6.4).

[12] ***. *** producer questionnaire response, sections 3.11 and 3.11b.
[13] ***. *** producer questionnaire response, sections 3.11 and 3.11b.

SG&A expenses and operating income or loss

As presented in table 6.1, U.S. producers' total SG&A expenses consistently increased from 2022 to 2024 and were higher in interim 2025 than interim 2025 (mostly a result of increases in net sales) while SG&A expense ratio (i.e., total SG&A expenses divided by net sales) irregularly increased from 2022 to 2024 but was lower in interim 2025 than interim 2025. As shown in table 6.4, of five U.S. producers with sales throughout the period examined, three firms (***) reported an increasing SG&A expense ratio from 2022 to 2024 and two firms, *** reported a lower SG&A expense ratio in interim 2025 than interim 2024. *** reported notably higher SG&A expenses ratio than industry average SG&A expense ratio.[14] [15] New U.S. producers *** also reported a higher SG&A expense ratio due in part to ***. The industry's SG&A expenses per unit irregularly declined from 2022 to 2024 and were lower in interim 2025 than interim 2024.

Table 6.1 shows that U.S. producers' operating loss worsened from 2022 to 2024 but improved in interim 2025 compared to interim 2024. As presented in table 6.4, most of U.S. producers of CSPV products reported an operating loss throughout of the period examined. *** U.S. producer *** reported positive operating income in 2022, but reported operating losses in 2023 and 2024, caused by raw materials, other factory costs, and SG&A expenses increasing faster than its net sales values in 2023 and 2024. Of five U.S. producers with sales throughout the period examined, all firms except *** reported an overall declining operating income or worsening operating loss from 2022 to 2024 and two firms, *** reported an improved operating loss in interim 2025 than interim 2024.

[14] ***. Email from ***, August 13, 2025 and Consumer Product Safety Commission webpage, https://www.cpsc.gov/Recalls/2023/GAF-Energy-Recalls-Timberline-Solar-Energy-Shingles-Due-to-Fire-Hazard-Recall-Alert, retrieved August 18, 2025.

[15] ***.

All other expenses and net income or loss

Classified below the operating income level are interest expenses, other expenses, and other income. In table 6.1, these items are aggregated, and only the net amount is shown. The all other expenses increased from 2022 to 2024 and were higher in interim 2025 than in interim in 2024. Government incentives were not reported in 2023. They increased from 2023 to 2024 and were higher in interim 2025 than in interim in 2024.[16]

Table 6.1 shows that U.S. producers' net loss worsened from 2022 to 2024 but improved in interim 2025 (net income) compared to interim 2024 (net loss). The industry's net loss improved compared to operating loss primarily due to government incentives in 2023, 2024, and both interim periods. As presented in table 6.4, most of U.S. producers of CSPV products reported a net loss throughout of the period of examined. Of five U.S. producers with sales throughout the period examined, three firms (***) reported an overall declining net income or worsening net loss from 2022 to 2024 and two firms (***) reported a higher net income in interim 2025 than interim 2024.[17]

[16] ***. *** producer questionnaire response, sections 3.11a and 3.11b.
[17] A variance analysis is not shown due to *** among the reporting firms.

Capital expenditures and research and development expenses

Table 6.7 presents capital expenditures, by firm, and table 6.9 presents R&D expenses, by firm. Tables 6.8 and 6.10 present the firms' narrative explanations of the nature, focus, and significance of their capital expenditures and R&D expenses, respectively. Aggregated capital expenditures increased from 2022 to 2024 as new facilities started producing CSPV products and were higher in interim 2025 than in interim 2024.

Table 6.7 CSPV cells and modules: U.S. producers' capital expenditures, by firm and period

Value in 1,000 dollars; interim is January through March

Firm	2022	2023	2024	Interim 2024	Interim 2025
Canadian Solar	***	***	***	***	***
GAF Energy	***	***	***	***	***
Hanwha GA	***	***	***	***	***
Hounen	***	***	***	***	***
Illuminate	***	***	***	***	***
Merlin	***	***	***	***	***
Mission	***	***	***	***	***
PowerFilm	***	***	***	***	***
Runergy	***	***	***	***	***
SEG Manufacturing	***	***	***	***	***
Silfab	***	***	***	***	***
Suniva	***	***	***	***	***
Trina/T1	***	***	***	***	***
All firms	***	***	***	***	***

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

Note: Zeroes, null values, and undefined calculations are suppressed and shown as "—".

Table 6.8 CSPV cells and modules: U.S. producers' narrative descriptions of their capital expenditures, by firm

	Narrative on capital expenditures
***	***
***	***
***	***
***	***
***	***
***	***
***	***
***	***
***	***
***	***
***	***
***	***
***	***

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

Note: One producer (Suniva)'s description of their capital expenditures was in response to the capital expenditures related to cell production. All other producers responded with descriptions of their capital expenditures related to module production.

Table 6.9 CSPV cells and modules: U.S. producers' R&D expenses, by firm and period

Value in 1,000 dollars; interim is January through March

Firm	2022	2023	2024	Interim 2024	Interim 2025
Canadian Solar	***	***	***	***	***
GAF Energy	***	***	***	***	***
Hanwha GA	***	***	***	***	***
Hounen	***	***	***	***	***
Illuminate	***	***	***	***	***
Merlin	***	***	***	***	***
Mission	***	***	***	***	***
PowerFilm	***	***	***	***	***
Runergy	***	***	***	***	***
SEG Manufacturing	***	***	***	***	***
Silfab	***	***	***	***	***
Suniva	***	***	***	***	***
Trina/T1	***	***	***	***	***
All firms	***	***	***	***	***

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

Note: Zeroes, null values, and undefined calculations are suppressed and shown as "—".

Table 6.10 CSPV modules: U.S. producers' narrative descriptions of their R&D expenses, by firm

Firm	Narrative on R&D expenses
***	***
***	***
***	***
***	***
***	***
***	***
***	***
***	***

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

Assets and return on assets

Table 6.11 presents data on the U.S. producers' total assets while table 6.12 presents their operating ROA.[18] Table 6.13 presents U.S. producers' narrative responses explaining their major asset categories and any significant changes in asset levels over time.

Table 6.11 CSPV cells and modules: U.S. producers' total net assets, by firm and period

Value in 1,000 dollars

Firm	2022	2023	2024
Canadian Solar	***	***	***
GAF Energy	***	***	***
Hanwha GA	***	***	***
Hounen	***	***	***
Illuminate	***	***	***
Merlin	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
SEG Manufacturing	***	***	***
Silfab	***	***	***
Suniva	***	***	***
Trina/T1	***	***	***
All firms	***	***	***

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

Note: Zeroes, null values, and undefined calculations are suppressed and shown as "—".

[18] The operating ROA is calculated as operating income divided by total assets. With respect to a firm's overall operations, the total asset value reflects an aggregation of a number of assets which are generally not product specific. Thus, high-level allocations are generally required in order to report a total asset value on a product-specific basis.

Table 6.12 CSPV cells and modules: U.S. producers' ROA, by firm and period

Ratio in percent

Firm	2022	2023	2024
Canadian Solar	***	***	***
GAF Energy	***	***	***
Hanwha GA	***	***	***
Hounen	***	***	***
Illuminate	***	***	***
Merlin	***	***	***
Mission	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
SEG Manufacturing	***	***	***
Silfab	***	***	***
Suniva	***	***	***
Trina/T1	***	***	***
All firms	***	***	***

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

Note: Zeroes, null values, and undefined calculations are suppressed and shown as "—".

Table 6.13 CSPV cells and modules: U.S. producers' narrative descriptions of their total net assets, by firm

Firm	Narrative on assets
***	***
***	***
***	***
***	***
***	***
***	***
***	***
***	***
***	***
***	***
***	***
***	***
***	***

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

Capital and investment

The Commission requested U.S. producers of CSPV cells and modules to describe any actual or potential negative effects of imports of CSPV cells and modules from India, Indonesia, and Laos on their firms' growth, investment, ability to raise capital, development and production efforts, or the scale of capital investments. Table 6.14 presents the number of firms reporting an impact in each category and table 6.15 provides the U.S. producers' narrative responses. Table 6.16 presents U.S. producers' narrative descriptions of the impact of filing of the petition on April 23, 2024 and/or the investigations by the U.S. Department of Commerce and the U.S. International Trade Commission concerning imports of CSPV cells and/or modules imported from Cambodia, Malaysia, Thailand, and/or Vietnam on income statement data. Table 6.17 presents U.S. module producers' narrative descriptions regarding plans to start CSPV cell production and table 6.18 presents U.S. producers' narrative descriptions regarding the anticipated impact of the One Big Beautiful Bill Act.

Table 6.14 CSPV cells and modules: Count of firms indicating actual and anticipated negative effects of imports from subject sources on investment, growth, and development since January 1, 2022, by effect

Number of firms reporting

Effect	Category	Count
Cancellation, postponement, or rejection of expansion projects	Investment	7
Denial or rejection of investment proposal	Investment	2
Reduction in the size of capital investments	Investment	4
Return on specific investments negatively impacted	Investment	7
Other investment effects	Investment	2
Any negative effects on investment	Investment	10
Rejection of bank loans	Growth	1
Lowering of credit rating	Growth	0
Problem related to the issue of stocks or bonds	Growth	1
Ability to service debt	Growth	4
Other growth and development effects	Growth	5
Any negative effects on growth and development	Growth	7
Anticipated negative effects of imports	Future	8

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

Note: ***.

Table 6.15 CSPV cells and modules: U.S. producers' narratives relating to actual and anticipated negative effects of imports on investment, growth, and development, since January 1, 2022, by firm and effect

Item	Firm name and narrative on impact of imports
Cancellation, postponement, or rejection of expansion projects	***
Cancellation, postponement, or rejection of expansion projects	***
Cancellation, postponement, or rejection of expansion projects	***
Cancellation, postponement, or rejection of expansion projects	***
Cancellation, postponement, or rejection of expansion projects	***
Cancellation, postponement, or rejection of expansion projects	***
Cancellation, postponement, or rejection of expansion projects	***
Denial or rejection of investment proposal	***
Denial or rejection of investment proposal	***
Reduction in the size of capital investments	***
Reduction in the size of capital investments	***
Return on specific investments negatively impacted	***

Table continued.

Item	Firm name and narrative on impact of imports
Return on specific investments negatively impacted	***
Return on specific investments negatively impacted	***
Return on specific investments negatively impacted	***
Return on specific investments negatively impacted	***
Return on specific investments negatively impacted	***
Other negative effects on investments	***
Other negative effects on investments	***

Table continued.

Item	Firm name and narrative on impact of imports
Rejection of bank loans	***
Problem related to the issue of stocks or bonds	***
Ability to service debt	***
Ability to service debt	***
Ability to service debt	***
Other effects on growth and development	***
Other effects on growth and development	***
Other effects on growth and development	***
Other effects on growth and development	***
Other effects on growth and development	***

Table continued.

Item	Firm name and narrative on impact of imports
Anticipated effects of imports	***
Anticipated effects of imports	***
Anticipated effects of imports	***
Anticipated effects of imports	***
Anticipated effects of imports	***
Anticipated effects of imports	***
Anticipated effects of imports	***
Anticipated effects of imports	***

Table continued.

Item	Firm name and narrative on impact of imports
Anticipated effects of imports	***

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

Note: ***.

Table 6.16 CSPV cells and modules: U.S. producers' narrative descriptions of the impact of filing of the petition on April 23, 2024 and/or the investigations by the U.S. Department of Commerce and the U.S. International Trade Commission concerning imports of CSPV cells and/or modules imported from Cambodia, Malaysia, Thailand, and/or Vietnam on income statement data, by item and firm

Item	Narrative on impact on income
Impact from previous petitions	***
Impact from previous petitions	***
Impact from previous petitions	***
Impact from previous investigations	***
Impact from previous investigations	***

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

Table 6.17 CSPV modules: U.S. producers' narrative descriptions regarding plans to start CSPV cell production, by firm

Firm	Narrative on plans for CSPV cell production
***	***
***	***
***	***
***	***

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

Table 6.18 CSPV cells and modules: U.S. producers' narrative descriptions regarding the anticipated impact of the One Big Beautiful Bill Act, by firm

Firm	Narrative on anticipated impact
***	***
***	***
***	***
***	***
***	***
***	***
***	***
***	***
***	***

Table continued.

Firm	Narrative on anticipated impact
***	***
***	***

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

Note: ***.

Part 7: Threat considerations and information on nonsubject countries

Section 771(7)(F)(i) of the Act (19 U.S.C. § 1677(7)(F)(i)) provides that—

> In determining whether an industry in the United States is threatened with material injury by reason of imports (or sales for importation) of the subject merchandise, the Commission shall consider, among other relevant economic factors[1]--
>
> (I) if a countervailable subsidy is involved, such information as may be presented to it by the administering authority as to the nature of the subsidy (particularly as to whether the countervailable subsidy is a subsidy described in Article 3 or 6.1 of the Subsidies Agreement), and whether imports of the subject merchandise are likely to increase,
>
> (II) any existing unused production capacity or imminent, substantial increase in production capacity in the exporting country indicating the likelihood of substantially increased imports of the subject merchandise into the United States, taking into account the availability of other export markets to absorb any additional exports,
>
> (III) a significant rate of increase of the volume or market penetration of imports of the subject merchandise indicating the likelihood of substantially increased imports,
>
> (IV) whether imports of the subject merchandise are entering at prices that are likely to have a significant depressing or suppressing effect on domestic prices, and are likely to increase demand for further imports,
>
> (V) inventories of the subject merchandise,

[1] Section 771(7)(F)(ii) of the Act (19 U.S.C. § 1677(7)(F)(ii)) provides that "The Commission shall consider {these factors} . . . as a whole in making a determination of whether further dumped or subsidized imports are imminent and whether material injury by reason of imports would occur unless an order is issued or a suspension agreement is accepted under this title. The presence or absence of any factor which the Commission is required to consider . . . shall not necessarily give decisive guidance with respect to the determination. Such a determination may not be made on the basis of mere conjecture or supposition."

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

(VII) in any investigation under this title which involves imports of both a raw agricultural product (within the meaning of paragraph (4)(E)(iv)) and any product processed from such raw agricultural product, the likelihood that there will be increased imports, by reason of product shifting, if there is an affirmative determination by the Commission under section 705(b)(1) or 735(b)(1) with respect to either the raw agricultural product or the processed agricultural product (but not both),

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

(IX) any other demonstrable adverse trends that indicate the probability that there is likely to be material injury by reason of imports (or sale for importation) of the subject merchandise (whether or not it is actually being imported at the time).[2]

Information on the nature of the "alleged" subsidies was presented earlier in this report; information on the volume and pricing of imports of the subject merchandise is presented in Parts 4 and 5; and information on the effects of imports of the subject merchandise on U.S. producers' existing development and production efforts is presented in Part 6. Information on inventories of the subject merchandise; foreign producers' operations, including the potential for "product-shifting;" any other threat indicators, if applicable; and any dumping in third-country markets, follows. Also presented in this section of the report is information obtained for consideration by the Commission on nonsubject countries.

[2] Section 771(7)(F)(iii) of the Act (19 U.S.C. § 1677(7)(F)(iii)) further provides that, in antidumping investigations, ". . . the Commission shall consider whether dumping in the markets of foreign countries (as evidenced by dumping findings or antidumping remedies in other WTO member markets against the same class or kind of merchandise manufactured or exported by the same party as under investigation) suggests a threat of material injury to the domestic industry."

Subject countries

The Commission issued foreign producers' or exporters' questionnaires to 102 firms believed to produce and/or export CSPV cells and modules from India, Indonesia, and Laos.[3] Usable responses to the Commission's questionnaire were received from 24 firms in total.

Table 7.1 presents the number of producers/exporters that responded to the Commission's questionnaire, their estimated share of total production of CSPV cells and modules, and their exports to the United States as a share of U.S. imports, by each subject country in 2024.

Table 7.1 CSPV cells and modules: Number of responding producers/exporters, approximate share of production, and exports to the United States as a share of U.S. imports, by subject foreign industry, 2024

Subject foreign industry	Number of responding firms	Approximate share of cell production (percent)	Approximate share of module production (percent)	Exports as a share of U.S. imports from subject country (percent)
India	10	***	***	***
Indonesia	13	***	***	***
Laos	1	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records, using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010, accessed August 12, 2025.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—". Data related to the additional importers of record identified using proprietary, Census-edited Customs records that did not respond to the Commission questionnaire are included in U.S. imports.

Note: "Approximate share of production" reflects the responding firms' estimates of their production as a share of total country production of CSPV cells and modules in 2024. Since not all firms have perfect knowledge of the industry in their home market, different firms might use different denominators in estimating their firm's share of the total requested. For countries in which more than one firm responded, the average denominator for reasonably reported estimates is used in the share presented. Approximate shares are rounded to the nearest whole number. Coverage figures for *** are as each reported an estimate of *** percent, skewing the data.

[3] These firms were identified through a review of information submitted in the petition and presented in third-party sources.

Note: “Exports as a share of U.S. imports” reflects a comparison of export data reported by firms in response to the Commission’s foreign producer/exporter questionnaire with import data submitted in response to the Commission’s importer questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010, accessed August 12, 2025.

Table 7.2 presents information on the CSPV cells operations of the responding producers in India, Indonesia, and Laos (or the responding subject producers, by firm) and table 7.3 presents summary information on responding resellers of subject CSPV cells in 2024.

Table 7.2 CSPV cells: Summary data on responding subject foreign producers in 2024, by firm

Subject foreign industry: Producer	Production (kilowatts)	Share of reported production (percent)	Exports to the United States (kilowatts)	Share of reported exports to the United States (percent)	Total shipments (kilowatts)	Share of firm's total shipments exported to the United States (percent)
India: Emmvee	***	***	***	***	***	***
India: Mundra Solar Energy	***	***	***	***	***	***
India: Mundra Solar PV	***	***	***	***	***	***
India: Premier Energies	***	***	***	***	***	***
India: ReNew	***	***	***	***	***	***
India: Tata Power	***	***	***	***	***	***
India: Waaree Energies	***	***	***	***	***	***
Indonesia: Ali Solar	***	***	***	***	***	***
Indonesia: Allianz Solar	***	***	***	***	***	***
Indonesia: Four Seas	***	***	***	***	***	***
Indonesia: SEG Solar	***	***	***	***	***	***
Laos: Solarspace	***	***	***	***	***	***
All individual producers	***	100.0	***	100.0	***	***

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

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as “—“. ***.

Table 7.3 CSPV cells: Summary data for subject foreign resellers, by firm in 2024

Subject foreign industry: Reseller	Resales exported to the United States (kilowatts)	Share of resales exported to the United States (percent)
Indonesia: Clear Energy	***	***
Indonesia: MSUN Solar	***	***
All individual firms	***	---

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

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—".

Note: ***.

Table 7.4 presents summary information on the CSPV cells subject foreign producers in 2024.

Table 7.4 CSPV cells: Summary data for subject foreign producers, by subject foreign industry in 2024

Subject foreign industry	Production (kilowatts)	Share of reported production (percent)	Exports to the United States (kilowatts)	Share of reported exports to the United States (percent)	Total shipments (kilowatts)	Share of firm's total shipments exported to the United States (percent)
India	***	***	***	***	***	***
Indonesia	***	***	***	***	***	***
Laos	***	***	***	***	***	***
All subject foreign industries	***	100.0	***	100.0	***	***

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

Table 7.5 presents summary information on the CSPV modules for subject foreign producers, in India, Indonesia, and Laos (or the responding subject producers, by firm) and table 7.6 presents summary information on responding resellers of subject CSPV modules in 2024. Table 7.7 presents summary information on the CSPV modules for subject foreign producers in 2024.

Table 7.5 CSPV modules: Summary data for subject foreign producers, by firm in 2024

Subject foreign industry: Producer	Production (kilowatts)	Share of reported production (percent)	Exports to the United States (kilowatts)	Share of reported exports to the United States (percent)	Total shipments (kilowatts)	Share of firm's total shipments exported to the United States (percent)
India: Ecosol Power	***	***	***	***	***	***
India: Emmvee	***	***	***	***	***	***
India: HR Solar Solution	***	***	***	***	***	***
India: Mundra Solar Energy	***	***	***	***	***	***
India: Mundra Solar PV	***	***	***	***	***	***
India: Premier Energies	***	***	***	***	***	***
India: Rayzon Solar	***	***	***	***	***	***
India: ReNew	***	***	***	***	***	***
India: Tata Power	***	***	***	***	***	***
India: Waaree Energies	***	***	***	***	***	***
Indonesia: Allianz Solar	***	***	***	***	***	***
Indonesia: Apollo Solar	***	***	***	***	***	***
Indonesia: Deltamas Solusindo	***	***	***	***	***	***
Indonesia: IDN Solar Tech	***	***	***	***	***	***
Indonesia: Jaya Electrical Energy	***	***	***	***	***	***
Indonesia: MSUN Solar	***	***	***	***	***	***
Indonesia: Sky Energy	***	***	***	***	***	***
Indonesia: Thornova	***	***	***	***	***	***
Indonesia: Trina Mas Agra	***	***	***	***	***	***
Laos: Solarspace	***	***	***	***	***	***
All individual producers	***	100.0	***	100.0	***	***

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

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—".

Table 7.6 CSPV modules: Summary data for subject foreign resellers, by firm in 2024

Subject foreign industry: Reseller	Resales exported to the United States (kilowatts)	Share of resales exported to the United States (percent)
Indonesia: Apollo Solar	***	***
Indonesia: MSUN Solar	***	***
Indonesia: Thornova	***	***
All individual resellers	***	100.0

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

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—". ***.

Table 7.7 CSPV modules: Summary data for subject foreign producers, by subject foreign industry in 2024

Subject foreign industry	Production (kilowatts)	Share of reported production (percent)	Exports to the United States (kilowatts)	Share of reported exports to the United States (percent)	Total shipments (kilowatts)	Share of firm's total shipments exported to the United States (percent)
India	***	***	***	***	***	***
Indonesia	***	***	***	***	***	***
Laos	***	***	***	***	***	***
All subject foreign industries	***	100.0	***	100.0	***	***

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

Table 7.8 presents events in the subject countries' industries since January 1, 2022.

Table 7.8 CSPV cells and modules: Important industry events in the subject foreign industries since 2022

Item	Firm	Event
Plant expansion (India)	Saatvik Solar	In February 2022, Saatvik Solar doubled its module production capacity to 1 GW at its facility in Haryana. The additional 500 MW produces monocrystalline PERC, half-cut, multi-busbar technology to produce solar modules with a power output of 530 to 610 Wp.
Plant expansion (India)	Waaree Energies	In March 2023, Waaree Energies added 3 GW of additional module manufacturing capacity, bringing its total solar module manufacturing capacity to 12 GW.
Plant expansion (India)	Goldi Solar	In March 2025, Goldi Solar launched an AI-powered solar manufacturing line at its new facility in Kosamba, Surat, Gujarat. The planned production capacity for this facility is 14 GW.
Plant expansion (India)	Waaree Energies	In August 2025, Waaree Energies commissioned a new 1.8 GW solar module manufacturing line at its facility in Chikhli, Navsari district, Gujarat.
Plant opening (India)	Emmvee	In June 2024, Emmvee began production of TOPCon solar cells at its 1.5 GW manufacturing facility in the Indian state of Karnataka.
Plant opening (India)	Indosolar	In July 2024, Indosolar, a subsidiary of Indian solar company Waaree Energies, began production at its 1.3 GW module assembly facility in Noida, in the northern Indian state of Uttar Pradesh.
Plant opening (India)	TP Solar	In February 2025, TP Solar, a subsidiary of Indian company TATA Power, commission a 4.3 GW solar cell and module manufacturing plant in the state of Tamil Nadu. TP Solar noted that the facility would produce 1.4 GW PERC and TOPCon products but did not specify relative capacity for each technology.
Plant opening (India)	Waaree Energies	In February 2025, Waaree Energies commissioned the first phase of its 5.4 GW solar cell manufacturing plant in the state of Gujarat. In the first phase, the facility will produce 1.4 GW of PERC cells, with the remaining 4.0 GW of TOPCon cell production capacity to be added in fiscal year 2026.
Plant opening (India)	Gautam Solar	In February 2025, one year after acquiring the land on which to build the facility, Gautam Solar commissioned the first phase of a 3.2 GW module assembly plant in the state of Haryana. The facility will produce TOPCon modules.
Plant opening (India)	Avaada Electro	In March 2025, Avaada Electro commissioned a 1.5 GW module assembly plant in Noida, in the northern Indian state of Uttar Pradesh. The facility, built in three and a half months, will produce bifacial TOPCon modules.

Item	Firm	Event
Plant opening (India)	Emmvee	In April 2025, Emmvee began production at a new 2 GW solar module manufacturing facility in Sulibele, Karnataka. This brings Emmvee's cumulative manufacturing capacity to 6.6 GW for modules, as well as 2.5 GW for cells.
Plant opening (Indonesia)	Apollo Solar Indonesia	In February 2023, Apollo Solar completed construction of its 500 MW solar module manufacturing facility.
Plant opening (Indonesia)	New East Solar	In August 2023, New East Solar completed construction of its 3.5 GW factory in Indonesia to produce solar modules.
Plant opening (Indonesia)	Thornova Solar	In November 2024, Thornova Solar, a U.S.-based solar manufacturer, began production at its new 2.5 GW module manufacturing facility on the island of Batam. With 2.5 GW of capacity, the facility can produce both n-type and PERC technologies.
Plant opening (Indonesia)	EliTe Solar	In December 2024, EliTe Solar opened a solar cell production facility in Indonesia, eight months after selecting the site of the facility.
Plant opening (Indonesia)	SEG Solar	In May 2025, SEG Solar, a U.S.-based PV module manufacturer, commissioned a new cell manufacturing plant on the island of Java, with a manufacturing capacity of 2 GW. SEG Solar noted the first product manufactured at this facility is an n-type solar cell.
Plant opening (Indonesia)	Trina Solar Indonesia	In June 2025, Trina Solar Indonesia, a joint venture between China's Trina Solar and state-owned utilities in Indonesia, commissioned an integrated manufacturing plant with an annual production capacity of 1 GW. The plant plans to produce TOPCon solar modules.
Plant opening (Laos)	Solarspace	In September 2023, Solarspace started manufacturing activities at a new 5 GW factory in the Saysettha Development Zone in Laos, near the Thai border.

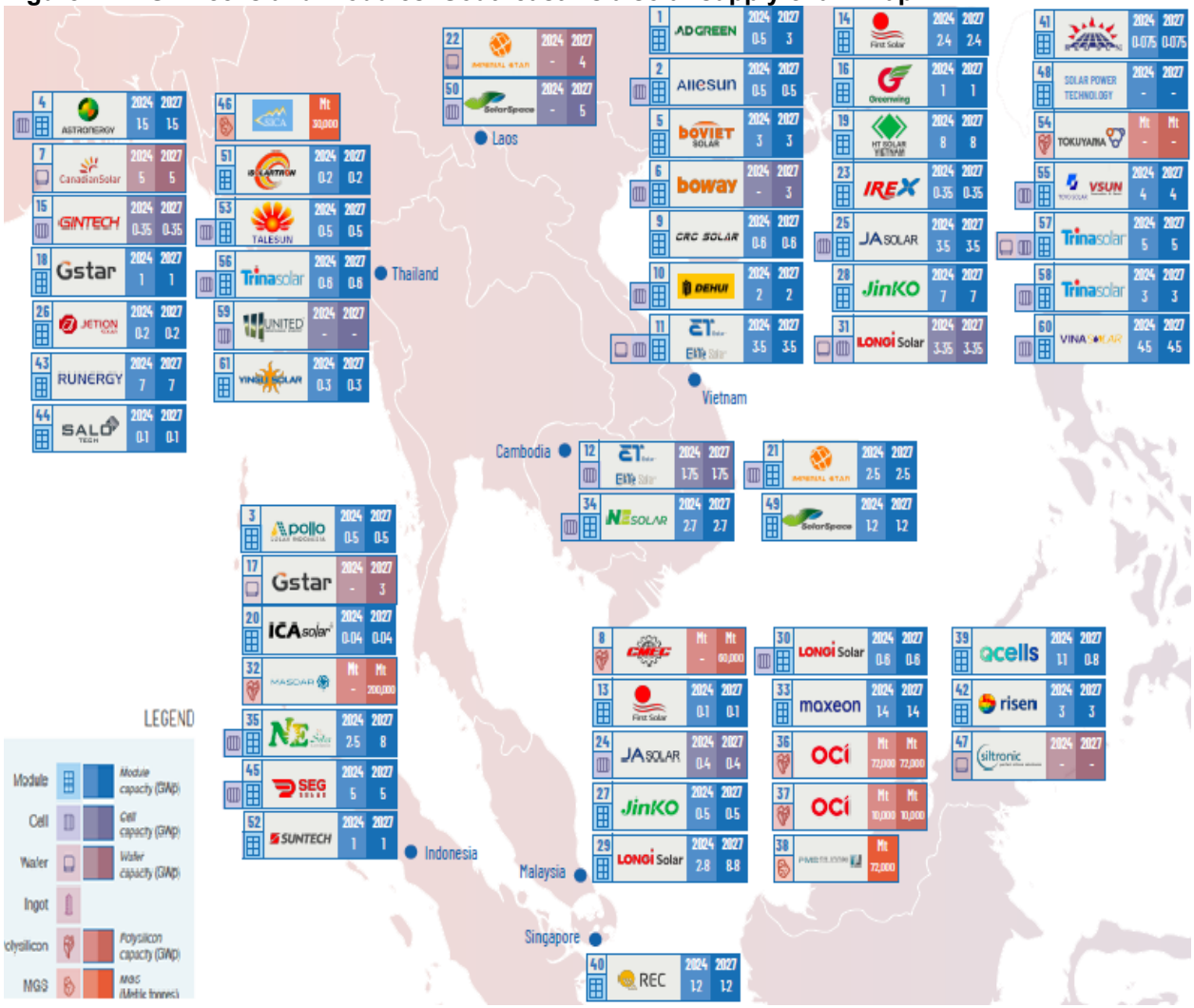
Source: PV Magazine, "Saatvik Solar doubles module capacity to 1GW with new fab," February 8, 2022, https://www.pv-magazine-india.com/2022/02/08/saatvik-solar-expands-module-capacity-to-1-gw-with-new-500-mw-facility/; PV Magazine, "Waaree ramping up solar module capacity to 12 GW," December 22, 2022, https://www.pv-magazine-india.com/2022/12/20/waaree-ramping-up-solar-module-capacity-to-12-gw/; PV Tech, "Waaree commissions 1.8GW solar module line in Gujarat," August 4, 2025, https://www.pv-tech.org/waaree-commissions-1-8gw-solar-module-line-in-gujarat/; PV Magazine India, "Emmvee expands solar module capacity to 6.6 GW," April 16, 2025, https://www.pv-magazine-india.com/2025/04/16/emmvee-expands-solar-module-capacity-to-6-6-gw/; PV Magazine, "Emmvee to start TOPCon solar cell production from June," February 21, 2024, https://www.pv-magazine-india.com/2024/02/21/emmvee-to-start-topcon-solar-cell-production-from-june/; PV Tech, "Avaada commissions 1.5 GW TOPCon module assembly plant in India," March 10, 2025, https://www.pv-tech.org/avaada-commissions-1-5gw-topcon-module-manufacturing-plant-india/; PV Magazine, "Goldi Solar launches AI-powered solar manufacturing line," March 4, 2025, https://www.pv-magazine.com/2025/03/04/goldi-solar-launches-ai-powered-solar-manufacturing-line/; PV Tech, "INDIA ROUND-UP: Gautam Solar and Waaree advance module and cell plants, India reaches 100GW of installed PV capacity," February 11, 2025, https://www.pv-tech.org/india-round-up-gautam-solar-waaree-module-cell-facilities-100gw-installed-capacity/; PV Tech, "Tata Power subsidiary commissions 4.3GW solar cell and module plat in India," February 7, 2025, https://www.pv-tech.org/tata-power-subsidiary-commissions-4-3gw-solar-cell-module-plant-india/; PV Tech, "Waaree subsidiary starts operations at 1.3GW module assembly plant in India," July 15, 2024, https://www.pv-tech.org/waaree-subsidiary-starts-

operations-at-1-3gw-module-assembly-plant-in-india/; NE Solar, “NE Solar Indonesian factory will be completed in August 2023,” May 9, 2023, http://www.nesolar.com.kh/?content/176; Energy Trend, “Trina’s New Overseas Moves,” June 23, 2025, https://www.energytrend.com/news/20250623-49780.html; PV Magazine, “US-based SEG Solar launches cell production in Indonesia,” May 12, 2025, https://www.pv-magazine.com/2025/05/12/us-based-seg-solar-launches-cell-production-in-indonesia/; PV Magazine, “EliTe Solar opens solar cell production facility in Indonesia,” December 10, 2024, https://www.pv-magazine.com/2024/12/10/elite-solar-opens-solar-cell-production-facility-in-indonesia/; PV Tech, “Thornova Solar begins solar module production in Indonesia,” November 19, 2024, https://www.pv-tech.org/thornova-solar-begins-solar-module-production-in-indonesia/; Apollo Solar Indonesia, “About Us,” accessed August 12, 2025, https://apollosolarindonesia.com/about; PV Tech, “SolarSpace begins cell production at first Laos manufacturing plant,” September 28, 2023, https://www.pv-tech.org/solarspace-begins-cell-production-at-first-laos-manufacturing-plant/.

Note: See Part 1 of this report for a description of TOPCon, n-type, and PERC cell technologies.

Figures 7.1 and 7.2 present solar supply chain maps for Southeast Asia, including CSPV cells and modules factories in India, Indonesia, and Laos, as of June 2025, their current manufacturing capacity, and planned manufacturing capacity projections through 2027.

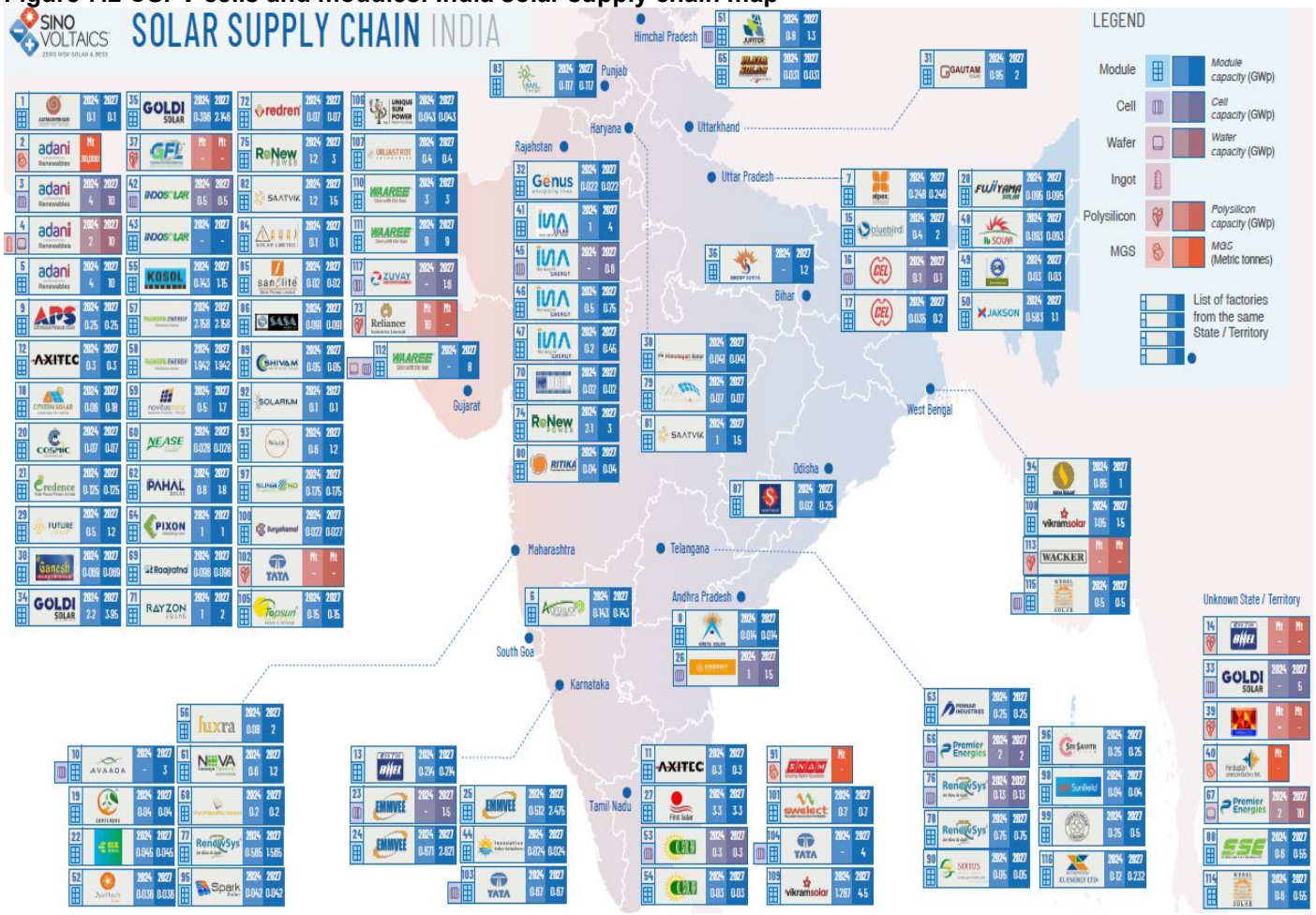
Figure 7.1 CSPV cells and modules: Southeast Asia solar supply chain map



Source: Sinovoltaics, "Southeast Asian Solar Supply Chain Edition 1 - 2025," June 2025, https://sinovoltaics.com/sinovoltaics-southeast-asia-sea-solar-energy-supply-chain-map/.

Note: Production capacity figures in gigawatts (GW). This map includes production facilities across the solar supply chain: modules (blue), cells (darker purple), wafers (lighter purple), polysilicon (red), and metallurgical-grade silicon (orange). Production capacity figures in gigawatts (GW) for modules, cells, and wafers, and metric tons (mt) for polysilicon and metallurgical-grade silicon.

Figure 7.2 CSPV cells and modules: India solar supply chain map



Source: Sinovoltaics, “India Solar Supply Chain Map Edition 1 - 2025,” July 2025, https://sinovoltaics.com/sinovoltaics-india-solar-energy-supply-chain-map/.

Note: Production capacity figures in gigawatts (GW). This map includes production facilities across the solar supply chain: modules (blue), cells (darker purple), wafers (lighter purple), polysilicon (red), and metallurgical-grade silicon (orange). Production capacity figures in gigawatts (GW) for modules, cells, and wafers, and metric tons (mt) for polysilicon and metallurgical-grade silicon.

Changes in operations

Subject producers were asked to report any change in the character of their operations or organization relating to the production of CSPV cells and modules since 2022. Twenty-one of 24 producers indicated in their questionnaires that they had experienced such changes. Firms in all subject countries reported plant openings and expansions. Only two producers in India reported plant closings. Tables 7.9 and 7.10 present the changes identified by these producers.

Table 7.9 CSPV cells and modules: Count of reported changes in operations since January 1, 2022, by change and subject foreign industry

Count in number of firms reporting

Change category	India	Indonesia	Laos	Subject producers
Plant openings	5	9	1	15
Plant closings	2	0	0	2
Prolonged shutdowns	0	3	0	3
Production curtailments	1	0	0	1
Relocations	0	0	0	0
Expansions	5	3	1	9
Acquisitions	0	0	0	0
Consolidations	0	0	0	0
Weather-related or force majeure events	2	0	0	2
Other	2	1	0	3
Any change	8	12	1	21

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

Table 7.10 CSPV cells and modules: Reported changes in operations in the subject countries since January 1, 2022, by change, subject foreign industry, and firm

Change category	Subject foreign industry: Firm name and accompanying narrative response regarding changes in operations
Plant openings	***
Plant openings	***
Plant openings	***
Plant openings	***
Plant openings	***
Plant openings	***
Plant openings	***
Plant openings	***
Plant openings	***
Plant openings	***
Plant openings	***
Plant openings	***
Plant openings	***
Plant openings	***
Plant openings	***
Plant openings	***
Plant openings	***
Plant closings	***
Plant closings	***
Prolonged shutdowns	***
Prolonged shutdowns	***
Prolonged shutdowns	***
Production curtailments	***
Expansions	***

Table continued.

Change category	Subject foreign industry: Firm name and accompanying narrative response regarding changes in operations
Expansions	***
Expansions	***
Expansions	***
Expansions	***
Expansions	***
Expansions	***
Expansions	***
Expansions	***
Weather-related or force majeure events	***
Weather-related or force majeure events	***
Other	***
Other	***

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

Table 7.11 presents anticipated changes in operations identified by subject producers.

Table 7.11 CSPV cells and modules: Reported anticipated changes in operations in the subject countries by change, subject foreign industry, and firm

Subject foreign industry: Firm name	Narrative response regarding anticipated changes in operations
***	***
***	***
***	***
***	***
***	***
***	***
***	***

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

Installed and practical overall capacity

Table 7.12 presents data on subject producers' installed capacity, practical overall capacity, and practical for CSPV cells capacity and production on the same equipment and table 7.13 presents data on subject producers' installed capacity, practical overall capacity, and practical for CSPV modules capacity and production on the same equipment.

From 2022 to 2024, subject cell producers' installed overall capacity, practical overall capacity, and practical CSPV cells capacity increased annually and overall by *** percent, *** percent, and *** percent, respectively. Practical CSPV cell production increased by *** percent from 2022 to 2024 and was higher in interim 2025 than in interim 2024. Practical CSPV cell production had similar trends and also increased during 2022 to 2024 and was higher in interim 2025 than in interim 2024. Practical CSPV cell capacity utilization increased by *** percentage points from 2022 to 2023 then decreased by *** percentage points from 2023 to 2024, for an overall increase of *** percentage points from 2022 to 2024. Practical CSPV capacity utilization was lower in interim 2025 than in interim 2024 and is projected to fall further in 2025.

From 2022 to 2024, subject module producers' installed overall capacity, practical overall capacity, and practical CSPV modules capacity increased by *** percent, by *** percent and by *** percent, respectively. Practical CSPV module production increased by *** percent from 2022 to 2023, then increased by *** percent from 2023 to 2024, for an overall increase of *** percent from 2022 to 2024. Practical CSPV module capacity utilization decreased by *** percentage points from 2022 to 2023 then increased by *** percentage points from 2023 to 2024, for an overall increase of *** percentage points from 2022 to 2024.

Table 7.12 CSPV cells: Subject producers' installed and practical capacity and production on the same equipment as in-scope production, by period

Capacity and production in kilowatts; utilization in percent; interim period is January to March

Item	Measure	2022	2023	2024	Interim 2024	Interim 2025
Installed overall	Capacity	***	***	***	***	***
Installed overall	Production	***	***	***	***	***
Installed overall	Utilization	***	***	***	***	***
Practical overall	Capacity	***	***	***	***	***
Practical overall	Production	***	***	***	***	***
Practical overall	Utilization	***	***	***	***	***
Practical CSPV cells	Capacity	***	***	***	***	***
Practical CSPV cells	Production	***	***	***	***	***
Practical CSPV cells	Utilization	***	***	***	***	***

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

Table 7.13 CSPV modules: Subject producers' installed and practical capacity and production on the same equipment as in-scope production, by period

Capacity and production in kilowatts; utilization in percent; interim period is January to March

Item	Measure	2022	2023	2024	Interim 2024	Interim 2025
Installed overall	Capacity	***	***	***	***	***
Installed overall	Production	***	***	***	***	***
Installed overall	Utilization	***	***	***	***	***
Practical overall	Capacity	***	***	***	***	***
Practical overall	Production	***	***	***	***	***
Practical overall	Utilization	***	***	***	***	***
Practical CSPV modules	Capacity	***	***	***	***	***
Practical CSPV modules	Production	***	***	***	***	***
Practical CSPV modules	Utilization	***	***	***	***	***

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

Note: Staff adjusted capacity data for *** so installed and overall capacity are at least equal to practical capacity, but not less than practical capacity, and one likely typo in reported projected production for ***. Foreign producer questionnaires, sections 2.3b and 2.11.

Constraints on capacity

Tables 7.14 and 7.15 present subject producers' reported production and capacity constraints for CSPV cells and CSPV modules since January 1, 2022.

Table 7.14 CSPV cells: Constraints on practical overall capacity, by subject foreign industry

Count in number of firms reporting

Type of constraint	India	Indonesia	Laos	Subject producers
Production bottlenecks	2	2	0	4
Existing labor force	0	2	1	3
Supply of material inputs	2	1	0	3
Fuel or energy	0	1	1	2
Storage capacity	0	0	1	1
Logistics/transportation	0	0	1	1
Other constraints	6	1	0	7

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

Table 7.15 CSPV modules: Constraints on practical overall capacity, by subject foreign industry

Count in number of firms reporting

Type of constraint	India	Indonesia	Laos	Subject producers
Production bottlenecks	2	5	0	7
Existing labor force	0	3	1	4
Supply of material inputs	4	1	0	5
Fuel or energy	0	3	1	4
Storage capacity	2	2	1	5
Logistics/transportation	0	1	1	2
Other constraints	6	1	0	7

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

Tables 7.16 and 7.17 present subject producers' narrative responses on constraints to practical overall capacity for CSPV cells and CSPV modules since January 1, 2022.

Table 7.16 CSPV cells: Subject producers' reported practical overall capacity constraints since January 1, 2022, by constraint and firm

Type of constraint	Subject foreign industry: Firm name and narrative response on constraints to practical overall capacity
Production bottlenecks	***
Production bottlenecks	***
Production bottlenecks	***
Production bottlenecks	***
Existing labor force	***

Table continued.

Type of constraint	Subject foreign industry: Firm name and narrative response on constraints to practical overall capacity
Existing labor force	***
Existing labor force	***
Supply of material inputs	***
Supply of material inputs	***
Supply of material inputs	***
Fuel or energy	***
Fuel or energy	***
Storage capacity	***
Logistics/transportation	***
Other constraints	***
Other constraints	***
Other constraints	***
Other constraints	***
Other constraints	***
Other constraints	***
Other constraints	***

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

Table 7.17 CSPV modules: Subject producers' reported practical overall capacity constraints since January 1, 2022, by constraint and firm

Type of constraint	Subject foreign industry: Firm name and narrative response on constraints to practical overall capacity
Production bottlenecks	***
Production bottlenecks	***
Production bottlenecks	***
Production bottlenecks	***
Production bottlenecks	***
Production bottlenecks	***
Production bottlenecks	***
Existing labor force	***
Existing labor force	***
Existing labor force	***
Existing labor force	***
Supply of material inputs	***
Supply of material inputs	***
Supply of material inputs	***
Supply of material inputs	***
Supply of material inputs	***
Fuel or energy	***
Fuel or energy	***
Fuel or energy	***
Storage capacity	***
Storage capacity	***

Table continued.

Type of constraint	Subject foreign industry: Firm name and narrative response on constraints to practical overall capacity
Storage capacity	***
Storage capacity	***
Logistics/transportation	***
Other constraints	***
Other constraints	***
Other constraints	***
Other constraints	***
Other constraints	***
Other constraints	***
Other constraints	***

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

Operations on CSPV cells and modules

Aggregate CSPV cells operations in the subject countries

Table 7.18 presents information on the CSPV cells operations of the responding producers/exporters (aggregate data for all subject foreign industries). During 2022 through 2024, subject producers' CSPV cell capacity increased by *** percent and is projected to increase by *** percent in 2025 and *** percent in 2026. Subject producers' CSPV cell production increased by *** percent during 2022 to 2024, increasing by *** percent during 2022 to 2023 and by *** percent during 2023 to 2024. Subject producers' production is projected to increase in 2025 by *** percent but expected to decrease in 2026 by *** percent. Overall, from 2024 to 2026, subject producers project CSPV cell capacity, production, end-of-period inventories, internal consumption, home market shipments, and exports to the United States to increase. The vast majority over the period was of home market shipments, but with an increasing share to export markets. Commercial home shipments and exports to all other markets are also expected to increase.

Table 7.18 CSPV cells: Data on subject foreign industries, by item and period

Quantity in kilowatts; interim period is January to March

Item	2022	2023	2024	Interim 2024	Interim 2025	Projection 2025	Projection 2026
Capacity	***	***	***	***	***	***	***
Production	***	***	***	***	***	***	***
End-of-period inventories	***	***	***	***	***	***	***
Internal consumption	***	***	***	***	***	***	***
Commercial home market shipments	***	***	***	***	***	***	***
Home market shipments	***	***	***	***	***	***	***
Exports to the United States	***	***	***	***	***	***	***
Exports to all other markets	***	***	***	***	***	***	***
Export shipments	***	***	***	***	***	***	***
Total shipments	***	***	***	***	***	***	***
Resales exported to the United States	***	***	***	***	***	***	***
Total exports to the United States	***	***	***	***	***	***	***

Table continued.

Table 7.18 Continued CSPV cells: Data on subject foreign industries, by item and period

Shares and ratios in percent, interim period is January to March

Item	2022	2023	2024	Interim 2024	Interim 2025	Projection 2025	Projection 2026
Capacity utilization ratio	***	***	***	***	***	***	***
Inventory ratio to production	***	***	***	***	***	***	***
Inventory ratio to total shipments	***	***	***	***	***	***	***
Internal consumption share	***	***	***	***	***	***	***
Commercial home market shipments share	***	***	***	***	***	***	***
Home market shipments share	***	***	***	***	***	***	***
Exports to the United States share	***	***	***	***	***	***	***
Exports to all other markets share	***	***	***	***	***	***	***
Export shipments share	***	***	***	***	***	***	***
Total shipments share	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Share of total exports to the United States by producers	***	***	***	***	***	***	***
Share of total exports to the United States by resellers	***	***	***	***	***	***	***
Adjusted share of total shipments exported to the United States	***	***	***	***	***	***	***

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

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as “—“.

Practical CSPV cells capacity and production by subject foreign industry

Table 7.19 presents information on subject producers' production, capacity, and capacity utilization by subject country.

Table 7.19 CSPV cells: Subject producers' output: Practical capacity, by source and period

Practical capacity

Capacity in kilowatts, interim period is January to March

Subject foreign industry	2022	2023	2024	Interim 2024	Interim 2025	Projection 2025	Projection 2026
India	***	***	***	***	***	***	***
Indonesia	***	***	***	***	***	***	***
Laos	***	***	***	***	***	***	***
All subject foreign industries	***	***	***	***	***	***	***

Table continued.

Table 7.19 Continued CSPV cells: Subject producers' output: Production, by source and period

Production

Production in kilowatts; interim period in January to March

Subject foreign industry	2022	2023	2024	Interim 2024	Interim 2025	Projection 2025	Projection 2026
India	***	***	***	***	***	***	***
Indonesia	***	***	***	***	***	***	***
Laos	***	***	***	***	***	***	***
All subject foreign industries	***	***	***	***	***	***	***

Table continued.

Table 7.19 Continued CSPV cells: Subject producers' output: Capacity utilization, by source and period

Capacity utilization

Capacity utilization in percent; interim period is January to March

Subject foreign industry	2022	2023	2024	Interim 2024	Interim 2025	Projection 2025	Projection 2026
India	***	***	***	***	***	***	***
Indonesia	***	***	***	***	***	***	***
Laos	***	***	***	***	***	***	***
All subject foreign industries	***	***	***	***	***	***	***

Table continued.

Note: Capacity utilization ratio represents the ratio of the subject producer's production to its production capacity.

Table 7.19 Continued CSPV cells: Subject producers' output: Share of production, by source and period

Share of production

Share in percent; interim period is January to March

Subject foreign industry	2022	2023	2024	Interim 2024	Interim 2025	Projection 2025	Projection 2026
India	***	***	***	***	***	***	***
Indonesia	***	***	***	***	***	***	***
Laos	***	***	***	***	***	***	***
All subject foreign industries	100.0	100.0	100.0	100.0	100.0	100.0	100.0

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

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—".

CSPV cells exports, by subject country

Table 7.20 presents information on subject producers' (and resellers) exports of CSPV cells by subject country. Subject producers from India and Laos did not report any exports of CSPV cells to the United States in 2022. While exports of CSPV cells from India to the U.S. decreased from 2023 to 2024, exports from CSPV cells from Indonesia and Laos to the U.S. increased for the same period. CSPV cell exports to the U.S. from subject countries were higher in interim 2025 than in 2024, except for Indonesia. CSPV cell exports to the U.S. are projected to increase from 2024 to 2026 from India, peak in 2025 then decrease in 2026 for Indonesia, and decrease for Laos.

Table 7.20 CSPV cells: Subject producers' (and resellers') exports: Exports to the United States, by source and period

Exports to the United States

Quantity in kilowatts; interim period is January to March

Subject foreign industry	2022	2023	2024	Interim 2024	Interim 2025	Projection 2025	Projection 2026
India	***	***	***	***	***	***	***
Indonesia	***	***	***	***	***	***	***
Laos	***	***	***	***	***	***	***
All subject foreign industries	***	***	***	***	***	***	***

Table continued.

Table 7.20 Continued CSPV cells: Subject producers' (and resellers') exports: Share of total shipments exported to the United States, by source and period

Share of total shipments exported to the United States

Share in percent; interim period is January to March

Subject foreign industry	2022	2023	2024	Interim 2024	Interim 2025	Projection 2025	Projection 2026
India	***	***	***	***	***	***	***
Indonesia	***	***	***	***	***	***	***
Laos	***	***	***	***	***	***	***
All subject foreign industries	***	***	***	***	***	***	***

Table continued.

Table 7.20 Continued CSPV cells: Subject producers' (and resellers') exports: Exports to all destination markets, by source and period

Total exports

Quantity in kilowatts, interim period is January to March

Subject foreign industry	2022	2023	2024	Interim 2024	Interim 2025	Projection 2025	Projection 2026
India	***	***	***	***	***	***	***
Indonesia	***	***	***	***	***	***	***
Laos	***	***	***	***	***	***	***
All subject foreign industries	***	***	***	***	***	***	***

Table continued.

Table 7.20 Continued CSPV cells: Subject producers' (and resellers') exports: Share of total shipments exported to all destinations, by source and period

Share of total shipments exported

Share in percent, interim period is January to March

Subject foreign industry	2022	2023	2024	Interim 2024	Interim 2025	Projection 2025	Projection 2026
India	***	***	***	***	***	***	***
Indonesia	***	***	***	***	***	***	***
Laos	***	***	***	***	***	***	***
All subject foreign industries	***	***	***	***	***	***	***

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

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—".

CSPV cells inventories, by subject foreign industry

Table 7.21 presents information on ending inventory of the responding producers by subject foreign country.

Table 7.21 CSPV cells: Subject foreign industries' ending inventories: Ending inventories, by source and period

Quantity in kilowatts; interim is January to March

Subject foreign industry	2022	2023	2024	Interim 2024	Interim 2025	Projection 2025	Projection 2026
India	***	***	***	***	***	***	***
Indonesia	***	***	***	***	***	***	***
Laos	***	***	***	***	***	***	***
All subject foreign industries	***	***	***	***	***	***	***

Table continued.

Table 7.21 Continued CSPV cells: Subject foreign industries' ending inventories: Ratio of ending inventories to total shipments, by source and period

Ratio in percent, interim is January to March

Subject foreign industry	2022	2023	2024	Interim 2024	Interim 2025	Projection 2025	Projection 2026
India	***	***	***	***	***	***	***
Indonesia	***	***	***	***	***	***	***
Laos	***	***	***	***	***	***	***
All subject foreign industries	***	***	***	***	***	***	***

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

Aggregate CSPV modules operations in the subject countries

Table 7.22 presents information on the CSPV modules operations of the responding producers/exporters (aggregate data for all subject foreign industries). During 2022 through 2024, subject producers' CSPV module capacity increased by *** percent and is projected to increase by *** percent in 2025 and *** percent in 2026. Subject producers' CSPV module production increased by *** percent during 2022 to 2024, increasing by *** percent during 2022 to 2023 and by *** percent during 2023 to 2024. Subject producers' production is projected to increase in 2025 by *** and by *** percent in 2026. Overall, from 2024 to 2026, subject producers project CSPV module capacity, production, end-of-period inventories, internal consumption, home market and commercial shipments, and exports to all other markets are expected to increase. However, exports to the United States are expected to decrease marginally from 2024 to 2026. Home market shipments had the largest share in all periods. The share of home market shipments increased by *** percent between 2022 and 2024, is expected to increase in 2025 but then decrease slightly in 2026. The share of exports to total shipments peaked in 2023 but then decreased in 2024 and is expected to decrease in 2026 compared to 2024. The United States was by far the largest export market in every period.

Table 7.22 CSPV modules: Data on subject foreign industries, by item and period

Quantity in kilowatts; interim period is January to March

Item	2022	2023	2024	Interim 2024	Interim 2025	Projection 2025	Projection 2026
Capacity	***	***	***	***	***	***	***
Production	***	***	***	***	***	***	***
End-of-period inventories	***	***	***	***	***	***	***
Internal consumption	***	***	***	***	***	***	***
Commercial home market shipments	***	***	***	***	***	***	***
Home market shipments	***	***	***	***	***	***	***
Exports to the United States	***	***	***	***	***	***	***
Exports to all other markets	***	***	***	***	***	***	***
Export shipments	***	***	***	***	***	***	***
Total shipments	***	***	***	***	***	***	***
Resales exported to the United States	***	***	***	***	***	***	***
Total exports to the United States	***	***	***	***	***	***	***

Table continued.

Table 7.22 Continued CSPV modules: Data on subject foreign industries, by item and period

Shares and ratios in percent, interim period is January to March

Item	2022	2023	2024	Interim 2024	Interim 2025	Projection 2025	Projection 2026
Capacity utilization ratio	***	***	***	***	***	***	***
Inventory ratio to production	***	***	***	***	***	***	***
Inventory ratio to total shipments	***	***	***	***	***	***	***
Internal consumption share	***	***	***	***	***	***	***
Commercial home market shipments share	***	***	***	***	***	***	***
Home market shipments share	***	***	***	***	***	***	***
Exports to the United States share	***	***	***	***	***	***	***
Exports to all other markets share	***	***	***	***	***	***	***
Export shipments share	***	***	***	***	***	***	***
Total shipments share	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Share of total exports to the United States by producers	***	***	***	***	***	***	***
Share of total exports to the United States by resellers	***	***	***	***	***	***	***
Adjusted share of total shipments exported to the United States	***	***	***	***	***	***	***

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

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as “—“.

Practical CSPV modules capacity and production by subject foreign industry

Table 7.23 presents information on subject producers' production, capacity, and capacity utilization by subject country.

Table 7.23 CSPV modules: Subject producers' output: Practical capacity, by source and period

Practical capacity

Capacity in kilowatts, interim period is January to March

Subject foreign industry	2022	2023	2024	Interim 2024	Interim 2025	Projection 2025	Projection 2026
India	***	***	***	***	***	***	***
Indonesia	***	***	***	***	***	***	***
Laos	***	***	***	***	***	***	***
All subject foreign industries	***	***	***	***	***	***	***

Table continued.

Table 7.23 Continued CSPV modules: Subject producers' output: Production, by source and period

Production

Production in kilowatts; interim period in January to March

Subject foreign industry	2022	2023	2024	Interim 2024	Interim 2025	Projection 2025	Projection 2026
India	***	***	***	***	***	***	***
Indonesia	***	***	***	***	***	***	***
Laos	***	***	***	***	***	***	***
All subject foreign industries	***	***	***	***	***	***	***

Table continued.

Table 7.23 Continued CSPV modules: Subject producers' output: Capacity utilization, by source and period

Capacity utilization

Capacity utilization in percent; interim period is January to March

Subject foreign industry	2022	2023	2024	Interim 2024	Interim 2025	Projection 2025	Projection 2026
India	***	***	***	***	***	***	***
Indonesia	***	***	***	***	***	***	***
Laos	***	***	***	***	***	***	***
All subject foreign industries	***	***	***	***	***	***	***

Table continued.

Note: Capacity utilization ratio represents the ratio of the subject producer's production to its production capacity.

Table 7.23 Continued CSPV modules: Subject producers' output: Share of production, by source and period

Share of production

Share in percent; interim period is January to March

Subject foreign industry	2022	2023	2024	Interim 2024	Interim 2025	Projection 2025	Projection 2026
India	***	***	***	***	***	***	***
Indonesia	***	***	***	***	***	***	***
Laos	***	***	***	***	***	***	***
All subject foreign industries	100.0	100.0	100.0	100.0	100.0	100.0	100.0

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

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—".

CSPV modules exports, by subject country

Table 7.24 presents information on subject producers' (and resellers) exports of CSPV modules by subject country. Subject producers from Laos did not report any exports of CSPV modules to the United States in 2022 or 2023. While exports of CSPV modules from India to the U.S. peaked in 2023, they decreased in 2024, were lower in interim 2025 than in interim 2024 and are projected to decrease in 2026 from 2024. Exports of CSPV modules from Indonesia to the U.S. also peaked in 2023 but decreased in 2024. However, exports of CSPV modules from India to the U.S. are expected to increase in 2026 from 2024. Laos exports of CSPV modules to the U.S. commenced in 2024 and are projected to increase during 2024 to 2026. Aggregate subject exports of CSPV modules to the U.S. increased irregularly during 2022 to 2024, was lower in interim 2025 than in interim 2024 and is projected to decrease from 2024 to 2026.

Table 7.24 CSPV modules: Subject producers' (and resellers') exports: Exports to the United States, by source and period

Exports to the United States

Quantity in kilowatts; interim period is January to March

Subject foreign industry	2022	2023	2024	Interim 2024	Interim 2025	Projection 2025	Projection 2026
India	***	***	***	***	***	***	***
Indonesia	***	***	***	***	***	***	***
Laos	***	***	***	***	***	***	***
All subject foreign industries	***	***	***	***	***	***	***

Table continued.

Table 7.24 Continued CSPV modules: Subject producers' (and resellers') exports: Share of total shipments exported to the United States, by source and period

Share of total shipments exported to the United States

Share in percent; interim period is January to March

Subject foreign industry	2022	2023	2024	Interim 2024	Interim 2025	Projection 2025	Projection 2026
India	***	***	***	***	***	***	***
Indonesia	***	***	***	***	***	***	***
Laos	***	***	***	***	***	***	***
All subject foreign industries	***	***	***	***	***	***	***

Table continued.

Table 7.24 Continued CSPV modules: Subject producers' (and resellers') exports: Exports to all destination markets, by source and period

Total exports

Quantity in kilowatts, interim period is January to March

Subject foreign industry	2022	2023	2024	Interim 2024	Interim 2025	Projection 2025	Projection 2026
India	***	***	***	***	***	***	***
Indonesia	***	***	***	***	***	***	***
Laos	***	***	***	***	***	***	***
All subject foreign industries	***	***	***	***	***	***	***

Table continued.

Table 7.24 Continued CSPV modules: Subject producers' (and resellers') exports: Share of total shipments exported to all destinations, by source and period

Share of total shipments exported

Share in percent, interim period is January to March

Subject foreign industry	2022	2023	2024	Interim 2024	Interim 2025	Projection 2025	Projection 2026
India	***	***	***	***	***	***	***
Indonesia	***	***	***	***	***	***	***
Laos	***	***	***	***	***	***	***
All subject foreign industries	***	***	***	***	***	***	***

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

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—".

CSPV modules inventories, by subject foreign industry

Table 7.25 presents information on ending inventory of the responding producers by subject foreign country. The ratio of ending inventories to total shipments increased collectively and for each of the subject countries during 2022 to 2024. Ratios of ending inventories to total shipments increased from *** percent in 2022 to *** percent in 2024 for India, *** percent in 2022 to *** percent for Indonesia, and it was *** percent in 2024 for Laos.

Table 7.25 CSPV modules: Subject foreign industries' ending inventories: Ending inventories, by source and period

Quantity in kilowatts; interim is January to March

Subject foreign industry	2022	2023	2024	Interim 2024	Interim 2025	Projection 2025	Projection 2026
India	***	***	***	***	***	***	***
Indonesia	***	***	***	***	***	***	***
Laos	***	***	***	***	***	***	***
All subject foreign industries	***	***	***	***	***	***	***

Table continued.

Table 7.25 Continued CSPV modules: Subject foreign industries' ending inventories: Ratio of ending inventories to total shipments, by source and period

Ratio in percent, interim is January to March

Subject foreign industry	2022	2023	2024	Interim 2024	Interim 2025	Projection 2025	Projection 2026
India	***	***	***	***	***	***	***
Indonesia	***	***	***	***	***	***	***
Laos	***	***	***	***	***	***	***
All subject foreign industries	***	***	***	***	***	***	***

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

Alternative products

The responding producers in India, Indonesia, and Laos did not report any production of alternative products using the same equipment and/or labor as those used to produce CSPV cells and/or modules during the period of investigations.

Exports

Table 7.26 presents Global Trade Atlas ("GTA") data for exports of CSPV cells and modules from subject countries to the United States and to all destination markets. During 2022 to 2024, the vast majority of subject country's exports of CSPV cells and modules were destined to the United States, with the exception of Laos, which entered the market in 2024.

Table 7.26 CSPV cells and modules: Global exports from subject foreign industries: Exports to the United States, by subject foreign country and period

Value in 1,000 dollars

Exporter	Measure	2022	2023	2024
India	Value	525,514	1,787,556	1,513,782
Indonesia	Value	162,485	245,089	591,577
Laos	Value	—	7	349,372
Subject exporters	Value	687,999	2,032,651	2,454,730

Table continued.

Table 7.26 Continued CSPV cells and modules: Global exports from subject foreign industries: Exports to all destination markets, by subject foreign country and period

Value in $1,000 dollars

Exporter	Measure	2022	2023	2024
India	Value	553,917	1,836,433	1,551,978
Indonesia	Value	174,149	254,305	644,503
Laos	Value	667	5,863	375,222
Subject exporters	Value	728,732	2,096,600	2,571,703

Table continued.

Table 7.26 Continued CSPV cells and modules: Global exports from subject foreign industries: Share of exports exported to the United States, by subject foreign country and period

Share in percent

Exporter	Measure	2022	2023	2024
India	Share	94.9	97.3	97.5
Indonesia	Share	93.3	96.4	91.8
Laos	Share	—	0.1	93.1
Subject exporters	Share	94.4	96.9	95.5

Source: Official exports statistics and official global imports statistics from Laos (constructed exports) under HS subheadings 8541.42 and 8541.43 as reported by various national statistical authorities in the Global Trade Atlas Suite database, accessed August 4, 2025.

Note: Shares represent the shares of value exported to the United States out of all destination markets. Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—".

U.S. inventories of imported merchandise

Table 7.27 presents data on U.S. importers' reported inventories of CSPV cells and modules. U.S. importers from India reported inventories throughout the period of data collection, while U.S. importers from Indonesia and Laos reported inventories for 2024 and interim 2025. In 2024 and interim 2025, U.S. importers' inventories from Laos accounted for the majority of subject inventories. As a ratio to imports, U.S. shipments of imports, and total shipment of imports, aggregate U.S. importers' inventories from subject sources decreased from 2022 to 2023 then increased in 2024 and were higher in interim 2025 compared to interim 2024. U.S. importers' inventories from nonsubject sources accounted for the vast majority of inventories in all periods. U.S. importers' inventories from nonsubject sources increased between 2022 and 2024[4] and were lower in interim 2025 than in interim 2024.

[4] *** accounted for more than *** percent of U.S. importers' nonsubject inventories in 2024.

Table 7.27 CSPV cells and modules: U.S. importers' inventories and their ratio to select items, by source and period

Quantity in kilowatts; ratio in percent; interim period is January to March

Measure	Source	2022	2023	2024	Interim 2024	Interim 2025
Inventories quantity	India	***	***	***	***	***
Ratio to imports	India	***	***	***	***	***
Ratio to U.S. shipments of imports	India	***	***	***	***	***
Ratio to total shipments of imports	India	***	***	***	***	***
Inventories quantity	Indonesia	***	***	***	***	***
Ratio to imports	Indonesia	***	***	***	***	***
Ratio to U.S. shipments of imports	Indonesia	***	***	***	***	***
Ratio to total shipments of imports	Indonesia	***	***	***	***	***
Inventories quantity	Laos	***	***	***	***	***
Ratio to imports	Laos	***	***	***	***	***
Ratio to U.S. shipments of imports	Laos	***	***	***	***	***
Ratio to total shipments of imports	Laos	***	***	***	***	***
Inventories quantity	Subject sources	***	***	***	***	***
Ratio to imports	Subject sources	***	***	***	***	***
Ratio to U.S. shipments of imports	Subject sources	***	***	***	***	***
Ratio to total shipments of imports	Subject sources	***	***	***	***	***
Inventories quantity	Nonsubject sources	***	***	***	***	***
Ratio to imports	Nonsubject sources	***	***	***	***	***
Ratio to U.S. shipments of imports	Nonsubject sources	***	***	***	***	***
Ratio to total shipments of imports	Nonsubject sources	***	***	***	***	***
Inventories quantity	All import sources	***	***	***	***	***
Ratio to imports	All import sources	***	***	***	***	***
Ratio to U.S. shipments of imports	All import sources	***	***	***	***	***
Ratio to total shipments of imports	All import sources	***	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010, accessed August 12, 2025.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—". Data related to the additional importers of record identified using proprietary, Census-edited Customs records that did not respond to the Commission questionnaire are included.

U.S. importers' outstanding orders

The Commission requested importers to indicate whether they imported or arranged for the importation of CSPV cells and modules from India, Indonesia, and Laos after March 31, 2025. Thirty-one of 45 firms indicated they arranged imports from subject and nonsubject sources. Subject sources accounted for nearly *** of total arranged imports for all quarters, while inventories from nonsubject sources were higher in three of the four quarters. Their reported data are presented in table 7.28.

Table 7.28 CSPV cells and modules: U.S. importers' arranged imports, by source and period

Quantity in kilowatts

Source	Q2 2025	Q3 2025	Q4 2025	Q1 2026	Total
India	***	***	***	***	***
Indonesia	***	***	***	***	***
Laos	***	***	***	***	***
Subject sources	***	***	***	***	***
Nonsubject sources	***	***	***	***	***
All import sources	***	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records, using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010, accessed August 12, 2025.

Note: Zeroes, null values, and undefined calculations are suppressed and shown as "—". Data related to the additional importers of record identified using proprietary, Census-edited Customs records that did not respond to the Commission questionnaire are included.

Third-country trade actions

Table 7.29 provides information on trade remedy actions on CSPV cells and modules and related products in third-country markets.

Table 7.29 CSPV cells and modules: Third-country trade remedy actions in effect

Date	Trade remedy action
January 2014	China imposed antidumping duties on solar-grade polysilicon from the United States and South Korea and countervailing duties on solar-grade polysilicon from the United States, all of which were later extended in January 2020.
May 2014	The European Union imposed antidumping and countervailing duties on solar glass from China, which were later extended in July 2020.
July 2015	Canada imposed antidumping and countervailing duties on certain photovoltaic modules and laminates from China, which were later extended in March 2021.
April 2017	Turkey imposed antidumping duties on solar panels from China.
March 2019	India imposed antidumping duties on imports of ethyl vinyl acetate sheet for solar modules from China. India also imposed antidumping duties on ethyl vinyl acetate sheet for solar modules from Malaysia, Saudi Arabia, and Thailand on March 29, 2019, which were later terminated on March 28, 2024.
September 2024	India imposed antidumping duties on imports of aluminum frames for solar panels from China in September 2024.
September 2024	India initiated an antidumping investigation into imports of solar cells and modules from China on September 30, 2024.
May 2025	India imposed antidumping duties on imports of textured tempered coated and uncoated glass, otherwise known as solar glass, from China and Vietnam in May 2025.

Source: World Trade Organization, Trade Remedies Data Portal, accessed February 21, 2025, https://trade-remedies.wto.org/en; Ministry of Finance, No. 11/2025-CUSTOMS(ADD), May 8, 2025, https://dn721307.ca.archive.org/0/items/in.gazette.central.e.2025-05-08.262982/262982.pdf.

Information on nonsubject countries

Global production[5]

According to the International Energy Agency, global PV cell production increased from 394 GW in 2022 to 644 GW in 2023.[6] China is by far the largest producer of PV cells, accounting for 91.8 percent of global production during 2023, followed by Malaysia (2.3 percent), Vietnam (1.7 percent), and South Korea (1.6 percent).[7] Based on 2023 production volumes, the top manufacturers of PV cells include Tongwei Solar (80.8 GW), Jinkosolar (63.9 GW), LONGi Green Energy Technology (62.3 GW), JA Solar Technology (45.5 GW), and Trina Solar (44.3 GW).[8]

As newer global cell production plants come online, the average size of these plants has increased, and this trend is projected to continue through the next decade. In 2024, cell production plants with annual capacity greater than 5 GW accounted for almost 60 percent of global production. This share is expected to increase to approximately 70 percent of global production in 2025 and is projected to grow to nearly 90 percent by 2035.[9]

Global PV module production increased from 324 GW in 2022 to 612 GW in 2023.[10] China is the largest producer of PV modules, accounting for 84.6 percent of global production during 2023, followed by Vietnam (3.4 percent), India (2.7 percent), and Thailand (2.3 percent).[11] Based on 2023 production volumes, the top manufacturers of PV module include Jinkosolar (83.5 GW), LONGi Green Energy Technology (72.8 GW), JA Solar Technology (58.9 GW), Trina Solar (58.9 GW), and Canadian Solar (31.4 GW).[12]

[5] Global capacity and production data in this section for PV cells and modules include both crystalline silicone products and out-of-scope thin film products due to limitations in the availability of the data. Data for 2024 are not yet available; IEA's Trends in Photovoltaic Applications 2025 report will be published in Q4 2025.

[6] IEA, *Trends in Photovoltaic Applications 2024*, retrieved February 12, 2025, p. 53, https://iea-pvps.org/wp-content/uploads/2024/10/IEA-PVPS-Task-1-Trends-Report-2024.pdf.

[7] Ibid.

[8] Ibid.

[9] Smaller cell production plants with annual capacity less than 5 GW are projected to account for roughly 10 percent of the global market by 2035 and are expected to primarily serve local markets and niche products. VDMA, *International Technology Roadmap for Photovoltaics, 2024 Results*, May 2025, p. 39, https://www.vdma.org/international-technology-roadmap-photovoltaic.

[10] IEA, *Trends in Photovoltaic Applications 2024*, retrieved February 12, 2025, p. 54, https://iea-pvps.org/wp-content/uploads/2024/10/IEA-PVPS-Task-1-Trends-Report-2024.pdf.

[11] Ibid.

[12] IEA, *Trends in Photovoltaic Applications 2024*, retrieved February 12, 2025, p. 53, https://iea-pvps.org/wp-content/uploads/2024/10/IEA-PVPS-Task-1-Trends-Report-2024.pdf.

The average size of module production plants has also increased globally over time, and this trend is expected to continue through the next decade. In 2024, module production plants with annual capacity greater than 5 GW accounted for roughly 55 percent of the global market. This share is expected to increase to approximately 65 percent in 2025 and is projected to grow to nearly 85 percent by 2035.[13]

Global exports

Global exports of CSPV cells and modules decreased by 36.4 percent during 2022 to 2024, from $75.4 billion in 2022 to $47.9 billion in 2024. China was the largest global exporter of CSPV cells and modules in 2024, with exports totaling $30.6 billion, or 63.9 percent of total exports by value (table 7.30). After China, the next largest global exporters in 2024 were the Netherlands (with exports totaling $4.4 billion, or 9.3 percent of total exports) and Thailand (with exports totaling $2.7 billion, or 5.6 percent of total exports).[14]

[13] Smaller module production plants with annual capacity less than 5 GW are projected to account for less than 20 percent of the global market by 2034 and are expected to primarily serve regional markets and special applications. VDMA, *International Technology Roadmap for Photovoltaics, 2024 Results*, May 2025, p. 54, https://www.vdma.org/international-technology-roadmap-photovoltaic.

[14] Official exports statistics from Vietnam under HS subheadings 8541.42 and 8541.43 are not available for 2024. However, in 2023 Vietnam was the second largest global exporter after China, with exports totaling $8.2 billion. The Netherlands is the largest global importer of CSPV modules, the vast majority of which come from China. The Netherlands re-exports approximately 60 percent of those imports, primarily to other countries within the European Union. Statistics Netherlands, "The Netherlands largest importer of Chinese solar panels," September 8, 2023, https://www.cbs.nl/en-gb/news/2023/36/the-netherlands-largest-importer-of-chinese-solar-panels.

Table 7.30 CSPV cells and modules: Global exports by exporter and period

Value in 1,000 dollars; share in percent

Exporting country	Measure	2022	2023	2024
United States	Value	48,272	93,436	67,298
India	Value	553,917	1,836,433	1,551,978
Indonesia	Value	174,149	254,305	644,503
Laos	Value	667	5,863	375,222
Subject exporters	Value	728,732	2,096,600	2,571,703
China	Value	46,378,414	43,783,325	30,605,297
Netherlands	Value	8,305,842	8,059,403	4,445,089
Thailand	Value	2,154,048	4,237,355	2,664,564
Malaysia	Value	2,369,525	4,165,078	2,423,175
South Korea	Value	1,576,203	1,159,182	682,117
Portugal	Value	745,788	629,070	621,154
Slovenia	Value	405,968	546,566	585,665
All other exporters	Value	12,651,895	15,868,345	3,239,708
All reporting exporters	Value	75,364,686	80,638,360	47,905,771
United States	Share of value	0.1	0.1	0.1
India	Share of value	0.7	2.3	3.2
Indonesia	Share of value	0.2	0.3	1.3
Laos	Share of value	0.0	0.0	0.8
Subject exporters	Share of value	1.0	2.6	5.4
China	Share of value	61.5	54.3	63.9
Netherlands	Share of value	11.0	10.0	9.3
Thailand	Share of value	2.9	5.3	5.6
Malaysia	Share of value	3.1	5.2	5.1
South Korea	Share of value	2.1	1.4	1.4
Portugal	Share of value	1.0	0.8	1.3
Slovenia	Share of value	0.5	0.7	1.2
All other exporters	Share of value	16.8	19.7	6.8
All reporting exporters	Share of value	100.0	100.0	100.0

Source: Official exports statistics and official global imports statistics from Laos (constructed exports) under HS subheadings 8541.42 and 8541.43 as reported by various national statistical authorities in the Global Trade Atlas Suite database, accessed August 4, 2025.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. United States is shown at the top followed by the countries under investigation, all remaining top exporting countries in descending order of 2024 data. Prior to January 26, 2022, CSPV cells and modules entered under HS subheading 8541.40. HS subheading 8541.40 may have contained products outside the scope of these investigations, including photosensitive semiconductor devices and light-emitting diodes. Official exports statistics from Vietnam under HS subheadings 8541.42 and 8541.43 are not available for 2024.

China[15]

China is the largest global producer of PV cells and modules (including out-of-scope thin film products) by a wide margin, accounting for the large majority of total production in both sectors. China's capacity to produce PV cells increased by 83.8 percent from 506 GW in 2022 to 930 GW in 2023.[16] Chinese PV cell production increased by 78.5 percent from 331 GW in 2022 to 591 GW in 2023.[17] During 2022 to 2023, Chinese PV module capacity increased from 552 GW to 920 GW (66.7 percent) and Chinese PV module production increased from 295 GW to 510 GW (72.9 percent).[18] Moreover, China increased its share of global production in both sectors between 2022 and 2023—increasing from 84.0 percent to 91.8 percent of total PV cell production and increasing from 77.8 percent to 84.6 percent of total PV module production.[19]

China's exports of CSPV cells and modules totaled $30.6 billion in 2024.[20] The top destinations for such exports from China were the Netherlands ($4.7 billion), India ($3.1 billion), Brazil ($2.6 billion), and Pakistan ($2.0 billion).[21]

[15] 2024 capacity and production data for China are not yet available; IEA's Trends in Photovoltaic Applications 2025 report will be published in Q4 2025.

[16] IEA, *Trends in Photovoltaic Applications 2023*, accessed August 13, 2025, p. 50, https://iea-pvps.org/wp-content/uploads/2023/10/PVPS_Trends_Report_2023_WEB.pdf; IEA, *Trends in Photovoltaic Applications 2024*, accessed August 13, 2025, p. 53, https://iea-pvps.org/wp-content/uploads/2024/10/IEA-PVPS-Task-1-Trends-Report-2024.pdf.

[17] Ibid.

[18] IEA, *Trends in Photovoltaic Applications 2023*, accessed August 13, 2025, p. 51, https://iea-pvps.org/wp-content/uploads/2023/10/PVPS_Trends_Report_2023_WEB.pdf; IEA, *Trends in Photovoltaic Applications 2024*, accessed August 13, 2025, p. 54, https://iea-pvps.org/wp-content/uploads/2024/10/IEA-PVPS-Task-1-Trends-Report-2024.pdf.

[19] IEA, *Trends in Photovoltaic Applications 2023*, accessed August 13, 2025, pp. 50-51, https://iea-pvps.org/wp-content/uploads/2023/10/PVPS_Trends_Report_2023_WEB.pdf; IEA, *Trends in Photovoltaic Applications 2024*, accessed August 13, 2025, pp. 53-54, https://iea-pvps.org/wp-content/uploads/2024/10/IEA-PVPS-Task-1-Trends-Report-2024.pdf.

[20] Official export statistics under HS subheadings 8541.42 and 8541.43 as reported by China Customs in the Global Trade Atlas Suite (GTAS) database, accessed August 13, 2025.

[21] The United States is not a top destination for China's exports of CSPV cells and modules due to existing AD/CVD orders on such imports. See Part 1 of this report for more information on previous and related investigations. Ibid.

APPENDIX A

FEDERAL REGISTER NOTICES

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

Citation	Title	Link
90 FR 34518, July 22, 2025	Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From India, Indonesia, and Laos; Institution of Antidumping and Countervailing Duty Investigations and Scheduling of Preliminary Phase Investigations	https://www.govinfo.gov/content/pkg/FR-2025-07-22/pdf/2025-13756.pdf
90 FR 38736, August 12, 2025	Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From India, Indonesia, and the Lao People's Democratic Republic: Initiation of Less-Than-Fair-Value Investigations	https://www.govinfo.gov/content/pkg/FR-2025-08-12/pdf/2025-15250.pdf
90 FR 38745 August 12, 2025	Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From India, Indonesia, and the Lao People's Democratic Republic: Initiation of Countervailing Duty Investigations	https://www.govinfo.gov/content/pkg/FR-2025-08-12/pdf/2025-15251.pdf

APPENDIX B

LIST OF STAFF CONFERENCE WITNESSES

CALENDAR OF PUBLIC PRELIMINARY CONFERENCE

Those listed below appeared as witnesses at the United States International Trade Commission's preliminary conference:

Subject:	Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules from India, Indonesia, and Laos
Inv. Nos.:	701-TA-772-774 and 731-TA-1756-1758 (Preliminary)
Date and Time:	August 7, 2025 – 9:30 a.m.

Sessions were held in connection with these preliminary phase investigations all virtually via Webex.

OPENING REMARKS:

In Support of Imposition (**Laura El-Sabaawi,** Wiley Rein LLP)

In Support of the Imposition of the Antidumping and Countervailing Duty Orders:

Wiley Rein LLP
Washington, DC
on behalf of

Alliance for American Solar Manufacturing and Trade ("Alliance")

Joe Mendelson, Vice President and Head of Public Policy and Government Relations, Hanwha Q CELLS USA

Scott Moskowitz, Senior Director of Market Strategy and Public Affairs, Hanwha . Q CELLS USA

Sam Martens, President, Mission Solar

Adam Tesanovich, Co-Founder and Chief Executive Officer, Talon PV

In Support of the Imposition of the
Antidumping and Countervailing Duty Orders (continued):

Seth Kaplan, President, International Economic Research LLC

Nathan Smith, Research Analyst, Capital Trade

Timothy Brightbill)
) – OF COUNSEL
Laura El-Sabaawi)

ArentFox Schiff LLP
Washington, DC
on behalf of

Hanwha QCells USA, Inc. ("HQCUSA")

John M. Gurley) – OF COUNSEL

CLOSING REMARKS:

In Support of Imposition (**Timothy Brightbill**, Wiley Rein LLP)

APPENDIX C

SUMMARY DATA

Table C.1
CSPV cells and modules: Summary data concerning the U.S. market, by item and period
Quantity=kilowatts; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per kilowatt; Period changes=percent--exceptions noted; Interim period is January to March

Item	Reported data					Period change comparisons			
	Calendar year			Interim		Calendar year			Interim
	2022	2023	2024	2024	2025	2022–24	2022–23	2023–24	2024–25
U.S. consumption quantity:									
Amount	***	***	***	***	***	▲***	▲***	▲***	▼***
Producers' share (fn1) (fn2)	***	***	***	***	***	▲***	***	▲***	▲***
Importers' share (fn1):									
India	***	***	***	***	***	▲***	▲***	▼***	▼***
Indonesia	***	***	***	***	***	▲***	▼***	▲***	▲***
Laos	***	***	***	***	***	▲***	***	▲***	▲***
Subject sources	***	***	***	***	***	▲***	▲***	▲***	▲***
Nonsubject sources	***	***	***	***	***	▼***	▼***	▼***	▼***
All import sources	***	***	***	***	***	▼***	***	▼***	▼***
U.S. consumption value:									
Amount	***	***	***	***	***	▲***	▲***	▼***	▼***
Producers' share (fn1) (fn2):									
Fully domestic value	***	***	***	***	***	▲***	***	▲***	▲***
Value added to imports	***	***	***	***	***	▲***	▼***	▲***	▲***
Overall value for U.S. producers	***	***	***	***	***	▲***	▼***	▲***	▲***
Importers' share (fn1):									
India	***	***	***	***	***	▲***	▲***	▼***	▼***
Indonesia	***	***	***	***	***	▲***	▼***	▲***	▲***
Laos	***	***	***	***	***	▲***	***	▲***	▲***
Subject sources	***	***	***	***	***	▲***	▲***	▲***	▲***
Nonsubject sources	***	***	***	***	***	▼***	▼***	▼***	▼***
All import sources	***	***	***	***	***	▼***	▲***	▼***	▼***
U.S. importers' U.S. shipments of imports from:									
India:									
Quantity	***	***	***	***	***	▲***	▲***	▼***	▼***
Value	***	***	***	***	***	▲***	▲***	▼***	▼***
Unit value	***	***	***	***	***	▼***	▼***	▼***	▼***
Ending inventory quantity	***	***	***	***	***	▲***	▼***	▲***	▲***
Indonesia:									
Quantity	***	***	***	***	***	▲***	▲***	▲***	▲***
Value	***	***	***	***	***	▲***	▼***	▲***	▲***
Unit value	***	***	***	***	***	▼***	▼***	▼***	▼***
Ending inventory quantity	***	***	***	***	***	▲***	***	▲***	▲***
Laos:									
Quantity	***	***	***	***	***	▲***	***	▲***	▲***
Value	***	***	***	***	***	▲***	***	▲***	▲***
Unit value	***	***	***	***	***	▲***	***	▲***	▲***
Ending inventory quantity	***	***	***	***	***	▲***	***	▲***	▲***
Subject sources:									
Quantity	***	***	***	***	***	▲***	▲***	▲***	▲***
Value	***	***	***	***	***	▲***	▲***	▲***	▲***
Unit value	***	***	***	***	***	▼***	▼***	▼***	▼***
Ending inventory quantity	***	***	***	***	***	▲***	▼***	▲***	▲***
Nonsubject sources:									
Quantity	***	***	***	***	***	▲***	▲***	▲***	▼***
Value	***	***	***	***	***	▲***	▲***	▼***	▼***
Unit value	***	***	***	***	***	▼***	▲***	▼***	▼***
Ending inventory quantity	***	***	***	***	***	▲***	▲***	▲***	▼***
All import sources:									
Quantity	***	***	***	***	***	▲***	▲***	▲***	▼***
Value	***	***	***	***	***	▲***	▲***	▼***	▼***
Unit value	***	***	***	***	***	▼***	▲***	▼***	▼***
Ending inventory quantity	***	***	***	***	***	▲***	▲***	▲***	▼***

Table continued.

Table C.1 Continued
CSPV cells and modules: Summary data concerning the U.S. market, by item and period
Quantity=kilowatts; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per kilowatt; Period changes=percent--exceptions noted; Interim period is January to March

Item	Reported data					Period change comparisons			
	Calendar year			Interim		Calendar year			Interim
	2022	2023	2024	2024	2025	2022–24	2022–23	2023–24	2024–25
U.S. producers' (fn3):									
Cells: Practical capacity quantity	***	***	***	***	***	▲***	***	▲***	▲***
Cells: Production quantity	***	***	***	***	***	▲***	***	▲***	▲***
Cells: Capacity utilization (fn1)	***	***	***	***	***	▲***	***	▲***	▲***
Modules: Practical capacity quantity	***	***	***	***	***	▲***	▲***	▲***	▲***
Modules: Production quantity	***	***	***	***	***	▲***	▲***	▲***	▲***
Modules: Capacity utilization (fn1)	***	***	***	***	***	▼***	▼***	▲***	▲***
Modules: U.S. shipments:									
Quantity	***	***	***	***	***	▲***	▲***	▲***	▲***
Value	***	***	***	***	***	▲***	▼***	▲***	▲***
Unit value	***	***	***	***	***	▼***	▼***	▼***	▲***
Ratio to consumption, quantity (fn1)	***	***	***	***	***	▲***	▼***	▲***	▲***
Ratio to consumption, value (fn1)	***	***	***	***	***	▲***	▼***	▲***	▲***
Cells and modules: U.S. shipments for use in apparent consumption (fn2):									
Quantity	***	***	***	***	***	▲***	***	▲***	▲***
Value:									
Fully domestic value	***	***	***	***	***	▲***	***	▲***	▲***
Value added to imports	***	***	***	***	***	▲***	▼***	▲***	▲***
Overall value for U.S. producers	***	***	***	***	***	▲***	▼***	▲***	▲***
Cells and modules: Export shipments:									
Quantity	***	***	***	***	***	***	***	***	***
Value	***	***	***	***	***	***	***	***	***
Unit value	***	***	***	***	***	***	***	***	***
Cells: Ending inventory quantity	***	***	***	***	***	▲***	***	▲***	▲***
Cells: Inventories/total shipments (fn1)	***	***	***	***	***	▲***	***	▲***	▲***
Modules: Ending inventory quantity	***	***	***	***	***	▲***	▲***	▲***	▲***
Modules: Inventories/total shipments (fn1)	***	***	***	***	***	▲***	▲***	▲***	▲***
Production workers	***	***	***	***	***	▲***	▲***	▲***	▲***
Hours worked (1,000s)	***	***	***	***	***	▲***	▼***	▲***	▲***
Wages paid ($1,000)	***	***	***	***	***	▲***	▼***	▲***	▲***
Hourly wages (dollars per hour)	***	***	***	***	***	▲***	▲***	▲***	▼***
Cells: Productivity (kilowatts per 1,000 hours)	***	***	***	***	***	▲***	***	▲***	▲***
Modules: Productivity (kilowatts per 1,000 hours	***	***	***	***	***	▲***	▲***	▲***	▲***
Cells: Unit labor costs	***	***	***	***	***	▲***	***	▲***	▲***
Modules: Unit labor costs	***	***	***	***	***	▼***	▼***	▼***	▼***
Cells and modules:									
Net sales:									
Quantity	***	***	***	***	***	▲***	▲***	▲***	▲***
Value	***	***	***	***	***	▲***	▼***	▲***	▲***
Unit value	***	***	***	***	***	▼***	▼***	▼***	▲***
Cost of goods sold (COGS)	***	***	***	***	***	▲***	▼***	▲***	▲***
Gross profit or (loss) (fn4)	***	***	***	***	***	▼***	▼***	▼***	▲***
SG&A expenses	***	***	***	***	***	▲***	▲***	▲***	▲***
Operating income or (loss) (fn4)	***	***	***	***	***	▼***	▼***	▼***	▲***
Net income or (loss) (fn4)	***	***	***	***	***	▼***	▼***	▼***	▲***
Unit COGS	***	***	***	***	***	▼***	▼***	▼***	▼***
Unit SG&A expenses	***	***	***	***	***	▼***	▲***	▼***	▼***
Unit operating income or (loss) (fn4)	***	***	***	***	***	▼***	▼***	▲***	▲***
Unit net income or (loss) (fn4)	***	***	***	***	***	▲***	▼***	▲***	▲***
COGS/sales (fn1)	***	***	***	***	***	▲***	▲***	▲***	▼***
Operating income or (loss)/sales (fn1)	***	***	***	***	***	▼***	▼***	▼***	▲***
Net income or (loss)/sales (fn1)	***	***	***	***	***	▼***	▼***	▲***	▲***
Capital expenditures	***	***	***	***	***	▲***	▲***	▲***	▲***
Research and development expenses	***	***	***	***	***	▼***	▼***	▼***	▼***
Total assets	***	***	***	***	***	▲***	▲***	▲***	***

Source: Compiled from data submitted in response to Commission questionnaires and from proprietary, Census-edited Customs records using HTS statistical reporting numbers 8541.42.0010 and 8541.43.0010, accessed August 12, 2025. 508-compliant tables for these data are contained in parts 3, 4, 6, and 7 of this report.

Note.--Shares and ratios shown as "0.0" percent represent non-zero values less than "0.05" percent (if positive) and greater than "(0.05)" percent (if negative). Zeroes, null values, and undefined calculations are suppressed and shown as "—". Period changes preceded by a "▲" represent an increase, while period changes preceded by a "▼" represent a decrease. Data related to the additional importers of record identified using proprietary, Census-edited Customs records that did not respond to the Commission questionnaire are included.

fn1.--Reported data are in percent and period changes are in percentage points.
fn2.--Quantity for U.S. producers' U.S. shipments only reflects domestically produced cells to assemble into modules. Value for U.S. producers' U.S. shipments reflects domestically produced cells to assemble into modules and the incremental value added by U.S. module producers to imported CSPV cells. In measuring consumption and market share this methodology avoids reclassifying and/or double counting merchandise already reported as an import.
fn3.--U.S. producers' data are mainly module production only with small amounts of domestic cell production starting up in 2024.
fn4.--Percent changes only calculated when both comparison values represent profits; The directional change in profitability provided when one or both comparison values represent a loss.

APPENDIX D

FIRMS' RESPONSES REGARDING SEMI-FINISHED PRODUCT ANALYSIS

Table D.1 CSPV cells and modules: Count of firms' responses regarding semi-finished product analysis comparing CSPV cells to CSPV modules, by firm type and factor

Count in number of firms reporting

Firm type	Factor	No	Yes
U.S. producers	Other uses	11	2
U.S. producers	Separate market	4	10
U.S. producers	Differences in characteristics	3	10
U.S. producers	Differences in costs	2	11
U.S. producers	Transformation intensive	2	11
Importers	Other uses	34	5
Importers	Separate market	17	22
Importers	Differences in characteristics	12	27
Importers	Differences in costs	4	33
Importers	Transformation intensive	10	27

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

Table D.2 CSPV cells and modules: U.S. producers' narrative responses regarding the semi-finished product analysis comparing CSPV cells to CSPV modules

Factor	Producer name and narrative regarding semi-finished product analysis
Other uses	***
Other uses	***
Separate market	***
Separate market	***
Separate market	***

Factor	Producer name and narrative regarding semi-finished product analysis
Separate market	***
Separate market	***
Separate market	***
Separate market	***
Separate market	***
Separate market	***

Table continued.

Factor	Producer name and narrative regarding semi-finished product analysis
Separate market	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***

Table continued.

Factor	Producer name and narrative regarding semi-finished product analysis
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***

Table continued.

Factor	Producer name and narrative regarding semi-finished product analysis
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***

Table continued.

Factor	Producer name and narrative regarding semi-finished product analysis
Transformation intensive	***

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

Table D.3 CSPV cells and modules: U.S. importers' narrative responses regarding the semi-finished product analysis comparing CSPV cells to CSPV modules

Factor	Importer name and narrative regarding semi-finished product analysis
Other uses	***
Other uses	***
Other uses	***
Other uses	***
Other uses	***
Separate market	***
Separate market	***
Separate market	***
Separate market	***
Separate market	***

Table continued.

Factor	Importer name and narrative regarding semi-finished product analysis
Separate market	***
Separate market	***
Separate market	***
Separate market	***
Separate market	***
Separate market	***
Separate market	***
Separate market	***
Separate market	***
Separate market	***
Separate market	***
Separate market	***
Separate market	***
Separate market	***
Separate market	***
Separate market	***

Table continued.

Factor	Importer name and narrative regarding semi-finished product analysis
Separate market	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***

Table continued.

Factor	Importer name and narrative regarding semi-finished product analysis
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***

Table continued.

Factor	Importer name and narrative regarding semi-finished product analysis
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in characteristics	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***

Table continued.

Factor	Importer name and narrative regarding semi-finished product analysis
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***

Table continued.

Factor	Importer name and narrative regarding semi-finished product analysis
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***

Table continued.

Factor	Importer name and narrative regarding semi-finished product analysis
Differences in cost	***
Differences in cost	***
Differences in cost	***
Differences in cost	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***

Table continued.

Factor	Importer name and narrative regarding semi-finished product analysis
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***

Table continued.

Factor	Importer name and narrative regarding semi-finished product analysis
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***
Transformation intensive	***

Table continued.

Factor	Importer name and narrative regarding semi-finished product analysis
Transformation intensive	***
Transformation intensive	***

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