

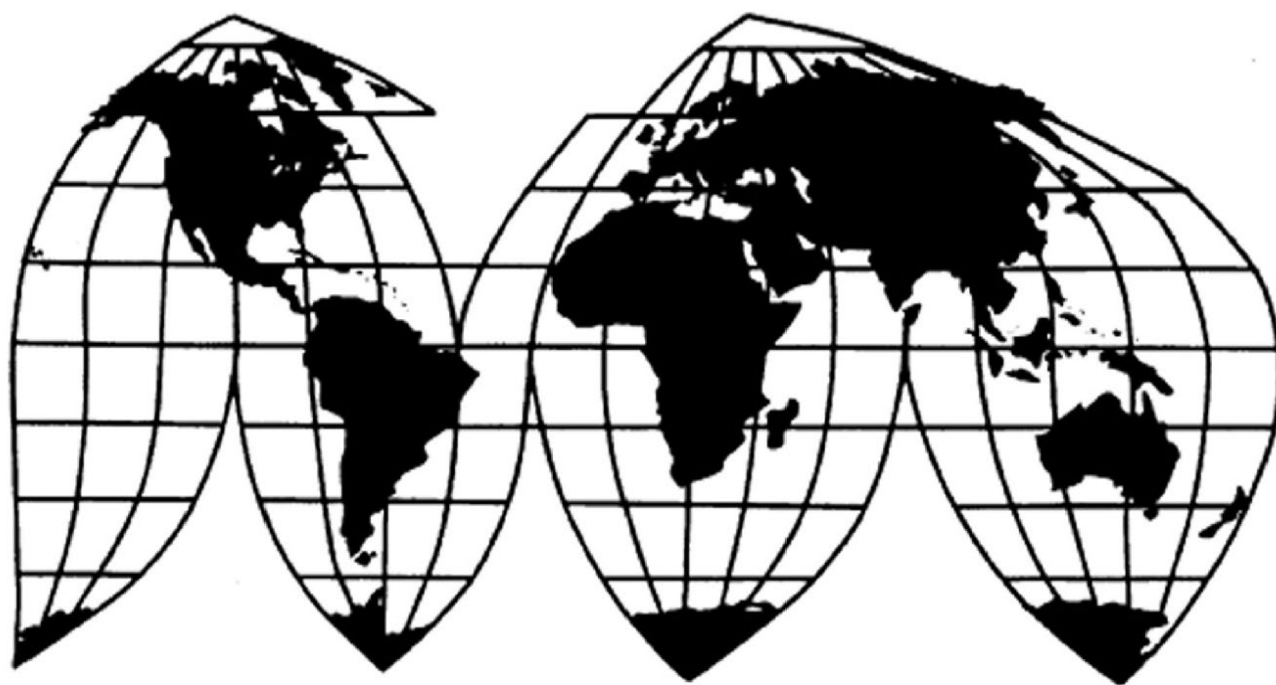
Crystalline Silicon Photovoltaic Cells, Whether or Not Partially or Fully Assembled Into Other Products: Evaluation of the Effectiveness of Import Relief

Investigation No. TA-201-075 (Evaluation)

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U.S. International Trade Commission



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Note.—Information that would reveal confidential operations of individual firms may not be published.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

EXECUTIVE SUMMARY

Section 204(d) of the Trade Act of 1974 (the “Act”) requires the U.S. International Trade Commission (“Commission”), upon termination of a safeguard measure, to evaluate the effectiveness of the action in facilitating positive adjustment by the domestic industry to import competition, consistent with the reasons set out by the President in the report submitted to the Congress under section 203(b) of the Act. The safeguard action on certain crystalline silicon photovoltaic cells, whether or not partially or fully assembled into other products (“CSPV products”), went into effect on February 7, 2018, and after one four-year extension, terminated on February 6, 2026. The Commission is required to submit a report on the evaluation to the President and the Congress no later than 180 days after the day on which the relief action was terminated.

The safeguard measure went into effect following an investigation by the Commission pursuant to section 202 of the Act and the President's decision to impose the safeguard measure pursuant to section 203(a). The Commission's investigation, as described in its report submitted to the President pursuant to section 202(f) in November 2017, found that CSPV products were being imported into the United States in such increased quantities as to be a substantial cause of serious injury to the domestic industry producing a like or directly competitive article. On January 23, 2018, the President proclaimed the safeguard measure and transmitted a report to Congress under Section 203(b) of the Act describing the safeguard measure and the reasons for imposing it.

The President's report cited the circumstances underlying the decision to apply the safeguard measure as increased imports, a decline in U.S. prices, the domestic industry's loss of market share, the closure of 25 domestic CSPV producers since 2012, and despite the United States being a pioneer in solar electricity generation technology, Chinese producers having dominated the global supply chain for CSPV products. The President's report also cited that Chinese CSPV producers undermined the effectiveness of antidumping and countervailing duty measures by shifting CSPV production to other countries. The President's report additionally stated that the safeguard remedy was intended to give remaining U.S. producers a chance to adjust to import competition, and encourage new CSPV producers to take advantage of the United States' well-educated workforce and major market for solar electricity generation.¹

Following imposition of the safeguard measure, several companies have commenced production of CSPV modules in the United States and the domestic industry has gained market share in CSPV modules. Additionally, U.S. cell production capacity came back online for the first time since 2019.² However, throughout the time the safeguard measures were in effect, China has remained the largest global producer of CSPV products, as well as the largest supplier

¹ See Confidential Staff Report (“CR”) and *Crystalline Silicon Photovoltaic Cells, Whether or Not Partially or Fully Assembled: Evaluation of the Effectiveness of Import Relief*, Inv. No. TA-201-075 (Evaluation), USITC Pub. 5773 (Aug. 2026) (“PR”) citing Report by the President to the United States Congress Pursuant to Section 203(b) of the Trade Act of 1974, as Amended, Regarding a Safeguard Measure on Imports of Large Residential Washers, transmitted to Speaker of the House Paul D. Ryan on January 23, 2018.

² Domestic production of CSPV cells ceased in 2019, and resumed in late 2024. CR/PR at 3.10. For this reason, most of the discussion of U.S. market share focuses on the market for CSPV modules.

of raw material inputs for CSPV products and several responding U.S. producers indicated that Chinese CSPV producers have continued to shift production to third countries to avoid existing trade remedies or take advantage of exclusions in the safeguard measures. Accordingly, while several responding firms indicated that the safeguard measures provided a moderate degree of trade relief, they attributed more of the improvement in the domestic industry either to additional antidumping and countervailing duty measures or increases in government incentives for U.S. production of CSPV products.³

Background

Related antidumping and countervailing duty (“AD/CVD”) proceedings and orders

In October 2011, SolarWorld Industries America, Inc. (“SolarWorld”) filed antidumping and countervailing duty petitions concerning CSPV cells and modules from China. In November 2012, the Commission determined that an industry in the United States was materially injured by reason of imports of CSPV cells and modules from China. Subsequently, the Department of Commerce (“Commerce”) issued antidumping and countervailing duty orders (“*CSPV 1* orders”).⁴ These orders covered CSPV cells produced in China, CSPV modules assembled in China from CSPV cells made in China, and CSPV modules assembled in a third country from CSPV cells made in China. The *CSPV 1* orders were most recently extended after the second five-year reviews in September 2024.

On December 31, 2013, SolarWorld filed petitions with Commerce and the Commission concerning CSPV products from China and Taiwan. The Commission determined on February 5, 2015, that the domestic industry was materially injured by reason of imports of CSPV products from China and Taiwan that were found by Commerce to be sold in the United States at less than fair value (“LTFV”) and subsidized by the government of China. Subsequently, Commerce issued antidumping and countervailing duty orders (“*CSPV 2* orders”). SolarWorld filed the antidumping and countervailing duty petitions covering CSPV products imported from China and Taiwan leading to the *CSPV 2* orders after Commerce determined that CSPV modules imported from China were not subject to earlier orders on China if they were made using CSPV cells produced in countries other than China.⁵ The *CSPV 2* orders were most recently extended after the second five-year reviews in June 2026.

On April 24, 2024, the Alliance filed petitions with Commerce and the Commission concerning CSPV cells, whether or not assembled into modules, from Cambodia, Malaysia, Thailand, and Vietnam. The Commission determined on June 24, 2025, that the domestic industry was materially injured by reason of imports of CSPV products from Malaysia and Vietnam that were found by Commerce to be sold in the United States at LTFV and subsidized by the government of Malaysia and Vietnam, and threatened with material injury by reason of imports of CSPV products from Cambodia and Thailand that were found by Commerce to be

³ See CR/PR at Table 7.1.

⁴ See *Crystalline Silicon Photovoltaic Cells and Modules from China*, Inv. Nos. 701-TA-481 and 731-TA-1190 (Final), USITC Pub. 4360 (Nov. 2012).

⁵ *Certain Crystalline Silicon Photovoltaic Products from China and Taiwan*, Inv. Nos. 701-TA-511 and 731-TA-1246-1247, USITC Pub. 4519 (Feb. 2015).

sold in the United States at LTFV and subsidized by the governments of Cambodia and Thailand. Subsequently, Commerce issued antidumping and countervailing duty orders (“CSPV 3 orders”).⁶

On June 17, 2025, the Alliance filed petitions with Commerce and the Commission concerning CSPV cells, whether or not assembled into modules, from India, Indonesia, and Laos. The Commission issued its preliminary affirmative determinations that there was a reasonable indication of material injury by reason of imports of CSPV products from India, Indonesia, and Laos on September 2, 2025 (“CSPV 4 investigations”).⁷ On February 26, 2026, Commerce published its affirmative preliminary countervailing duty determinations and alignment of final countervailing duty determinations with final antidumping duty determinations for India, Indonesia, and Laos. On April 28, 2026, Commerce published its affirmative preliminary antidumping duty determinations and its postponement of the final determination on Laos. Commerce is scheduled to make its final determinations no later than September 10, 2026. The Commission published its notice of scheduling of the final phase of the CSPV 4 investigations on May 13, 2026.

Safeguard proceeding

On May 17, 2017, U.S. CSPV cell producer Suniva filed a petition under section 202 of the Act alleging that CSPV products were being imported into the United States in such increased quantities as to be a substantial cause of serious injury, or threat thereof, to the domestic industry producing an article like or directly competitive with the imported article. In November 2017, the Commission completed its investigation and issued its report pursuant to section 202 of the Act. The Commission determined that CSPV products were being imported into the United States in such increased quantities as to be a substantial cause of serious injury to the domestic industry producing a like or directly competitive article. Among other conclusions, the Commission found that the increase in imports led to lower prices and declining financial performance for the domestic industry. The report also contained recommended remedies to facilitate efforts by the domestic industry and its workers to make a positive adjustment to import competition.

Safeguard measures, extension proceedings, and the exclusion of bifacial modules

On January 23, 2018, the President issued Presidential Proclamation 9693 which imposed a safeguard measure on CSPV products for a period of four years beginning on February 7, 2018, in the form of (1) a tariff rate quota (“TRQ”) on imports of CSPV cells not partially or fully assembled into other products and (2) an increase in duties on imports of solar modules. During the first four years of the measure, the annual in-quota tariff-free quantity of

⁶ See *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).

⁷ *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), USITC Pub. 5665 (Sep. 2025).

CSPV cells was 2.5 GW, allocated among all countries, except those that were specifically excluded.⁸ The TRQ portion of the safeguard measure subjected imports of CSPV cells in excess of 2.5 GW annually to tariffs of 30 percent in the first year, 25 percent in the second year, 20 percent in the third year, and 15 percent in the fourth year.⁹

On February 4, 2022, the President announced an extension and modification of the existing safeguard measure for an additional four years beginning on February 7, 2022, with annual reductions in the rates of duty on CSPV modules in the fifth, sixth, seventh, and eighth years.¹⁰ The Presidential Proclamation extended the TRQ measure on cells and increased the in-quota tariff-free quantity to 5.0 GW per year. Imports of CSPV cells in excess of 5.0 GW annually were subject to additional tariffs of 14.75 percent in the fifth year, 14.5 percent in the sixth year, 14.25 percent in the seventh year, and 14.0 percent in the eighth year.¹¹ On August 12, 2024, the President increased the aggregate in-quota, tariff-free quantity for the TRQ on CSPV cells to 12.5 GW per year in the last two years of the safeguard measure. The aggregate in-quota quantity for the TRQ on cells was larger than the total quantity of cell imports for the first six years of the safeguard remedy before reaching the quota level in the final two years, and this resulted in most CSPV cell imports not being covered by the safeguard tariffs during the life of the safeguard.¹²

Throughout most of the period that the safeguard measures were in effect, bifacial CSPV modules were excluded. In June 2019, USTR granted an exclusion for bifacial CSPV modules

⁸ The countries excluded from the safeguard measures were Afghanistan, Albania, Algeria, Angola, Armenia, Azerbaijan, Belize, Benin, Bhutan, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Burkina Faso, Burma, Burundi, Cambodia, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo (Brazzaville), Congo (Kinshasa), Cote d'Ivoire, Djibouti, Dominica, Ecuador, Egypt, Eritrea, Ethiopia, Fiji, Gabon, The Gambia, Georgia, Ghana, Grenada, Guinea, Guinea-Bissau, Guyana, Haiti, India, Indonesia, Iraq, Jamaica, Jordan, Kazakhstan, Kenya, Kiribati, Kosovo, Kyrgyzstan, Lebanon, Lesotho, Liberia, Macedonia, Madagascar, Malawi, Maldives, Mali, Mauritania, Mauritius, Moldova, Mongolia, Montenegro, Mozambique, Namibia, Nepal, Niger, Nigeria, Pakistan, Papua New Guinea, Paraguay, Rwanda, Saint Lucia, Saint Vincent and the Grenadines, Samoa, Sao Tome and Principe, Senegal, Serbia, Sierra Leone, Solomon Island, Somalia, South Africa, South Sudan, Sri Lanka, Suriname, Swaziland, Tanzania, Timor-Leste, Togo, Tonga, Tunisia, Turkey, Tuvalu, Uganda, Ukraine, Uzbekistan, Vanuatu, Yemen (Republic of), Zambia and Zimbabwe.

⁹ See *Proclamation 9693 of January 23, 2018: To Facilitate Positive Adjustment to Competition From Imports of Certain Crystalline Silicon Photovoltaic Cells (Whether or Not Partially or Fully Assembled Into Other Products) and for Other Purposes*, 83 Fed. Reg. 3541 (Jan. 25, 2018); CR/PR at Table 1.3.

¹⁰ See *Presidential Proclamation 10339 of February 4, 2022: To Continue Facilitating Positive Adjustment to Competition From Imports of Certain Crystalline Silicon Photovoltaic Cells (Whether or Not Partially or Fully Assembled Into Other Products)*, 87 Fed. Reg. 7357 (Feb. 9, 2022). During the first four years, the safeguard duty rate on CSPV modules decreased by 5 percent each year, from 30.0 percent from February 7, 2018 to February 6, 2019, to 15.0 percent from February 7, 2021 to February 6, 2022. During the final four years of the safeguard measure, the duty rate on CSPV modules decreased by 0.25 percent per year, from 14.75 percent from February 7, 2022 to February 6, 2023, to 14.0 percent from February 7, 2025 to February 6, 2026. CR/PR at Table 1.4.

¹¹ CR/PR at Table 1.3.

¹² CR/PR at Table 1.3.

from the safeguard measures.¹³ While imports of bifacial panels were excluded from the safeguard measure when it was extended in February 2022, Presidential Proclamation 10779 revoked that exclusion effective June 26, 2024, and provided that imports of bifacial panels would be subject to the safeguard measure.¹⁴ Accordingly, most bifacial CSPV modules were excluded from the safeguard measure from June 13, 2019 to June 26, 2024.¹⁵

Safeguard monitoring proceedings and actions

On July 15, 2019, the Commission instituted a proceeding for the purpose of preparing a report to the President and the Congress as required by section 204(a)(2) of the Act on the results of its monitoring of developments with respect to the domestic CSPV products industry since the imposition of the safeguard measures. On February 7, 2020, the Commission issued its report. Additionally, in response to a request by the U.S. Trade Representative (“USTR”) in a letter dated December 6, 2019, the Commission analyzed the effect of increasing the level of the TRQ covering CSPV cells from 2.5 gigawatts (“GW”) to 4.0, 5.0, or 6.0 GW, without other changes to the remedy. On June 8, 2023, the Commission instituted a proceeding for the purpose of preparing a report to the President and the Congress required by section 204(a)(2)

¹³ *Exclusion of Particular Products From the Solar Products Safeguard Measure*, 84 Fed. Reg. 27684 (June 13, 2019). On October 16, 2020, the President issued Proclamation 10101, which revoked the exclusion applied to bifacial modules, increased the duty on cells entered in excess of the TRQ, and increased the duty on modules in the fourth year of the safeguard action. On November 16, 2021, the Court of International Trade (“CIT”) invalidated Proclamation 10101 on the grounds that it was outside the President’s delegated statutory authority and enjoined the government from enforcing the revocation of the exclusion of bifacial panels from the safeguard measures. *Solar Energy Indus. Ass’n. v. United States*, 553 F. Supp. 3d 1322 (Ct. Int’l Trade 2021). On November 13, 2023, the U.S. Court of Appeals for the Federal Circuit reversed the judgment of the CIT, upholding the President’s interpretation that the statute permitted such modifications of the safeguard measure, finding that the President did not violate the procedural requirements of the statute, and accordingly concluding that Presidential Proclamation 10101 was valid. *Solar Energy Indus. Ass’n. v. United States*, 86 F. 4th 885 (Fed. Cir. 2023), *supplemented and upheld*, 111 F. 4th 1349 (Fed. Cir. 2024).

¹⁴ *See Presidential Proclamation 10779 of June 21, 2024: To Further Facilitate Positive Adjustment to Competition From Imports of Certain Crystalline Silicon Photovoltaic Cells (Whether or Not Partially or Fully Assembled Into Other Products)*, 89 Fed. Reg. 53333 (June 26, 2024). The bifacial exclusion still applied to imports of CSPV products sold to purchasers from June 26, 2024, until September 23, 2024 if the purchasers had signed a sales contract by May 16, 2024. *Id.*

¹⁵ While the appeal was pending, the CIT had entered an order suspending liquidation of imports of bifacial modules during the pendency of the litigation. *See Solar Energy Indus. Ass’n v. United States*, 779 F. Supp. 3d 1368, 1370 (Ct. Int’l Trade 2025). On remand from the Federal Circuit, the CIT declined to order reliquidation of entries that were inadvertently liquidated during the appeal period from October 25, 2020 and before February 7, 2022, “the vast majority of which were liquidated at a lower duty rate than would have ultimately applied” if the suspension order had been followed and entries had been liquidated pursuant to the Federal Circuit’s mandate. *Id.* at 1374. Some bifacial panels that entered during the appeal period were unliquidated at the time of the CIT’s remand decision, and the plaintiffs did not challenge the government’s “request to liquidate entries that remain unliquidated in compliance with the Suspension Order.” *Id.* at 1375 n.7.

of the Trade Act on the results of its monitoring of developments with respect to the domestic industry producing CSPV products since the imposition of the TRQ on imports of CSPV cells and the increase in duties on imports of CSPV modules. On February 6, 2024, the Commission issued its report of its monitoring of developments with respect to the domestic CSPV products industry.

Evaluation proceeding

On February 6, 2026, the safeguard action imposed by the President terminated. As discussed above, Section 204(d) of the Act requires the Commission, following termination of a relief action, to evaluate the effectiveness of the action in facilitating positive adjustment by the domestic industry to import competition. As part of the required evaluation proceeding, the Commission issued questionnaires to collect data and other information from U.S. producers and U.S. importers of CSPV products. As the Commission's prior extension proceedings and related AD/CVD investigations had collected data covering the preceding calendar years (2018-2022), the Commission's evaluation proceeding collected data for the additional three full years that the safeguard measure was in place (2023, 2024, and 2025). U.S. industry data collected during the evaluation proceeding are based on the questionnaire responses of 13 firms that accounted for the majority of U.S. production of CSPV products during 2025. U.S. import data in the evaluation proceeding are based on the responses of the 44 firms that responded to the Commission's questionnaires and accounted for approximately 66.0 percent of all U.S. imports of CSPV products during 2025.¹⁶ Section 204(d) of the Act requires that the Commission hold a public hearing on the effectiveness of the action in this investigation under this subsection. The Commission scheduled its hearing for June 12, 2026, but the two interested parties that filed an appearance, the Alliance for American Solar Manufacturing and Trade ("Alliance") and Hanwha QCells USA and Hanwha Q Cells Georgia Inc., (collectively "Hanwha"), withdrew their requests to appear and requested that the Commission cancel the hearing.¹⁷ Pursuant to these requests, the Commission cancelled the in-person hearing, sent written questions to the interested parties, and provided the opportunity for all interested parties to submit additional evidence for the Commission to consider. The Alliance and Hanwha filed briefs in this evaluation proceeding and filed responses to the Commission's written hearing questions.

Market Developments

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 install CSPV

¹⁶ The Commission sent U.S. importer questionnaires to 170 firms believed to be importers of CSPV products, and 43 firms submitted responses on narrative questions related to the effects of the safeguard measure, anticipated changes in operations, and efforts since implementation of safeguard measures. In addition, this report presents data from 44 firms that provided responses to U.S. importers' questionnaire in the final phase of the CSPV 4 investigations.

¹⁷ CR/PR at B.2.

products. Although most electricity demand in the United States is supplied by conventional sources, the share of electricity generated from renewable sources has been steadily increasing. Solar generated-electricity's share of U.S. net electricity generation increased from 1.5 percent in 2018 to 6.7 percent in 2025. There are three on-grid market segments that drive demand for CSPV products: residential, commercial, and utilities. Since the original safeguard investigation, firms have reported that demand for CSPV products has increased. Based on the data from the safeguard proceedings and related AD/CVD investigations, total apparent U.S. consumption for CSPV products, by volume, has increased dramatically since 2018.

The Alliance and Hanwha contend that the exclusion of bifacial panels from the safeguard from June 2019 until June 2024 diminished the effectiveness of the safeguard measures. Available information indicates that non-bifacial and bifacial modules have moved closer to cost parity, and after the exclusion of bifacial modules from the safeguard measures, foreign producers shifted to producing bifacial modules. Accordingly, the share of apparent U.S. consumption increased significantly for imported bifacial modules and decreased for non-bifacial modules from 2020 to 2022. Available data indicate that by the end of the safeguard period, imports of CSPV modules were almost entirely bifacial.

The Alliance and Hanwha also contend that additional AD/CVD measures were necessary to address deficiencies in the safeguard measures and the circumvention of existing AD/CVD orders. They note that several developing countries, including Cambodia and Indonesia, were excluded from the safeguard measures, per the statutory provision permitting exclusion of developing countries, and that Chinese firms have shifted production to these and other countries to circumvent existing trade remedies. For example, 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.¹⁸ 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 "moratorium").¹⁹ 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 moratorium, became subject to the applicable duties under those orders upon expiration of the two-year tariff moratorium on June 6, 2024.²⁰

¹⁸ *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).

¹⁹ *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).

²⁰ The Court of International Trade concluded that the moratorium was invalid and that decision is currently on appeal before the Court of Appeals for the Federal Circuit. *Auxin Solar, Inc. v. United States*, 798 F. Supp. 3d 1331, 1334 (Ct. Int'l Trade 2025), appeal filed, No. 2025-2120, 2026 WL 304864 (Fed. Cir. Feb. 5, 2026).

Available data also indicate that imports of CSPV products from countries excluded from the safeguard measures, including Ethiopia, India, Indonesia, and Laos, became larger sources of imports of CSPV products from 2023 to 2025.²¹

Individual Firms' Adjustment Efforts

Pursuant to section 204(a)(1) of the Act, the Commission collected information concerning the progress and specific efforts made by workers and firms to make a positive adjustment to import competition. During the original safeguard investigation, SolarWorld, which has since ceased production, submitted proposed adjustment plans. Heliene and Suniva also provided questionnaire responses in this evaluation regarding the adjustment plans that they submitted in connection with the original safeguard investigation.²² During this current evaluation proceeding, ten U.S. producers of CSPV products reported on the efforts they made to compete more effectively since the safeguard measures were imposed, including constructing new production facilities, investing in new equipment, developing new products, and investing in workforce training.²³

Developments in the Domestic Industry

Since the safeguard measure was put in place in 2018, several new companies have entered the domestic industry, and the domestic industry has increased capacity, production, U.S. shipments, and employment, and now holds a significant although still minority share of the market for CSPV modules. However, while some of its financial performance metrics improved, the industry's financial performance has generally been poor. From 2018 to 2020, the domestic industry's market share for CSPV modules increased slightly, and its capacity utilization, production, U.S. shipments, and employment indicators generally increased. However, the domestic industry operated at a loss throughout that period. Similarly, in the second monitoring period from 2020 to 2021, the domestic industry's market share for CSPV modules increased slightly, and its capacity utilization, production, U.S. shipments, and employment indicators generally increased, but the industry was not profitable. Likewise, in the most recent evaluation period from 2023 to 2025, the domestic industry's market share for CSPV modules increased slightly, and its capacity utilization, production, U.S. shipments, and employment indicators generally increased, but the industry was not profitable. Furthermore, in 2022, U.S. producer LG Electronics ceased CSPV module production, and in May 2025, U.S. producer Meyer Burger ceased operations.

Responding firms were mixed on whether the safeguard measures provided relief to their operations. For those firms that indicated the measures had a positive impact they

²¹ See CR/PR at Table 5.2.

²² Heliene's and Suniva's commentary on their adjustment plans are available in the confidential version of the evaluation report. See CR/PR at 7.7-7.8.

²³ The ten firms that responded regarding their post-safeguard efforts were American Panel Solutions, Canadian Solar, Hanwha, Heliene, Hounen Solar America, Mission Solar, PowerFilm, Silfab Solar WA, Suniva, and T1 Energy. See CR/PR at 7.8-7.10. Each firm's individual post-relief efforts are available in the confidential version of the evaluation report.

generally indicated that the measure was useful but not the primary driver of improvements seen in the domestic industry in the last few years. Other factors mentioned by firms as driving improvements in the domestic industry include additional AD/CVD measures on imports of CSPV products from several countries, including some excluded from the safeguard measures, and government incentives in the Inflation Reduction Act (“IRA”) and related policies. With respect to the relationship between the safeguard measures and other factors, Hanwha reported that the safeguard measures created conditions for the U.S. solar industry to attract capital and build capacity, and the Alliance stated that the safeguard, in addition to other trade remedies, helped the domestic industry improve its competitiveness to take advantage of the IRA incentives. As noted, there were several exclusions to the safeguard measures over the life of the safeguard (bifacial and certain countries), and under the TRQ the in-quota volume tariff-free quantity of CSPV cells increased multiple times from 2.5 GW when the measure was first imposed to 12.5 GW in 2024 such that aggregate in-quota quantity for CSPV cells was larger than the total quantity of CSPV cell imports from 2018 until 2025, resulting in most of the CSPV cell imports not being covered by the safeguard tariffs during the life of the safeguard.

During the time the safeguard measures were in effect, several firms started or expanded production of modules and several firms affiliated with foreign CSPV producers, including Hanwha, Canadian Solar, Heliene, Illuminate, Runergy, Imperial Star Solar, and Waaree Energies, have commenced producing CSPV products in the United States.²⁴ Furthermore, U.S. commercial production of CSPV cells recommenced in late 2024 for the first time since 2019, when Suniva resumed cell manufacturing operations. In 2025, Silfab Solar and ES Foundry also began commercial domestic production of CSPV cells. In the first quarter of 2026, Canadian Solar announced a successful trial of cell production, which it expects to reach 2.1 GW of annual production by the end of this year. Several other firms plan to produce CSPV cells in the United States in the next year.²⁵

Accordingly, the U.S. industry’s CSPV products capacity and production increased during the period the safeguard measures were in effect, as new entrant U.S. producers began production. However, U.S. producers’ capacity utilization has fluctuated greatly during that period and was affected at least in part by the bifacial exclusion from the safeguard measures. From 2023 to 2025, U.S. producers’ CSPV module capacity utilization increased, and in 2025 it was significantly higher than in 2018, the last full year of the original safeguard investigation, and in 2022, the last full year of the second monitoring proceeding.²⁶ From 2023 to 2025, the U.S. industry’s production-related workers, hours worked, and wages paid increased significantly, although its hourly wages declined slightly.

Prices for U.S.-produced CSPV products for which pricing product data were available decreased during the original safeguard investigation from 2012 to 2016, and in the first monitoring investigation from January 2016 to June 2019. In the extension investigation from January 2018 to June 2021, prices for all pricing products for which data were available decreased. In the second monitoring investigation, from June 2020 to June 2023, prices for two of the three pricing products decreased, and prices for one product increased slightly. The

²⁴ See CR/PR at Table 3.1.

²⁵ See CR/PR at 3.10.

²⁶ CR/PR at Appendix D.

pricing data available in this evaluation period from January 2023 to March 2026 indicate that U.S. producers' prices for CSPV products continued to decrease.²⁷ There were several factors that affected U.S. prices of CSPV products during the evaluation period, including decreases in raw materials and other production costs,²⁸ and price depression by certain imports of CSPV products subject to the AD/CVD investigations during the evaluation period.²⁹

²⁷ CR/PR at Table 6.6.

²⁸ CR/PR at 6.1-6.2 & Table C.1.

²⁹ See *CSPV 3*, USITC Pub. 5631 at 71.

Part 1: Introduction and Overview

On February 6, 2026, the safeguard action imposed by the President on imports of imports of certain crystalline silicon photovoltaic cells, whether or not partially or fully assembled into other products (“CSPV products”) terminated. Section 204(d) of the Trade Act of 1974 (“the Act”) requires the U.S. International Trade Commission (“USITC” or “Commission”), following termination of a relief action, to evaluate the effectiveness of the action in facilitating positive adjustment by the domestic industry to import competition, consistent with the reasons set out by the President in the report submitted to the Congress under section 203(b) of the Act. The Commission is required to submit a report on the evaluation to the President and the Congress no later than 180 days after the day on which the relief action was terminated. Table 1.1 presents information relating to the schedule of this evaluation proceeding.^{1 2}

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

Effective date	Action
February 6, 2026	Termination of relief action
February 6, 2026	Commission’s institution and scheduling (91 FR 12814, March 17, 2026)
June 12, 2026	Commission’s hearing (Cancelled; 91 FR 36000, June 15, 2026)
August 5, 2026	Commission’s transmittal of report to the President and the Congress

¹ Pertinent Federal Register notices are referenced in appendix A and may be found at the Commission’s website (www.usitc.gov).

² Appendix B contains the notice of cancellation of the Commission’s public hearing. On June 8, 2026, counsel for the for the American Solar Manufacturing and Trade (“the Alliance”) and Hanwha Q Cells USA, Inc. (“Hanwha”) withdrew their requests to appear at the hearing and filed a request that the Commission cancel the scheduled hearing for this proceeding given the lack of witnesses. Pursuant to these requests, the Commission canceled the in-person hearing, sent written questions to the interested parties, and provided the opportunity for all interested parties to submit additional evidence for the Commission to consider. 91 FR 36000, June 15, 2026.

Background

On May 17, 2017, a petition, as amended, was properly filed under section 202(a) of the Trade Act (19 U.S.C. § 2552(a)) by counsel for Suniva Inc. (“Suniva”). The petition alleged that CSPV products were being imported into the United States in such increased quantities as to be a substantial cause of serious injury, or threat thereof, to the domestic industry producing an article like or directly competitive with the imported article.³ The Commission conducted an investigation under section 202(b)(1)(A) of the Trade Act. Following receipt of the report from the Commission in November 2017 under section 202 of the Trade Act (19 U.S.C. § 2252) containing an affirmative serious injury determination and remedy recommendations, the President, on January 23, 2018, pursuant to section 203 of the Trade Act (19 U.S.C. § 2253), issued Proclamation 9693, imposing a safeguard measure in the form of (a) a tariff-rate quota (“TRQ”) on imports of CSPV (or “solar”) cells not partially or fully assembled into other products and (b) an increase in duties on imports of CSPV modules for a period of four years, effective February 7, 2018.^{4 5}

On July 25, 2019,⁶ the Commission instituted a proceeding for the purpose of preparing a report to the President and the Congress required by section 204(a)(2) of the Trade Act⁷ on the results of its monitoring of developments with respect to the domestic industry producing CSPV products since the imposition of the TRQ on imports of CSPV cells and the increase in duties on imports of CSPV modules. On February 7, 2020, the Commission issued its report of its monitoring of developments with respect to the domestic CSPV products industry.⁸ Additionally, in response to a request by the U.S. Trade Representative (“USTR”) in a letter dated December 6, 2019,⁹ the Commission analyzed the effect of increasing the level of the

³ On May 25, 2017, SolarWorld Americas, Inc. (“SolarWorld”) and Suniva notified the Commission that SolarWorld was joining Suniva as co-petitioner in the investigation.

⁴ 83 FR 3541, January 25, 2018.

⁵ See the sections entitled “Scope of the safeguard remedy” and “Tariff treatment” in Part I of this report for a complete description of the merchandise subject to the safeguard measure.

⁶ 84 FR 37674, August 1, 2019.

⁷ 19 U.S.C. § 2254(a)(2).

⁸ Crystalline Silicon Photovoltaic Cells, Whether or Not Partially or Fully Assembled Into Other Products: Monitoring Developments in the Domestic Industry, Investigation No. TA-201-075 (Monitoring), Publication 5021, February 2020 (“Monitoring publication”).

⁹ USTR’s request for probable economic effect advice was made pursuant to section 204(a)(4) of the Trade Act (19 U.S.C. § 2254(a)(4)). Section 204(a)(4) of the Trade Act requires the Commission, upon request of the President, to advise the President of its judgment as to the probable economic effect on the industry concerned of any reduction, modification, or termination of the action taken under section 203 of the Trade Act (a safeguard measure) that is under consideration. The President has delegated certain authority to the USTR for this purpose.

TRQ covering CSPV cells from 2.5 gigawatts (“GW”)¹⁰ to 4.0, 5.0, or 6.0 GW, without other changes to the remedy.¹¹ Following receipt of the monitoring and modification reports, the President issued Proclamation 10101, effective October 10, 2020, revoking the exclusion previously applied to bifacial modules and increasing the duty on cells entered in excess of the TRQ, and the duty on modules, from 15 percent to 18 percent in the fourth year of the safeguard action.¹²

On August 6, 2021, the Commission instituted a proceeding following receipt of petitions filed by Auxin Solar Inc. (“Auxin”) and Suniva on August 2, 2021 and amended on August 5, 2021, and filed by Hanwha Q CELLS USA, Inc. (“Hanwha”), LG Electronics USA, Inc. (“LG”), and Mission Solar Energy LLC (“Mission”) on August 4, 2021, requesting extension of the relief action in place on imports of CSPV products.¹³ On December 8, 2021, the Commission determined that action under section 203 of the Trade Act with respect to imports of CSPV products continued to be necessary to prevent or remedy serious injury and that there was evidence that the domestic industry was making a positive adjustment to import competition.¹⁴ After taking into account the information provided in the Commission’s report and the information received from the public,¹⁵ the President issued Proclamation 10339, extending the TRQ covering CSPV cells,¹⁶ and the duty on modules,¹⁷ by an additional four years.

On November 16, 2021, the Court of International Trade (“CIT”) issued a decision setting aside Proclamation 10101 as null and void, on the grounds that it was outside the President’s delegated statutory authority.¹⁸ On November 13, 2023, the U.S. Court of Appeals for the Federal Circuit issued a decision reversing the judgment of the CIT, upholding the President’s

¹⁰ This report discusses data in terms of watts (“W”), kilowatts (“kW” (equal to 1,000 watts)), megawatts (“MW” (1,000 kW)), and gigawatts (“GW” (1,000 MW)).

¹¹ Crystalline Silicon Photovoltaic Cells, Whether or Not Partially or Fully Assembled Into Other Products: Advice on the Probable Economic Effect of Certain Modifications to the Safeguard Measure, Investigation No. TA-201-075 (Modification), Publication 5032, March 2020 (“Modification report”).

¹² 85 FR 65639, October 16, 2020. The sections “Scope of the safeguard remedy” and “The safeguard measure” in this Part contain additional information on the safeguard measure and excluded products.

¹³ 86 FR 44403, August 12, 2021. The Commission exercised its authority under section 603(a) of the Trade Act (19 U.S.C. 2482(a)) to consolidate the proceedings.

¹⁴ 86 FR 71092, December 14, 2021.

¹⁵ 86 FR 54279, September 30, 2021.

¹⁶ With unchanging within-quota quantities of 5.0 GW for each year and annual reductions in the rates of duty applicable to goods entered in excess of those quantities of cells in the fifth, sixth, seventh, and eighth years. 87 FR 7357, February 9, 2022.

¹⁷ With annual reductions in the fifth, sixth, seventh, and eighth years. *Ibid.*

¹⁸ *Solar Energy Indus. Ass’n v. United States*, 553 F. Supp. 3d 1322 (Ct. Int’l Trade 2021). *Solar Energy Indus. Ass’n v. United States*, 86 F. 4th 885 (Fed. Cir. 2023), supplemented and upheld, 111 F. 4th 1349 (Fed. Cir. 2024).

interpretation that the statute permitted such modifications of the safeguard measure, finding that the President did not violate the procedural requirements of the statute, and accordingly concluding that Presidential Proclamation 10101 was not invalid.

On June 8, 2023,¹⁹ the Commission instituted a proceeding for the purpose of preparing a report to the President and the Congress required by section 204(a)(2) of the Trade Act²⁰ on the results of its monitoring of developments with respect to the domestic industry producing CSPV products since the imposition of the TRQ on imports of CSPV cells and the increase in duties on imports of CSPV modules. On February 6, 2024, the Commission issued its report of its monitoring of developments with respect to the domestic CSPV products industry.²¹

The President's report to Congress

The statute governing this evaluation proceeding by the Commission (section 204(d) of the Trade Act of 1974, as amended) states that “{a}fter any action taken under section 2253 of this title has terminated, the Commission shall evaluate the effectiveness of the actions in facilitating positive adjustment by the domestic industry to import competition, consistent with the reasons set out by the President in the report submitted to the Congress under section 2253(b) of this title.”²²

The President's report under section 2253(b) (section 203(b) of the Trade Act of 1974, as amended) was transmitted to Congress on January 23, 2018. Before outlining the specific relief components of the safeguard measure, the President's report explained in pertinent part:

President Donald J. Trump has decided to impose a temporary safeguard measure on crystalline silicon photovoltaic cells (whether or not partially or fully assembled into other products) (CSPV cells and modules) to provide appropriate relief to U.S. producers of solar cells and modules who have been damaged by a recent surge in imports. He provides this relief in response to the unanimous determination by the independent, bipartisan United States International Trade Commission ("ITC") that increased imports of CSPV cells and modules are a substantial cause of serious injury to U.S. producers of such products. This action is consistent with the President's commitment to enforce U.S. trade laws to help

¹⁹ 88 FR 38892, June 14, 2023.

²⁰ 19 U.S.C. § 2254(a)(2).

²¹ 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), Publication 5494, February 2024 (“Monitoring 2 publication”).

²² 19 U.S.C. 2254(d)(1).

maintain the competitiveness of American manufacturing, provide well-paying jobs for American workers, and sustain a robust economy for American communities. China's industrial planning has included a focus on increasing its own production of CSPV cells and modules, using state incentives, subsidies, and tariffs, to dominate the global supply chain. China's share of global solar cell production skyrocketed from 7 percent in 2005 to 61 percent in 2012. It now dominates the global supply chain, accounting for nearly 70 percent of total planned global capacity expansions announced in the first half of 2017. China produces 60 percent of the world's solar cells and 71 percent of solar modules.

The United States has been a pioneer in technologies to generate electricity from sunlight. In the face of the Chinese onslaught, however, U.S. manufacturers' share of the market has withered.

U.S. manufacturers sought to arrest the decline by using U.S. trade-remedy laws, successfully petitioning the Department of Commerce to impose antidumping and countervailing duties on China. But China evaded the duties by moving production to other countries.

As a result, imports have continued to rise, and now account for the large majority of sales in the U.S. market. Prices have declined, to the point where most U.S. producers have ceased production, moved their facilities to other countries, or declared bankruptcy. By 2017, the U.S. solar industry had almost disappeared. Since 2012, 25 companies have closed, leaving only two producers of both solar cells and modules and eight firms that produce modules using imported cells. By the beginning of 2018, one of the two remaining U.S. producers of solar cells and modules had declared bankruptcy and ceased production.

A robust and fair remedy will give the remaining U.S. producers a chance to adjust to import competition, and may also encourage new market entrants to take advantage of the United States' well-educated workforce and major market for solar electricity generation.

World Trade Organization (WTO) rules expressly allow for the type of temporary safeguard measures announced today, and have done so for 70 years. Many of our trading partners - including the EU, China, and India - have exercised their right to apply safeguard measures on a wide variety of products. The last time the United States imposed

safeguard measures, then with respect to a number of steel products, the steel industry was able to restructure successfully.

The Administration will also provide a process to request the exclusion of particular products from the safeguard tariffs. This relief is intended to last for four years. . . .^{23 24}

²³ Report by the President to the United States Congress Pursuant to Section 203(b) of the Trade Act of 1974, as Amended, Regarding a Safeguard Measure on Imports of Certain Crystalline Silicon Photovoltaic Cells (Whether or Not Partially or Fully Assembled into Other Products) and for Other Purposes, transmitted to Speaker of the House Paul D. Ryan on January 23, 2018.

²⁴ See Presidential Proclamation 9693 of January 23, 2018 and additional exclusions of September 19, 2018 and June 13, 2019 in part 1 for more information.

Organization of report

Part 1 of this report presents information on the related World Trade Organization (“WTO”) proceedings, previous and related investigations, global developments summary data and data sources, U.S. market participants, and the subject merchandise. 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. Part 4 presents information on the financial experience of U.S. producers. Part 5 presents information on U.S. imports, apparent U.S. consumption, and market shares. Part 6 presents information on pricing data. Part 7 presents information on the adjustment efforts of U.S. producers in connection with the safeguard measure.

World Trade Organization proceedings

On May 14, 2018, South Korea requested consultations with the United States concerning imposition of the safeguard measure on imports of CSPV products pursuant to the World Trade Organization (“WTO”) Dispute Settlement Understanding. On May 24, 2018, China requested to join the consultations and on May 25, 2018, the European Union (“EU”), Malaysia, Russia, and Thailand requested the same. Subsequently, the United States informed the Dispute Settlement Body (“DSB”) that it accepted the requests of China, the EU, Malaysia, and Thailand to join the consultations. On August 14, 2018, South Korea requested the establishment of a panel and at its meeting on September 26, 2018, the DSB established a panel.²⁵

On August 14, 2018, China also requested consultations with the United States concerning imposition of the safeguard measure on imports of CSPV products pursuant to the WTO Dispute Settlement Understanding. The EU and Thailand requested to join the consultations on August 23, 2018 and August 27, 2018, respectively. Subsequently, the United States informed the DSB that it accepted both requests to join the consultations. On July 11, 2019, China requested the establishment of a panel and at its meeting on August 15, 2019, the DSB established a panel.²⁶ After the United States and China were unable to agree on panelists, the Director-General determined the composition of the panel on October 24, 2019, at China’s request. On September 2, 2021, the WTO panel circulated its final report in this dispute, rejecting China’s claims and upholding the Commission’s serious injury determination in its safeguard investigation of imports of CSPV products.²⁷ China notified the WTO Dispute Settlement Body on September 16, 2021 that it intended to appeal to the WTO Appellate Body certain issues in the panel report, while noting that there is currently no division of the Appellate Body that can be established to hear the appeal.²⁸ The appeal was circulated to WTO members on September 20, 2021.²⁹

²⁵ WTO, “DS545: United States – Safeguard Measure on Imports of Crystalline Silicon Photovoltaic Products.”

²⁶ WTO, “DS562: United States – Safeguard Measure on Imports of Crystalline Silicon Photovoltaic Products.”

²⁷ WTO, “WT/DS562/R: United States – Safeguard Measure on Imports of Crystalline Silicon Photovoltaic Products, Report of the Panel (2 September 2021).”

²⁸ WTO, “WT/DS562/12: United States – Safeguard Measure on Imports of Crystalline Silicon Photovoltaic Products (20 September 2021).”

²⁹ Currently, the Appellate Body is unable to review appeals given its ongoing vacancies. See also https://www.wto.org/english/news_e/news19_e/gc_09dec19_e.htm.

Previous and related investigations

Antidumping and countervailing duty investigations on CSPV Products

The Commission has conducted several import relief investigations concerning CSPV cells and modules or similar merchandise, as presented below.

Inv. Nos. 701-TA-481 and 731-TA-1190 (“CSPV 1”)

The antidumping (“AD”) and countervailing duty (“CVD”) investigations on CSPV cells and modules from China (Inv. Nos. 701-TA-481 and 731-TA-1190) (hereinafter referred to as “CSPV 1”) resulted from petitions filed by SolarWorld Industries America, Inc. on October 19, 2011.³⁰ On October 12, 2012, the U.S. Department of Commerce (“Commerce”) announced its final affirmative determinations in its AD/CVD investigations on CSPV cells and modules from China. The countervailable subsidy margins ranged from 14.78 percent to 15.97 percent³¹ and the estimated weighted-average dumping margins ranged from 18.32 percent to 249.96 percent.³² In November 2012, the Commission determined that an industry in the United States was materially injured by reason of imports of CSPV cells and modules from China that Commerce found were sold at less than fair value (“LTFV”) in the U.S. market and subsidized by the Government of China.³³ Effective December 7, 2012, Commerce issued AD/CVD orders on those imports.³⁴ In CSPV 1, Commerce determined that the country of origin of subject CSPV modules was the country of manufacture of the CSPV cells, including modules assembled outside of China using Chinese CSPV cells. Therefore, the scope of the CSPV 1 orders did not include U.S. imports of CSPV modules assembled in China from CSPV cells made in a country other than China.³⁵

³⁰ Crystalline Silicon Photovoltaic Cells and Modules from China, Inv. Nos. 701-TA-481 and 731-TA-1190 (Final), USITC Publication 4360, November 2012 (“CSPV 1 original publication”), p. I.1. Effective October 1, 2014, SolarWorld Industries America, Inc. changed its name to SolarWorld Americas, Inc. Certain Crystalline Silicon Photovoltaic Products from China and Taiwan, Inv. Nos. 701-TA-511 and 731-TA-1246-1247 (Final), USITC Publication 4519, February 2015 (“CSPV 2 original publication”), p. I.1.

³¹ 77 FR 63788, October 17, 2012.

³² 77 FR 63791, October 17, 2012. On August 4, 2015, the U.S. Trade Representative instructed Commerce to implement its determinations under Section 129 of the Uruguay Round Agreements Act (“URAA”) regarding the antidumping duty investigation of CSPV cells and modules from China. Accordingly, Commerce revised the antidumping cash deposit rates to account for double remedies, reflecting rates ranging from 6.68 percent to 238.88 percent. 80 FR 48812, August 14, 2015.

³³ CSPV 1 original publication, p. 1 (all six Commissioners reached affirmative determinations).

³⁴ 77 FR 73017, December 7, 2012; 77 FR 73018, December 7, 2012.

³⁵ CSPV 2 original publication, pp. 3 through 4.

On November 1, 2017, the Commission gave notice, pursuant to Section 751(c) of the Tariff Act of 1930, as amended,³⁶ that it had instituted its first five-year reviews of the CSPV 1 orders³⁷ and on February 5, 2018, the Commission determined that it would conduct full reviews.³⁸ On the basis of the record developed in the first five-year reviews of the CSPV 1 orders, the Commission determined on March 1, 2019, pursuant to the Tariff Act of 1930, that revocation of the AD/CVD orders on CSPV cells and modules from China would be likely to lead to continuation or recurrence of material injury to an industry in the United States within a reasonably foreseeable time.³⁹ Commerce issued a continuation of the AD/CVD orders on imports of CSPV cells and modules from China, effective March 20, 2019.^{40 41}

On February 1, 2024, the Commission instituted its second five-year reviews of the CSPV 1 orders⁴² and on May 6, 2024, the Commission determined to conduct expedited reviews.⁴³ On September 20, 2024, the Commission determined that revocation of the countervailing and antidumping duty orders on crystalline silicon photovoltaic cells and modules from China would be likely to lead to continuation or recurrence of material injury to an industry in the United States within a reasonably foreseeable time.⁴⁴ Based on affirmative determinations by Commerce⁴⁵ and the Commission, Commerce issued a continuation of the AD/CVD orders on imports of CSPV cells and modules from China, effective September 20, 2024.⁴⁶

³⁶ 19 U.S.C. 1675(c).

³⁷ 82 FR 50681 and 50612, November 1, 2017.

³⁸ 83 FR 8296, February 26, 2018.

³⁹ 84 FR 8342, March 7, 2019.

⁴⁰ 84 FR 10299 and 10300, March 20, 2019.

⁴¹ On August 16, 2021, the American Solar Manufacturers Against Chinese Circumvention (“A-SMACC”) filed requests with Commerce to investigate imports from certain producers of CSPV cells and modules from China that are completed in Malaysia, Thailand, and Vietnam which they alleged to have circumvented the AD/CVD orders on imports of CSPV products from China. On November 10, 2021, Commerce rejected these requests, citing the refusal of A-SMACC members to publicly identify themselves. Letter from Commerce to Timothy Brightbill, Wiley Rein LLP, Re: Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules, from the People’s Republic of China: Requests for Circumvention Inquiries, November 10, 2021.

⁴² 89 FR 6550, February 1, 2024.

⁴³ 89 FR 48442, June 6, 2024.

⁴⁴ 89 FR 78900, September 26, 2024.

⁴⁵ 89 FR 48559, June 7, 2024.

⁴⁶ 89 FR 81041, October 7, 2024.

Inv. Nos. 701-TA-511 and 731-TA-1246-1247 (“CSPV 2”)

The AD/CVD investigations on CSPV cells and modules from China and Taiwan (Inv. Nos. 701-TA-511 and 731-TA-1246-1247) (hereinafter referred to as “CSPV 2”) resulted from petitions filed by SolarWorld on December 31, 2013.⁴⁷ On December 16, 2014, Commerce announced its final affirmative determinations in its AD investigations on CSPV cells and modules from China and Taiwan and its CVD investigation on CSPV cells and modules from China. The countervailable subsidy margins ranged from 27.64 percent to 49.79 percent for China.⁴⁸ The estimated weighted-average dumping margins (in percent ad valorem), as reported by Commerce ranged from 26.71 percent to 165.04 percent for China and 11.45 percent to 27.55 percent for Taiwan.⁴⁹ In February 2015, the Commission determined that an industry in the United States was materially injured by reason of imports of certain CSPV cells and modules from Taiwan that Commerce found were sold in the U.S. market at LTFV and imports from China that Commerce found were sold at LTFV and subsidized by the Government of China.⁵⁰ Effective February 18, 2015, Commerce issued AD/CVD orders on those imports from China and an AD order on those imports from Taiwan.⁵¹

In its final CSPV 2 determinations, Commerce defined the subject merchandise from China to 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

⁴⁷ CSPV 2 original publication, p. I.1.

⁴⁸ 79 FR 76962, December 23, 2014.

⁴⁹ 79 FR 76970, December 23, 2014; 79 FR 76966, December 23, 2014.

⁵⁰ Chairman Schmittlein, Vice Chairman Johanson, and Commissioners Williamson and Pinkert voted in the affirmative. Commissioner Broadbent voted in the affirmative with respect to CSPV modules from China and Taiwan and in the negative with respect to CSPV cells from Taiwan (CSPV cells from China were not included in the scope as they were already covered by the CSPV 1 orders). Commissioner Kieff did not participate in the CSPV 2 investigations. 80 FR 7495, February 10, 2015.

⁵¹ 80 FR 8592 and 8596, February 18, 2015.

cell manufacture location determined the country of origin for U.S. imports of cells and modules from Taiwan.⁵²

On January 2, 2020, the Commission gave notice, pursuant to Section 751(c) of the Tariff Act of 1930, as amended,⁵³ that it had instituted first five-year reviews of the CSPV 2 orders⁵⁴ and on April 6, 2020, the Commission determined that it would conduct expedited reviews.⁵⁵ On the basis of the record developed in the first five-year reviews of the CSPV 2 orders, the Commission determined on August 31, 2020, pursuant to the Tariff Act of 1930, that revocation of the AD/CVD orders on CSPV cells and modules from China, and revocation of the antidumping duty order on CSPV cells and modules from Taiwan, would be likely to lead to continuation or recurrence of material injury to an industry in the United States within a reasonably foreseeable time.⁵⁶ Commerce issued a continuation of the AD/CVD orders on imports of CSPV cells and modules from China, and of the antidumping duty order on imports of CSPV cells and modules from Taiwan, effective September 11, 2020.⁵⁷

On August 1, 2025, the Commission instituted the second reviews to determine whether revocation of the countervailing and antidumping duty orders on CSPV products from China and the antidumping duty order on CSPV products from Taiwan would likely lead to the continuation or recurrence of material injury to a domestic industry.⁵⁸ On December 22, 2025 the Commission determined to conduct expedited reviews of the antidumping and countervailing duty orders on CSPV products from China and the antidumping duty order of CSPV products from Taiwan. On February 10, 2026, Commerce published its affirmative final results for the related proceedings on CSPV products from China and Taiwan.⁵⁹ The results of the second reviews on CSPV products from China and Taiwan are currently pending before the Commission.

⁵² 79 FR 76962 and 76970, December 23, 2014; *see also* CSPV 2 original publication, pp. 3-4 and 6. The CIT affirmed Commerce's scope determinations, as further explained by the agency on remand. *See SunPower Corp. v. United States*, 253 F.Supp. 3d 1275 (Ct. Int'l Trade 2017); *Kyocera Solar, Inc. v. United States*, 253 F.Supp. 3d 1294 (Ct. Int'l Trade 2017).

⁵³ 19 U.S.C. 1675(c).

⁵⁴ 85 FR 120, January 2, 2020.

⁵⁵ 85 FR 42430, July 14, 2020.

⁵⁶ 85 FR 55319, September 4, 2020.

⁵⁷ 85 FR 56215, September 11, 2020.

⁵⁸ 90 FR 36184, August 1, 2025.

⁵⁹ 91 FR 5900 and 91 FR 5910, February 10, 2026.

Inv. Nos. 701-TA-722-725 and 731-TA-1690-1693 (“CSPV 3”)

The investigations resulted from petitions filed on April 24, 2024, by the American Alliance for Solar Manufacturing Trade Committee with Commerce and Commission.⁶⁰ On October 4, 2024, Commerce published its affirmative preliminary countervailing duty determinations and alignment of final countervailing duty determinations with final antidumping duty determinations.⁶¹ On December 4, 2024, Commerce published its affirmative preliminary antidumping duty determinations⁶² and on December 30, 2024, the Commission instituted its scheduling of final phase of investigations.⁶³ Commerce issued its final affirmative determinations on April 25, 2025.⁶⁴ On June 9, the Commission determined that that an industry in the United States is materially injured by reason of imports of CSPV products from Malaysia and Vietnam and that a U.S. industry is threatened with material injury by reason of imports of CSPV products from Cambodia and Thailand that have been found by the U.S. Commerce to be sold in the United States at LTFV and subsidized by the governments of Cambodia, Malaysia, Thailand, and Vietnam.⁶⁵ Following final affirmative determinations from Commerce and the Commission, Commerce issued its antidumping and countervailing duty orders on June 24, 2025.⁶⁶ These proceedings are currently under pending litigation before the Court of International Trade.

Commerce’s Circumvention Inquiries

On April 1, 2022, in response to the request from Auxin, Commerce initiated country-wide circumvention inquiries to determine whether imports of CSPV cells, whether or not assembled into modules, produced in Cambodia, Malaysia, Thailand, or Vietnam using Chinese CSPV cells are circumventing the AD/CVD orders on CSPV cells and modules from China.⁶⁷ On

⁶⁰ 89 FR 34268, April 30, 2024 and 89 FR 43809 and 89 FR 43816, May 20, 2024. Members include Convalt Energy; First Solar, Inc.; Hanwha Q CELLS USA, Inc.; and Mission Solar Energy LLC.

⁶¹ 89 FR 80877, 89 FR 80861, 89 FR 80874, and 89 FR 80866, October 4, 2024.

⁶² 89 FR 96226, 89 FR 96207, 89 FR 96214, and 89 FR 96219.

⁶³ 89 FR 106578, December 30, 2024.

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

⁶⁵ 90 FR 25075, June 13, 2025. The Commission also found that imports subject to Commerce's affirmative critical circumstances determinations are not likely to undermine seriously the remedial effect of the countervailing and antidumping duty orders on CSPV products from Vietnam. Because of its threat determination, no critical circumstances findings with regard to imports of this product from Thailand were reached.

⁶⁶ 90 FR 26791. On July 7, 2025, Commerce issued a notice of correction to the antidumping duty orders of Malaysia and Vietnam, 90 FR 29843.

⁶⁷ 87 FR 19071, April 1, 2022.

June 6, 2022, President Biden declared an emergency under Section 318 of the Tariff Act of 1930, and authorized the Secretary of Commerce to allow the importation, free of AD/CVD duties, of certain solar cells and modules from Cambodia, Malaysia, Thailand, and Vietnam.⁶⁸ On September 16, 2022, Commerce published its Final Rule creating procedures in accordance with the President’s emergency declaration.⁶⁹ On December 8, 2022, Commerce published its preliminary affirmative determinations of circumvention with respect to Cambodia, Malaysia, Thailand, and Vietnam.⁷⁰ On May 3, 2023, Congress passed H.J.Res. 39 disapproving of Commerce’s September 16 Final Rule.⁷¹ President Biden vetoed H.J.Res. 39 on May 16, 2023,⁷² and a vote in the House of Representatives to override the President’s veto failed on May 24, 2023.⁷³ On August 17, 2023, Commerce issued its final determination in the anticircumvention investigation, determining that, with some exceptions, imports of certain solar cells and modules that were completed in Cambodia, Malaysia, Thailand, or Vietnam using parts and components produced in China, and then subsequently exported from Cambodia, Malaysia, Thailand, or Vietnam to the United States, were circumventing the AD/CVD orders on solar cells from China.⁷⁴ In light of the President’s emergency declaration and Commerce’s final rule, there was a moratorium which expired on June 6, 2024 on any AD/CVD duties on imports of solar cells and modules from these four countries resulting from Commerce’s final determination of circumvention.⁷⁵

Inv. Nos. 701-TA-772 and 731-TA-1756-1758 (“CSPV 4”)

The AD/CVD investigations on CSPV cells and modules from India, Indonesia, and Laos (hereinafter referred to as “CSPV 4”) resulted from petitions filed by the Alliance for American Solar Manufacturing and Trade on July 17, 2025.⁷⁶ The Commission issued its affirmative preliminary determinations on the investigations on the CSPV cells and modules from India,

⁶⁸ 87 FR 35067, June 9, 2022.

⁶⁹ 87 FR 56868, September 16, 2022.

⁷⁰ 87 FR 75221, December 8, 2022.

⁷¹ [H.J.Res.39](#), 118th Congress.

⁷² The White House, “[Message to the House of Representatives – President’s Veto of H.J. Res. 39](#),” May 16, 2023.

⁷³ 118th Congress, [Roll Call 233](#).

⁷⁴ 88 FR 57419, August 23, 2023.

⁷⁵ The Court of International Trade concluded that the moratorium was invalid and that decision is currently on appeal before the Court of Appeals for the Federal Circuit. *Auxin Solar, Inc. v. United States*, 798 F. Supp. 3d 1331, 1334 (Ct. Int’l Trade 2025), appeal filed, No. 2025-2120, 2026 WL 304864 (Fed. Cir. Feb. 5, 2026).

⁷⁶ Members include Hanwha Q CELLS USA, Inc., First Solar Inc., and Mission Solar Energy LLC.

Indonesia, and Laos on September 2, 2025.⁷⁷ On February 26, 2026, Commerce published its affirmative preliminary countervailing duty determinations and alignment of final countervailing duty determinations with final antidumping duty determinations for India, Indonesia, and Laos.⁷⁸ On April 28, 2026 Commerce published its affirmative preliminary antidumping duty determinations and its postponement of the final determination on Laos.^{79 80} Subsequently, Commerce postponed its final determinations on India and Indonesia.⁸¹ Commerce is scheduled to make its final determinations no later than September 10, 2026.

On May 13, 2026, the Commission published its notice of scheduling of the final phase of investigations for the antidumping and countervailing duty investigations for India, Indonesia, and Laos.⁸²

⁷⁷ 90 FR 42983, September 5, 2025.

⁷⁸ 91 FR 9555, 91 FR 9564, and 91 FR 9568, February 26, 2026.

⁷⁹ 91 FR 22798, 91 FR 22802 and 91 FR 22794, April 28, 2026.

⁸⁰ 91 FR 22794, February 28, 2026.

⁸¹ 91 FR 27014, May 13, 2026 and 91 FR 29459, May 20, 2026.

⁸² 91 FR 27078, May 13, 2026.

Table 1.2 CSPV products: 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
2026	701-TA-772	India	Affirmative	Final determination pending
2026	701-TA-773	Indonesia	Affirmative	Final determination pending
2026	701-TA-774	Laos	Affirmative	Final determination pending
2026	731-TA-1756	India	Affirmative	Final determination pending
2026	731-TA-1757	Indonesia	Affirmative	Final determination pending
2026	731-TA-1758	Laos	Affirmative	Final determination pending

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.

Inv. Nos. 701-TA-475 and 731-TA-1177

The AD/CVD investigations on aluminum extrusions, primary raw materials for CSPV products, from China resulted from petitions filed by the Aluminum Extrusions Fair Trade Committee (“AEFTC”) and the United Steel, Paper and Forestry, Rubber, Manufacturing, Energy, Allied Industrial and Service Workers International Union (“USW”) on March 31, 2010. In May 2011, the Commission determined that an industry in the United States was materially injured by reason of imports of certain aluminum extrusions from China other than certain finished heat sinks (“FHS”) that Commerce had found to be sold in the United States at LTFV and subsidized by the government of China.⁸³ The Commission, however, determined that the domestic FHS industry was not materially injured or threatened with material injury by reason of imports of FHS from China.⁸⁴ On May 26, 2011, Commerce issued AD/CVD orders with respect to imports of certain aluminum extrusions from China other than FHS.⁸⁵

On April 1, 2016, the Commission instituted the first five-year reviews.⁸⁶ On March 27, 2017, after conducting full reviews,⁸⁷ the Commission determined that revocation of the AD/CVD orders on aluminum extrusions from China would be likely to lead to continuation or recurrence of material injury to an industry in the United States within a reasonably foreseeable time.⁸⁸ Commerce issued a notice of continuation of the orders on April 25, 2017.⁸⁹

The Commission instituted the second five-year reviews on March 1, 2022.⁹⁰ On June 6, 2022, the Commission determined to conduct expedited reviews of the orders.⁹¹ On October 21, 2022, the Commission determined that revocation of the AD/CVD orders on aluminum extrusions from China would be likely to lead to continuation or recurrence of material injury to

⁸³ Certain Aluminum Extrusions from China, Inv. Nos. 701-TA-475 and 731-TA-1177 (Final), USITC Publication 4229, May 2011.

⁸⁴ Ibid.

⁸⁵ 76 FR 30650, May 26, 2011.; 76 FR 30653, May 26, 2011. The CIT upheld Commerce’s revision of the scope language to reflect the exclusion of FHS. *Aluminum Extrusions Fair Trade Committee v. United States*, 968 F. Supp. 2d 1244 (Ct. Int’l Trade 2014).

⁸⁶ Institution of Five-Year Reviews, 81 FR 18884 April 1, 2016.

⁸⁷ 81 FR 45304, July 13, 2016.

⁸⁸ Certain Aluminum Extrusions from China, Inv. Nos. 701-TA-475 and 731-TA-1177 (Review), USITC Publication 4677, March 2017.

⁸⁹ 82 FR 19025, April 25, 2017.

⁹⁰ 87 FR 11470 March 1, 2022.

⁹¹ 87 FR 57518 September 20, 2022.

an industry in the United States within a reasonably foreseeable time.⁹² Commerce issued a notice of continuation of the orders on November 2, 2022.⁹³

Administrative Reviews

Inv. Nos. 701-TA-481 and 731-TA-1190 (“CSPV 1”)

Commerce has completed eleven administrative reviews regarding the CVD order on CSPV from China (Inv. 701-TA-481), plus two ongoing reviews; and eleven administrative reviews regarding the AD order on CSPV products from China (Inv. 731-TA-1190), along with two additional ongoing reviews on the AD order. The completed final results for the CVD order span the 2012 through 2022 periods of review and the completed final results for the AD order cover the 2012 through 2023 periods of review.⁹⁴

Inv. Nos. 701-TA-511 and 731-TA-1246-1247 (“CSPV 2”)

Commerce has completed three administrative reviews regarding the CVD order on CSPV from China (Inv. 701-TA-511); three administrative reviews regarding the AD order on CSPV products from China (Inv. 731-TA-1246); and six administrative reviews regarding the AD order on Taiwan (Inv. 731-TA-1247) plus one ongoing and one review initiated. The completed final results for the CVD order span the 2014 through 2021 periods of review and the completed final results for the AD orders cover the 2014 through 2024 periods of review.⁹⁵

⁹² 87 FR 64113, October 21, 2022.

⁹³ 87 FR 66128, November 2, 2022.

⁹⁴ Various Federal Register citations.

⁹⁵ Various Federal Register citations.

Changed Circumstances Reviews

Inv. Nos. 701-TA-481 and 731-TA-1190 ("CSPV 1")

Commerce has completed twelve changed circumstance reviews regarding the AD and CVD orders on CSPV 1 from China between 2016 and 2025.⁹⁶

Inv. Nos. 701-TA-511 and 731-TA-1246-1247 ("CSPV 2")

Commerce has completed six changed circumstances reviews regarding the AD and CVD orders on CSPV 2 from China and Taiwan between 2017 and 2025.⁹⁷

Scope of the safeguard remedy

Presidential Proclamation 9693 of January 23, 2018

According to Presidential Proclamation 9693,⁹⁸ the President's remedy covers the following CSPV products effective with respect to goods entered, or withdrawn from warehouse for consumption, on or after February 7, 2018, and through February 6, 2022:

(a) solar cells, whether or not assembled into modules or made up into panels. . .;

(b) parts or subassemblies of solar cells. . .;

(c) inverters or batteries with CSPV cells attached. . .; and

(d) DC generators with CSPV cells attached. . .

. . . the term "crystalline silicon photovoltaic cells" ("CSPV 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 (or subassemblies thereof. . .) 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. . . {Included are} goods presented in cell form and which at the time of importation are not presented assembled into circuits, laminates or modules or made up into panels.

. . . the term "modules" . . . is a joined group of CSPV cells . . . regardless of the number of cells or the shape of the joined group, that are capable of generating electricity. Also

⁹⁶ Various Federal Register citations.

⁹⁷ Various Federal Register citations.

⁹⁸ 83 FR 3541, January 23, 2018.

included as a "module" are goods each known as a "panel" comprising a CSPV cell that has undergone any processing, assembly, or interconnection (including, but not limited to, assembly into a laminate). Such CSPV cells assembled into modules or made up into panels include . . . (i) CSPV cells which are presented attached to inverters or batteries . . .; and (ii) CSPV cells classifiable as DC generators . . .

{The remedy} . . . shall not cover—

- (1) thin film photovoltaic products produced from amorphous silicon ("a-Si"), cadmium telluride ("CdTe"), or copper indium gallium selenide ("CIGS");*
- (2) CSPV cells, not exceeding 10,000 mm² in surface area, that are permanently integrated into a consumer good whose primary function is other than power generation and that consumes the electricity generated by the integrated CSPV cell. Where more than one CSPV 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 CSPV cells that are integrated into the consumer good; and*
- (3) CSPV cells, whether or not partially or fully assembled into other products, if such CSPV cells were manufactured in the United States.*

{The remedy} . . . shall likewise not cover the following goods, . . .:

- (1) 10 to 60 watt, inclusive, rectangular solar panels, where the panels have the following characteristics: (A) length of 250 mm or more but not over 482 mm or width of 400 mm or more but not over 635 mm, and (B) surface area of 1000 cm² or more but not over 3,061 cm², provided that no such panel with those characteristics shall contain an internal battery or external computer peripheral ports at the time of entry;*
- (2) 1 watt solar panels incorporated into nightlights that use rechargeable batteries and have the following dimensions: 58 mm or more but not over 64 mm by 126 mm or more but not over 140 mm;*
- (3) 2 watt solar panels incorporated into daylight dimmers, that may use rechargeable batteries, such panels with the following dimensions: 75 mm or more but not over 82 mm by 139 mm or more but not over 143 mm;*
- (4) off-grid and portable CSPV panels, whether in a foldable case or in rigid form containing a glass cover, where the panels have 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) where the panels have glass covers, such panels 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);*
- (5) 3.19 watt or less solar panels, each with length of 75 mm or more but not over 266 mm and width of 46 mm or more but not over 127 mm, with surface area of 338 cm²*

- or less, 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 edge, provided that no such panel shall contain an internal battery or external computer peripheral ports;*
- (6) *27.1 watt or less solar panels, each with surface area less than 3,000 cm² and coated across the entire surface with a polyurethane doming resin, the foregoing joined to a battery charging and maintaining unit, such unit which is an acrylonitrile butadiene styrene ("ABS") box that incorporates a light emitting diode ("LED") by coated wires that include a connector to permit the incorporation of an extension cable.*

Additional exclusions of September 19, 2018

Pursuant to authority provided by the President, USTR determined that the following additional products should be excluded from the safeguard measure applied to certain solar products, effective with respect to goods entered, or withdrawn from warehouse for consumption, on or after September 19, 2018:⁹⁹

- (7) *off-grid, 45 watt or less solar panels, each with length not exceeding 950 mm and width of 100 mm or more but not over 255 mm, with a surface area of 2,500 cm² or less, with a pressure-laminated tempered glass cover at the time of entry but not a frame, electrical cables or connectors, or an internal battery;*
- (8) *4 watt or less solar panels, each with a length or diameter of 70 mm or more but not over 235 mm, with a surface area not exceeding 539 cm², and not exceeding 16 volts, provided that no such panel with these characteristics shall contain an internal battery or external computer peripheral ports at the time of entry;*
- (9) *solar panels with a maximum rated power of equal to or less than 60 watts, having the following characteristics, provided that no such panel with those characteristics shall contain an internal battery or external computer peripheral ports at the time of entry: (A) Length of not more than 482 mm and width of not more than 635 mm or (B) a total surface area not exceeding 3,061 cm²;*
- (10) *flexible and semi-flexible off-grid solar panels designed for use with motor vehicles and boats, where the panels range in rated wattage from 10 to 120 watts, inclusive;*
- (11) *frameless solar panels in a color other than black or blue with a total power output of 90 watts or less where the panels have a uniform surface without visible solar cells or busbars;*
- (12) *solar cells with a maximum rated power between 3.4 and 6.7 watts, inclusive, having the following characteristics: (A) A cell surface area between 154 cm² and 260 cm², inclusive, (B) no visible busbars or gridlines on the front of the cell, and (C) more than 100 interdigitated fingers of tin-coated solid copper adhered to the back of the cell, with the copper portion of the metal fingers having a thickness of greater than 0.01 mm;*

⁹⁹ 83 FR 47393, September 19, 2018.

- (13) solar panels with a maximum rated power between 320 and 500 watts, inclusive, having the following characteristics: (A) Length between 1,556 mm and 2,070 mm inclusive, and width between 1,014 mm and 1,075 mm, inclusive, (B) where the solar cells comprising the panel have no visible busbars or gridlines on the front of the cells, and (C) the solar cells comprising the panel have more than 100 interdigitated fingers of tin-coated solid copper adhered to the back of the cells, with the copper portion of the metal fingers having thickness greater than 0.01 mm;*
- (14) modules . . . incorporating only CSPV cells that are products of the United States and not incorporating any CSPV cells that are the product of any other country.*

Additional exclusions of June 13, 2019

On June 13, 2019, the USTR announced its determination to grant the following additional exclusion requests, effective with respect to goods entered, or withdrawn from warehouse for consumption, on or after June 13, 2019:¹⁰⁰

- (15) bifacial solar panels that absorb light and generate electricity on each side of the panel and that consist of only bifacial solar cells that absorb light and generate electricity on each side of the cells;*
- (16) flexible fiberglass solar panels without glass components other than fiberglass, such panels having power outputs ranging from 250 to 900 watts;*
- (17) solar panels consisting of solar cells arranged in rows that are laminated in the panel and that are separated by more than 10 mm, with an optical film spanning the gaps between all rows that is designed to direct sunlight onto the solar cells, and not including panels that lack said optical film or only have a white or other backing layer that absorbs or scatters sunlight.*

The safeguard measure

In Presidential Proclamation 9693 of January 23, 2018,¹⁰¹ the President imposed a safeguard measure on CSPV products for a period of four years beginning on February 7, 2018, in the form of (1) a TRQ on imports of solar cells not partially or fully assembled into other products and (2) an increase in duties on imports of solar modules. 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

¹⁰⁰ 84 FR 27684, June 13, 2019.

¹⁰¹ 83 FR 3541, January 25, 2018.

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.¹⁰²

In Presidential Proclamation 10339 of February 4, 2022,¹⁰³ the President announced an extension and modification of the existing safeguard measure for an additional four years beginning on February 7, 2022. The Presidential Proclamation extended the TRQ measure on CSPV cells and increased the within-quota quantity to 5.0 GW for each year. The President also extended the increase in duties on imports of solar modules and included an exemption for bifacial modules. As a result of an agreement between USTR and the Government of Canada reached on July 8, 2022, USTR suspended the application of the safeguard measure on imports of CSPV products originating in Canada, applicable as of February 1, 2022.¹⁰⁴

¹⁰² The countries listed in Presidential Proclamation 9693 as developing countries that are WTO members and not subject to the safeguard duties or TRQ are: Afghanistan, Albania, Algeria, Angola, Armenia, Azerbaijan, Belize, Benin, Bhutan, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Burkina Faso, Burma, Burundi, Cambodia, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo (Brazzaville), Congo (Kinshasa), Cote d'Ivoire, Djibouti, Dominica, Ecuador, Egypt, Eritrea, Ethiopia, Fiji, Gabon, The Gambia, Georgia, Ghana, Grenada, Guinea, Guinea-Bissau, Guyana, Haiti, India, Indonesia, Iraq, Jamaica, Jordan, Kazakhstan, Kenya, Kiribati, Kosovo, Kyrgyzstan, Lebanon, Lesotho, Liberia, Macedonia, Madagascar, Malawi, Maldives, Mali, Mauritania, Mauritius, Moldova, Mongolia, Montenegro, Mozambique, Namibia, Nepal, Niger, Nigeria, Pakistan, Papua New Guinea, Paraguay, Rwanda, Saint Lucia, Saint Vincent and the Grenadines, Samoa, Sao Tome and Principe, Senegal, Serbia, Sierra Leone, Solomon Island, Somalia, South Africa, South Sudan, Sri Lanka, Suriname, Swaziland, Tanzania, Timor-Leste, Togo, Tonga, Tunisia, Turkey, Tuvalu, Uganda, Ukraine, Uzbekistan, Vanuatu, Yemen (Republic of), Zambia and Zimbabwe. If the President determines that a surge in imports of CSPV products from a developing country that is a WTO member results in imports of that product from that developing country exceeding either of the thresholds described, the safeguard measure shall be modified to apply to such product from such country. Turkey was removed from the list of beneficiary developing countries as of May 17, 2019. India was removed from the list of beneficiary developing countries as of June 5, 2019. Proclamation to Modify the List of Beneficiary Developing Countries Under the Trade Act, May 16, 2019, <https://www.whitehouse.gov/presidential-actions/proclamation-modify-list-beneficiary-developing-countries-trade-act-1974/>, retrieved January 12, 2020; Proclamation to Modify the List of Beneficiary Developing Countries Under the Trade Act, May 31, 2019, <https://www.whitehouse.gov/presidential-actions/proclamation-modify-list-beneficiary-developing-countries-trade-act-1974-2/>, retrieved January 12, 2020.

¹⁰³ 87 FR 7357, February 9, 2022.

¹⁰⁴ 87 FR 43369, July 20, 2022.

Tariff-rate quota under the safeguard measure

The safeguard measure imposed a TRQ on imports of solar cells not partially or fully assembled into other products (“CSPV cells”) for a period of four years, with unchanging within-quota quantities and annual reductions in the rates of duty applicable to goods entered in excess of those quantities in the second, third, and fourth years. During the first four years of the measure, the annual aggregate in-quota quantity of solar cell imports not exceeding 2.5 GW in each year under the TRQ was to be allocated among all countries, except those that were specifically excluded. On February 4, 2022, the President extended the measure an additional four years and increased the aggregate in-quota quantity to 5.0 GW in each year.¹⁰⁵ The Presidential Proclamation also extended the annual reductions in the rates of duty applicable to goods entered in excess of those quantities in the fifth, sixth, seventh, and eighth years. On August 12, 2024, the President increased the aggregate in-quota quantity to 12.5 GW annually in the seventh and eighth years.¹⁰⁶ Table 1.3 presents the safeguard TRQ measure on CSPV cells.¹⁰⁷

¹⁰⁵ 87 FR 7357, February 9, 2022.

¹⁰⁶ 89 FR 66181, August 12, 2024.

¹⁰⁷ Also see U.S. Customs and Border Protection, CSPV Solar Cells Historical Fill Table, May 12, 2023, <https://www.cbp.gov/document/report/cpsv-solar-cells-historical-fill-table>, retrieved May 19, 2026. See U.S. Customs and Border Protection, Weekly Commodity Status Reports, at <https://www.cbp.gov/trade/quota/tariff-rate-quotas>.

Table 1.3 CSPV cells: Safeguard TRQ measure on cells, by period

Quantity in megawatts; Duty in percent ad valorem

Period	Annual in-quota quantity (megawatts)	Safeguard duty on imported cells exceeding annual in-quota quantity (percent)	Entered quantity (megawatts)	Percent filled (percent)	Fill date
February 7, 2018 to February 6, 2019	2,500	30.0	707	28.28	-
February 7, 2019 to February 6, 2020	2,500	25.0	2,370	94.81	-
February 7, 2020 to February 6, 2021	2,500	20.0	2,098	83.93	-
February 7, 2021 to February 6, 2022	2,500	15.0	2,498	99.95	12/30/2021
February 7, 2022 to February 6, 2023	5,000	14.75	2,681	53.63	
February 7, 2023 to February 6, 2024	5,000	14.50	3,682	73.64	
February 7, 2024 to February 6, 2025	12,500	14.25	12,500	100.00	12/30/2024
February 7, 2025 to February 6, 2026	12,500	14.0	12,500	100.00	07/25/2025

Source: Annual in-quota quantity and safeguard duties are compiled from 83 FR 3541, January 25, 2018 and 87 FR 7357, February 9, 2022. U.S. Customs and Border Protection, CSPV Solar Cells Historical Fill Table, March 7, 2025,

<https://www.cbp.gov/document/report/cpsv-solar-cells-historical-fill-table>, retrieved July 14, 2026. See U.S. Customs and Border Protection, Weekly Commodity Status Reports, at <https://www.cbp.gov/trade/quota/tariff-rate-quotas>.

Note: The increase in duties in the fourth year of the measure from 15.0 percent to 18.0 percent set forth in Presidential Proclamation 10101 (85 FR 65639, October 16, 2020) was set aside by the CIT on November 16, 2021.

Import duties under the safeguard measure

The safeguard measure imposed an increase in duties on imports of CSPV modules for a period of four years, with annual reductions in the rates of duty in the second, third, and fourth years. On February 4, 2022, the President extended the measure an additional four years, with annual reductions in the rates of duty in the fifth, sixth, seventh, and eighth years. Table 1.4 presents the safeguard measure on CSPV modules.

Table 1.4 CSPV modules: Safeguard measure on modules, by period

Duty in percent ad valorem, Quantity in megawatts

Period	Safeguard duty on imported modules (percent)	Imports subject to chapter 99 in 12 month intervals (megawatts)	All imports in 12 month intervals (megawatts)
February 7, 2018 to February 6, 2019	30.0	3,036	6,274
February 7, 2019 to February 6, 2020	25.0	11,856	20,122
February 7, 2020 to February 6, 2021	20.0	13,516	26,413
February 7, 2021 to February 6, 2022	15.0	14,547	23,369
February 7, 2022 to February 6, 2023	14.75	3,788	32,243
February 7, 2023 to February 6, 2024	14.50	2,728	56,043
February 7, 2024 to February 6, 2025	14.25	8,811	52,895
February 7, 2025 to February 6, 2026	14.0	24,304	33,104

Source: 83 FR 3541, January 25, 2018; 87 FR 7357, February 9, 2022. Compiled from official U.S. import statistics of the U.S. Department of Commerce Census Bureau using HTS statistical reporting numbers 8541.43.0010, 8541.43.0080, 8541.40.6015, 8541.40.6035, and 8541.40.6020, accessed on April 30, 2026. Imports are based on the imports for consumption data series.

Note: The increase in duties in the fourth year of the measure from 15.0 percent to 18.0 percent set forth in Presidential Proclamation 10101 (85 FR 65639, October 16, 2020) was set aside by the CIT on November 16, 2021. Chapter 99 of the HTSUS covers temporary or special tariffs/trade measures, including safeguard duties, section 232 measures, section 301 tariffs, IEEPA, etc. Data for imports subject to chapter 99 uses rate provision codes 69 (imports subject to chapter 99, duty reported) and 79 (imports subject to chapter 99, no duty reported). Data are for full months of data from February to January of a given period.

Tariff treatment

CSPV cells and modules are currently imported under Harmonized Tariff Schedule of the United States (“HTS”) 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”). The 2026 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 subheadings 8501.71, 8501.72, 8501.80, and 8507.20.80. Decisions on the tariff classification and treatment of imported goods are within the authority of U.S. Customs and Border Protection.

Section 301

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 1974.¹⁰⁸ 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.¹⁰⁹

Section 122 tariffs

Effective February 24, 2026, CSPV products originating in all countries are subject to an additional 10 percent ad valorem duty under section 122 of the Trade Act of 1974.¹¹⁰ CSPV products originating in Canada or Mexico that enter with duty free treatment under the United

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

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

¹¹⁰ Section 122 authorizes the President to impose a temporary import surcharge for a period not exceeding 150 days unless such period is extended by an Act of the Congress. 91 FR 9339, February 25, 2026. See also HTS heading 9903.03.01 and U.S. note 2(aa) to subchapter 3 of chapter 99 and related tariff provisions for this duty treatment. USITC, HTS (2026) Revision 4, Publication 5711, February 2026, pp. 99.3.49 to 99.3.59 and 99.3.410.

States-Mexico-Canada Agreement (“USMCA”) are not subject to the additional ad valorem duty under section 122.¹¹¹

Tariffs initiated under the International Emergency Economic Powers Act (“IEEPA”)¹¹²

Effective April 5, 2025, CSPV products originating in all countries (except for Canada, Mexico, Belarus, Cuba, North Korea, and Russia) was subject to an additional 10 percent ad valorem duty as part of tariffs initiated in April 2025 under IEEPA.¹¹³ ¹¹⁴ Effective April 9, 2025, certain countries were assigned individualized country duties (see table 1.5 for country duty rates). However, effective April 10, 2025, the individualized country duties were suspended and the additional duty rates as part of tariffs initiated in April 2025 under IEEPA for CSPV products were returned to 10 percent.¹¹⁵ Effective August 7, 2025, certain countries were assigned individualized country duties under IEEPA (see table 1.5 for duty rates).¹¹⁶ In some cases, the duty rates assigned under IEEPA in August 2025 were different from those assigned in April

¹¹¹ Section 122 authorizes the President to impose a temporary import surcharge for a period not exceeding 150 days unless such period is extended by an Act of the Congress. 91 FR 9339, February 25, 2026. See also HTS headings 9903.03.07 and 9903.03.08, and U.S. notes 2(aa)(vi) and 2(aa)(vii) to subchapter 3 of chapter 99 and related tariff provisions for this duty treatment. USITC, HTS (2026) Revision 4, Publication 5711, February 2026, pp. 99.3.49 to 99.3.59 and 99.3.411.

¹¹² Multiple tariffs were enacted under the authority of the International Emergency Economic Powers Act (“IEEPA”), including tariffs that applied to countries that may not be subject in this proceeding. Tariffs specific to Canada, China, and Mexico were initiated in February 2025. Tariffs initiated in April 2025 under IEEPA were applied globally. Tariffs specific to Brazil were initiated in July 2025. Tariffs specific to India were initiated in August 2025 and terminated effective February 7, 2026. Tariffs under IEEPA were amended over time. All tariffs initiated under IEEPA were terminated effective February 20, 2026. 91 FR 9437, February 25, 2026.

¹¹³ Imports originating in Canada, Mexico, Belarus, Cuba, North Korea, or Russia were exempt from tariffs initiated in April 2025 under IEEPA. 90 FR 15041, April 7, 2025. See also HTS headings 9903.01.25 to 9903.01.27 and 9903.01.29 and U.S. note 2(v) to subchapter 3 of chapter 99 and related tariff provisions for this duty treatment. USITC, HTS (2026) Revision 4, Publication 5711, February 2026, pp. 99.3.4 to 99.3.41 and 99.3.375 to 99.3.376.

¹¹⁴ 90 FR 15041, April 7, 2025; 90 FR 37963, August 6, 2025. See also HTS heading 9903.01.25 and U.S. note 2(v) to subchapter 3 of chapter 99 and related tariff provisions for this duty treatment USITC, HTS (2026) Revision 4, Publication 5711, February 2026, pp. 99.3.4 to 99.3.41 and 99.3.375.

¹¹⁵ Individualized country duties as part of tariffs initiated in April 2025 under IEEPA for all countries other than China were suspended April 10, 2025, until August 7, 2025. 90 FR 15041, April 7, 2025; 90 FR 15625, April 15, 2025; 90 FR 30823, July 10, 2025; 90 FR 37963, August 6, 2025. See also HTS headings 9903.01.25 and 9903.01.43 to 9903.01.76 and U.S. note 2(v) to subchapter 3 of chapter 99 and related tariff provisions for this duty treatment. USITC, HTS (2026) Revision 4, Publication 5711, February 2026, pp. 99.3.4 to 99.3.41 and 99.3.375 to 99.3.385.

¹¹⁶ 90 FR 37963, August 6, 2025. See also HTS headings 9903.01.25 and 9903.01.43 to 9903.01.76 and U.S. note 2(v) to subchapter 3 of chapter 99 and related tariff provisions for this duty treatment. USITC, HTS (2026) Revision 4, Publication 5711, February 2026, pp. 99.3.4 to 99.3.41 and 99.3.375 to 99.3.385.

2025.¹¹⁷ Effective February 20, 2026, tariffs initiated under IEEPA and the associated duties imposed under IEEPA were terminated.¹¹⁸

Table 1.5 CSPV cells and modules: Tariffs initiated in April 2025 under IEEPA

Duty rates in percent ad valorem

Country	Effective: April 9 to 10, 2025	Effective: August 7, 2025, to February 20, 2026
Afghanistan	10	15
Algeria	30	30
Angola	32	15
Bangladesh	37	20
Bolivia	10	15
Bosnia and Herzegovina	35	30
Botswana	37	15
Brazil	10	10
Brunei	24	25
Cambodia	49	19
Cameroon	11	15
Chad	13	15
Costa Rica	10	15
China (including Hong Kong and Macau)	84 from April 9 to 10, 2025; 125 from April 10 to May 14, 2025; 10 percent May 14, 2025, to February 20, 2026	
Cote d'Ivoire	21	15
Democratic Republic of the Congo	11	15
Ecuador	10	15
Equatorial Guinea	13	15
European Union	20	15
Falkland Islands	41	10
Fiji	32	15
Ghana	10	15

¹¹⁷ On January 29, 2026, and January 30, 2026, the United States entered into agreements on reciprocal trade with El Salvador and Guatemala. Pursuant to those agreements, eligible products from El Salvador and Guatemala that entered into the United States under the rules of origin of the Dominican Republic-Central America - United States Free Trade Agreement (CAFTA-DR) were not subject to the additional duties under IEEPA. Office of the United States Trade Representative, “Joint Statement on Framework for United States–El Salvador Agreement on Reciprocal Trade,” January 29, 2026, p. 1.1, Annex 1, no. 4, <https://ustr.gov/sites/default/files/files/Press/Releases/2026/El%20Salvador%20Agreement%201.29%20FINAL.pdf>, Office of the United States Trade Representative, “Joint Statement on Framework for United States–Guatemala Agreement on Reciprocal Trade,” January 30, 2026, p. 1.1, Annex 1, no. 4, <https://ustr.gov/sites/default/files/files/Press/Releases/2026/Guatemala%20ART%201.30%20for%20posting%20CLEAN.pdf>.

¹¹⁸ 91 FR 9437, February 25, 2026.

Country	Effective: April 9 to 10, 2025	Effective: August 7, 2025, to February 20, 2026
Guyana	38	15
Iceland	10	15
India	26	25
Indonesia	32	19
Iraq	39	35
Israel	17	15
Japan	24	15
Jordan	20	15
Kazakhstan	27	25
Laos	48	40
Lesotho	50	15
Libya	31	30
Liechtenstein	37	15
Madagascar	47	15
Malawi	17	15
Malaysia	24	19
Mauritius	40	15
Moldova	31	25
Mozambique	16	15
Myanmar (Burma)	44	40
Namibia	21	15
Nauru	30	15
New Zealand	10	15
Nicaragua	18	18
Nigeria	14	15
North Macedonia	33	15
Norway	15	15
Pakistan	29	19
Papua New Guinea	10	15
Philippines	17	19
Serbia	37	35
South Africa	30	30
South Korea	25	15
Sri Lanka	44	20
Switzerland	31	39 percent effective August 7, 2025; effective November 14, 2025, 15 percent
Syria	41	41
Taiwan	32	20
Thailand	36	19
Trinidad and Tobago	10	15
Tunisia	28	25
Turkey	10	15

Country	Effective: April 9 to 10, 2025	Effective: August 7, 2025, to February 20, 2026
Uganda	10	15
United Kingdom	10	10
Vanuatu	22	15
Venezuela	15	15
Vietnam	46	20
Zambia	17	15
Zimbabwe	18	15
Others	10	10

Source: Federal Register notices and other sources cited in this section (Tariff treatment).

Note: Afghanistan, Bolivia, Brazil, Costa Rica, Ecuador, Ghana, Iceland, New Zealand, Papua New Guinea, Trinidad and Tobago, Turkey, Uganda, and the UK were not assigned individualized country duty rates in April 2025 and remained subject to the 10 percent duty rate for tariffs initiated in April 2025 under the IEEPA until August 2025.

The product

Description and applications¹¹⁹

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. 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).

¹¹⁹ 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 to 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 May 19, 2026.

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

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

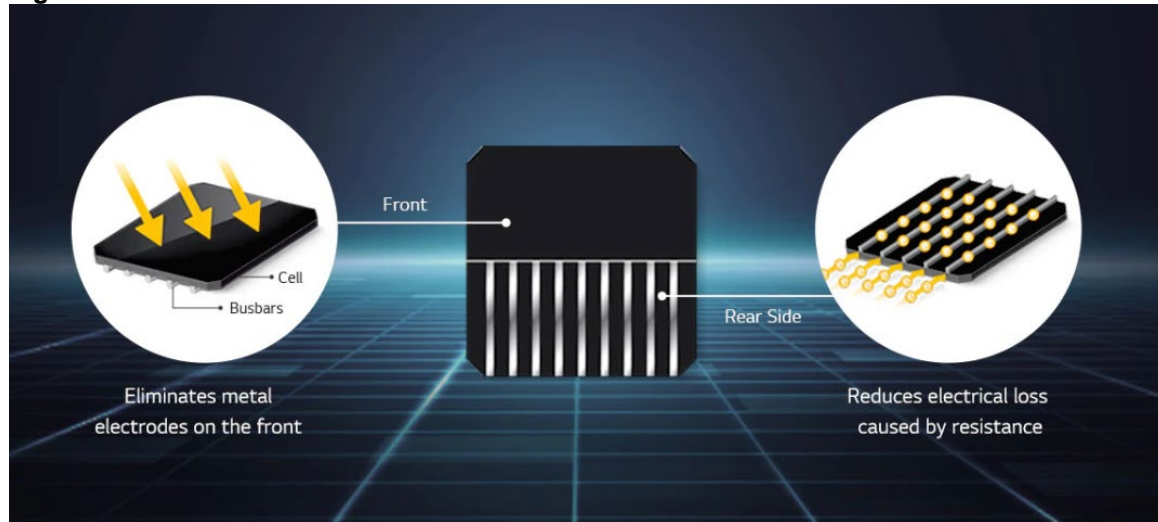
Wafer Size Comparison M0 - M12



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

CSPV cells have a positive layer, a negative layer, and a positive-negative junction (p/n junction). Electricity is generated when sunlight strikes the CSPV cell, knocking electrons loose that flow onto thin metal “fingers” that run across the CSPV cell and conduct electricity to the busbars.¹²⁰ 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

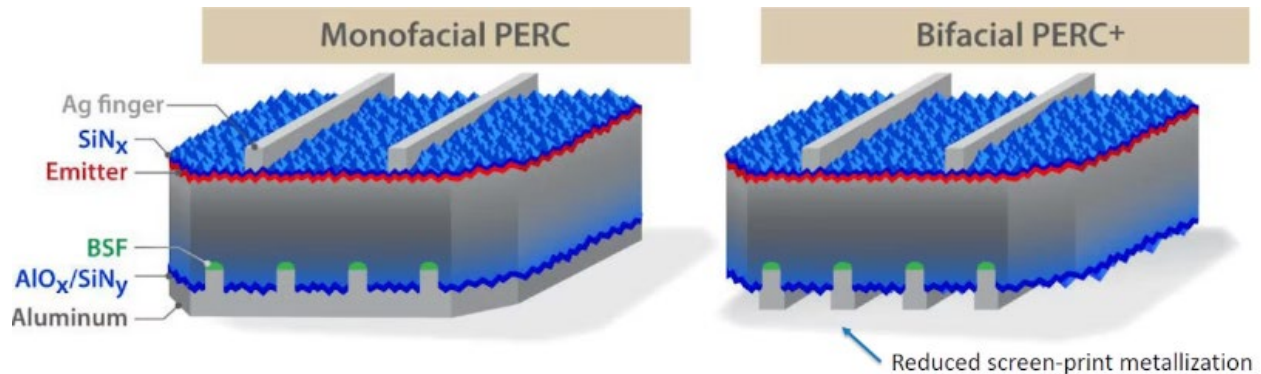


Source: Solar Analytica, “Report: LG Neon R,” May 6, 2023, <https://solaranalytica.com/lg-neon-r-report/>.

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 (“HJT”) technologies, discussed later in this section.

¹²⁰ 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.

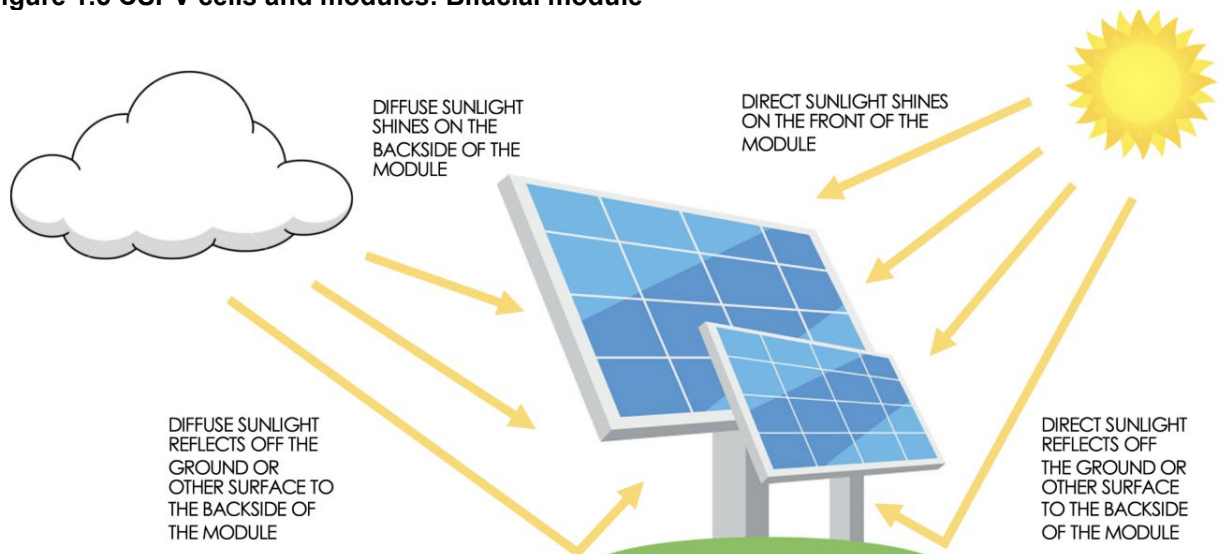
Figure 1.4 CSPV cells and modules: Monofacial and bifacial cell design



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).

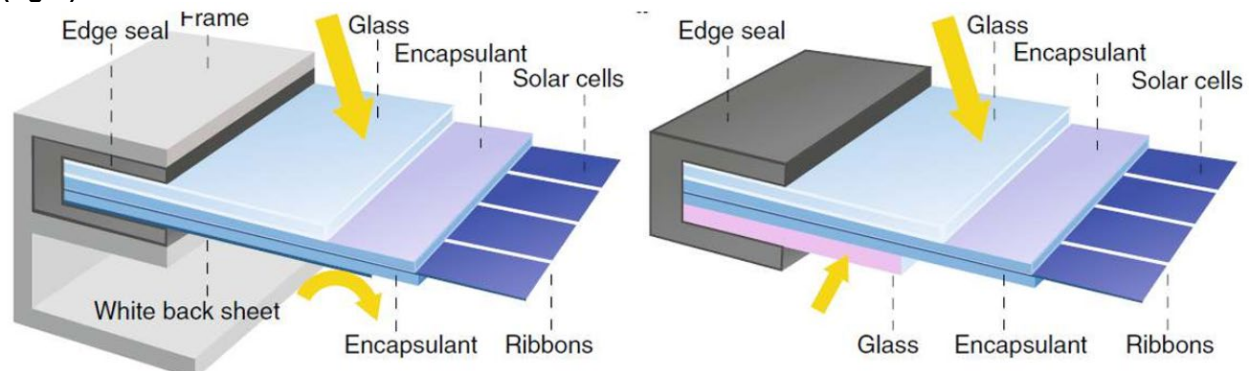
Figure 1.5 CSPV cells and modules: Bifacial module



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.

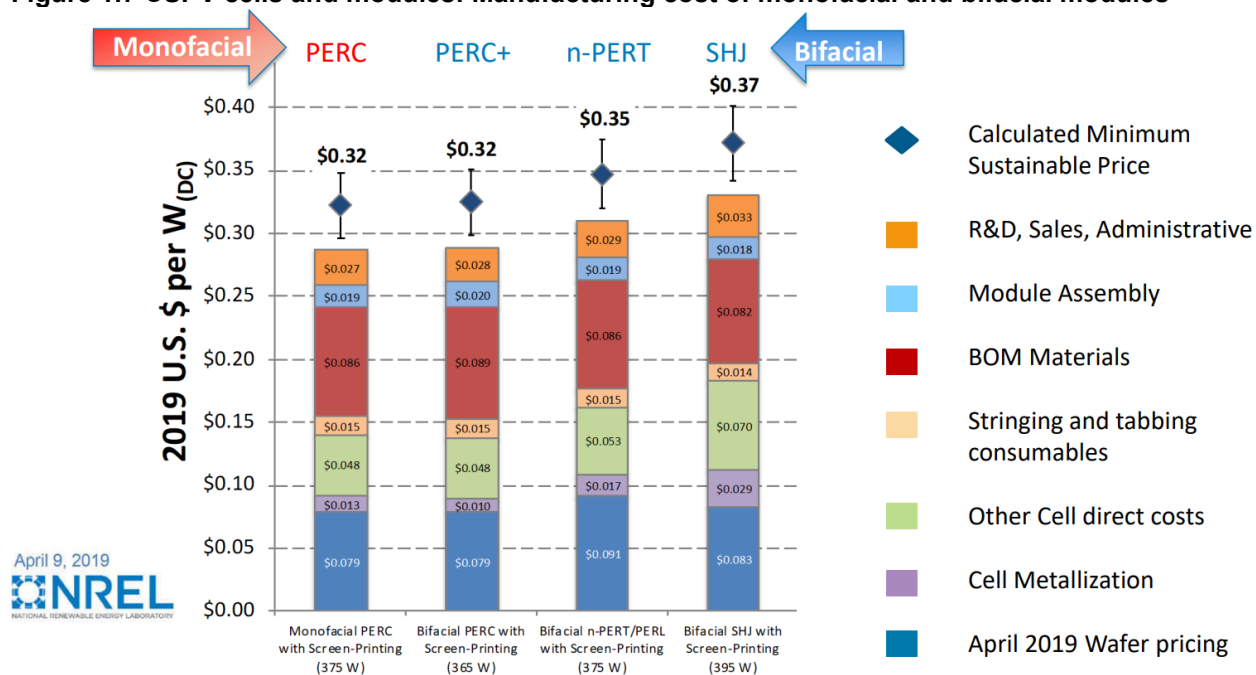
Figure 1.6 CSPV cells and modules: Assembly of monofacial module (left) and bifacial module (right)



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.

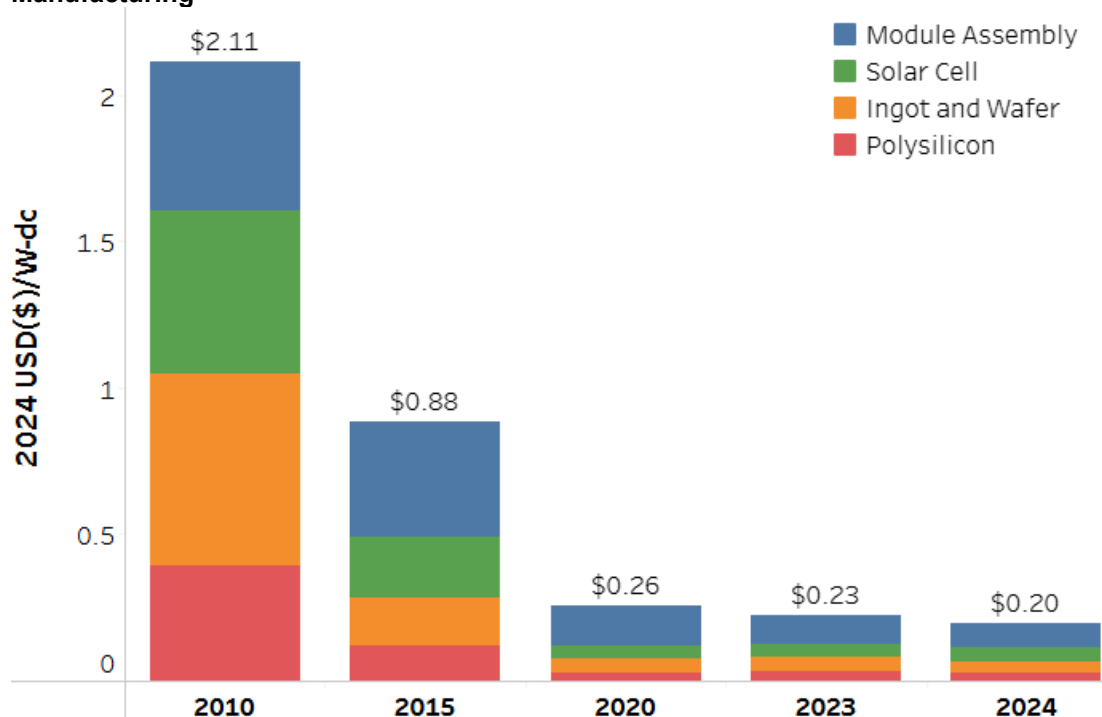
Monofacial and bifacial modules have moved closer to cost parity in recent years (figure 1.7), and manufacturers who have switched from assembling monofacial modules to bifacial modules have had to make a few adjustments to their production lines, such as replacing the traditional back sheet with glass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

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.¹²¹

Monocrystalline and multicrystalline cells commonly use PERC and related technologies.¹²² 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.”

¹²¹ Conversion efficiency is the percent of sunlight that is converted to electricity.

¹²² Related technologies include Passivated Emitter Rear Totally Diffused (PERT) and Passivated Emitter Rear Locally Diffused (PERL).

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 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).¹²³ 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.¹²⁴ 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).

¹²³ Some CSPV modules do not use a frame, which reduces costs. These modules typically use glass as the rear layer to ensure mechanical stability.

¹²⁴ 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/webinars/filling-in-the-gaps-the-evolution-of-high-density-module-design/>.

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.

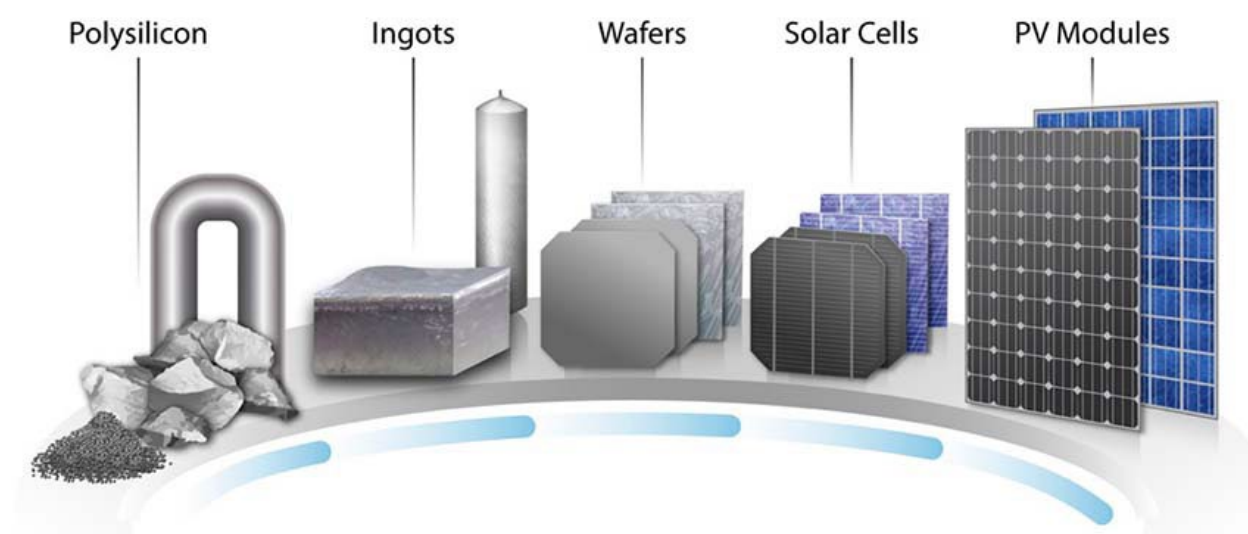
Manufacturing processes¹²⁵

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

¹²⁵ 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 to 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 the majority of polysilicon used in solar cells, and fluidized bed reactor (“FBR”) technology, which accounts for most of the remaining market.¹²⁶

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

¹²⁶ In 2024, granular polysilicon manufactured using the FBR process accounted for approximately 14 percent of total polysilicon output in China. IEA, *Trends in Photovoltaic Applications 2025*, accessed May 19, 2026, p. 55, [IEA-PVPS Trends 2025-.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.

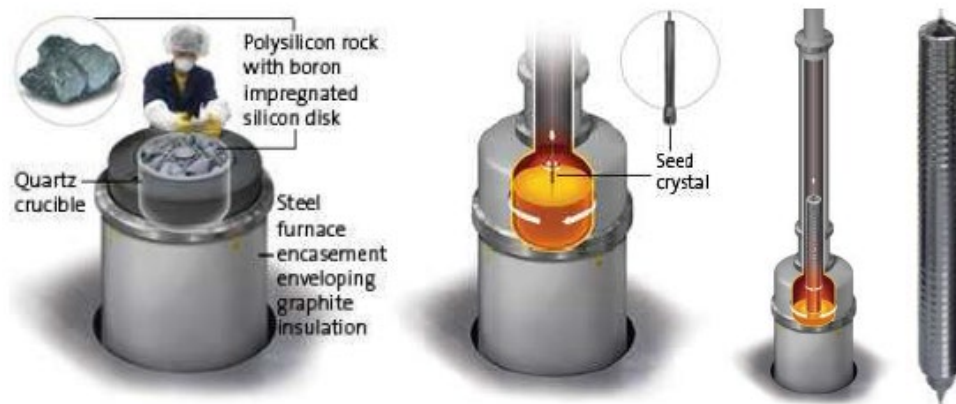
Instead of inserting rods, FBR uses seed granules of purified silicon. The seed granules are fed into a chamber that has heated silane gas entering from below and exiting above. The flow of gas ‘fluidizes’ the silicon granules, causing them to flow like a liquid, as the silane gas breaks down and deposits 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

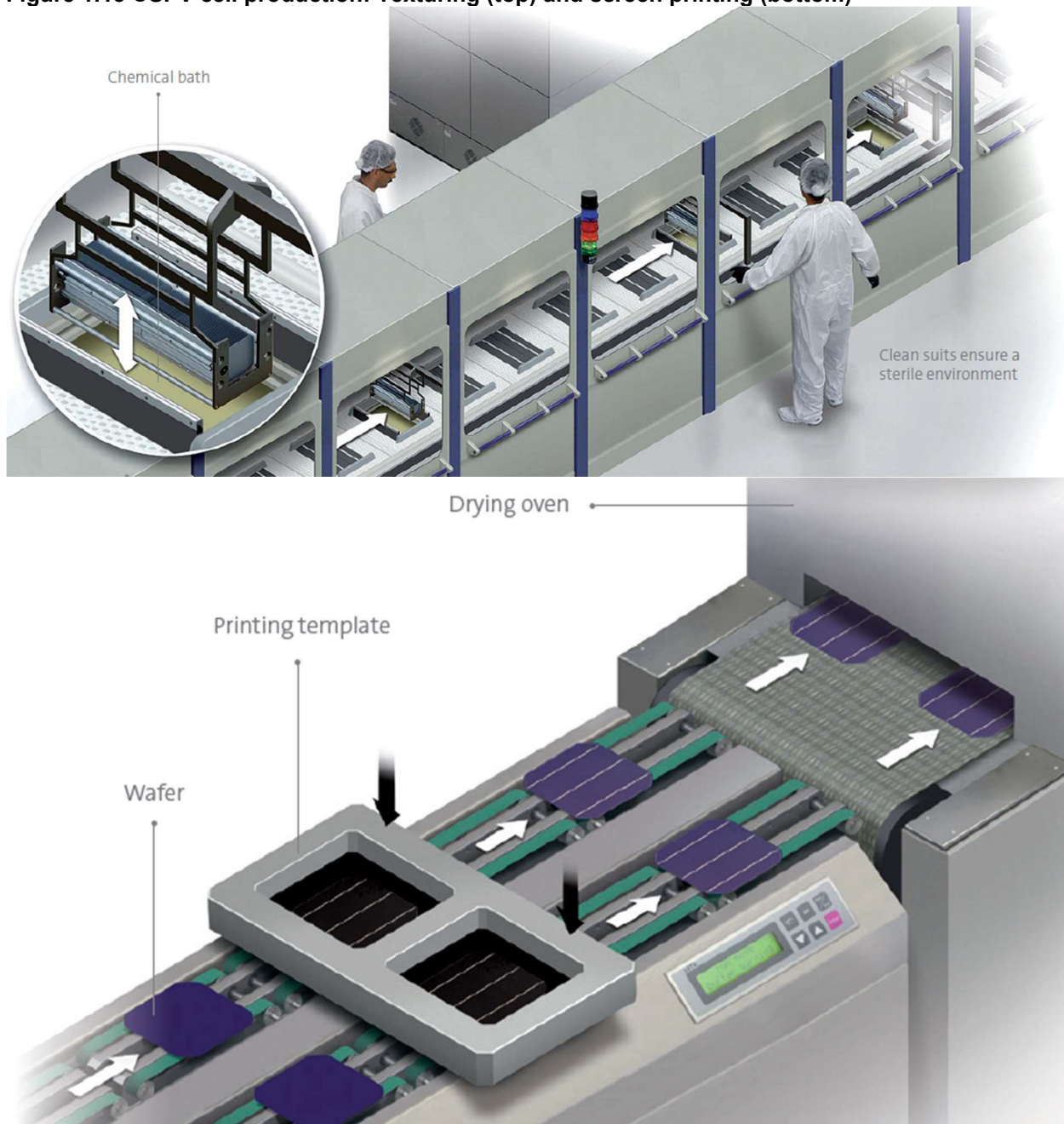
The monocrystalline and multicrystalline wafers, which are 180 to 200 micrometers thick, are next processed into CSPV cells.¹²⁷ CSPV cell production is capital intensive and requires a skilled workforce. Some firms use a highly automated manufacturing process, while others mix automation and manual labor in their production processes. The main steps in CSPV cell production are as follows:¹²⁸

- **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.

¹²⁷ The cell manufacturing process varies by company and technology.

¹²⁸ 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.

Global Developments

Global Industry

According to the International Energy Agency, global PV cell production (including out-of-scope thin film products) increased from 644 GW in 2023 to 753 GW in 2024. China is by far the largest producer of PV cells, accounting for 90.1 percent of global production during 2024, followed by Malaysia (2.5 percent), Vietnam (2.1 percent), and Thailand (2.0 percent). Based on 2024 production volumes, the top manufacturers of PV cells include Tongwei Solar (89.1 GW), Jinko Solar (81.3 GW), JA Solar Technology (70.4 GW), LONGi Green Energy Technology (60.8 GW), and Trina Solar (59.4 GW).

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, and was estimated to account for approximately 70 percent of global production in 2025. This share is projected to grow to nearly 90 percent by 2035.

Global PV module production increased from 612 GW in 2023 to 726 GW in 2024. China is the largest producer of PV modules, accounting for 86.5 percent of global production during 2024, followed by India (3.3 percent), the United States (3.2 percent), and Vietnam (2.5 percent). Based on 2024 production volumes, the top manufacturers of PV module include Jinko Solar (89.8 GW), JA Solar Technology (72.1 GW), LONGi Green Energy Technology (70.2 GW), Trina Solar (66.0 GW), and Tongwei Group (50.0 GW).

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, and was estimated to account for approximately 65 percent in 2025. This share is projected to grow to nearly 85 percent by 2035.¹²⁹

¹²⁹ 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 2035 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>.

Global exports

Global exports of PV cells and modules (including out-of-scope thin film products) decreased by 37.9 percent during 2023 to 2025, from \$70.2 billion in 2023 to \$43.6 billion in 2025. China was the largest global exporter of CSPV cells and modules in 2025, with exports totaling \$28.2 billion, or 64.7 percent of total exports by value (table 1.6). After China, the next largest global exporters in 2025 were Indonesia (with exports totaling \$3.2 billion, or 7.2 percent of total exports), the Netherlands (with exports totaling \$3.1 billion, or 7.1 percent of total exports), and Thailand (with exports totaling \$1.4 billion, or 3.1 percent of total exports).¹³⁰

¹³⁰ Official exports statistics from Vietnam under HS subheadings 8541.42 and 8541.43 are not available for 2025. 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 1.6 PV cells and modules: Global exports, by reporting country and by period

Value in 1,000 dollars; share of value in percent

Exporting country	Measure	2023	2024	2025
United States	Value	93,436	67,298	86,876
China	Value	43,681,408	30,598,704	28,199,518
Indonesia	Value	254,305	644,503	3,155,727
Netherlands	Value	8,042,436	4,436,174	3,096,626
Thailand	Value	4,237,808	2,664,564	1,357,330
India	Value	1,836,433	1,551,978	1,261,470
Malaysia	Value	4,165,078	2,423,175	969,303
Singapore	Value	520,433	331,176	796,711
Slovenia	Value	546,566	585,665	634,381
Belgium	Value	859,194	551,527	623,583
South Korea	Value	1,159,182	682,117	526,251
All other exporters	Value	4,803,631	3,149,396	2,875,234
All reporting exporters	Value	70,199,908	47,686,278	43,583,010
United States	Share of value	0.1	0.1	0.2
China	Share of value	62.2	64.2	64.7
Indonesia	Share of value	0.4	1.4	7.2
Netherlands	Share of value	11.5	9.3	7.1
Thailand	Share of value	6.0	5.6	3.1
India	Share of value	2.6	3.3	2.9
Malaysia	Share of value	5.9	5.1	2.2
Singapore	Share of value	0.7	0.7	1.8
Slovenia	Share of value	0.8	1.2	1.5
Belgium	Share of value	1.2	1.2	1.4
South Korea	Share of value	1.7	1.4	1.2
All other exporters	Share of value	6.8	6.6	6.6
All reporting exporters	Share of value	100.0	100.0	100.0

Source: Official exports statistics under HS subheadings 8541.42 and 8541.43 as reported by various national statistical authorities in the Global Trade Atlas Suite database, accessed April 28, 2026.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—". United States is shown at the top followed by the top exporting countries in descending order of 2025 data.

Country profiles

China

China is the largest global producer of PV cells and modules (including out-of-scope thin film products) by a wide margin, accounting for the large majority of total production in both sectors. China's capacity to produce PV cells increased from 930 GW in 2023 to approximately 1,302 GW in 2024, or approximately 91 percent of the global total.¹³¹ During 2023 to 2024, Chinese PV module capacity increased from 920 GW to 1,156 GW, and Chinese PV module production increased from 510 GW to 627 GW.¹³²

In 2025, Chinese exports of PV cells (including out-of-scope thin film) were valued at approximately \$4.5 billion, while exports of PV modules (including out-of-scope thin film) were valued at \$23.7 billion.¹³³ The top five export destinations in 2025, by value, for PV cells were India (44.0 percent), Indonesia (22.8 percent), Turkey (8.3 percent), Philippines (3.6 percent), and Laos (2.7 percent).¹³⁴ The top five export destinations in 2025, by value, for PV modules were the Netherlands (13.4 percent), Pakistan (6.8 percent), Brazil (5.5 percent), India (4.0 percent), and the United Arab Emirates (3.9 percent).¹³⁵

Southeast Asia

After China, countries in Southeast Asia have the next largest share of global PV cell production in 2024: Malaysia (2.5 percent), Vietnam (2.1 percent), and Thailand (2.0 percent), India (0.7 percent). In 2024, Vietnam produced approximately 20 GW of modules, followed by Thailand with around 10 GW, and Malaysia with about 7 GW.¹³⁶

India

After Thailand, India has the next largest share of global PV cell production in 2024 at 0.7 percent. Cell production capacity was reported to have reached 27 GW in 2025, and annual

¹³¹ IEA, *Trends in Photovoltaic Applications 2025*, accessed May 19, 2026, p. 57, [IEA-PVPS Trends 2025-.pdf](#).

¹³² IEA, *Trends in Photovoltaic Applications 2025*, accessed May 19, 2026, p. 58, [IEA-PVPS Trends 2025-.pdf](#).

¹³³ Official exports statistics under HS subheadings 8541.42 and 8541.43 for China from China's customs as reported in the Global Trade Atlas Suite database, accessed May 20, 2026.

¹³⁴ Official exports statistics under HS subheading 8541.42 for China from China's customs as reported in the Global Trade Atlas Suite database, accessed May 20, 2026.

¹³⁵ Official exports statistics under HS subheading 8541.43 for China from China's customs as reported in the Global Trade Atlas Suite database, accessed May 20, 2026.

¹³⁶ IEA, *Trends in Photovoltaic Applications 2025*, accessed May 19, 2026, p. 58, [IEA-PVPS Trends 2025-.pdf](#).

capacity is forecasted to grow to 120 GW by 2030.¹³⁷ In 2024, India produced 24 GW of PV modules. In 2025, India added approximately 119 GW of solar module capacity, bringing its total cumulative module production capacity to about 210 GW.¹³⁸

Table 1.7 presents events in CSPV industries in Southeast Asia and India since 2023.

Table 1.7 CSPV cells and modules: Important industry events in Southeast Asia since 2023

Item	Firm	Event
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.

¹³⁷ PV Magazine, [India's PV module manufacturing capacity tops 210 GW – pv magazine International](#), March 18, 2026; IEA, *Trends in Photovoltaic Applications 2025*, accessed May 19, 2026, p. 57, [IEA-PVPS Trends 2025-.pdf](#).

¹³⁸ PV Magazine, [India's PV module manufacturing capacity tops 210 GW – pv magazine International](#), March 18, 2026.

Item	Firm	Event
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.
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 (India)	Eastman Auto & Power	In March 2026, Solarium Green Energy began production at its 800 MW manufacturing plant in the Indian state of Haryana.
Plant opening (India)	Solarium Green Energy	In March 2026, Solarium Green Energy commissioned a fully automated 1 GW module manufacturing plant in the Indian state of Gujarat. It will produce TOPCon modules of up to 725 W.
Plant opening (India)	RenewSys India	In March, 2026 RenewSys opened a 3 GW module production plant in the Indian state of Maharashtra, bringing the manufacturer's total annual capacity to 5.6 GW.
Plant opening (India)	Premier Energies Ltd	In March 2026, Premier Energies Ltd began trial production at its 5.6 GW module manufacturing facility in the Indian state of Telangana. The facility produces TOPCon modules and brings the company's total solar module production capacity to 10GW.
Plant opening (India)	Aroma Solar	In April 2026, Aroma Solar, opened a 1.2 GW TOPCon module facility in the northern Indian state of Haryana. The facility will produce modules rated at 620 W to 635 W.
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)	PT Bintan Cellular Indonesia (BCI)	In the fourth quarter of 2024, BCI, a subsidiary of China's Sichuan Yingfa Ruineng Technology, began production of N-type TOPCon cells at its 7GW manufacturing facility in the Bintan Special Economic Zone, Riau Islands Province.
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,

Item	Firm	Event
		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.
Project termination (Vietnam)	JinkoSolar	In March 2026, JinkoSolar formally terminated its 4GW solar cell project in Vietnam, pointing to antidumping duty orders issues on CSPV cells from Vietnam in June 2025.

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 plant 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/>; PV Magazine, [Eastman launches 800 MW solar module plant in India – pv magazine International](#), March 12, 2026; PV Magazine, [Solarium commissions 1 GW solar module plant in India – pv magazine International](#), March 19, 2026; PV Magazine, [RenewSys inaugurates 3 GW solar module plant in India – pv magazine International](#), March 17, 2026; PV Magazine, [Premier Energies commissions 5.6 GW solar module facility in India – pv magazine International](#), March 31, 2026; PV Magazine, [Aroma Solar launches 1.2 GW module factory in India – pv magazine International](#), April 7, 2026; NE Solar, "NE Solar Indonesian factory will be completed in August 2023," May 9, 2023, <http://www.nesolar.com.kh/?content/176>; Petromindo, [Yingfa Ruineng Technology expands solar cell production capacity in Indonesia - Yingfa Ruineng Technology expands solar cell production capacity in Indonesia](#), August 21, 2025; 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 May 19, 2026, <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/>; PV Magazine, [JinkoSolar drops Vietnam solar manufacturing project – pv magazine International](#), March 31, 2026.

Note: See Description and applications in Part 1 of this report for a description of TOPCon, n-type, and PERC cell technologies.

Figures 1.14 and 1.15 present solar supply chain maps for major cells and modules factories in Southeast Asia and India as of June 2025, their current manufacturing capacity, and planned manufacturing capacity projections through 2027, respectively.

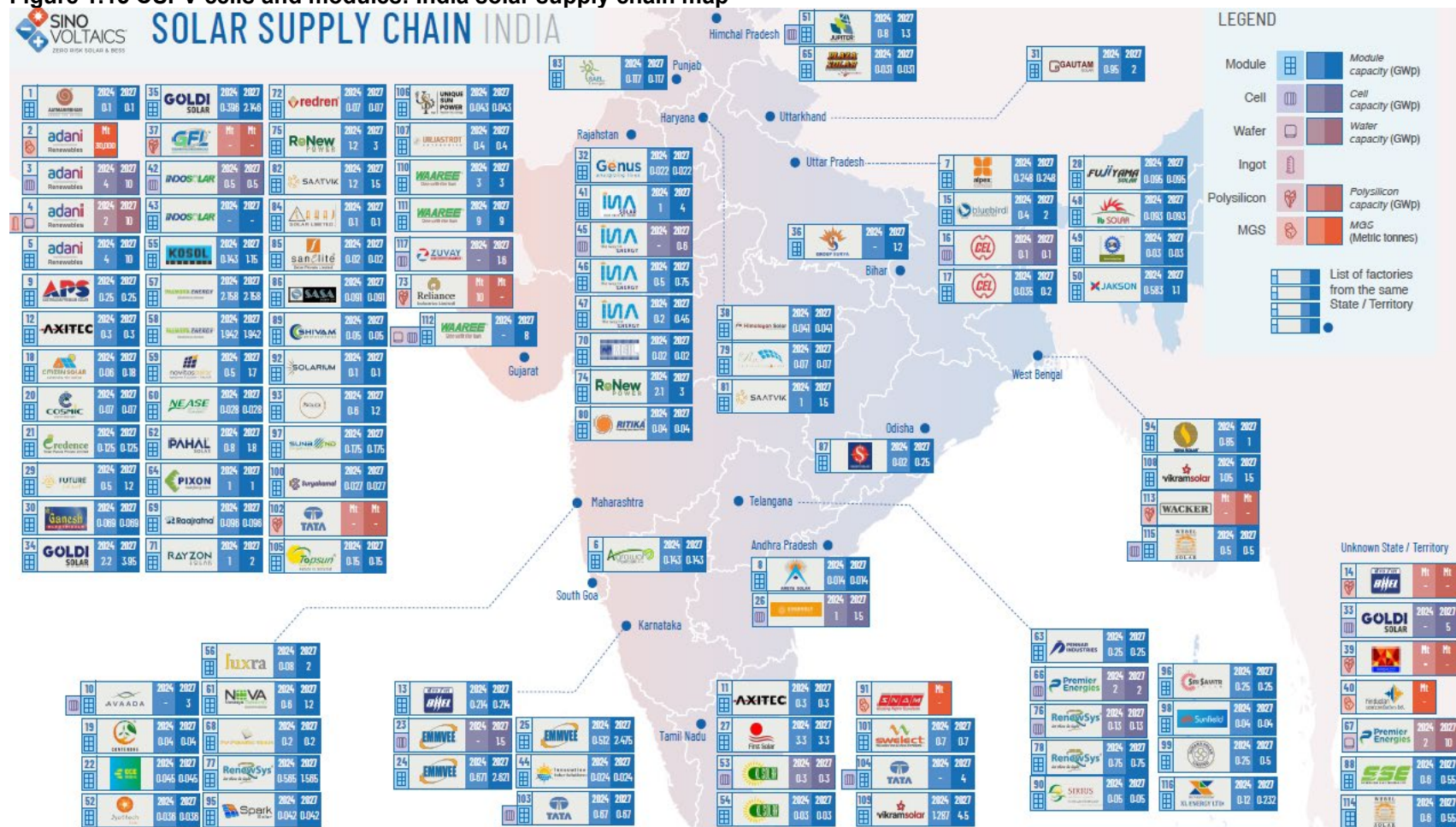
Figure 1.14 CSPV cells and modules: Southeast Asia solar supply chain map



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 1.15 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.

Global trade actions

Table 1.8 provides information on trade remedy actions on CSPV cells and modules and related products in third-country markets.

Table 1.8 CSPV cells and modules: Third-country trade remedy actions, 2014 to 2023

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.
January 2016	Canada imposed AD/CVD duties on CSPV modules from China
January 2016	EU imposed antidumping (AD) duties on CSPV cells and modules from China.
January 2016	China imposed AD and countervailing (CVD) duties on polysilicon (HTS 2804.61) from the EU, Korea, and the United States.
February 2016	Conclusion of EU anti-circumvention investigation and extension of duties to certain companies in Malaysia and Taiwan.
October 2016	Australia terminated an AD investigation on module imports from China.
April 2017	Turkey imposed AD duties on modules from China, with rates ranging from \$20 - \$25 per square meter.
April 2017	Korea imposed AD duties on PET film (HTS 3920.90) from Chinese Taipei, Thailand, and the United Emirates.
August 2017	India imposed duties on glass for PV modules from China.
September 2017	EU announced that it would progressively reduce minimum import prices.
November 2017	China adjusts AD duties on polysilicon (HTS 2804.61) from Korea from 4.4 percent to 113.8 percent.
December 2017	Indonesia initiated a sunset review on biaxially oriented polypropylene (BOPP) (HS 3920.20.10, 3920.20.91, 3920.20) from Thailand and Vietnam. Quota limits were placed on Biaxially Oriented Polypropylene from Thailand.
February 2018	Brazil initiated anti-dumping investigations on polyethylene terephthalate films from the Kingdom of Bahrain and Peru. AD duties of \$480.15/ton on imports from the Kingdom of Bahrain and \$123.20/ton on imports from Peru were effective January 7, 2019.
March 2018	Indian Solar Manufacturers Association withdrew an AD petition.
April 2018	India initiated an AD investigation on ethyl vinyl acetate sheet for solar modules (HTS 3901, 3920, 3921) from China. Anti-dumping duties on China were enforced March 29, 2019.
May 2018	The EU initiated an AD investigation on solar glass (HS 7007.19) from Malaysia.
June 2018	India initiated AD and CVD investigations on textured tempered coated and uncoated glass (7007.19) from Malaysia. On February 26, 2019, India imposed duties of \$114.58 per MT.
July 2018	India imposed safeguard duties on solar cells and modules. Developing countries except China and Malaysia, were exempt. The duties include 25 percent in the first year, 20 percent for the first six months of the second year and 15 percent thereafter.
September 2018	EU terminated measures on cells and modules from China.
November 2018	China duties on polysilicon (HS 2804.61) imports from the EU expired.

Date	Trade remedy action
January 2019	China initiated a sunset review of polysilicon (HTS 2804.61) imports from Korea and the United States. AD/CVD measures against Korea and the United States were continued.
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.
August 2019	Indonesia initiated AD investigations on BOPP (HTS 3920.20.10, 3920.20.91, 3920.20) from China and Malaysia.
January 2020	China imposed a 5-year extension on AD duties on imports of solar-grade polysilicon from Korea and the United States.
July 2020	India reviewed the safeguard duty on PV solar cells and modules and granted a one-year extension for products imported from China, Thailand, and Vietnam. Malaysian products were exempted from the safeguard duties.
July 2020	EU extended AD duties on imports of solar glass from China.
March 2021	India announced that it would impose a basic customs duty of 25 percent on PV cells and 40 percent on PV modules, effective April 1, 2022.
September 2022	India announced that no measure would be imposed on solar cells from China, Thailand, Vietnam, as the investigation was terminated.
September 2024	Turkey imposed antidumping duties on imports of solar panels on Croatia, Jordan, Malaysia, Thailand, and Vietnam. Imports from these countries were found to be circumventing the \$20 per square meter duty imposed on Chinese solar modules.
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: Second Monitoring publication, pp. I-61—I-62; World Trade Organization, Trade Remedies Data Portal, accessed May 19, 2026, <https://trade-remedies.wto.org/en>; World Trade Organization, [Semi-annual Report Under Article 16.4 of the Agreement](#), March 4, 2026, p. 46; 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>.

Summary data and data sources

Except as noted, U.S. industry data are based on questionnaire responses of thirteen firms that accounted for the majority of U.S. production of CSPV products during 2025. U.S. imports are based on official U.S. import statistics and responses to Commission questionnaires.¹

¹ The Commission sent U.S. importer questionnaires to 170 firms believed to be importers of CSPV products, and 43 firms submitted responses on narrative questions related to the effects of the safeguard measure, anticipated changes in operations, and efforts since implementation of safeguard measures. In addition, this report presents data from 44 firms that provided responses to U.S. importers' questionnaire in the CSPV4 final phase investigations.

U.S. market participants

U.S. producers

The Commission issued U.S. producers' questionnaires to 23 firms, fourteen² of which provided the Commission with information on their CSPV products operations in 2025.³ These firms are believed to account for the majority of all U.S. production of CSPV products in 2025. Tables 1.9 lists U.S. producers of CSPV cells and CSPV modules and the share of total U.S. production in 2025.

Table 1.9 CSPV cells and modules: U.S. producers, their location of production, and share of reported production, 2025

Share of production in percent

Firm	Production location(s)	Share of cell production	Share of module production
AMPS	Tolleson, AZ	***	***
Canadian Solar	Mesquite, TX	***	***
Hanwha GA	Dalton, GA Cartersville, GA	***	***
Heliene	Mountain Iron, MN Rogers, MN	***	***
Hounen Solar	Orangeburg, SC	***	***
Illuminate	Pataskala, OH	***	***
Mission Solar	San Antonio, TX	***	***
PowerFilm	Ames, IA	***	***
Runergy	Huntsville, AL	***	***
SEG Manufacturing	Houston, TX	***	***
Silfab Solar	Burlington, WA Fort Mill, SC Fort Mill, SC	***	***
Suniva	Norcross, GA	***	***
T1 Energy	Wilmer, TX	***	***
Waaree Solar	Brookshire, TX	***	***
All firms	Various	100.0	100.0

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

² *** did not report capacity or production data for 2025. ***, reported that they did not produce CSPV products in the United States since January 1, 2023.

³ This report presents data provided in responses to U.S. producers' questionnaires in the final phase of investigations for CSPV4. The Commission received a late U.S. producer questionnaire response from Tesla, Inc. which is not included in this report. Tesla reported that it produced ***, equivalent to less than *** percent of total U.S. production in any single year between 2023 and 2025.

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

U.S. importers

The Commission issued U.S. importers' questionnaires to 170 firms believed to be possible importers of CSPV products, including all U.S. producers of CSPV products. Usable questionnaire responses were received from 44 firms, representing approximately 66.0 percent of all U.S. imports of CSPV products during 2025.^{4 5} Table 1.10 presents U.S. importers of CSPV cells and modules, their location, and share of total imports in 2025.

Table 1.10 CSPV cells and modules: U.S. importers, their headquarters, and share of total imports within a given source by firm, 2025

Shares in percent

Firm	Headquarters	India	Indonesia	Laos	Recent order sources	All other sources	All import sources
Acciona	Chicago, IL	***	***	***	***	***	***
BYD	Pasadena, CA	***	***	***	***	***	***
Canadian (USA)	Walnut Creek, CA	***	***	***	***	***	***
Energon	Houston, TX	***	***	***	***	***	***
First Solar	Phoenix, AZ	***	***	***	***	***	***
Hanwha America	Irvine, CA	***	***	***	***	***	***
Hanwha Dalton	Dalton, GA	***	***	***	***	***	***
Hanwha USA	Irvine, CA	***	***	***	***	***	***
Hanwha White	White, GA	***	***	***	***	***	***
Heliene	Sault Ste. Marie, ON	***	***	***	***	***	***
Hounen SC	Orangeburg, SC	***	***	***	***	***	***
Hounen Solar CA	Chino, CA	***	***	***	***	***	***
Hyundai	Seongnam-si, Gyeonggi-do, South Korea	***	***	***	***	***	***

⁴ Coverage is based on staff research and adjusted official U.S. import statistics. The Commission presented U.S. import data from official U.S. import statistics in the prehearing report, along with U.S. importers' narratives regarding the effect of the tariff rate quota imposed by the President effective February 7, 2018, anticipated changes in operations, (including imports, shipments of imports, or inventories of CSPV products), and whether the firm made any efforts to increase product availability to customers. In this report, U.S. import data was collected through questionnaire responses in the final phase investigations of CSPV cells and modules from India, Indonesia, and Laos (Inv. Nos. 701-TA-772-774 and 731-TA-1756-1758).

⁵ Moreover, the following firms submitted responses certifying that they had not imported CSPV products since January 1, 2023: ***. Also, *** reported that the firm was unable to provide a response due to bankruptcy proceedings in its headquarters in Singapore. Voice message from ***, Advisor for ***, April 22, 2026.

The Commission received a late U.S. importer questionnaire response from Tesla, Inc. which is not included in the dataset.

Firm	Headquarters	India	Indonesia	Laos	Recent order sources	All other sources	All import sources
Illuminate	Pataskala, OH	***	***	***	***	***	***
Independent Pump	Farmington, NM	***	***	***	***	***	***
Invenergy	Chicago, IL	***	***	***	***	***	***
JA Solar	San Jose, CA	***	***	***	***	***	***
JA Solar USA	San Jose, CA	***	***	***	***	***	***
JerryP	Albany, OR	***	***	***	***	***	***
LONGi	San Ramon, CA	***	***	***	***	***	***
Merlin	San Jose, CA	***	***	***	***	***	***
Mundra Solar Energy	Taluka Mundra, India	***	***	***	***	***	***
Mundra Solar PV	Ahmadabad, India	***	***	***	***	***	***
New Energy	Houston, TX	***	***	***	***	***	***
NextEra	Juno Beach, FL	***	***	***	***	***	***
Omni Pro	Addison, TX	***	***	***	***	***	***
Origis	Miami, FL	***	***	***	***	***	***
Orsini	Hong Kong, HK	***	***	***	***	***	***
PowerFilm	Ames, IA	***	***	***	***	***	***
Premier Energies	Hyderabad, India	***	***	***	***	***	***
PT Bintan Cellular	Kabupaten Bintan, Indonesia	***	***	***	***	***	***
REC Americas	San Luis Obispo, CA	***	***	***	***	***	***
Recurrent Energy	Austin, TX	***	***	***	***	***	***
Runergy	City of Industry, CA	***	***	***	***	***	***
SEG Manufacturing	Houston, TX	***	***	***	***	***	***
Solarmax	Riverside, CA	***	***	***	***	***	***
T1 Energy	Austin, TX	***	***	***	***	***	***
Talesun	Batam City, Thailand	***	***	***	***	***	***
Tech-Seal	Houston, TX	***	***	***	***	***	***
TXAM Pumps	Houston, TX	***	***	***	***	***	***
Vietnam Sunergy	Bac Ninh, Vietnam	***	***	***	***	***	***
Waaree Energies	Navsari, India	***	***	***	***	***	***
Workspport	West Seneca, NY	***	***	***	***	***	***
ZY International	Greenville, SC	***	***	***	***	***	***
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.

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. Over the course of the safeguard, the solar industry has been in part 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. It has also been characterized by changing policies on incentives for 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

As of 2025, the United States has the capacity to produce every major component of the solar supply chain.² While production capacity for modules is estimated to be large enough to meet domestic demand, upstream capacity is still underdeveloped, particularly with respect to ingots, wafers, and cells.³ Production capacity in the United States is estimated to be: 25 GW for polysilicon, 5 GW for ingots, 5 GW for wafers, 3.2 GW for cells, and 70 GW for modules. An additional 25.3 GW of cell production capacity is currently under construction, as well as an additional 3.3 GW for ingots and 3.3 GW for wafers.⁴

¹ See Part 3 for more information.

² Solar Energy Industries Association (SEIA), <https://seia.org/news/domestic-solar-manufacturing-booms-during-trump-administration-with-entire-solar-supply-chain-reshored/>, retrieved May 20, 2026.

³ SEIA, <https://seia.org/news/manufacturers-highlight-importance-of-domestic-production/>, retrieved May 21, 2026.

⁴ SEIA Solar & Storage Supply Chain Dashboard, <https://seia.org/research-resources/solar-storage-supply-chain-dashboard/>, retrieved May 21, 2026.

Supply and demand considerations

U.S. supply

Table 2.1 provides a summary of the supply factors regarding CSPV cells and modules from U.S. producers.

Table 2.1 CSPV cells and modules: Supply factors that affect the ability to increase shipments to the U.S. market

Quantity in kilowatts; ratios and shares in percent

Factor	Measure	United States
Cells: Capacity 2023	Quantity	***
Cells: Capacity 2025	Quantity	***
Cells: Capacity utilization 2023	Ratio	***
Cells: Capacity utilization 2025	Ratio	***
Cells: Inventories to total shipments 2023	Ratio	***
Cells: Inventories to total shipments 2025	Ratio	***
Cells: Home market shipments 2025	Share	***
Cells: Non-US export market shipments 2025	Share	***
Cells: Ability to shift production	Count	***
Modules: Capacity 2023	Quantity	***
Modules: Capacity 2025	Quantity	***
Modules: Capacity utilization 2023	Ratio	***
Modules: Capacity utilization 2025	Ratio	***
Modules: Inventories to total shipments 2023	Ratio	***
Modules: Inventories to total shipments 2025	Ratio	***
Modules: Home market shipments 2025	Share	***
Modules: Non-US export market shipments 2025	Share	***
Modules: Ability to shift production	Count	***

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

Note: For additional data on the number of responding firms and their share of U.S. production, please refer to Part 3.

Domestic production

Based on available information, U.S. producers have the ability to respond to changes in demand with small changes in the quantity of shipments of U.S.-produced CSPV 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 availability of domestic production capacity. The largest responding U.S. producer of cells, ***

since it restarted production in 2024.⁵ The main contributing factors to the high degree of responsiveness of supply in modules include the high availability of unused capacity, along with the rapid rate at which domestic production capacity for modules has increased.⁶ Factors mitigating responsiveness of supply of modules include the inability to shift shipments from alternate markets and limited ability to shift production from alternate products.

Supply constraints

Two of fourteen responding U.S. producers reported that they had experienced supply constraints since January 1, 2023. Of those that reported they had experienced supply constraints, none reported the constraints occurred during 2023, one firm (***) reported they occurred during 2024, and two firms (***) during 2025. *** reported that its capacity has been fully allocated *** while *** reported limited availability of domestically produced cells as its supply constraint.

U.S. demand

Demand for CSPV products is derived from the demand for solar electricity, which is influenced by factors such as cost competitiveness with traditional energy sources, environmental concerns, a desire for national energy independence, total energy consumption, and the availability of federal, state, and local incentives. According to the Solar Energy Industries Association (SEIA), U.S. solar electricity-generating capacity increased by 43.2 GW in 2025, reaching a year-end total of 279 GW, and is projected to reach 769 GW in 2036.⁷

⁵ See *** U.S. producer questionnaire response, section 4.19b. A majority (***) percent) of reported U.S. production capacity for cells in 2025 was reported by ***.

⁶ Reported U.S. production capacity for modules increased by *** percent between 2023 and 2025. For additional information regarding reported U.S. producer data see Part 3.

⁷ Solar accounted for 54 percent of all new electricity-generating capacity added to the US grid in 2025. U.S. Solar Market Insight, Wood Mckenzie and SEIA, <https://seia.org/research-resources/solar-market-insight-report-2025-year-in-review/>, retrieved May 19, 2026.

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 over the course of the safeguard measure. As shown in table 2.2, solar energy grew from 1.5 percent of utility-scale electricity generation in 2018 to 6.7 percent in 2025. The ERCOT grid, which covers most of Texas, is expected to account for 40 percent of total solar capacity additions in the United States this year, and the U.S. Energy Information Administration (EIA) estimates that in 2026 annual electric power generation from utility-scale solar in this grid will surpass that from coal for the first time.⁸

Table 2.2 CSPV cells and modules: Share of net electricity generation in the United States, by type and year

Share in percent

Electricity generation type	2018	2019	2020	2021
Natural gas	35.2	38.5	40.6	38.4
Nuclear	19.3	19.6	19.7	19.0
Coal	27.5	23.4	19.3	21.9
Wind	6.5	7.2	8.4	9.2
Solar	1.5	1.7	2.2	2.8
All other	10.0	9.7	9.8	8.7
All electricity generation types	100.0	100.0	100.0	100.0

Table continued.

Table 2.2 Continued 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	2025
Natural gas	39.9	43.2	43.4	40.8
Nuclear	18.2	18.5	18.1	17.7
Coal	19.7	16.1	15.1	16.6
Wind	10.3	10.1	10.5	10.5
Solar	3.4	4.0	5.1	6.7
All other	8.5	8.1	7.7	7.7
All electricity generation types	100.0	100.0	100.0	100.0

Source: EIA, <http://www.eia.gov/electricity/data/browser/>, retrieved June 26, 2026.

⁸ U.S. Energy Information Administration (EIA), <https://www.eia.gov/todayinenergy/detail.php?id=67685>, retrieved May 20, 2026.

Demand trends

Since the original safeguard investigation, firms have generally reported that demand for CSPV products has been increasing. In the original safeguard investigation, the vast majority of firms reported that U.S. demand for CSPV products increased during January 2012 to June 2017 due to a reduction in CSPV system prices; federal, state, and local incentive programs; and a general interest in renewable energy.⁹ Similarly, in the first monitoring report and extension report, majorities or pluralities of firms reported that U.S. demand for CSPV products increased since February 7, 2018 and that future demand for CSPV products will continue to increase across all sectors.¹⁰ During the second monitoring investigation, in which firms were asked to report on demand trends since 2020, a vast majority of firms reported that demand has increased for CSPV products within and outside of the United States.¹¹

U.S. producers and importers were asked how demand for CSPV cells and modules within the United States and outside of the United States has changed since January 1, 2023, with most responding firms reporting both domestic and foreign demand has increased (table 2.3). With respect to domestic demand, most firms generally cited to domestic content requirements from the Inflation Reduction Act (IRA) and increased energy demand as factors driving the increase in domestic demand. According to ***, U.S. solar installations have increased from about 30 GW in 2023 to over 50 GW in 2025 and are expected to further increase to 80 GW in 2027. With respect to demand outside of the United States, most firms cited to policy support for renewable energy in markets such as China, India, Europe, and the Middle East as key drivers of foreign demand.

Table 2.3 CSPV cells and modules: Count of firms' responses regarding overall domestic and foreign demand, by firm type

Share in percent

Market	Firm type	Steadily Increase	Fluctuate Up	No change	Fluctuate Down	Steadily Decrease
Domestic demand	U.S. producers	5	6	0	3	0
Domestic demand	Importers	20	15	4	3	1
Foreign demand	U.S. producers	3	4	3	1	0
Foreign demand	Importers	14	14	4	2	0

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

⁹ Safeguard publication, vol. II, p. V-11.

¹⁰ Monitoring 1 publication, p. II-17 and Extension publication, p. II-14.

¹¹ Monitoring 2 publication, pp. II-14 and II-15.

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

In the safeguard investigation of the covered merchandise, the Commission defined the domestic industry as all domestic producers of CSPV cells, whether or not partially or fully assembled into other products, consistent with its definition of the like or directly competitive domestic product.¹ The information in this section of the report was compiled from responses to the Commission's domestic producers' questionnaire by fourteen firms, which accounted for the majority of U.S. production of covered merchandise during 2025.²

U.S. developments

Table 3.1 presents events in the U.S. industry since January 1, 2022.

Table 3.1 CSPV products: Important industry events since 2022

Item	Firm	Event
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 an \$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.
Acquisition	Inox Clean Energy	In May 2026, India-based Inox Clean Energy announced the acquisition of Boviet Solar's North Carolina assets through its wholly owned subsidiary, Inox Solar Americas, LLC. The acquisition includes 3 GW of operational TOPCon solar module manufacturing capacity, along with an agreement to acquire another 3 GW of TOPCon cell manufacturing capacity expected to be commissioned by December 2026.

¹ Safeguard publication, vol. I, p. 18. In the safeguard investigation, the Commission defined a single domestic product corresponding to the imported products within the scope of the investigation that includes CSPV cells and CSPV modules. Safeguard publication, vol. I, p. 16. The term "domestic industry" is defined in section 202(c)(6)(A)(i) of the Trade Act, 19 U.S.C. § 2252(c)(6)(A)(i), as "the producers as a whole of the like or directly competitive article or those producers whose collective production of the like or directly competitive article constitutes a major proportion of the total domestic production of such article." For more information on CSPV cells and module producers, see part 1 of this report.

² For more information, see part 1 of this report.

Item	Firm	Event
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 closing	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.
Plant expansion	Hanwha Q Cells USA	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.
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.

Item	Firm	Event
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, [Inox Clean buys U.S. PV manufacturing assets of Boviet Solar for \\$750 million – pv magazine International](#), May 15, 2026; 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/>; Solar Power World, [LG to exit solar panel manufacturing and close Alabama plant](#), February 23, 2022; 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/UVX5DKR6QJGHTLTJTJEJH2QHKE/>; 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/>.

U.S. CSPV cell producers

Two U.S. producers of CSPV cells, Silfab Solar and Suniva, provided responses to the Commission’s U.S. producers’ questionnaire. These firms accounted for the vast majority of U.S. production of CSPV cells during 2025. In addition to these two firms, other firms have announced starting production of CSPV cells since 2023, two notable ones of which are profiled below.

Canadian Solar

Canadian Solar was founded in 2001 and began solar module production in Mesquite, Texas in 2024. The manufacturing plant has an annual capacity of 5 GW focusing primarily on N-Type TOPCon PV modules.³ It plans to increase its module capacity to 10 GW by the end of 2026.⁴ In 2025, Canadian Solar announced that it would be forming a new joint venture with American shareholders for its U.S.-based module and energy storage manufacturing and sales.⁵ The Ontario-headquartered Canadian Solar primarily operates out of China, and is currently building a solar cell manufacturing facility in Indiana.⁶ Canadian Solar also produces CSPV products in China, Brazil, Thailand, and Vietnam.⁷ In Q1 2026, Canadian Solar announced the successful trial of heterojunction (HJT) technology cell production at its Jeffersonville, Indiana

³ Construction Review, [Canadian Solar Mesquite PV Assembly and Production Facility in Texas](#), January 21, 2026.

⁴ Solar Power World, [Solar panel manufacturers in the United States](#), last updated May 14, 2026.

⁵ Solar Power World, [Canadian Solar moves American panel, energy storage operations under new U.S. joint venture](#), December 1, 2025.

⁶ Solar Power World, [Canadian Solar to start 5-GW cell factory in Indiana for Texas module assembly](#), October 30, 2023.

⁷ Ibid.

facility, and it expects to reach 2.1 GW of annual production in 2026.⁸ Phase II of the cell factory expects to increase capacity by 4.2 GW in 2027 to reach 6.3 GW of annual cell production in the United States.⁹

ES Foundry

ES Foundry is a U.S.-owned manufacturer of CSPV solar cells, specializing in bifacial PERC solar cells. ES Foundry opened its cell manufacturing facility in January 2025 with an initial annual capacity of 1 GW, with plans to increase to 3 GW. In future expansion, ES Foundry stated it plans to also produce TOPCon and HJT cells.¹⁰

Silfab Solar

Silfab Solar was established in 2010, with its first manufacturing facility opening in Toronto, Canada, and its first U.S.-based facility launching in 2019 in Bellingham, Washington after acquiring Itek Energy.¹¹ Silfab Solar produces monocrystalline and bifacial solar modules at its Burlington, Washington manufacturing facility with an annual capacity of 1.1 GW.¹² In 2024, Silfab Solar began construction of its cell and module manufacturing facility in Fort Mill, South Carolina.¹³ As of March 2026, Silfab Solar has not yet begun full capacity production of silicon solar cells at the Fort Mill site.¹⁴

Suniva, Inc.

Suniva, Inc. (“Suniva”), one of the petitioners in the original Safeguard proceeding, is headquartered in Norcross, Georgia, and produced mono (including PERC) CSPV cells and CSPV modules until April 2017. Suniva was founded in 2007 as a producer of CSPV cells based on the work of the Georgia Institute of Technology’s University Center of Excellence in Photovoltaics. In 2015, Shungfeng International Clean Energy (China) acquired approximately 63 percent of Suniva. Suniva ceased operations in 2017, but restarted cell manufacturing operations in

⁸ See Part 1 of this report for a description of HJT cell technologies.

⁹ Solar Power World, [Canadian Solar to boost Texas panel factory to 10-GW capacity](#), May 14, 2026.

¹⁰ PV Magazine, [New US solar cell manufacturer lands multi-year, multi-GW contract – pv magazine International](#), January 16, 2025.

¹¹ Silfab Solar, [Our Story - Silfab Solar - America's Trusted Manufacturer](#), accessed May 21, 2026.

¹² SunWatts, [Silfab Solar Panels | SunWatts](#), accessed May 21, 2026.

¹³ Renewable Energy World, [Made in the USA: Silfab Solar raises another \\$100M to scale its new South Carolina cell plant](#), November 21, 2024.

¹⁴ Solar Power World, [Silfab solar cell manufacturing site temporarily closed after chemical incident](#), March 9, 2026.

Georgia in late 2024. In 2026, Suniva announced it would open a second cell manufacturing facility in Laurens, South Carolina, with production to commence in Q2 2027.¹⁵

Planned U.S. CSPV cell production

Table 3.2 presents planned U.S. CSPV cell production facilities that have been publicly announced since 2023.

Table 3.2 CSPV cells: New U.S. CSPV cell production facilities announced since 2023

n.a.= not available

Company	State	Planned start of production	Notes
Boviet Solar	NC	2026	Construction of a new 600,000-square-foot facility with an annual capacity of 3 GW of solar cells to be commissioned by December 2026. Inox Clean Energy agreed to acquire this cell manufacturing capacity as part of its announced acquisition of Boviet Solar's North Carolina assets.
Mission Solar Energy	TX	2026	Plans to produce 1 GW of cells with room to grow to 2 GW. OCI Holdings, Mission Solar's parent company, announced it would supply the polysilicon from its Malaysia subsidiary OCI TerraSus.
Hanwha Q Cells USA	GA	n.a.	In addition to its existing two solar module assembly facilities in Dalton, Georgia, the company will build a new factory in the state that will manufacture 3.3 GW of silicon ingots, wafers, cells, and more finished panels.
Silfab	SC	n.a.	In 2024, Silfab began construction of its cell manufacturing facility in Fort Mill, South Carolina. It is expected to have cell production capacity totaling 1 GW.
Suniva	SC	2027	Suniva announced it will open a second CSPV cell manufacturing facility in Laurens, South Carolina. The facility will have 4.5 GW of annual cell production capacity, bringing the company's total U.S. cell manufacturing capacity to 5.5 GW annually.
T1 Energy	TX	2026	T1 Energy announced construction of a new cell manufacturing facility to begin production in 2026. T1 Energy announced it had secured a U.S. polysilicon

¹⁵ Solar Power World, "Suniva to open second solar cell manufacturing facility in the United States," April 14, 2026. <https://www.solarpowerworldonline.com/2026/04/suniva-to-open-second-solar-cell-manufacturing-facility-in-the-united-states/>.

Company	State	Planned start of production	Notes
			supply with Hemlock for its eventual cell production. The facility is expected to have 2.1 GW of cell production.
Talon PV	TX	2027	Talon PV is preparing to manufacture TOPCon solar cells in Houston, Texas. It is expected to have annual production of 4 GW of cell manufacturing.

Source: PR Newswire, [“Boviet Solar North Carolina Plan to Begin Module Production in Early 2025,”](#) October 9, 2024; PV Magazine, [Inox Clean buys U.S. PV manufacturing assets of Boviet Solar for \\$750 million – pv magazine International](#), May 15, 2026; Solar Power World, [OCI, Mission Solar to build 2-GW solar cell factory in Texas](#), March 20, 2025; Solar Power World, [Qcells will manufacture every part of a silicon solar panel in the United States](#), January 11, 2023; Solar Power World, [Silfab to start 1-GW solar cell manufacturing plant in the United States by 2024](#), March 8, 2023; Solar Power World, [Suniva to open second solar cell manufacturing facility in the United States](#), April 14, 2026; Solar Power World, [FREYR buys Trina solar panel factory in Texas for \\$340 million](#), November 6, 2024; PV Tech, [How Talon PV plans to crack America's TOPCon solar cell challenge - PV Tech](#), October 6, 2025.

Note: This table is based on publicly available information. Information on changes in production capacity at existing plants is not included. For further discussion on U.S. production capacity, see part 3 of this report.

U.S. CSPV module producers

Fourteen U.S. producers of modules provided responses to the Commission’s U.S. producers’ questionnaire. These firms accounted for the majority of U.S. production of CSPV modules during 2025. In addition to the cell producers profiled above, below are other notable or historical U.S. module producers.

American Panel Solutions

American Panel Solutions is a wholly owned subsidiary of Corning, which also owns polysilicon manufacturer Hemlock.¹⁶ In 2025, Corning acquired JA Solar’s Phoenix, Arizona module manufacturing facility, and the facility is now an asset of American Panel Solutions. The expected annual output of the facility is 2 GW.¹⁷

Hanwha Q Cells USA

Hanwha Q Cells USA (“Hanwha USA”) has manufacturing locations in Dalton, Georgia and Cartersville, Georgia. Hanwha USA is a wholly owned subsidiary of its ultimate parent company based in South Korea, Hanwha Chemical Corporation. Hanwha USA began production

¹⁶ PV Magazine, [Corning acquires JA Solar facility in Arizona – pv magazine USA](#), July 22, 2025.

¹⁷ PV Magazine, [Corning acquires JA Solar facility in Arizona – pv magazine USA](#), July 22, 2025.

at its \$157 million CSPV module assembly plant in Dalton, Georgia in February 2019. In April 2025, Hanwha began production at its Cartersville, Georgia facility. The Dalton plant produces 5.1 GW of solar modules per year, while Cartersville has a projected production capacity of 3.3 GW by the end of 2026, where it will produce ingots, wafers, and cells.¹⁸

Heliene

Heliene was founded in 2010 and is headquartered in Ontario, Canada. It has multiple manufacturing facilities in the United States, including in Rogers, Minnesota and Mountain Iron, Minnesota.¹⁹ The two panel assembly lines in Mountain Iron have an annual capacity of 800 MW of solar modules. The Rogers facility opened in Q2 2025 and has an annual capacity of 500 MW of solar modules.²⁰

Hounen Solar

Hounen Solar is a U.S.-based solar module manufacturer headquartered in California, with its primary manufacturing facility located in Orangeburg, South Carolina.²¹ Hounen Solar's 1 GW facility in South Carolina began operations in 2022.²²

Mission Solar Energy

Mission Solar Energy is headquartered in San Antonio, Texas, and is a fully owned subsidiary of OCI Solar Power.²³ Mission Solar Energy produces modules in a variety of cell type and form factors. The company opened its manufacturing plant in San Antonio, Texas, in 2014. In September 2016, however, Mission Solar Energy closed its n-type mono PV cell production lines. Following the closure of cell production, Mission has continued module assembly with imported CSPV cells. In March 2025, Mission Solar Energy announced a \$265 million investment to add 2 GW of solar cell production capacity at its San Antonio facility, with operations

¹⁸ PV Magazine, [Qcells resumes solar panel production at Georgia factories following customs-related furlough – pv magazine USA](#), March 6, 2026.

¹⁹ Unis, [Heliene Inc. | North American Solar Module Manufacturer &...](#), accessed May 21, 2026.

²⁰ Transition Equity Partners, [Transition Equity Partners LLC | Heliene's 500-MW Solar Facility Launches in Minneapolis](#), July 30, 2025.

²¹ Hounen Solar, <https://hounensolar.com/>, accessed May 21, 2026.

²² PV Magazine, [Hounen Solar showcases solar modules for the US market – pv magazine USA](#), September 30, 2025.

²³ OCI Solar Power is a subsidiary of OCI Enterprises, the North American subsidiary of OCI Company, Ltd. (Korea). Mission was formerly known as Nexolon America when it was a joint venture of OCI Solar Power and Texas-based CPS Energy.

expected to come online in 2026.²⁴ Its facility in Texas has an annual capacity of 500 MW of CSPV modules.²⁵

T1 Energy

T1 Energy acquired Trina Solar's 5 GW module manufacturing facility in Wilmer, Texas in 2024. It began construction of a cell manufacturing facility in Texas in 2025, with an expected capacity of 2.1 GW.²⁶

U.S. policies

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.²⁷ 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 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.²⁸

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

²⁴ PR Newswire, [Mission Solar Energy Expands Operations with Solar Cell Manufacturing](#), March 20, 2025.

²⁵ Solar Power World, [Solar panel manufacturers in the United States](#), last updated May 14, 2026.

²⁶ Solar Power World, [FREYR buys Trina solar panel factory in Texas for \\$340 million](#), November 6, 2024.

²⁷ 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>.

²⁸ 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>.

July 4, 2026.²⁹ 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).³⁰ 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.³¹

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 2025.³² 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 2025.³³

U.S. installations³⁴

U.S. utility-scale PV installations, including out-of-scope thin film products, increased from 9.6 GW in 2020 to 30.1 GW in 2024, according to Lawrence Berkeley National Laboratory data (table 3.3).³⁵

²⁹ 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-obbbba/>.

³⁰ 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.

³¹ 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/>.

³² 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/>.

³³ Ibid.

³⁴ U.S. installations are not a proxy for apparent consumption of modules due to differences in timing between when a module is shipped and when it is installed.

³⁵ Lawrence Berkeley National Laboratory, *Utility-Scale Solar, 2025 Edition*, data file, <https://emp.lbl.gov/utility-scale-solar>, retrieved May 18, 2026.

Table 3.3 CSPV products: Annual utility-scale PV installations, by period

Installations in megawatts annual capacity

Year	Annual capacity additions (MW _{AC})	Cumulative capacity (MW _{AC})
2020	9,623	38,825
2021	12,491	51,316
2022	10,429	61,744
2023	19,265	81,010
2024	30,056	111,066

Source: WoodMac and SEIA data from Bolinger, Mark, and Joachim Seel, *Utility-Scale Solar, 2023 Edition*, Lawrence Berkeley National Laboratory, October 2023, data file, <https://emp.lbl.gov/utility-scale-solar>, May 18, 2026.

U.S. production, capacity, and capacity utilization

CSPV Cells

Tables 3.4 through 3.5 and figure 3.1 present U.S. producers' output for installed and practical capacity, production, and capacity utilization for CSPV cells on the same equipment. Installed overall capacity increased continuously from 2023 to 2025, and by about a quarter between 2024 and 2025. Practical overall and practical capacity followed similar trends.³⁶ Only two firms reported producing cells in the United States in 2025, with *** reporting the higher installed and practical capacity. *** reported CSPV cell production in 2023 and while Suniva began CSPV cell production in 2024,³⁷ Silfab Solar reported CSPV cell production in 2025.³⁸ However, while *** reported producing well below 50.0 percent its practical capacity in 2025, *** reached capacity utilization above 80.0 percent in the same year.³⁹

³⁶ Only *** provided cell production data. Canadian Solar, which began trial CSPV cell production in 2026, did not provide cell production data.

³⁷ Suniva's CSPV cell manufacturing plant in Norcross, GA began commercially producing CSPV cells in October 2024. In April 2026, Suniva announced its intentions to commence construction on new, 4.5GW solar cell manufacturing facility in Laurens, South Carolina. The new factory is scheduled to begin commercial production in Q2 of 2027. Suniva's U.S. producer's questionnaire, section 2.2 and <https://www.solarpowerworldonline.com/2026/04/suniva-to-open-second-solar-cell-manufacturing-facility-in-the-united-states/>. Suniva began shipping its first cells from its Georgia facility to Canadian-American module producer Heliene in early 2025. See <https://pv-magazine-usa.com/2026/04/14/suniva-to-build-4-5-gw-solar-cell-factory-in-south-carolina/>, April 14, 2026.

³⁸ <https://silfabsolar.com/2025/01/02/big-things-are-happening-for-silfab-solar-in-south-carolina-in-2025/>.

³⁹ Silfab ***. Silfab's U.S. producer's questionnaire response, section 2.2. The firm also stated that it started production in November of 2025 and is ramping up to 1 GW cell capacity. See <https://silfabsolar.com/silfab-solar-pivot-energy-announce-u-s-made-partnership/>. See also <https://silfabsolar.com/silfab-solar-nexamp-announce-u-s-made-solar-supply-agreement/>, December 17, 2024.

Table 3.4 CSPV cells: 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

Item	Measure	2023	2024	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 "—".

Table 3.5 CSPV cells: U.S. producers' output: Practical capacity, by firm and period

Practical capacity

Capacity in kilowatts

Firm	2023	2024	2025
Silfab Solar	***	***	***
Suniva	***	***	***
All firms	***	***	***

Table continued.

Table 3.5 Continued CSPV cells: U.S. producers' output: by firm and period

Production

Production in kilowatts

Firm	2023	2024	2025
Silfab Solar	***	***	***
Suniva	***	***	***
All firms	***	***	***

Table continued.

Table 3.5 Continued CSPV cells: U.S. producers' output: by firm and period

Capacity utilization

Capacity utilization ratios in percent

Firm	2023	2024	2025
Silfab Solar	***	***	***
Suniva	***	***	***
All firms	***	***	***

Table continued.

Table 3.5 Continued CSPV cells: U.S. producers' output: by firm and period

Share of production

Share of production in percent

Firm	2023	2024	2025
Silfab Solar	***	***	***
Suniva	***	***	***
All firms	—	100.0	100.0

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

Figure 3.1 CSPV cells: U.S. producers' reported capacity, production, and capacity utilization, by period

* * * * *

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

CSPV Modules

Tables 3.6 through 3.7 and figure 3.2 present U.S. producers' output for installed and practical capacity, production, and capacity utilization for CSPV modules on the same equipment. Installed overall capacity tripled between 2023 and 2024 and increased further in 2025. Practical overall and practical capacity were the same and followed similar trends as installed overall capacity between 2023 and 2025. Eleven of the 13 responding U.S. producers reported increased practical capacity for CSPV modules between 2023 and 2025. *** reported the largest increase in capacity, followed by ***, while *** reported the lowest and only decreasing capacity. *** had stable capacity. *** reported

no CSPV module capacity during the same period. Two firms, (***) , reported starting operations in 2025.

Aggregated production of CSPV modules increased year-on-year from 2023 to 2025 and *** reported the highest production levels of CSPV modules in 2025 and together accounted for *** percent of reported production of CSPV modules in 2025. Regarding capacity utilization, aggregate rates steadily increased from 65.3 percent in 2023 to 72.5 percent in 2025. However, four firms, *** reported close to full capacity utilization rates of CSPV modules in 2025, while four other firms, **, reported decreased capacity utilization rates between 2023 and 2025.⁴⁰

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

Item	Measure	2023	2024	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: 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 "—".

⁴⁰ *** has paused module manufacturing as of February 2025. The firm stated that it continues to evaluate trade and other market conditions as it looks to resume cell and or module manufacturing. ***'s U.S. producer's questionnaire response, section 2.2.

Table 3.7 CSPV modules: U.S. producers' output: by firm and period**Practical capacity**

Capacity in kilowatts

Firm	2023	2024	2025
AMPS	***	***	***
Canadian Solar	***	***	***
Hanwha GA	***	***	***
Heliene	***	***	***
Hounen Solar	***	***	***
Illuminate	***	***	***
Mission Solar	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
SEG Manufacturing	***	***	***
Silfab Solar	***	***	***
Suniva	***	***	***
T1 Energy	***	***	***
Waaree Solar	***	***	***
All firms	***	***	***

Table continued.

Table 3.7 Continued CSPV modules: U.S. producers' output: by firm and period**Production**

Production in kilowatts

Firm	2023	2024	2025
AMPS	***	***	***
Canadian Solar	***	***	***
Hanwha GA	***	***	***
Heliene	***	***	***
Hounen Solar	***	***	***
Illuminate	***	***	***
Mission Solar	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
SEG Manufacturing	***	***	***
Silfab Solar	***	***	***
Suniva	***	***	***
T1 Energy	***	***	***
Waaree Solar	***	***	***
All firms	***	***	***

Table continued.

Table 3.7 Continued CSPV modules: U.S. producers' output: by firm and period**Capacity Utilization**

Capacity utilization ratios in percent

Firm	2023	2024	2025
AMPS	***	***	***
Canadian Solar	***	***	***
Hanwha GA	***	***	***
Heliene	***	***	***
Hounen Solar	***	***	***
Illuminate	***	***	***
Mission Solar	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
SEG Manufacturing	***	***	***
Silfab Solar	***	***	***
Suniva	***	***	***
T1 Energy	***	***	***
Waaree Solar	***	***	***
All firms	65.3	70.6	72.5

Table continued.

Table 3.7 Continued CSPV modules: U.S. producers' output: by firm and period**Share of production**

Share of production in percent

Firm	2023	2024	2025
AMPS	***	***	***
Canadian Solar	***	***	***
Hanwha GA	***	***	***
Heliene	***	***	***
Hounen Solar	***	***	***
Illuminate	***	***	***
Mission Solar	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
SEG Manufacturing	***	***	***
Silfab Solar	***	***	***
Suniva	***	***	***
T1 Energy	***	***	***
Waaree Solar	***	***	***
All firms	100.0	100.0	100.0

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

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

Note: *** stated they only started producing in December of 2025. Email from ***, May 15, 2026.

Figure 3.2 CSPV modules: U.S. producers' reported capacity, production, and capacity utilization, by period

* * * * *

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

Constraints on Capacity

U.S. CSPV module capacity grew by over 50 percent to 65.5 GW in 2025, yet continued shortages of domestic crystalline silicon cells and wafers left domestic manufacturers bottlenecked. As a result, domestic firms continued to rely on imported components and causing delays in local manufacturing expansion. According to the Solar Energy Industries Association (SEIA) Solar Market Insight Report 2025, these constraints led to a 14 percent drop in overall installations, including trade policy actions and grid interconnection challenge.⁴¹

⁴¹ For more details, visit the Solar Energy Industries Association, Solar Market Insight, <https://seia.org/research-resources/us-solar-market-insight/>, 2025.

Alternative products

As shown in table 3.8, *** reported producing CSPV cells or other products during 2023. In 2024 and 2025 U.S. producers produced only *** on the same equipment used to produce CSPV cells.

Table 3.8 CSPV cells: U.S. producers' overall production on the same equipment as in-scope production, by product type and period

Quantity in kilowatts; share in percent

Product type	Measure	2023	2024	2025
CSPV cells	Quantity	***	***	***
Thin-film solar products	Quantity	***	***	***
Other products	Quantity	***	***	***
All out-of-scope products	Quantity	***	***	***
All products	Quantity	***	***	***
CSPV cells	Share	***	***	***
Thin-film solar products	Share	***	***	***
Other products	Share	***	***	***
All out-of-scope products	Share	***	***	***
All products	Share	—	100.0	100.0

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

As shown in table 3.9, nearly all the CSPV product produced during 2023 to 2025 by U.S. producers was CSPV modules. One firm, (***), reported producing thin-film solar products, which accounted for less than *** percent of overall production on the same equipment used to produce CSPV modules.

Table 3.9 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

Product type	Measure	2023	2024	2025
CSPV modules	Quantity	***	***	***
Thin-film solar products	Quantity	***	***	***
Other products	Quantity	***	***	***
All out-of-scope products	Quantity	***	***	***
All products	Quantity	***	***	***
CSPV modules	Share	***	***	***
Thin-film solar products	Share	***	***	***
Other products	Share	***	***	***
All out-of-scope products	Share	***	***	***
All products	Share	100.0	100.0	100.0

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

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

U.S. producers' shipments

Tables 3.10 presents U.S. producers' U.S. shipments, export shipments, and total shipments of CSPV cells.

There were *** U.S. shipments or exports shipments in 2023 for CSPV cells. U.S. shipments, by quantity and value, accounted for *** total shipments in 2024 and 2025 since U.S. producers of CSPV cells *** report export shipments. The two U.S. producers of CSPV cells, *** accounted for approximately *** percent and *** percent respectively, of all U.S. shipments of CSPV cells in 2025.

Table 3.10 CSPV cells: U.S. producers' total shipments, by destination and period

Quantity in kilowatts; value in 1,000 dollars; unit values in dollars per kilowatt; shares in percent

Item	Measure	2023	2024	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 "—".

Table 3.11 presents U.S. producers' U.S. shipments of CSPV cells by type and period. Only one firm (***) reported commercial U.S. shipments of CSPV cells in 2024 and 2025. Commercial U.S. shipments accounted for the majority (over half, by quantity) of U.S. shipments during 2025, followed by transfers to related firms. By value, U.S. commercial shipments of CSPV cells accounted for approximately three quarters of U.S. shipments in 2025. *** was the only firm to report transfers to related firms, and *** firm reported internal consumption.

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

Quantity in kilowatts; value in 1,000 dollars; unit value in dollars per kilowatt; shares in percent

Item	Measure	2023	2024	2025
Commercial U.S. shipments	Quantity	***	***	***
Internal consumption	Quantity	***	***	***
Transfers to related firms	Quantity	***	***	***
U.S. shipments	Quantity	***	***	***
Commercial U.S. shipments	Value	***	***	***
Internal consumption	Value	***	***	***
Transfers to related firms	Value	***	***	***
U.S. shipments	Value	***	***	***
Commercial U.S. shipments	Unit value	***	***	***
Internal consumption	Unit value	***	***	***
Transfers to related firms	Unit value	***	***	***
U.S. shipments	Unit value		***	***
Commercial U.S. shipments	Share of quantity	***	***	***
Internal consumption	Share of quantity	***	***	***
Transfers to related firms	Share of quantity	***	***	***
U.S. shipments	Share of quantity	—	100.0	100.0
Commercial U.S. shipments	Share of value	***	***	***
Internal consumption	Share of value	***	***	***
Transfers to related firms	Share of value	***	***	***
U.S. shipments	Share of value	—	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 3.12 presents U.S. producers' U.S. shipments, export shipments, and total shipments of CSPV modules. U.S. shipments of CSPV modules increased from 2023 to 2025 and accounted for *** total shipments since *** U.S. producer of CSPV modules reported export shipments. *** reported the largest quantities of U.S. shipments of CSPV modules in 2025, accounting for over three-quarters percent of the U.S. shipments of CSPV modules in that year. While U.S. shipments increased between 2023 and 2025 by quantity and value, U.S. shipment and total shipment unit values decreased irregularly during the same period.

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

Quantity in kilowatts; value in 1,000 dollars; unit values in dollars per kilowatt; shares in percent

Item	Measure	2023	2024	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
U.S. shipments	Share of value	***	***	***
Export shipments	Share of value	***	***	***
Total shipments	Share of value	100.0	100.0	100.0

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

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

Table 3.13 presents U.S. producers' U.S. shipments of CSPV modules by type and period. Commercial U.S. shipments accounted for the majority of U.S. shipments of modules by quantity and value during 2023 to 2025, followed by transfers to related firms. Four firms had transfers to related firms, one of which, ***, did not report commercial U.S. shipment during 2023 to 2025, and only two firms (***) reported small internal consumption quantities and values in 2025. Unit values were highest for international consumption and lowest for transfer to related firms in 2025.⁴²

Table 3.13 CSPV modules: U.S. producers' U.S. shipments, by type and period

Quantity in kilowatts; value in 1,000 dollars; unit value in dollars per kilowatt; shares in percent

Item	Measure	2023	2024	2025
Commercial U.S. shipments	Quantity	***	***	***
Internal consumption	Quantity	***	***	***
Transfers to related firms	Quantity	***	***	***
U.S. shipments	Quantity	***	***	***
Commercial U.S. shipments	Value	***	***	***
Internal consumption	Value	***	***	***
Transfers to related firms	Value	***	***	***
U.S. shipments	Value	***	***	***
Commercial U.S. shipments	Unit value	***	***	***
Internal consumption	Unit value	***	***	***
Transfers to related firms	Unit value	***	***	***
U.S. shipments	Unit value	***	***	***
Commercial U.S. shipments	Share of quantity	***	***	***
Internal consumption	Share of quantity	***	***	***
Transfers to related firms	Share of quantity	***	***	***
U.S. shipments	Share of quantity	100.0	100.0	100.0
Commercial U.S. shipments	Share of value	***	***	***
Internal consumption	Share of value	***	***	***
Transfers to related firms	Share of value	***	***	***
U.S. shipments	Share of value	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 "—".

⁴² The high unit value for modules internal consumption is due to *** "specialized market for solar which is different than standard grid solar panel." According to the firm, the average cost per watt is about ***. ***'s U.S. producer's questionnaire response, May 6, 2026.

Table 3.14 presents U.S. producers' U.S. shipments of CSPV cells and modules for use in apparent consumption, by type and period.

Table 3.14 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

Item	Measure	2023	2024	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

Tables 3.15 and 3.16 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 for CSPV cells and CSPV modules.

There were *** inventories reported in 2023 for CSPV cells and *** reported increased end-of-period inventories from 2024 to 2025. In 2025, the ratios of end-of-period inventory quantities of CSPV cells to U.S. production, U.S. shipments, and total shipments were less than *** percent. *** reported the higher level of CSPV cell inventories in 2025.

Ending inventories for CSPV modules increased from 2023 to 2024 and then decreased in 2025, still ending higher than in 2023. Two firms (***) did not report any ending inventories during 2023 to 2025 for CSPV modules. Three firms (***) reported increased ending inventories of CSPV modules from 2023 to 2025. CSPV modules inventory ratios to U.S. production, U.S. shipments, and total shipments decreased irregularly and were less than *** percent in 2025. Eleven firms reported end-of-period inventories of CSPV modules in 2025, while *** reported the highest levels of CSPV modules inventories in 2025.

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

Quantity in kilowatts; ratio in percent

Item	2023	2024	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.

Table 3.16 CSPV modules: U.S. producers' inventories and their ratio to select items, by period

Quantity in kilowatts; ratio in percent

Item	2023	2024	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. employment, wages, and productivity

Tables 3.17 and 3.18 show U.S. producers' employment-related data for CSPV cells and CSPV modules, respectively.

All aggregate labor indicators for CSPV cells, except for hourly wages (dollars per hour) and unit labor costs (dollars per kilowatt), increased between 2024 and 2025.⁴³ *** reported no employment data related to U.S. production of CSPV cells in 2023, while ***.

Similarly, all aggregate labor indicators for CSPV modules increased between 2023 and 2025, except for hourly wages (dollars per hour) and unit labor costs (dollars per kilowatt). Fourteen firms reported employment data related to U.S. production of CSPV modules in 2025. Three firms (***) accounted for the highest average number of PRWs in 2025, while *** had the highest PRW average wages. *** had the highest unit labor costs in dollars per kilowatt in the same period.

Table 3.17 CSPV cells: U.S. producers' employment related information, by item and period

Item	2023	2024	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.

⁴³ There are *** for CSPV cells in 2023 since the two firms began operations in late 2024 and 2025.

Table 3.18 CSPV modules: U.S. producers' employment related information, by item and period

Item	2023	2024	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: Staff removed 2024 employment data reported for *** since the firm did not report any production that year. The firm reported *** PRWs, *** hours worked by PRWs, and \$*** wages paid to the PRWs. ***'s U.S. producer questionnaire, section 2.14.

Table 3.19 presents U.S. producers' employment-related data for aggregated CSPV cells and CSPV modules by item and period.

Table 3.19 CSPV cells and modules: U.S. producers' employment related information, by item and period

Item	2023	2024	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: Financial Experience of U.S. producers

Background¹

Fourteen U.S. producers provided usable financial results on their CSPV cells and modules operations.^{2 3} All of the responding U.S. producers but *** provided their financial data on the basis of GAAP.⁴ Net sales consisted of commercial sales, internal consumption, and transfers to related firms. Internal consumption and transfers, together accounting for *** percent of the total net sales quantity in 2025, are incorporated within this section of the report but are not presented as separate items.

Figure 4.1 presents each responding firm's share of the total reported net sales quantity in 2025.

¹ The following abbreviations are used in the tables and/or text of this section: generally accepted accounting principles ("GAAP"), net sales ("NS"), cost of goods sold ("COGS"), selling, general, and administrative expenses ("SG&A expenses"), average unit values ("AUVs"), research and development ("R&D"), and return on assets ("ROA").

² 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/UVX5DKR6QJGHTLTJJEJH2QHKE/>, retrieved June 30, 2026. The firm restarted CSPV cell production in *** 2024. *** producer questionnaire response, section 2.2. ***. In this section of the report, *** CSPV cell operations are aggregated with those of CSPV module producers.

³ ***. Email from ***, June 24, 2026.

⁴ ***. *** U.S. producers' questionnaire responses, section 1.2b, section 3.2.B.4.

Figure 4.1 CSPV cells and modules: U.S. producers’ share of net sales quantity in 2025, by firm

* * * * *

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

Operations on CSPV cells and modules

Table 4.1 presents aggregated data on U.S. producers’ operations in relation to CSPV cells and modules, while table 4.2 presents corresponding changes in AUVs. Table 4.3 presents selected company-specific financial data. Appendix E presents data on the operations of U.S. producers for CSPV cell production and, separately, for CSPV module production.

Table 4.1 CSPV cells and modules: U.S. producers' results of operations, by item and period

Quantity in kilowatts; value in 1,000 dollars; ratios in percent

Item	Measure	2023	2024	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 4.1 (Continued) CSPV cells and modules: U.S. producers' results of operations, by item and period

Shares in percent; unit values in dollars per kilowatt; count in number of firms reporting

Item	Measure	2023	2024	2025
COGS: Raw materials	Share	***	***	***
COGS: Direct labor	Share	***	***	***
COGS: Other factory	Share	***	***	***
COGS: Total	Share	100.0	100.0	100.0
Total net sales	Unit value	***	***	***
COGS: Raw materials	Unit value	***	***	***
COGS: Direct labor	Unit value	***	***	***
COGS: Other factory	Unit value	***	***	***
COGS: Total	Unit value	***	***	***
Gross profit or (loss)	Unit value	***	***	***
SG&A expenses	Unit value	***	***	***
Operating income or (loss)	Unit value	***	***	***
Net income or (loss)	Unit value	***	***	***
Operating losses	Count	5	10	9
Net losses	Count	4	5	7
Data	Count	6	11	14

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

Table 4.2 CSPV cells and modules: Changes in AUVs between comparison periods

Changes in percent

Item	2023–25	2023–24	2024–25
Total net sales	***	***	***
COGS: Raw materials	***	***	***
COGS: Direct labor	***	***	***
COGS: Other factory	***	***	***
COGS: Total	***	***	***

Table continued.

Table 4.2 (Continued) CSPV cells and modules: Changes in AUVs between comparison periods

Changes in dollar per kilowatt

Item	2023–25	2023–24	2024–25
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 4.3 CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

Net sales quantity

Quantity in kilowatts

Firm	2023	2024	2025
AMPS	***	***	***
Canadian Solar	***	***	***
Hanwha GA	***	***	***
Heliene	***	***	***
Hounen Solar	***	***	***
Illuminate	***	***	***
Mission Solar	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
SEG Manufacturing	***	***	***
Silfab Solar	***	***	***
Suniva	***	***	***
T1 Energy	***	***	***
Waaree Solar	***	***	***
All firms	***	***	***

Table continued.

Table 4.3 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

Net sales value

Value in 1,000 dollars

Firm	2023	2024	2025
AMPS	***	***	***
Canadian Solar	***	***	***
Hanwha GA	***	***	***
Heliene	***	***	***
Hounen Solar	***	***	***
Illuminate	***	***	***
Mission Solar	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
SEG Manufacturing	***	***	***
Silfab Solar	***	***	***
Suniva	***	***	***
T1 Energy	***	***	***
Waaree Solar	***	***	***
All firms	***	***	***

Table continued.

Table 4.3 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

COGS

Value in 1,000 dollars

Firm	2023	2024	2025
AMPS	***	***	***
Canadian Solar	***	***	***
Hanwha GA	***	***	***
Heliene	***	***	***
Hounen Solar	***	***	***
Illuminate	***	***	***
Mission Solar	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
SEG Manufacturing	***	***	***
Silfab Solar	***	***	***
Suniva	***	***	***
T1 Energy	***	***	***
Waaree Solar	***	***	***
All firms	***	***	***

Table continued.

Table 4.3 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

Gross profit or (loss)

Value in 1,000 dollars

Firm	2023	2024	2025
AMPS	***	***	***
Canadian Solar	***	***	***
Hanwha GA	***	***	***
Heliene	***	***	***
Hounen Solar	***	***	***
Illuminate	***	***	***
Mission Solar	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
SEG Manufacturing	***	***	***
Silfab Solar	***	***	***
Suniva	***	***	***
T1 Energy	***	***	***
Waaree Solar	***	***	***
All firms	***	***	***

Table continued.

Table 4.3 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

SG&A expenses

Value in 1,000 dollars

Firm	2023	2024	2025
AMPS	***	***	***
Canadian Solar	***	***	***
Hanwha GA	***	***	***
Heliene	***	***	***
Hounen Solar	***	***	***
Illuminate	***	***	***
Mission Solar	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
SEG Manufacturing	***	***	***
Silfab Solar	***	***	***
Suniva	***	***	***
T1 Energy	***	***	***
Waaree Solar	***	***	***
All firms	***	***	***

Table continued.

Table 4.3 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

Operating income or (loss)

Value in 1,000 dollars

Firm	2023	2024	2025
AMPS	***	***	***
Canadian Solar	***	***	***
Hanwha GA	***	***	***
Heliene	***	***	***
Hounen Solar	***	***	***
Illuminate	***	***	***
Mission Solar	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
SEG Manufacturing	***	***	***
Silfab Solar	***	***	***
Suniva	***	***	***
T1 Energy	***	***	***
Waaree Solar	***	***	***
All firms	***	***	***

Table continued.

Table 4.3 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

Net income or (loss)

Value in 1,000 dollars

Firm	2023	2024	2025
AMPS	***	***	***
Canadian Solar	***	***	***
Hanwha GA	***	***	***
Heliene	***	***	***
Hounen Solar	***	***	***
Illuminate	***	***	***
Mission Solar	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
SEG Manufacturing	***	***	***
Silfab Solar	***	***	***
Suniva	***	***	***
T1 Energy	***	***	***
Waaree Solar	***	***	***
All firms	***	***	***

Table continued.

Table 4.3 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

COGS to net sales ratio

Ratios in percent

Firm	2023	2024	2025
AMPS	***	***	***
Canadian Solar	***	***	***
Hanwha GA	***	***	***
Heliene	***	***	***
Hounen Solar	***	***	***
Illuminate	***	***	***
Mission Solar	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
SEG Manufacturing	***	***	***
Silfab Solar	***	***	***
Suniva	***	***	***
T1 Energy	***	***	***
Waaree Solar	***	***	***
All firms	***	***	***

Table continued.

Table 4.3 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

Gross profit or (loss) to net sales ratio

Ratios in percent

Firm	2023	2024	2025
AMPS	***	***	***
Canadian Solar	***	***	***
Hanwha GA	***	***	***
Heliene	***	***	***
Hounen Solar	***	***	***
Illuminate	***	***	***
Mission Solar	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
SEG Manufacturing	***	***	***
Silfab Solar	***	***	***
Suniva	***	***	***
T1 Energy	***	***	***
Waaree Solar	***	***	***
All firms	***	***	***

Table continued.

Table 4.3 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

SG&A expenses to net sales ratio

Ratios in percent

Firm	2023	2024	2025
AMPS	***	***	***
Canadian Solar	***	***	***
Hanwha GA	***	***	***
Heliene	***	***	***
Hounen Solar	***	***	***
Illuminate	***	***	***
Mission Solar	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
SEG Manufacturing	***	***	***
Silfab Solar	***	***	***
Suniva	***	***	***
T1 Energy	***	***	***
Waaree Solar	***	***	***
All firms	***	***	***

Table continued.

Table 4.3 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

Operating income or (loss) to net sales ratio

Ratios in percent

Firm	2023	2024	2025
AMPS	***	***	***
Canadian Solar	***	***	***
Hanwha GA	***	***	***
Heliene	***	***	***
Hounen Solar	***	***	***
Illuminate	***	***	***
Mission Solar	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
SEG Manufacturing	***	***	***
Silfab Solar	***	***	***
Suniva	***	***	***
T1 Energy	***	***	***
Waaree Solar	***	***	***
All firms	***	***	***

Table continued.

Table 4.3 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

Net income or (loss) to net sales ratio

Ratios in percent

Firm	2023	2024	2025
AMPS	***	***	***
Canadian Solar	***	***	***
Hanwha GA	***	***	***
Heliene	***	***	***
Hounen Solar	***	***	***
Illuminate	***	***	***
Mission Solar	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
SEG Manufacturing	***	***	***
Silfab Solar	***	***	***
Suniva	***	***	***
T1 Energy	***	***	***
Waaree Solar	***	***	***
All firms	***	***	***

Table continued.

Table 4.3 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

Unit net sales value

Unit values in dollars per kilowatt

Firm	2023	2024	2025
AMPS	***	***	***
Canadian Solar	***	***	***
Hanwha GA	***	***	***
Heliene	***	***	***
Hounen Solar	***	***	***
Illuminate	***	***	***
Mission Solar	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
SEG Manufacturing	***	***	***
Silfab Solar	***	***	***
Suniva	***	***	***
T1 Energy	***	***	***
Waaree Solar	***	***	***
All firms	***	***	***

Table continued.

Table 4.3 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

Unit raw material

Unit values in dollars per kilowatt

Firm	2023	2024	2025
AMPS	***	***	***
Canadian Solar	***	***	***
Hanwha GA	***	***	***
Heliene	***	***	***
Hounen Solar	***	***	***
Illuminate	***	***	***
Mission Solar	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
SEG Manufacturing	***	***	***
Silfab Solar	***	***	***
Suniva	***	***	***
T1 Energy	***	***	***
Waaree Solar	***	***	***
All firms	***	***	***

Table continued.

Table 4.3 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

Unit direct labor

Unit values in dollars per kilowatt

Firm	2023	2024	2025
AMPS	***	***	***
Canadian Solar	***	***	***
Hanwha GA	***	***	***
Heliene	***	***	***
Hounen Solar	***	***	***
Illuminate	***	***	***
Mission Solar	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
SEG Manufacturing	***	***	***
Silfab Solar	***	***	***
Suniva	***	***	***
T1 Energy	***	***	***
Waaree Solar	***	***	***
All firms	***	***	***

Table continued.

Table 4.3 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

Unit other factory costs

Unit values in dollars per kilowatt

Firm	2023	2024	2025
AMPS	***	***	***
Canadian Solar	***	***	***
Hanwha GA	***	***	***
Heliene	***	***	***
Hounen Solar	***	***	***
Illuminate	***	***	***
Mission Solar	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
SEG Manufacturing	***	***	***
Silfab Solar	***	***	***
Suniva	***	***	***
T1 Energy	***	***	***
Waaree Solar	***	***	***
All firms	***	***	***

Table continued.

Table 4.3 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

Unit COGS

Unit values in dollars per kilowatt

Firm	2023	2024	2025
AMPS	***	***	***
Canadian Solar	***	***	***
Hanwha GA	***	***	***
Heliene	***	***	***
Hounen Solar	***	***	***
Illuminate	***	***	***
Mission Solar	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
SEG Manufacturing	***	***	***
Silfab Solar	***	***	***
Suniva	***	***	***
T1 Energy	***	***	***
Waaree Solar	***	***	***
All firms	***	***	***

Table continued.

Table 4.3 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

Unit gross profit or (loss)

Unit values in dollars per kilowatt

Firm	2023	2024	2025
AMPS	***	***	***
Canadian Solar	***	***	***
Hanwha GA	***	***	***
Heliene	***	***	***
Hounen Solar	***	***	***
Illuminate	***	***	***
Mission Solar	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
SEG Manufacturing	***	***	***
Silfab Solar	***	***	***
Suniva	***	***	***
T1 Energy	***	***	***
Waaree Solar	***	***	***
All firms	***	***	***

Table continued.

Table 4.3 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

Unit SG&A expenses

Unit values in dollars per kilowatt

Firm	2023	2024	2025
AMPS	***	***	***
Canadian Solar	***	***	***
Hanwha GA	***	***	***
Heliene	***	***	***
Hounen Solar	***	***	***
Illuminate	***	***	***
Mission Solar	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
SEG Manufacturing	***	***	***
Silfab Solar	***	***	***
Suniva	***	***	***
T1 Energy	***	***	***
Waaree Solar	***	***	***
All firms	***	***	***

Table continued.

Table 4.3 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

Unit operating income or (loss)

Unit values in dollars per kilowatt

Firm	2023	2024	2025
AMPS	***	***	***
Canadian Solar	***	***	***
Hanwha GA	***	***	***
Heliene	***	***	***
Hounen Solar	***	***	***
Illuminate	***	***	***
Mission Solar	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
SEG Manufacturing	***	***	***
Silfab Solar	***	***	***
Suniva	***	***	***
T1 Energy	***	***	***
Waaree Solar	***	***	***
All firms	***	***	***

Table continued.

Table 4.3 (Continued) CSPV cells and modules: U.S. producers' sales, costs/expenses, and profitability, by firm and period

Unit net income or (loss)

Unit values in dollars per kilowatt

Firm	2023	2024	2025
AMPS	***	***	***
Canadian Solar	***	***	***
Hanwha GA	***	***	***
Heliene	***	***	***
Hounen Solar	***	***	***
Illuminate	***	***	***
Mission Solar	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
SEG Manufacturing	***	***	***
Silfab Solar	***	***	***
Suniva	***	***	***
T1 Energy	***	***	***
Waaree Solar	***	***	***
All firms	***	***	***

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

Net sales

As shown in table 4.1, the industry's total net sales quantity and value increased from 2023 to 2025. This increase is largely attributable to the entry of several new producers—five firms (***) that began CSPV cells and/or modules production in 2024 and three additional firms (***) that started production in 2025—which expanded overall industry output and contributed new sales volume.⁵ On a company-by-company basis as shown in table 4.3, of the six firms that provided data during all reporting periods, (***), all but *** reported an overall increase in net sales quantity and value from 2023 to 2025.⁶

The average unit sales value declined from 2023 to 2025. Of the six firms that provided data during all reporting periods, all except *** reported an overall decline in unit sales values from 2023 to 2025. *** which manufacture cells only, has the lowest

⁵ ***, *** U.S. producers' questionnaire response, sections 2.8 and 2.11.

⁶ ***, *** U.S. producer questionnaire response, section 2.2.

net sales AUVs among the U.S. producers in 2025 and *** reported the highest net sales AUVs.⁷

Cost of goods sold and gross profit or loss

As presented in table 4.1, raw material costs represented the single largest component of total COGS. Raw material costs per unit declined from 2023 to 2025. Table 4.3 above 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. All firms but *** of the six firms which reported data in all periods, reported an overall decline in raw material costs per unit from 2023 to 2025. *** reported the highest raw material costs per unit similar to net sales AUVs. As a ratio to net sales, raw material costs declined irregularly from 2023 to 2025.

Table 4.4 presents raw material costs for CSPV cell and module production in 2025, by type. As shown in the table, imported CSPV cells accounted for the majority of total raw material costs for module production in 2025.

Table 4.4 CSPV cells and modules: U.S. producers' raw material costs for CSPV module production in 2025

Value in 1,000 dollars; share of value in percent

Item	Value	Share of value
Cells: Wafer	***	***
Cells: Other material input	***	***
Cells: Raw materials, total	***	***
Modules: Purchased cells: Domestic	***	***
Modules: Purchased cells: Imported	***	***
Modules: Cell costs, total	***	***
Modules: Backsheet	***	***
Modules: Encapsulant	***	***
Modules: Framing	***	***
Modules: Junction box	***	***
Modules: Solar glass	***	***
Modules: Other material input	***	***
Modules: Non-cell costs	***	***
Modules: Raw materials, total	***	***
Cells and modules: Raw materials, total	***	100.0%

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

⁷ ***. Email from ***, May 14, 2026.

As shown in table 4.1, direct labor costs constituted the smallest proportion of COGS, whereas other factory costs accounted for the second largest share of COGS. The average per-unit direct labor costs increased from 2023 to 2025 while the average per-unit other factory costs irregularly declined. On a company-by-company basis, three (***) of the six firms which reported data in all periods reported an overall increase in direct labor costs per unit from 2023 to 2025. Two (***) of the six firms which reported data in all periods, reported an overall decline in other factory costs per unit from 2023 to 2025. *** reported a notable increase in net sales quantity from 2023 to 2025. Meanwhile, their other factory costs did not increase proportionately, resulting in a decrease in other factory cost per unit. As these other factory costs comprised fixed expenses, the distribution of such costs across a larger volume led to a decline of the other factory costs per unit for both companies. As a ratio to net sales, both direct labor costs and other factory costs increased from 2023 to 2025.

As shown in table 4.1, total COGS increased from 2023 to 2025. COGS as a ratio to net sales increased irregularly from 2023 to 2025 while per-unit COGS declined from 2023 to 2025. As shown in table 4.3, of the six firms that provided data during all reporting periods, all but *** reported an overall increase in COGS from 2023 to 2025 and all but *** reported an overall decline in COGS per unit in the same period.⁸

Table 4.1 shows that U.S. producers' aggregate gross profit declined in 2023 to a loss in 2024, and further deteriorated in 2025 because the increase in total cost of goods sold exceeded the increase in total net sales value. As a ratio to net sales, gross profit declined from 2023 to a loss in 2024, followed by an improvement though remaining at a loss in 2025. As shown in table 4.3, of the six firms that provided data during all reporting periods, two firms (***) reported an overall decline in gross profit from 2023 to 2025.

SG&A expenses and operating income or loss

As presented in table 4.1, the U.S. industry's SG&A expenses increased from 2023 to 2025. SG&A expenses as a ratio to net sales irregularly increased from 2023 to 2025 whereas

⁸ ***. *** U.S. producers' questionnaire response, section 3.10f.

SG&A expenses per unit moved within a relatively narrow range from 2023 to 2025. As shown in table 4.3, of the six firms that provided data during all reporting periods, all but *** reported an increase in SG&A expenses from 2023 to 2025. *** reported notably high SG&A expense ratios in 2023 and *** reported notably high SG&A expense ratios in 2024 because each firm was in its start-up phase during those years.

Table 4.1 shows that U.S. producers' aggregate operating loss worsened from 2023 to 2025. The operating loss as a ratio to net sales and on a per unit basis worsened from 2023 to 2024 followed by an improvement though remaining at a loss in 2025. As shown in table 4.3, the operating loss of three firms (***) of the six firms provided data during all reporting periods, overall worsened from 2023 to 2025.

All other expenses and net income or loss

Classified below the operating income level are 45X MPTC/IRA income (government incentives), interest expenses, other expenses, and other income.⁹ In table 4.1, interest expenses, other expenses, and other income are aggregated, and only the net amount is shown. 45X MPTC/IRA income and aggregate all other expenses increased from 2023 to 2025.¹⁰

As shown in table 4.1, net income increased from 2023 to 2025.¹¹ The net income as a ratio to net sales and on a per unit basis declined from 2023 to 2025. As shown in table 4.3, of the six firms that provided data during all reporting periods, the net loss in 2023 of two firms (***) improved overall to an income in 2025 and the net loss of *** improved though remaining at a loss from 2023 to 2025.¹²

⁹ 45X MPTC/IRA income in this section reflects incentives received under Section 45X of the Inflation Reduction Act ("IRA") for eligible manufactured components and other IRA incentives. In part 3 of this report, details of additional IRA incentives (e.g., 48C, 48E, 45Y) were discussed.

¹⁰ ***. *** U.S. producers' questionnaire response, section 3.11a. ***. *** U.S. producers' questionnaire response, section 3.11a.

¹¹ Although the U.S. industry reported an operating loss, it reported a positive net income. This was due to other income items (primarily 45X MPTC/IRA income) exceeding the other expense items by a margin that was larger than operating losses.

¹² A variance analysis is not shown due to *** among the reporting firms.

Capital expenditures and research and development expenses

Table 4.5 presents capital expenditures, by firm, and table 4.7 presents R&D expenses, by firm. Tables 4.6 and 4.8 present the firms' narrative explanations of the nature, focus, and significance of their capital expenditures and R&D expenses, respectively. Both capital expenditure and R&D expenses increased irregularly from 2023 to 2025.

Table 4.5 CSPV cells and modules: U.S. producers' capital expenditures, by firm and period

Value in 1,000 dollars

Firm	2023	2024	2025
AMPS	***	***	***
Canadian Solar	***	***	***
Hanwha GA	***	***	***
Heliene	***	***	***
Hounen Solar	***	***	***
Illuminate	***	***	***
Mission Solar	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
SEG Manufacturing	***	***	***
Silfab Solar	***	***	***
Suniva	***	***	***
T1 Energy	***	***	***
Waaree Solar	***	***	***
All firms	***	***	***

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

Table 4.6 CSPV cells and modules: U.S. producers' narrative descriptions of their capital expenditures, by firm

Firm	Narrative on capital expenditures
AMPS	***
Canadian Solar	***
Hanwha GA	***
Heliene	***
Hounen Solar	***
Illuminate	***
Mission Solar	***
PowerFilm	***
Runergy	***
SEG Manufacturing	***
Silfab Solar	***
Suniva	***
T1 Energy	***
Waaree Solar	***

Table 4.7 CSPV cells and modules: U.S. producers' R&D expenses, by firm and period

Value in 1,000 dollars

Firm	2023	2024	2025
AMPS	***	***	***
Canadian Solar	***	***	***
Hanwha GA	***	***	***
Heliene	***	***	***
Hounen Solar	***	***	***
Illuminate	***	***	***
Mission Solar	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
SEG Manufacturing	***	***	***
Silfab Solar	***	***	***
Suniva	***	***	***
T1 Energy	***	***	***
Waaree Solar	***	***	***
All firms	***	***	***

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

Table 4.8 CSPV cells and modules: U.S. producers' narrative descriptions of their R&D expenses, by firm

Firm	Narrative on R&D expenses
AMPS	***
Canadian Solar	***
Hanwha GA	***
Heliene	***
Hounen Solar	***
Illuminate	***
Mission Solar	***
PowerFilm	***
Runergy	***
SEG Manufacturing	***
Silfab Solar	***
Suniva	***
T1 Energy	***
Waaree Solar	***

Assets and return on assets

Table 4.9 presents data on the U.S. producers' total assets while table 4.10 presents their operating ROA.¹³ Table 4.11 presents U.S. producers' narrative responses explaining their major asset categories and any significant changes in asset levels over time. Total net assets increased from 2023 to 2025 while the ROA declined over the same time period.

Table 4.9 CSPV cells and modules: U.S. producers' total net assets, by firm and period

Value in 1,000 dollars

Firm	2023	2024	2025
AMPS	***	***	***
Canadian Solar	***	***	***
Hanwha GA	***	***	***
Heliene	***	***	***
Hounen Solar	***	***	***
Illuminate	***	***	***
Mission Solar	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
SEG Manufacturing	***	***	***
Silfab Solar	***	***	***
Suniva	***	***	***
T1 Energy	***	***	***
Waaree Solar	***	***	***
All firms	***	***	***

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

¹³ 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 4.10 CSPV cells and modules: U.S. producers' ROA, by firm and period

Ratio in percent

Firm	2023	2024	2025
AMPS	***	***	***
Canadian Solar	***	***	***
Hanwha GA	***	***	***
Heliene	***	***	***
Hounen Solar	***	***	***
Illuminate	***	***	***
Mission Solar	***	***	***
PowerFilm	***	***	***
Runergy	***	***	***
SEG Manufacturing	***	***	***
Silfab Solar	***	***	***
Suniva	***	***	***
T1 Energy	***	***	***
Waaree Solar	***	***	***
All firms	***	***	***

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

Table 4.11 CSPV cells and modules: U.S. producers' narrative descriptions of their total net assets, by firm

Firm	Narrative on assets
AMPS	***
Canadian Solar	***
Hanwha GA	***
Heliene	***
Hounen Solar	***
Illuminate	***
Mission Solar	***
PowerFilm	***
Runergy	***
SEG Manufacturing	***
Silfab Solar	***
Suniva	***
T1 Energy	***
Waaree Solar	***

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

Part 5: U.S. imports, apparent U.S. consumption, and market shares

U.S. imports

As noted in part 1, U.S. importers questionnaire responses were received from 44 firms, representing most U.S. imports of CSPV products in 2025. Data presented in part 5 is based on official U.S. import statistics of the Department of Commerce and questionnaire responses.¹

U.S. imports of cells

Table 5.1 and figure 5.1 present U.S. imports of CSPV cells by source in descending order of quantity for 2025. Between 2023 and 2025, total U.S. imports of CSPV cells increased by nearly six-fold, from 3.9 million kW to 21.7 million kW. The largest import sources were Indonesia, accounting for 29.7 percent of U.S. imports of CSPV cells by quantity in 2025, followed by Laos, accounting for 20.8 percent, and Malaysia, accounting for 16.8 percent of U.S. imports of CSPV cells in the same year. By value, total U.S. imports of CSPV cells also increased from year-to-year from 2023 to 2025. U.S. imports from Indonesia, Laos, Malaysia, and South Korea had the highest share of U.S. imports of CSPV cells by value, together accounting for the vast majority of U.S. imports of CSPV cells. Unit values for CSPV cells from all import sources declined yearly from 2023 to 2025. Unit values went down even though quantity and value both increased, but quantity increased more than value. Thailand, Vietnam, and India had the lowest unit values in 2025, while Taiwan and Japan had the highest the same year. U.S. imports from Laos entered the market in 2023 and steadily increased through 2025, while U.S. imports from Vietnam, India, Taiwan, and Japan decreased.

¹ In this report, U.S. import data was collected through questionnaire responses in the final phase investigations of CSPV cells and modules from India, Indonesia, and Laos (Inv. Nos. 701-TA-772-774 and 731-TA-1756-1758).

Table 5.1 CSPV cells: U.S. imports, by source and period

Quantity in kilowatts; value in 1,000 dollars; unit values in dollars per kilowatt

Source	Measure	2023	2024	2025
Indonesia	Quantity	129,427	150,856	6,450,199
Laos	Quantity	45	778,249	4,533,291
Malaysia	Quantity	1,685,035	4,380,951	3,650,415
South Korea	Quantity	1,064,159	4,567,167	3,233,127
Thailand	Quantity	22,446	2,769,316	3,029,660
Germany	Quantity	1,651	88,145	263,691
Vietnam	Quantity	495,455	1,083,691	262,292
India	Quantity	124,468	267,169	109,104
Taiwan	Quantity	127,207	87,204	98,607
Japan	Quantity	64,223	12,998	37,530
All other sources	Quantity	139,598	176,156	81,546
All import sources	Quantity	3,853,714	14,361,902	21,749,461
Indonesia	Value	36,245	26,574	832,314
Laos	Value	8	100,243	641,642
Malaysia	Value	336,898	576,838	421,205
South Korea	Value	132,981	581,378	453,975
Thailand	Value	11,386	338,588	226,497
Germany	Value	6,546	28,342	53,980
Vietnam	Value	91,066	111,942	23,592
India	Value	23,285	39,108	10,879
Taiwan	Value	38,728	26,961	34,258
Japan	Value	12,376	5,655	12,104
All other sources	Value	31,495	34,089	23,956
All import sources	Value	721,015	1,869,717	2,734,402
Indonesia	Unit value	280	176	129
Laos	Unit value	178	129	142
Malaysia	Unit value	200	132	115
South Korea	Unit value	125	127	140
Thailand	Unit value	507	122	75
Germany	Unit value	3,964	322	205
Vietnam	Unit value	184	103	90
India	Unit value	187	146	100
Taiwan	Unit value	304	309	347
Japan	Unit value	193	435	323
All other sources	Unit value	226	194	294
All import sources	Unit value	187	130	126

Table continued.

Table 5.1 Continued: CSPV cells: U.S. imports, by source and period

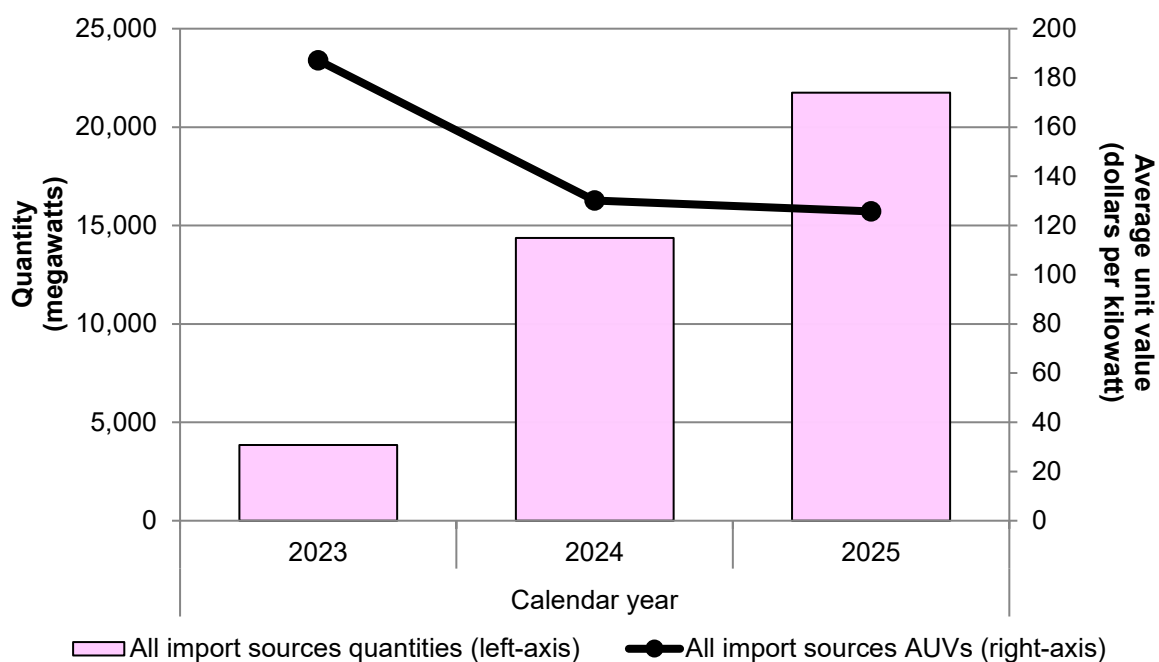
Share in percent

Source	Measure	2023	2024	2025
Indonesia	Share of quantity	3.4	1.1	29.7
Laos	Share of quantity	0.0	5.4	20.8
Malaysia	Share of quantity	43.7	30.5	16.8
South Korea	Share of quantity	27.6	31.8	14.9
Thailand	Share of quantity	0.6	19.3	13.9
Germany	Share of quantity	0.0	0.6	1.2
Vietnam	Share of quantity	12.9	7.5	1.2
India	Share of quantity	3.2	1.9	0.5
Taiwan	Share of quantity	3.3	0.6	0.5
Japan	Share of quantity	1.7	0.1	0.2
All other sources	Share of quantity	3.6	1.2	0.4
All import sources	Share of quantity	100.0	100.0	100.0
Indonesia	Share of value	5.0	1.4	30.4
Laos	Share of value	0.0	5.4	23.5
Malaysia	Share of value	46.7	30.9	15.4
South Korea	Share of value	18.4	31.1	16.6
Thailand	Share of value	1.6	18.1	8.3
Germany	Share of value	0.9	1.5	2.0
Vietnam	Share of value	12.6	6.0	0.9
India	Share of value	3.2	2.1	0.4
Taiwan	Share of value	5.4	1.4	1.3
Japan	Share of value	1.7	0.3	0.4
All other sources	Share of value	4.4	1.8	0.9
All import sources	Share of value	100.0	100.0	100.0

Source: Compiled from official U.S. import statistics of the U.S. Department of Commerce Census Bureau using HTS statistical reporting numbers 8541.42.0010 and 8541.42.0080, accessed on April 30, 2025. Imports are based on the imports for consumption data series. Value data reflect landed duty-paid values.

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 "—". Sources shown are the top ten import sources in descending order of 2025 data.

Figure 5.1 CSPV cells: U.S. import quantities and average unit values, by period



Source: Compiled from official U.S. import statistics of the U.S. Department of Commerce Census Bureau using HTS statistical reporting numbers 8541.42.0010 and 8541.42.0080, accessed on April 30, 2025. Imports are based on the imports for consumption data series. Value data reflect landed duty-paid values.

U.S. imports of modules

Table 5.2 and figure 5.2 present U.S. imports of CSPV modules by source in descending order of quantity for 2025. Unlike CSPV cells, from 2023 to 2025, total U.S. imports of CSPV modules decreased by nearly three-quarters, from 55.7 million kW to 33.3 million kW. The largest import sources by quantity were Indonesia, accounting for 40.0 percent of U.S. imports of CSPV cells by quantity in 2025, followed by Laos, accounting for 16.2 percent, and Vietnam, accounting for 10.2 percent of U.S. imports of CSPV modules in the same year. U.S. imports of CSPV modules from Laos entered the market in 2024 and increased through 2025, while U.S. imports of CSPV modules from Vietnam, Thailand, India, Malaysia, Singapore, and South Korea decreased between 2023 and 2025.

By value, total U.S. imports of CSPV modules also decreased year-on-year from 2023 to 2025. U.S. imports from Indonesia, Laos, and India had the highest share of U.S. imports of CSPV cells by value, together accounting for the majority of U.S. imports of CSPV cells. Unit values for CSPV modules from all import sources declined yearly from 2023 to 2025 and Thailand, the Philippines and Indonesia had the lowest unit values in 2025, while Singapore and India had the highest unit values the same year.

Table 5.2 CSPV modules: U.S. imports, by source and period

Quantity in kilowatts; value in 1,000 dollars; unit values in dollars per kilowatt

Source	Measure	2023	2024	2025
Indonesia	Quantity	458,042	1,832,712	13,311,109
Laos	Quantity	—	1,214,230	5,379,089
Vietnam	Quantity	15,286,669	19,786,065	3,389,947
Thailand	Quantity	11,357,718	13,165,932	3,215,250
India	Quantity	4,831,442	4,351,555	3,132,074
Malaysia	Quantity	10,085,809	7,836,357	2,169,955
Ethiopia	Quantity	—	—	1,150,988
Philippines	Quantity	562	1,493	545,266
Singapore	Quantity	645,243	453,470	373,438
South Korea	Quantity	3,262,647	457,343	154,950
All other sources	Quantity	9,811,579	6,625,625	447,347
All import sources	Quantity	55,739,711	55,724,782	33,269,413
Indonesia	Value	184,656	437,305	2,733,940
Laos	Value	—	303,175	1,177,110
Vietnam	Value	4,933,937	5,776,171	846,335
Thailand	Value	4,233,736	3,209,419	487,709
India	Value	1,920,318	1,576,339	953,423
Malaysia	Value	2,943,177	2,133,472	570,162
Ethiopia	Value	—	—	331,560
Philippines	Value	244	793	110,262
Singapore	Value	381,070	158,724	137,794
South Korea	Value	1,188,387	106,419	42,728
All other sources	Value	3,576,529	1,965,062	124,765
All import sources	Value	19,362,053	15,666,878	7,515,788
Indonesia	Unit value	403	239	205
Laos	Unit value	—	250	219
Vietnam	Unit value	323	292	250
Thailand	Unit value	373	244	152
India	Unit value	397	362	304
Malaysia	Unit value	292	272	263
Ethiopia	Unit value	—	—	288
Philippines	Unit value	434	531	202
Singapore	Unit value	591	350	369
South Korea	Unit value	364	233	276
All other sources	Unit value	365	297	279
All import sources	Unit value	347	281	226

Table continued.

Table 5.2 Continued CSPV modules: U.S. imports, by source and period

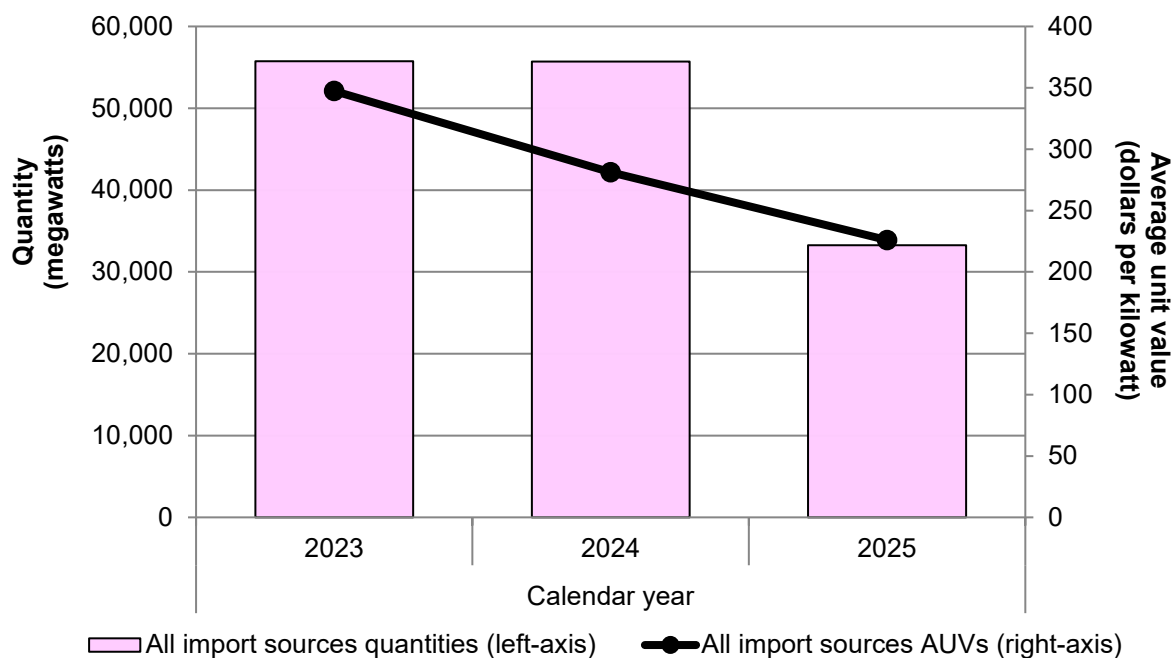
Share in percent

Source	Measure	2023	2024	2025
Indonesia	Share of quantity	0.8	3.3	40.0
Laos	Share of quantity	—	2.2	16.2
Vietnam	Share of quantity	27.4	35.5	10.2
Thailand	Share of quantity	20.4	23.6	9.7
India	Share of quantity	8.7	7.8	9.4
Malaysia	Share of quantity	18.1	14.1	6.5
Ethiopia	Share of quantity	—	—	3.5
Philippines	Share of quantity	0.0	0.0	1.6
Singapore	Share of quantity	1.2	0.8	1.1
South Korea	Share of quantity	5.9	0.8	0.5
All other sources	Share of quantity	17.6	11.9	1.3
All import sources	Share of quantity	100.0	100.0	100.0
Indonesia	Share of value	1.0	2.8	36.4
Laos	Share of value	—	1.9	15.7
Vietnam	Share of value	25.5	36.9	11.3
Thailand	Share of value	21.9	20.5	6.5
India	Share of value	9.9	10.1	12.7
Malaysia	Share of value	15.2	13.6	7.6
Ethiopia	Share of value	—	—	4.4
Philippines	Share of value	0.0	0.0	1.5
Singapore	Share of value	2.0	1.0	1.8
South Korea	Share of value	6.1	0.7	0.6
All other sources	Share of value	18.5	12.5	1.7
All import sources	Share of value	100.0	100.0	100.0

Source: Compiled from official U.S. import statistics of the U.S. Department of Commerce Census Bureau using HTS statistical reporting numbers 8541.43.0010 and 8541.43.0080, accessed on April 30, 2025. Imports are based on the imports for consumption data series. Value data reflect landed duty-paid values.

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 "—". Sources shown are the top ten import sources in descending order of 2025 data.

Figure 5.2 CSPV modules : U.S. import quantities and average unit values, by period



Source: Compiled from official U.S. import statistics of the U.S. Department of Commerce Census Bureau using HTS statistical reporting numbers 8541.43.0010 and 8541.43.0080, accessed on April 30, 2025. Imports are based on the imports for consumption data series. Value data reflect landed duty-paid values.

U.S. imports of cells and modules

Table 5.3 and figure 5.3 present U.S. imports of CSPV cells and modules combined by source in descending order of quantity for 2025. Total U.S. imports of CSPV cells and modules combined decreased irregularly by quantity and yearly by value, from 2023 to 2025. Indonesia, Laos, and Thailand held the largest shares in 2025 by quantity and unit values declined between 2023 to 2025 from all sources, except for Laos and Ethiopia. Thailand, South Korea, and Malaysia had the lowest average unit values for CSPV cells and modules combined in 2025.

Table 5.3 CSPV cells and modules: U.S. imports, by source and period

Quantity in kilowatts; value in 1,000 dollars; unit values in dollars per kilowatt

Source	Measure	2023	2024	2025
Indonesia	Quantity	587,469	1,983,568	19,761,309
Laos	Quantity	45	1,992,480	9,912,380
Thailand	Quantity	11,380,164	15,935,248	6,244,910
Malaysia	Quantity	11,770,844	12,217,308	5,820,370
Vietnam	Quantity	15,782,124	20,869,756	3,652,238
South Korea	Quantity	4,326,806	5,024,510	3,388,077
India	Quantity	4,955,910	4,618,724	3,241,178
Ethiopia	Quantity	—	—	1,161,888
Philippines	Quantity	2,688	3,794	575,011
Singapore	Quantity	645,609	466,225	373,440
All other sources	Quantity	10,141,766	6,975,072	888,074
All import sources	Quantity	59,593,424	70,086,685	55,018,874
Indonesia	Value	220,901	463,879	3,566,254
Laos	Value	8	403,417	1,818,752
Thailand	Value	4,245,122	3,548,007	714,206
Malaysia	Value	3,280,076	2,710,310	991,367
Vietnam	Value	5,025,003	5,888,113	869,927
South Korea	Value	1,321,367	687,797	496,703
India	Value	1,943,603	1,615,447	964,302
Ethiopia	Value	—	—	333,147
Philippines	Value	2,281	1,962	116,238
Singapore	Value	381,178	160,842	137,803
All other sources	Value	3,663,528	2,056,822	241,492
All import sources	Value	20,083,068	17,536,596	10,250,190
Indonesia	Unit value	376	234	180
Laos	Unit value	178	202	183
Thailand	Unit value	373	223	114
Malaysia	Unit value	279	222	170
Vietnam	Unit value	318	282	238
South Korea	Unit value	305	137	147
India	Unit value	392	350	298
Ethiopia	Unit value	—	—	287
Philippines	Unit value	849	517	202
Singapore	Unit value	590	345	369
All other sources	Unit value	361	295	272
All import sources	Unit value	337	250	186

Table continued.

Table 5.3 Continued CSPV cells and modules: U.S. imports, by source and period

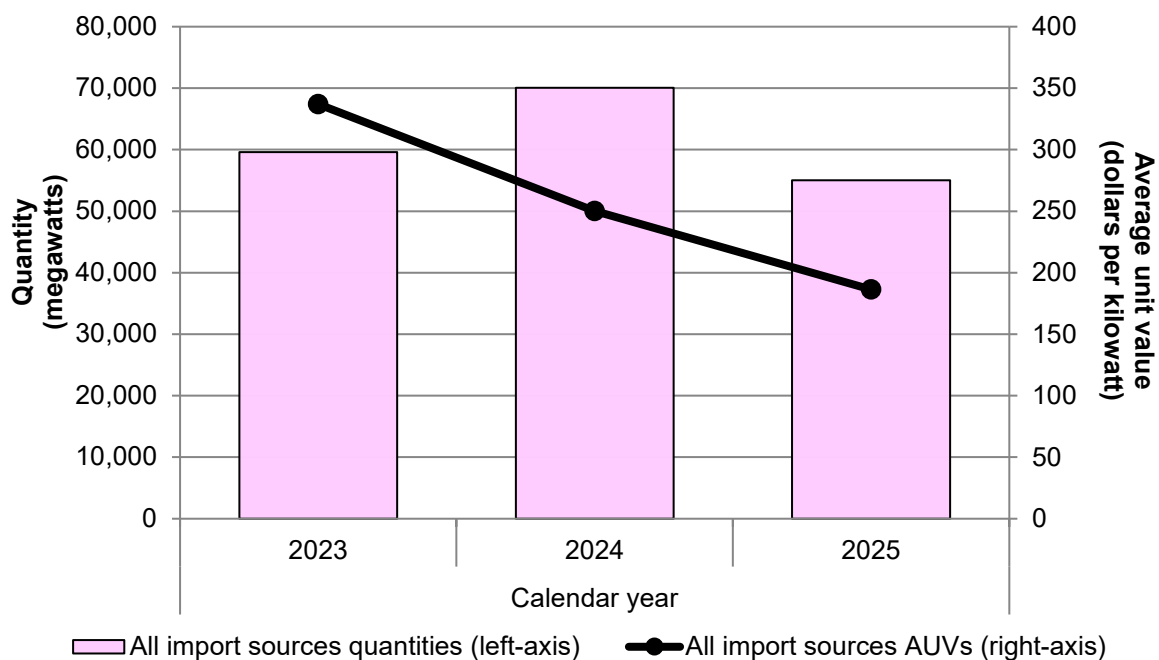
Share in percent

Source	Measure	2023	2024	2025
Indonesia	Share of quantity	1.0	2.8	35.9
Laos	Share of quantity	0.0	2.8	18.0
Thailand	Share of quantity	19.1	22.7	11.4
Malaysia	Share of quantity	19.8	17.4	10.6
Vietnam	Share of quantity	26.5	29.8	6.6
South Korea	Share of quantity	7.3	7.2	6.2
India	Share of quantity	8.3	6.6	5.9
Ethiopia	Share of quantity	—	—	2.1
Philippines	Share of quantity	0.0	0.0	1.0
Singapore	Share of quantity	1.1	0.7	0.7
All other sources	Share of quantity	17.0	10.0	1.6
All import sources	Share of quantity	100.0	100.0	100.0
Indonesia	Share of value	1.1	2.6	34.8
Laos	Share of value	0.0	2.3	17.7
Thailand	Share of value	21.1	20.2	7.0
Malaysia	Share of value	16.3	15.5	9.7
Vietnam	Share of value	25.0	33.6	8.5
South Korea	Share of value	6.6	3.9	4.8
India	Share of value	9.7	9.2	9.4
Ethiopia	Share of value	—	—	3.3
Philippines	Share of value	0.0	0.0	1.1
Singapore	Share of value	1.9	0.9	1.3
All other sources	Share of value	18.2	11.7	2.4
All import sources	Share of value	100.0	100.0	100.0

Source: Compiled from official U.S. import statistics of the U.S. Department of Commerce Census Bureau using HTS statistical reporting numbers 8541.42.0010, 8541.42.0080, 8541.43.0010, and 8541.43.0080, accessed on April 30, 2025. Imports are based on the imports for consumption data series. Value data reflect landed duty-paid values.

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 "—". Sources shown are the top ten import sources in descending order of 2025 data.

Figure 5.3 CSPV cells and modules : U.S. import quantities and average unit values, by period



Source: Compiled from official U.S. import statistics of the U.S. Department of Commerce Census Bureau using HTS statistical reporting numbers 8541.42.0010, 8541.42.0080, 8541.43.0010, and 8541.43.0080, accessed on April 30, 2025. Imports are based on the imports for consumption data series. Value data reflect landed duty-paid values.

U.S. imports by duty status

Table 5.4 and figure 5.4 present U.S. imports of CSPV cells by duty status and period.

Table 5.4 CSPV cells: U.S. imports, by duty status and period

Quantity in kilowatts; values in 1,000 dollars; unit values in dollars per kilowatt; shares in percent

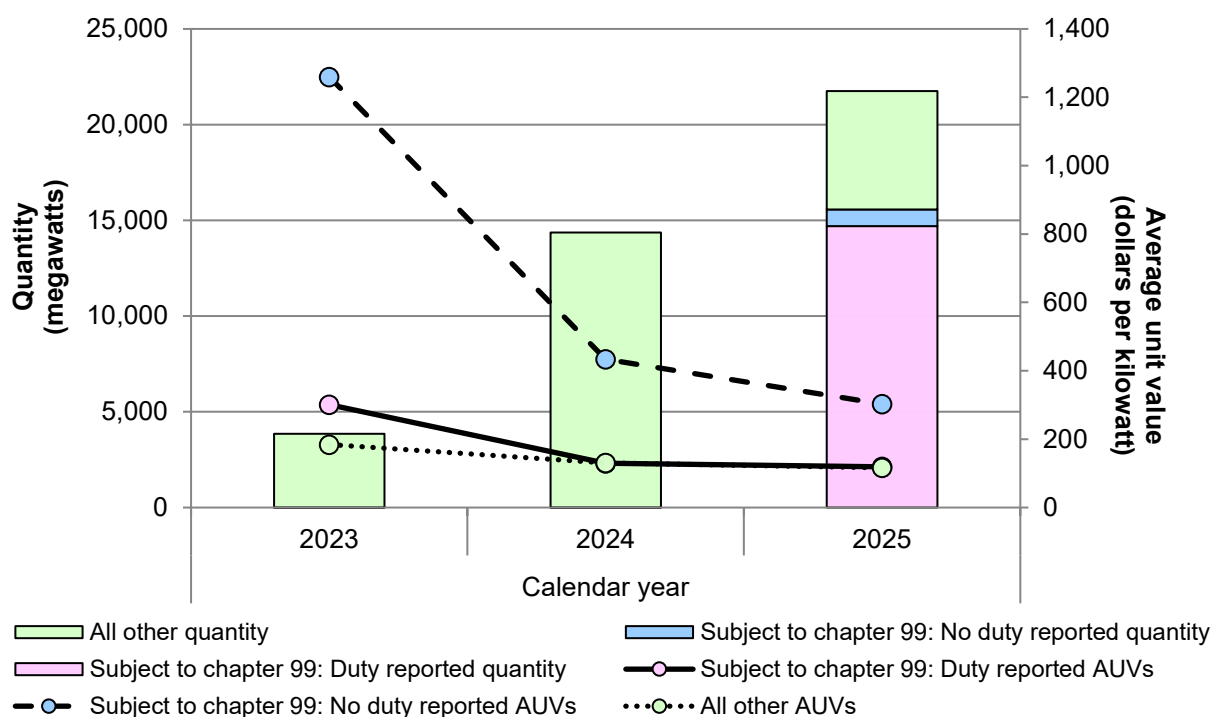
Duty status	Measure	2023	2024	2025
Imports subject to chapter 99, duty reported	Quantity	2,366	9,981	14,696,591
Imports subject to chapter 99, no duty reported	Quantity	9,613	3,296	873,594
Imports subject to chapter 99	Quantity	11,979	13,276	15,570,185
All other duty statuses	Quantity	3,841,735	14,348,626	6,179,276
All duty statuses	Quantity	3,853,714	14,361,902	21,749,461
Imports subject to chapter 99, duty reported	Value	712	1,291	1,751,123
Imports subject to chapter 99, no duty reported	Value	12,110	1,428	264,484
Imports subject to chapter 99	Value	12,822	2,719	2,015,607
All other duty statuses	Value	708,193	1,866,998	718,795
All duty statuses	Value	721,015	1,869,717	2,734,402
Imports subject to chapter 99, duty reported	Unit value	301	129	119
Imports subject to chapter 99, no duty reported	Unit value	1,260	433	303
Imports subject to chapter 99	Unit value	1,070	205	129
All other duty statuses	Unit value	184	130	116
All duty statuses	Unit value	187	130	126
Imports subject to chapter 99, duty reported	Share of quantity	0.1	0.1	67.6
Imports subject to chapter 99, no duty reported	Share of quantity	0.2	0.0	4.0
Imports subject to chapter 99	Share of quantity	0.3	0.1	71.6
All other duty statuses	Share of quantity	99.7	99.9	28.4
All duty statuses	Share of quantity	100.0	100.0	100.0
Imports subject to chapter 99, duty reported	Share of value	0.1	0.1	64.0
Imports subject to chapter 99, no duty reported	Share of value	1.7	0.1	9.7
Imports subject to chapter 99	Share of value	1.8	0.1	73.7
All other duty statuses	Share of value	98.2	99.9	26.3
All duty statuses	Share of value	100.0	100.0	100.0

Source: Compiled from official U.S. import statistics of the U.S. Department of Commerce Census Bureau using HTS statistical reporting numbers 8541.42.0010 and 8541.42.0080, accessed on April 30, 2025. Imports are based on the imports for consumption data series. Value data reflect landed duty-paid values.

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 "—". Chapter 99 of the HTSUS covers temporary or special tariffs/trade measures, including safeguard duties, section 232 measures, section 301 tariffs, IEEPA, etc. Data for imports subject to chapter 99 uses rate provision

codes 69 (imports subject to chapter 99, duty reported) and 79 (imports subject to chapter 99, no duty reported).

Figure 5.4 CSPV cells: U.S. imports, by duty status and period



Source: Compiled from official U.S. import statistics of the U.S. Department of Commerce Census Bureau using HTS statistical reporting numbers 8541.42.0010 and 8541.42.0080, accessed on April 30, 2025. Imports are based on the imports for consumption data series. Value data reflect landed duty-paid values.

Table 5.5 and figure 5.5 present U.S. imports of CSPV modules by duty status and period.

Table 5.5 CSPV modules: U.S. imports, by duty status and period

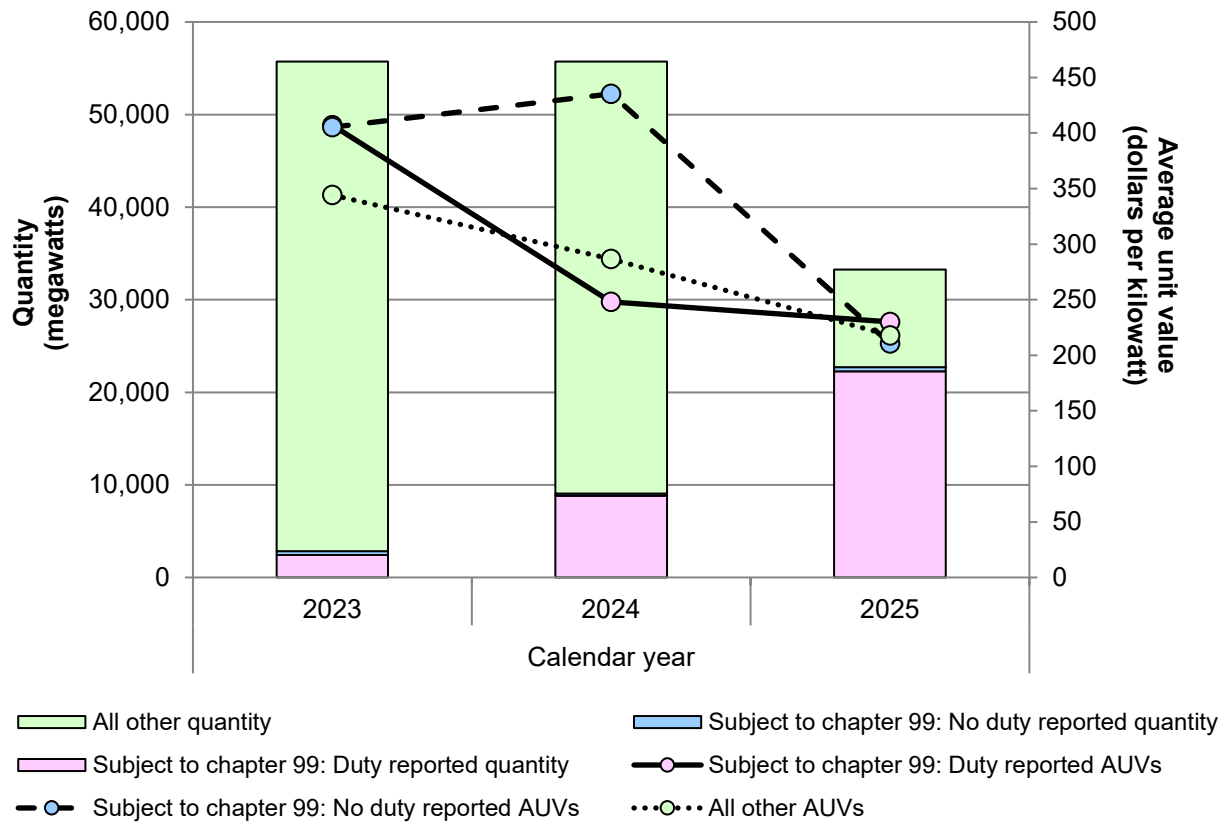
Quantity in kilowatts; values in 1,000 dollars; unit values in dollars per kilowatt; shares in percent

Duty status	Measure	2023	2024	2025
Imports subject to chapter 99, duty reported	Quantity	2,424,141	8,803,322	22,266,458
Imports subject to chapter 99, no duty reported	Quantity	426,335	263,977	448,089
Imports subject to chapter 99	Quantity	2,850,476	9,067,299	22,714,547
All other duty statuses	Quantity	52,889,235	46,657,484	10,554,866
All duty statuses	Quantity	55,739,711	55,724,782	33,269,413
Imports subject to chapter 99, duty reported	Value	986,761	2,182,437	5,121,968
Imports subject to chapter 99, no duty reported	Value	172,843	114,908	94,352
Imports subject to chapter 99	Value	1,159,604	2,297,344	5,216,320
All other duty statuses	Value	18,202,449	13,369,534	2,299,468
All duty statuses	Value	19,362,053	15,666,878	7,515,788
Imports subject to chapter 99, duty reported	Unit value	407	248	230
Imports subject to chapter 99, no duty reported	Unit value	405	435	211
Imports subject to chapter 99	Unit value	407	253	230
All other duty statuses	Unit value	344	287	218
All duty statuses	Unit value	347	281	226
Imports subject to chapter 99, duty reported	Share of quantity	4.3	15.8	66.9
Imports subject to chapter 99, no duty reported	Share of quantity	0.8	0.5	1.3
Imports subject to chapter 99	Share of quantity	5.1	16.3	68.3
All other duty statuses	Share of quantity	94.9	83.7	31.7
All duty statuses	Share of quantity	100.0	100.0	100.0
Imports subject to chapter 99, duty reported	Share of value	5.1	13.9	68.1
Imports subject to chapter 99, no duty reported	Share of value	0.9	0.7	1.3
Imports subject to chapter 99	Share of value	6.0	14.7	69.4
All other duty statuses	Share of value	94.0	85.3	30.6
All duty statuses	Share of value	100.0	100.0	100.0

Source: Compiled from official U.S. import statistics of the U.S. Department of Commerce Census Bureau using HTS statistical reporting numbers 8541.43.0010 and 8541.43.0080, accessed on April 30, 2025. Imports are based on the imports for consumption data series. Value data reflect landed duty-paid values.

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

Figure 5.5 CSPV modules: U.S. imports, by duty status and period



Source: Compiled from official U.S. import statistics of the U.S. Department of Commerce Census Bureau using HTS statistical reporting numbers 8541.43.0010 and 8541.43.0080, accessed on April 30, 2025. Imports are based on the imports for consumption data series. Value data reflect landed duty-paid values.

Table 5.6 and figure 5.6 present U.S. imports of CSPV cells and modules by duty status and period.

Table 5.6 CSPV cells and modules: U.S. imports, by duty status and period

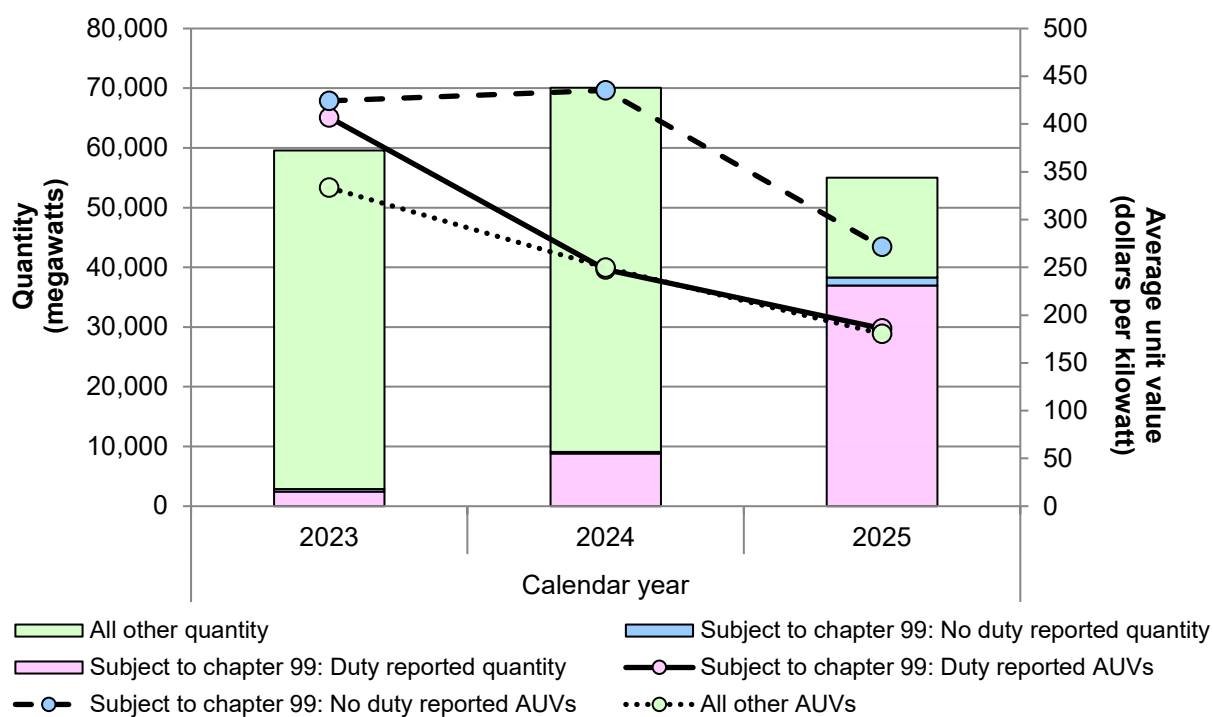
Quantity in kilowatts; values in 1,000 dollars; unit values in dollars per kilowatt; shares in percent

Duty status	Measure	2023	2024	2025
Imports subject to chapter 99, duty reported	Quantity	2,426,507	8,813,303	36,963,049
Imports subject to chapter 99, no duty reported	Quantity	435,948	267,272	1,321,683
Imports subject to chapter 99	Quantity	2,862,455	9,080,575	38,284,732
All other duty statuses	Quantity	56,730,970	61,006,109	16,734,142
All duty statuses	Quantity	59,593,424	70,086,685	55,018,874
Imports subject to chapter 99, duty reported	Value	987,473	2,183,727	6,873,091
Imports subject to chapter 99, no duty reported	Value	184,952	116,336	358,836
Imports subject to chapter 99	Value	1,172,426	2,300,064	7,231,927
All other duty statuses	Value	18,910,642	15,236,532	3,018,263
All duty statuses	Value	20,083,068	17,536,596	10,250,190
Imports subject to chapter 99, duty reported	Unit value	407	248	186
Imports subject to chapter 99, no duty reported	Unit value	424	435	271
Imports subject to chapter 99	Unit value	410	253	189
All other duty statuses	Unit value	333	250	180
All duty statuses	Unit value	337	250	186
Imports subject to chapter 99, duty reported	Share of quantity	4.1	12.6	67.2
Imports subject to chapter 99, no duty reported	Share of quantity	0.7	0.4	2.4
Imports subject to chapter 99	Share of quantity	4.8	13.0	69.6
All other duty statuses	Share of quantity	95.2	87.0	30.4
All duty statuses	Share of quantity	100.0	100.0	100.0
Imports subject to chapter 99, duty reported	Share of value	4.9	12.5	67.1
Imports subject to chapter 99, no duty reported	Share of value	0.9	0.7	3.5
Imports subject to chapter 99	Share of value	5.8	13.1	70.6
All other duty statuses	Share of value	94.2	86.9	29.4
All duty statuses	Share of value	100.0	100.0	100.0

Source: Compiled from official U.S. import statistics of the U.S. Department of Commerce Census Bureau using HTS statistical reporting numbers 8541.42.0010, 8541.42.0080, 8541.43.0010, and 8541.43.0080, accessed on April 30, 2025. Imports are based on the imports for consumption data series. Value data reflect landed duty-paid values.

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

Figure 5.6 CSPV cells and modules: U.S. imports, by duty status and period



Source: Compiled from official U.S. import statistics of the U.S. Department of Commerce Census Bureau using HTS statistical reporting numbers 8541.42.0010, 8541.42.0080, 8541.43.0010, and 8541.43.0080, accessed on April 30, 2025. Imports are based on the imports for consumption data series. Value data reflect landed duty-paid values.

Table 5.7 and figure 5.7 present U.S. imports of CSPV cells and modules by duty status and quarter.

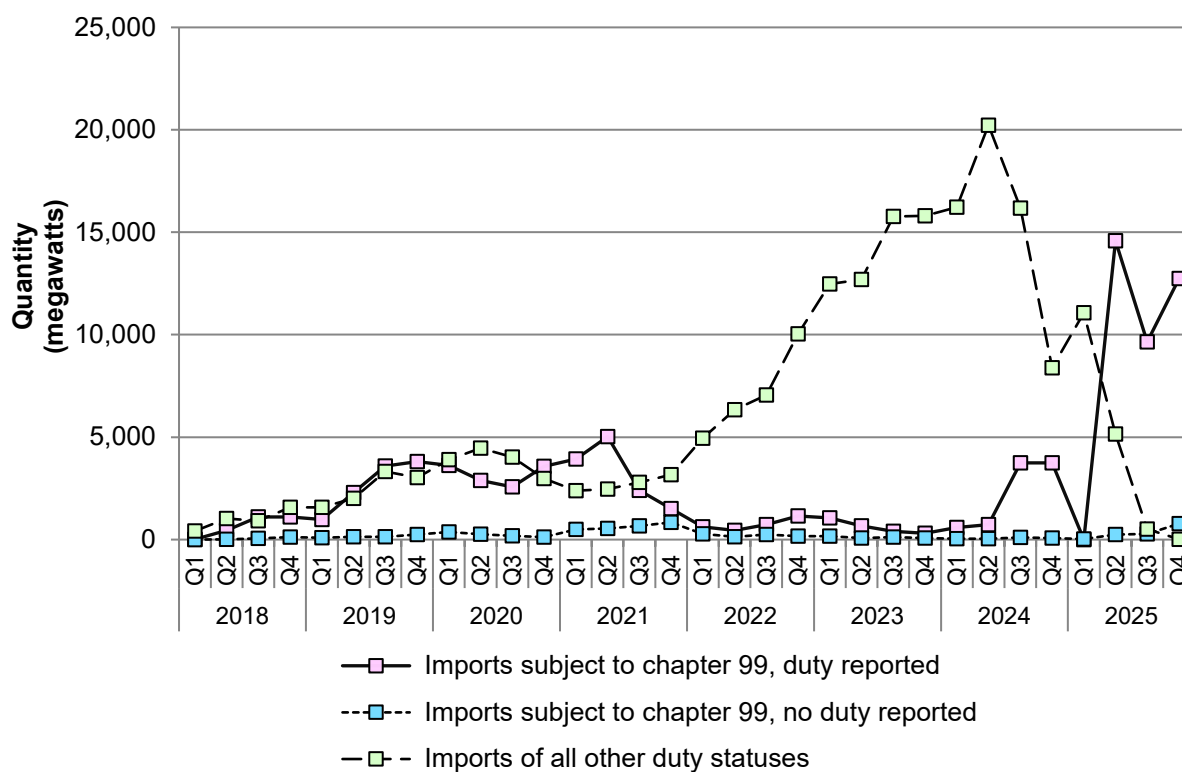
Table 5.7 CSPV cells and modules: U.S. imports, by duty status and quarter

Quantity in kilowatts

Year and quarter	Imports subject to chapter 99, duty reported	Imports subject to chapter 99, no duty reported	Imports subject to chapter 99	All other duty statuses	All duty statuses
2018 Q1	3,558	1,301	4,858	424,612	429,470
2018 Q2	445,954	18,027	463,981	1,032,064	1,496,045
2018 Q3	1,101,366	59,253	1,160,619	913,692	2,074,311
2018 Q4	1,110,668	114,759	1,225,427	1,567,821	2,793,249
2019 Q1	974,334	87,158	1,061,492	1,565,904	2,627,396
2019 Q2	2,284,550	132,646	2,417,196	2,016,008	4,433,204
2019 Q3	3,587,249	136,599	3,723,848	3,317,482	7,041,330
2019 Q4	3,814,269	253,201	4,067,470	3,019,579	7,087,049
2020 Q1	3,622,507	375,565	3,998,072	3,905,622	7,903,694
2020 Q2	2,887,015	262,431	3,149,446	4,465,924	7,615,370
2020 Q3	2,565,181	186,757	2,751,938	4,019,870	6,771,808
2020 Q4	3,565,484	114,995	3,680,480	2,981,469	6,661,948
2021 Q1	3,928,833	496,024	4,424,857	2,378,646	6,803,503
2021 Q2	5,030,017	536,827	5,566,844	2,462,805	8,029,649
2021 Q3	2,397,804	667,175	3,064,979	2,793,416	5,858,395
2021 Q4	1,514,171	839,674	2,353,845	3,168,578	5,522,423
2022 Q1	625,905	275,905	901,810	4,947,735	5,849,545
2022 Q2	451,057	140,063	591,120	6,336,618	6,927,738
2022 Q3	728,364	245,635	973,999	7,059,055	8,033,054
2022 Q4	1,156,507	162,281	1,318,789	10,033,362	11,352,151
2023 Q1	1,059,262	172,519	1,231,781	12,467,843	13,699,624
2023 Q2	660,746	73,467	734,213	12,692,006	13,426,220
2023 Q3	399,685	118,349	518,034	15,774,525	16,292,559
2023 Q4	306,814	71,612	378,426	15,796,595	16,175,022
2024 Q1	591,152	43,868	635,020	16,221,846	16,856,866
2024 Q2	728,547	43,642	772,189	20,229,350	21,001,538
2024 Q3	3,749,950	110,743	3,860,692	16,170,501	20,031,193
2024 Q4	3,743,655	69,020	3,812,674	8,384,413	12,197,087
2025 Q1	36	29,081	29,117	11,068,496	11,097,613
2025 Q2	14,583,813	238,720	14,822,534	5,144,949	19,967,483
2025 Q3	9,642,020	272,437	9,914,457	504,085	10,418,542
2025 Q4	12,737,180	781,444	13,518,624	16,612	13,535,236

Source: Compiled from official U.S. import statistics of the U.S. Department of Commerce Census Bureau using statistical reporting numbers 8541.42.0010, 8541.42.0080, 8541.40.6025, 8541.40.6045, and 8541.40.6030 for cells and statistical reporting numbers 8541.43.0010, 8541.43.0080, 8541.40.6015, 8541.40.6035, and 8541.40.6020 for modules, accessed April 30, 2026. Imports are based on the imports for consumption data series. Note: Zeroes, null values, and undefined calculations are suppressed and shown as “—”.

Figure 5.7 CSPV cells and modules: U.S. imports, by duty status and quarter



Source: Compiled from official U.S. import statistics of the U.S. Department of Commerce Census Bureau using statistical reporting numbers 8541.42.0010, 8541.42.0080, 8541.40.6025, 8541.40.6045, and 8541.40.6030 for cells and statistical reporting numbers 8541.43.0010, 8541.43.0080, 8541.40.6015, 8541.40.6035, and 8541.40.6020 for modules, accessed April 30, 2026. Imports are based on the imports for consumption data series.

U.S. imports by AD/CVD cohort

Table 5.8 and figure 5.8 present U.S. imports of CSPV cells and modules by AD/CVD cohort and quarter.

Table 5.8 CSPV cells and modules: U.S. imports, by AD/CVD cohort and quarter

Quantity in kilowatts

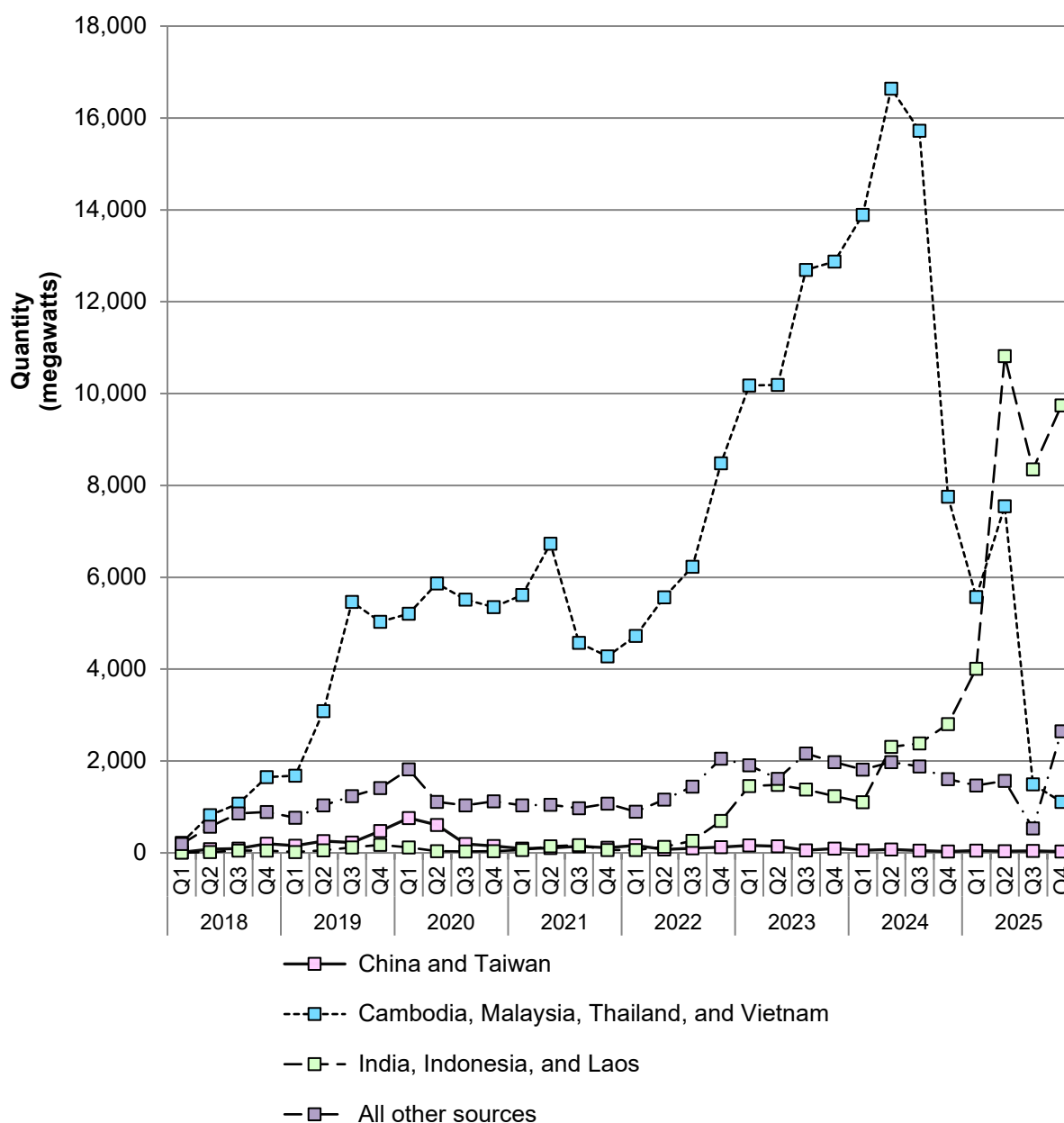
Quarter	China and Taiwan	Cambodia, Malaysia, Thailand, and Vietnam	India, Indonesia, and Laos	All other sources	All sources
2018 Q1	13,317	220,966	2,865	192,323	429,470
2018 Q2	78,964	824,101	20,552	572,428	1,496,045
2018 Q3	95,358	1,070,165	49,552	859,236	2,074,311
2018 Q4	199,140	1,650,253	50,512	893,345	2,793,249
2019 Q1	159,114	1,683,901	20,135	764,247	2,627,396
2019 Q2	254,245	3,086,445	55,822	1,036,692	4,433,204
2019 Q3	226,250	5,462,247	117,425	1,235,409	7,041,330
2019 Q4	475,958	5,030,010	172,949	1,408,131	7,087,049
2020 Q1	758,910	5,208,537	119,069	1,817,179	7,903,694
2020 Q2	605,174	5,865,107	35,846	1,109,243	7,615,370
2020 Q3	194,160	5,514,372	30,143	1,033,133	6,771,808
2020 Q4	147,941	5,352,803	38,486	1,122,718	6,661,948
2021 Q1	93,625	5,614,775	63,114	1,031,988	6,803,503
2021 Q2	104,734	6,729,948	146,219	1,048,749	8,029,649
2021 Q3	146,569	4,574,722	167,763	969,341	5,858,395
2021 Q4	110,392	4,278,188	63,130	1,070,713	5,522,423
2022 Q1	164,561	4,726,673	63,689	894,622	5,849,545
2022 Q2	72,888	5,563,094	129,817	1,161,938	6,927,738
2022 Q3	101,688	6,228,418	261,284	1,441,664	8,033,054
2022 Q4	121,946	8,483,338	693,937	2,052,930	11,352,151
2023 Q1	159,605	10,178,432	1,452,109	1,909,477	13,699,624
2023 Q2	143,031	10,190,923	1,477,446	1,614,820	13,426,220
2023 Q3	56,388	12,692,339	1,380,098	2,163,734	16,292,559
2023 Q4	95,033	12,871,952	1,233,771	1,974,266	16,175,022
2024 Q1	56,833	13,889,436	1,100,716	1,809,881	16,856,866
2024 Q2	77,568	16,640,122	2,311,164	1,972,685	21,001,538
2024 Q3	48,521	15,720,632	2,380,891	1,881,149	20,031,193
2024 Q4	31,961	7,757,086	2,802,001	1,606,040	12,197,087
2025 Q1	50,609	5,573,026	4,006,140	1,467,838	11,097,613
2025 Q2	36,637	7,545,594	10,814,134	1,571,118	19,967,483
2025 Q3	43,199	1,493,230	8,349,918	532,195	10,418,542
2025 Q4	30,255	1,111,881	9,744,674	2,648,426	13,535,236

Source: Compiled from official U.S. import statistics of the U.S. Department of Commerce Census Bureau using statistical reporting numbers 8541.42.0010, 8541.42.0080, 8541.40.6025, 8541.40.6045, and 8541.40.6030 for cells and statistical reporting numbers 8541.43.0010, 8541.43.0080, 8541.40.6015,

8541.40.6035, and 8541.40.6020 for modules, accessed April 30, 2026. Imports are based on the imports for consumption data series.

Note: Imports from Cambodia, Malaysia, Thailand, and Vietnam are based on official import statistics and may contain volumes of circumventing merchandise subject to the orders on China.

Figure 5.8 CSPV cells and modules: U.S. imports, by AD/CVD cohort and quarter



Source: Compiled from official U.S. import statistics of the U.S. Department of Commerce Census Bureau using statistical reporting numbers 8541.42.0010, 8541.42.0080, 8541.40.6025, 8541.40.6045, and 8541.40.6030 for cells and statistical reporting numbers 8541.43.0010, 8541.43.0080, 8541.40.6015, 8541.40.6035, and 8541.40.6020 for modules, accessed April 30, 2026. Imports are based on the imports for consumption data series.

U.S. inventories of imported merchandise

Table 5.9 presents data on CSPV cells and modules' U.S. importers' ending inventories and their ratios by year.

Table 5.9 CSPV cells and modules: U.S. importers' inventories and their ratio to select items, by source and period

Quantity in kilowatts; ratio in percent

Measure	Source	2023	2024	2025
Inventories quantity	All import sources	***	***	***
Ratio to imports	All import sources	***	***	***
Ratio to U.S. shipments of imports	All import sources	***	***	***
Ratio to total shipments of imports	All import sources	***	***	***

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

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

U.S. importers' outstanding orders

Table 5.10 presents arranged imports for CSPV cells and modules by product and period.

Table 5.10 CSPV cells and modules: Arranged imports, by product and period

Quantity in kilowatts

Item	Q2 2026	Q3 2026	Q4 2026	Q1 2027	Total
Cells	***	***	***	***	***
Modules	***	***	***	***	***
Cells and modules	***	***	***	***	***

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

Apparent U.S. consumption and market shares

CSPV cells by quantity

Table 5.11 and figure 5.9 present data on apparent U.S. consumption and market shares for CSPV cells based on quantity data by source and duty status of imports.

Table 5.11 CSPV cells: Apparent U.S. consumption and market shares based on quantity data, by source and duty status of imports

Quantity in kilowatts; shares in percent

Source / duty status of imports	Measure	2023	2024	2025
U.S. producers	Quantity	***	***	***
Imports from all sources	Quantity	3,853,714	14,361,902	21,749,461
Imports from all sources, of which subject to chapter 99, duty reported	Quantity	2,366	9,981	14,696,591
Imports from all sources, of which subject to chapter 99, no duty reported	Quantity	9,613	3,296	873,594
Imports from all sources, of which subject to chapter 99	Quantity	11,979	13,276	15,570,185
Imports from all sources, of which all other duty statuses	Quantity	3,841,735	14,348,626	6,179,276
All sources	Quantity	***	***	***
U.S. producers	Share	***	***	***
Imports from all sources	Share	***	***	***
Imports from all sources, of which subject to chapter 99, duty reported	Share	***	***	***
Imports from all sources, of which subject to chapter 99, no duty reported	Share	***	***	***
Imports from all sources, of which subject to chapter 99	Share	***	***	***
Imports from all sources, of which all other duty statuses	Share	***	***	***
All sources	Share	100.0	100.0	100.0

Source: Compiled from data submitted in response to Commission questionnaires and from official U.S. import statistics of the U.S. Department of Commerce Census Bureau using HTS statistical reporting numbers 8541.42.0010, 8541.42.0080, 8541.43.0010, and 8541.43.0080, accessed on April 30, 2025. Imports are based on the imports for consumption data series.

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

Figure 5.9 CSPV cells: Apparent U.S. consumption and market shares based on quantity data, by source and duty status of imports

* * * * *

Source: Compiled from data submitted in response to Commission questionnaires and from official U.S. import statistics of the U.S. Department of Commerce Census Bureau using HTS statistical reporting numbers 8541.42.0010, 8541.42.0080, 8541.43.0010, and 8541.43.0080, accessed on April 30, 2025. Imports are based on the imports for consumption data series.

CSPV cells by value

Table 5.12 and figure 5.10 present data on apparent U.S. consumption and market shares for CSPV cells based on value data, by source and duty status.

Table 5.12 CSPV cells: Apparent U.S. consumption and market shares based on value data, by source and duty status of imports

Value in 1,000 dollars; shares in percent

Source / duty status of imports	Measure	2023	2024	2025
U.S. producers	Value	***	***	***
Imports from all sources	Value	721,015	1,869,717	2,734,402
Imports from all sources, of which subject to chapter 99, duty reported	Value	712	1,291	1,751,123
Imports from all sources, of which subject to chapter 99, no duty reported	Value	12,110	1,428	264,484
Imports from all sources, of which subject to chapter 99	Value	12,822	2,719	2,015,607
Imports from all sources, of which all other duty statuses	Value	708,193	1,866,998	718,795
All sources	Value	***	***	***
U.S. producers	Share	***	***	***
Imports from all sources	Share	***	***	***
Imports from all sources, of which subject to chapter 99, duty reported	Share	***	***	***
Imports from all sources, of which subject to chapter 99, no duty reported	Share	***	***	***
Imports from all sources, of which subject to chapter 99	Share	***	***	***
Imports from all sources, of which all other duty statuses	Share	***	***	***
All sources	Share	100.0	100.0	100.0

Source: Compiled from data submitted in response to Commission questionnaires and from official U.S. import statistics of the U.S. Department of Commerce Census Bureau using HTS statistical reporting numbers 8541.42.0010, 8541.42.0080, 8541.43.0010, and 8541.43.0080, accessed on April 30, 2025. Imports are based on the imports for consumption data series. Import value data reflect the landed duty paid value.

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

Figure 5.10 CSPV cells: Apparent U.S. consumption and market shares based on value data, by source and duty status of imports

* * * * *

Source: Compiled from data submitted in response to Commission questionnaires and from official U.S. import statistics of the U.S. Department of Commerce Census Bureau using HTS statistical reporting numbers 8541.42.0010, 8541.42.0080, 8541.43.0010, and 8541.43.0080, accessed on April 30, 2025. Imports are based on the imports for consumption data series. Import value data reflect the landed duty paid value.

CSPV modules by quantity

Table 5.13 and figure 5.11 present data on apparent U.S. consumption and market shares for CSPV modules based on quantity data, by source and duty status of imports.

Table 5.13 CSPV modules: Apparent U.S. consumption and market shares based on quantity data, by source and duty status of imports

Quantity in kilowatts; shares in percent

Source / duty status of imports	Measure	2023	2024	2025
U.S. producers	Quantity	***	***	***
Imports from all sources	Quantity	55,739,711	55,724,782	33,269,413
Imports from all sources, of which subject to chapter 99, duty reported	Quantity	2,424,141	8,803,322	22,266,458
Imports from all sources, of which subject to chapter 99, no duty reported	Quantity	426,335	263,977	448,089
Imports from all sources, of which subject to chapter 99	Quantity	2,850,476	9,067,299	22,714,547
Imports from all sources, of which all other duty statuses	Quantity	52,889,235	46,657,484	10,554,866
All sources	Quantity	***	***	***
U.S. producers	Share	***	***	***
Imports from all sources	Share	***	***	***
Imports from all sources, of which subject to chapter 99, duty reported	Share	***	***	***
Imports from all sources, of which subject to chapter 99, no duty reported	Share	***	***	***
Imports from all sources, of which subject to chapter 99	Share	***	***	***
Imports from all sources, of which all other duty statuses	Share	***	***	***
All sources	Share	100.0	100.0	100.0

Source: Compiled from data submitted in response to Commission questionnaires and from official U.S. import statistics of the U.S. Department of Commerce Census Bureau using HTS statistical reporting numbers 8541.42.0010, 8541.42.0080, 8541.43.0010, and 8541.43.0080, accessed on April 30, 2025. Imports are based on the imports for consumption data series.

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

Figure 5.11 CSPV modules: Apparent U.S. consumption and market shares based on quantity data, by source and duty status of imports

* * * * *

Source: Compiled from data submitted in response to Commission questionnaires and from official U.S. import statistics of the U.S. Department of Commerce Census Bureau using HTS statistical reporting numbers 8541.42.0010, 8541.42.0080, 8541.43.0010, and 8541.43.0080, accessed on April 30, 2025. Imports are based on the imports for consumption data series.

CSPV modules by value

Table 5.14 and figure 5.12 present data on apparent U.S. consumption and market shares for CSPV modules based on value data, by source and duty status of imports.

Table 5.14 CSPV modules: Apparent U.S. consumption and market shares based on value data, by source and duty status of imports

Value in 1,000 dollars; shares in percent

Source / duty status of imports	Measure	2023	2024	2025
U.S. producers	Value	***	***	***
Imports from all sources	Value	19,362,053	15,666,878	7,515,788
Imports from all sources, of which subject to chapter 99, duty reported	Value	986,761	2,182,437	5,121,968
Imports from all sources, of which subject to chapter 99, no duty reported	Value	172,843	114,908	94,352
Imports from all sources, of which subject to chapter 99	Value	1,159,604	2,297,344	5,216,320
Imports from all sources, of which all other duty statuses	Value	18,202,449	13,369,534	2,299,468
All sources	Value	***	***	***
U.S. producers	Share	***	***	***
Imports from all sources	Share	***	***	***
Imports from all sources, of which subject to chapter 99, duty reported	Share	***	***	***
Imports from all sources, of which subject to chapter 99, no duty reported	Share	***	***	***
Imports from all sources, of which subject to chapter 99	Share	***	***	***
Imports from all sources, of which all other duty statuses	Share	***	***	***
All sources	Share	100.0	100.0	100.0

Source: Compiled from data submitted in response to Commission questionnaires and from official U.S. import statistics of the U.S. Department of Commerce Census Bureau using HTS statistical reporting numbers 8541.42.0010, 8541.42.0080, 8541.43.0010, and 8541.43.0080, accessed on April 30, 2025. Imports are based on the imports for consumption data series. Import value data reflect the landed duty paid value.

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. Value for U.S. producers' U.S. shipments reflects domestically produced cells, the value added to domestically manufactured cells and the value added to imported cells by responding 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.

Figure 5.12 CSPV modules: Apparent U.S. consumption and market shares based on value data, by source and duty status of imports

* * * * *

Source: Compiled from data submitted in response to Commission questionnaires and from official U.S. import statistics of the U.S. Department of Commerce Census Bureau using HTS statistical reporting numbers 8541.42.0010, 8541.42.0080, 8541.43.0010, and 8541.43.0080, accessed on April 30, 2025. Imports are based on the imports for consumption data series. Import value data reflect the landed duty paid value.

CSPV cells and modules by quantity

Table 5.15 and figure 5.13 present data on apparent U.S. consumption and market shares for CSPV cells and modules based on quantity data, by source and duty status of imports.

Table 5.15 CSPV cells and modules: Apparent U.S. consumption and market shares based on quantity data, by source and duty status of imports

Quantity in kilowatts; Shares in percent

Source / duty status of imports	Measure	2023	2024	2025
U.S. producers	Quantity	***	***	***
Imports from all sources	Quantity	59,593,424	70,086,685	55,018,874
Imports from all sources, of which subject to chapter 99, duty reported	Quantity	2,426,507	8,813,303	36,963,049
Imports from all sources, of which subject to chapter 99, no duty reported	Quantity	435,948	267,272	1,321,683
Imports from all sources, of which subject to chapter 99	Quantity	2,862,455	9,080,575	38,284,732
Imports from all sources, of which all other duty statuses	Quantity	56,730,970	61,006,109	16,734,142
All sources	Quantity	***	***	***
U.S. producers	Share	***	***	***
Imports from all sources	Share	***	***	***
Imports from all sources, of which subject to chapter 99, duty reported	Share	***	***	***
Imports from all sources, of which subject to chapter 99, no duty reported	Share	***	***	***
Imports from all sources, of which subject to chapter 99	Share	***	***	***
Imports from all sources, of which all other duty statuses	Share	***	***	***
All sources	Share	100.0	100.0	100.0

Source: Compiled from data submitted in response to Commission questionnaires and from official U.S. import statistics of the U.S. Department of Commerce Census Bureau using HTS statistical reporting numbers 8541.42.0010, 8541.42.0080, 8541.43.0010, and 8541.43.0080, accessed on April 30, 2025. Imports are based on the imports for consumption data series.

Note: Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Zeroes, null values, and undefined calculations are suppressed and shown as "—". 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 and the value added to imported cells by responding 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.

Figure 5.13 CSPV cells and modules: Apparent U.S. consumption and market shares based on quantity data, by source and duty status of imports

* * * * *

Source: Compiled from data submitted in response to Commission questionnaires and from official U.S. import statistics of the U.S. Department of Commerce Census Bureau using HTS statistical reporting numbers 8541.42.0010, 8541.42.0080, 8541.43.0010, and 8541.43.0080, accessed on April 30, 2025. Imports are based on the imports for consumption data series.

CSPV cells and modules by value

Table 5.16 and figure 5.14 present data on apparent U.S. consumption and market shares for CSPV cells and modules based on value data, by source and duty status of imports.

Table 5.16 CSPV cells and modules: Apparent U.S. consumption and market shares based on value data, by source and duty status of imports

Value in 1,000 dollars; Shares in percent

Source / duty status of imports	Measure	2023	2024	2025
U.S. producers: Fully domestic value	Value	***	***	***
U.S. producers: Value added to imports	Value	***	***	***
U.S. producers: Total value	Value	***	***	***
Imports from all sources	Value	20,083,068	17,536,596	10,250,190
Imports from all sources, of which subject to chapter 99, duty reported	Value	987,473	2,183,727	6,873,091
Imports from all sources, of which subject to chapter 99, no duty reported	Value	184,952	116,336	358,836
Imports from all sources, of which subject to chapter 99	Value	1,172,426	2,300,064	7,231,927
Imports from all sources, of which all other duty statuses	Value	18,910,642	15,236,532	3,018,263
All sources	Value	***	***	***
U.S. producers: Fully domestic value	Share	***	***	***
U.S. producers: Value added to imports	Share	***	***	***
U.S. producers: Total value	Share	***	***	***
Imports from all sources	Share	***	***	***
Imports from all sources, of which subject to chapter 99, duty reported	Share	***	***	***
Imports from all sources, of which subject to chapter 99, no duty reported	Share	***	***	***
Imports from all sources, of which subject to chapter 99	Share	***	***	***
Imports from all sources, of which all other duty statuses	Share	***	***	***
All sources	Share	100.0	100.0	100.0

Source: Compiled from data submitted in response to Commission questionnaires and from official U.S. import statistics of the U.S. Department of Commerce Census Bureau using HTS statistical reporting numbers 8541.42.0010, 8541.42.0080, 8541.43.0010, and 8541.43.0080, accessed on April 30, 2025. Imports are based on the imports for consumption data series. Import value data reflect the landed duty paid value.

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. Value for U.S. producers' U.S. shipments reflects domestically produced cells, the value added to domestically manufactured cells and the value added to imported cells by responding 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.

Figure 5.14 CSPV cells and modules: Apparent U.S. consumption and market shares based on value data, by source and duty status of imports

* * * * *

Source: Compiled from data submitted in response to Commission questionnaires and from official U.S. import statistics of the U.S. Department of Commerce Census Bureau using HTS statistical reporting numbers 8541.42.0010, 8541.42.0080, 8541.43.0010, and 8541.43.0080, accessed on April 30, 2025. Imports are based on the imports for consumption data series. Import value data reflect the landed duty paid value.

Part 6: Pricing data

Factors affecting prices

Raw material costs

The main underlying raw material input for CSPV cells is polysilicon, which is used to make ingots and wafers. These cells are then assembled, along with other components, including solar glass, aluminum frames, junction boxes, and backsheets, into CSPV modules. Raw material costs are the largest component of the total cost of goods sold (“COGS”) for CSPV modules, and crystalline silicon is the largest individual component.¹ According to the China Photovoltaic Industry Association (CPIA), in 2024, China produced 93.2 percent of the world’s polysilicon, 96.6 percent of wafers, 92.3 percent of photovoltaic (PV) cells, and 86.4 percent of PV modules.² During the same time period, global PV manufacturing capacity is estimated to be more than twice the modules actually installed.³

Raw material prices have generally decreased since the original safeguard investigation and have continued fluctuating downwards as shown in figure 6.1 and table 6.1.⁴ The global average price for polysilicon fluctuated downwards during 2023 through 2026, decreasing overall by *** and *** percent for polysilicon and second grade polysilicon, respectively. Polysilicon prices largely declined at the beginning of this period following large increases in global capacity due to new polysilicon factories coming online in China.⁵ Prices recovered modestly beginning in July 2025. During this period, the Chinese Ministry of Industry and Information Technology (MIIT) met with solar manufacturers to discuss government efforts to curb oversupply, and polysilicon output is estimated to have fallen by 43.8 percent in the first

¹ Emmvee PV, <https://www.emmveepv.com/blogs/raw-materials-are-used-in-pv-solar-panel-manufacturing>, retrieved May 18, 2026.

² Center for Strategic and International Studies (CSIS), <https://www.csis.org/analysis/chinas-solar-industry-upheaval-effects-will-be-global>, retrieved May 18, 2026.

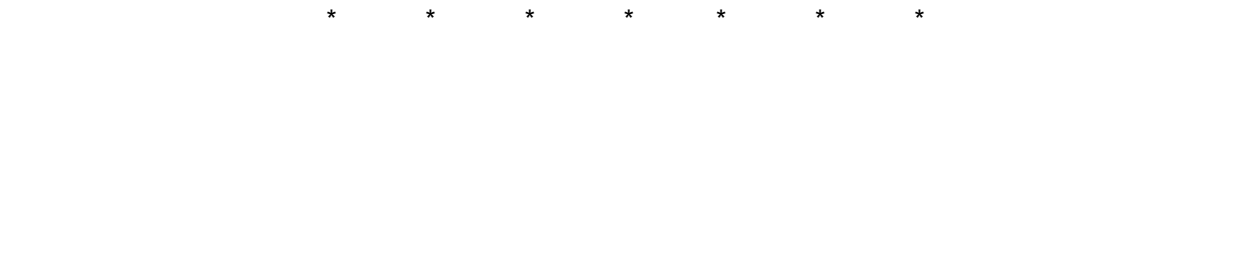
³ International Energy Agency, <https://www.iea.org/reports/world-energy-outlook-2025>, retrieved May 18, 2026.

⁴ Safeguard publication, vol. II, p. V-19. Monitoring publication, pp. VI-1 and VI-2. Extension publication, p. VII-1. Monitoring 2 publication, p. VI-1.

⁵ Monitoring 2 publication, p. I-47.

half of 2025.⁶ Prices have once again started fluctuating downwards after January 2026 as oversupply of polysilicon has persisted.⁷

Figure 6.1 Polysilicon prices: Average prices for polysilicon by month, January 2023 to May 2026



Source: ***, accessed May 16, 2026.

Table 6.1 Polysilicon prices: Average prices for polysilicon by month, January 2023 to May 2026

Prices in dollars per kilogram

Year	Month	Polysilicon	2 nd Grade Polysilicon
2023	January	***	***
2023	February	***	***
2023	March	***	***
2023	April	***	***
2023	May	***	***
2023	June	***	***
2023	July	***	***
2023	August	***	***
2023	September	***	***
2023	October	***	***
2023	November	***	***
2023	December	***	***

Table continued.

⁶ PV Tech, <https://www.pv-tech.org/chinese-polysilicon-producers-to-shut-down-one-third-of-production-capacity-reports-say/>, retrieved May 28, 2026.

⁷ PV Magazine, <https://www.pv-magazine.com/2026/04/09/polysilicon-prices-sliding-toward-historical-lows/>, retrieved May 18, 2026.

Table 6.1 Continued Polysilicon prices: Average prices for polysilicon by month, January 2023 to May 2026

Prices in dollars per kilogram

Year	Month	Polysilicon	2 nd Grade Polysilicon
2024	January	***	***
2024	February	***	***
2024	March	***	***
2024	April	***	***
2024	May	***	***
2024	June	***	***
2024	July	***	***
2024	August	***	***
2024	September	***	***
2024	October	***	***
2024	November	***	***
2024	December	***	***
2025	January	***	***
2025	February	***	***
2025	March	***	***
2025	April	***	***
2025	May	***	***
2025	June	***	***
2025	July	***	***
2025	August	***	***
2025	September	***	***
2025	October	***	***
2025	November	***	***
2025	December	***	***
2026	January	***	***
2026	February	***	***
2026	March	***	***
2026	April	***	***
2026	May	***	***

Source: ***, accessed May 16, 2026.

Global average prices for monocrystalline cells, shown in figure 6.2 and table 6.2, followed a similar trend to polysilicon prices, primarily declining in 2023 and then experiencing a modest recovery at the start of 2026. During this period, cell prices declined overall by *** percent, *** percent, and *** percent for mono cells, N-type mono cells, and PERC mono cells, respectively.

Figure 6.2 Cell prices: Average prices for monocrystalline cells by month, January 2023 to May 2026

* * * * *

Source: ***, accessed May 16, 2026.

Table 6.2 Cell prices: Average prices for monocrystalline cells by month, January 2023 to May 2026

Prices in dollars per kilowatt

Year	Month	Mono cell	N-type mono cell	PERC mono cell
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	***	***	***
2025	January	***	***	***
2025	February	***	***	***
2025	March	***	***	***
2025	April	***	***	***
2025	May	***	***	***
2025	June	***	***	***
2025	July	***	***	***
2025	August	***	***	***
2025	September	***	***	***
2025	October	***	***	***
2025	November	***	***	***
2025	December	***	***	***
2026	January	***	***	***
2026	February	***	***	***
2026	March	***	***	***
2026	April	***	***	***
2026	May	***	***	***

Source: ***, accessed May 16, 2026.

Price data

The Commission requested U.S. producers to provide quarterly data for the total quantity and f.o.b. value of the following CSPV module products shipped to unrelated U.S. customers during January 2023 to March 2026.⁸

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 and flexible 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 and flexible 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, excluding flexible modules.

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, excluding flexible modules.

⁸ The price data presented are from Commission questionnaires for the final phase investigations on CSPV cells and modules from India, Indonesia, and Laos; Inv. Nos. 701-TA-772-774 and 731-TA-1756-1758 (Final). These pricing products differ from those for which data were collected in the original safeguard investigation, the first monitoring investigation, the extension investigation, and the second monitoring investigation. These pricing products were also revised to exclude flexible modules following the preliminary phase investigations on CSPV products from India, Indonesia, and Laos.

Eight U.S. producers provided usable pricing data for sales of the requested products, although not all firms reported pricing for all products for all quarters.⁹ Pricing data reported by these firms accounted for approximately 40.9 percent of U.S. producers’ reported U.S. shipments of CSPV modules in 2025.¹⁰ Price data for products 1 to 4 are presented in table 6.3 and figure 6.3.

Table 6.3 CSPV modules: Weighted-average f.o.b. prices and quantities of domestic products, by quarter

Prices in dollars per kilowatt; Quantity in kilowatts

Period	Product 1 Price	Product 1 Quantity	Product 2 Price	Product 2 Quantity	Product 3 Price	Product 3 Quantity	Product 4 Price	Product 4 Quantity
2023 Q1	***	***	***	***	***	***	***	***
2023 Q2	***	***	***	***	***	***	***	***
2023 Q3	***	***	***	***	***	***	***	***
2023 Q4	***	***	***	***	***	***	***	***
2024 Q1	***	***	***	***	***	***	***	***
2024 Q2	***	***	***	***	***	***	***	***
2024 Q3	***	***	***	***	***	***	***	***
2024 Q4	***	***	***	***	***	***	***	***
2025 Q1	***	***	***	***	***	***	***	***
2025 Q2	***	***	***	***	***	***	***	***
2025 Q3	***	***	***	***	***	***	***	***
2025 Q4	***	***	***	***	***	***	***	***
2026 Q1	***	***	***	***	***	***	***	***

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

Note: Zeroes, null values, and undefined calculations are suppressed and shown as “—”.

⁹ Per-unit pricing data are calculated from total quantity and total value data provided by U.S. producers. The precision and variation of these figures may be affected by rounding, limited quantities, and producer estimates.

¹⁰ Pricing coverage is based on U.S. shipments reported in questionnaires.

Figure 6.3 CSPV modules: Weighted-average f.o.b. prices and quantities of domestic products, by quarter

Price of products

* * * * *

Volume of products

* * * * *

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

Price trends

As shown in figure 6.4 and table 6.4, price data from *** indicate that U.S. prices for certain CSPV modules have declined between January 2023 and May 2026.

Figure 6.4 Module prices: Average prices for modules by month, January 2023 to May 2026

* * * * *

Source: ***, accessed May 16, 2026.

Table 6.4 Module prices: Average prices for modules by month, January 2023 to May 2026

Prices in dollars per kilowatt

Year	Month	U.S. High Efficiency/PERC mono module	U.S. Bifacial N-type mono module	U.S. Bifacial PERC mono module
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	***	***	***
2025	January	***	***	***
2025	February	***	***	***
2025	March	***	***	***
2025	April	***	***	***
2025	May	***	***	***
2025	June	***	***	***
2025	July	***	***	***
2025	August	***	***	***
2025	September	***	***	***
2025	October	***	***	***
2025	November	***	***	***
2025	December	***	***	***
2026	January	***	***	***
2026	February	***	***	***
2026	March	***	***	***
2026	April	***	***	***
2026	May	***	***	***

Source: ***, accessed May 16, 2026.

Questionnaire responses from firms have generally shown declining prices since the original safeguard investigation with mixed results during the second monitoring investigation.¹¹ According to data received in questionnaire responses, in general, U.S. producer prices decreased during January 2023 to March 2026. Table 6.5 summarizes price trends for responding U.S. producers by product while table 6.6 and figure 6.5 show indexed U.S. producer prices by product. As shown in the tables, products 1 and 4 make up the majority of reported prices, by volume, with the average price for both products decreasing by *** percent and *** percent, respectively, over the time period.¹²

Table 6.5 CSPV modules: Summary of price data, by product and source, January 2023 through March 2026

Prices in dollars per kilowatt; Quantity in kilowatts; Change in percent

Product	Number of quarters	Quantity	Low price	High price	First quarter price	Last quarter price	Change over period
Product 1	13	***	***	***	***	***	***
Product 2	7	***	***	***	***	***	***
Product 3	12	***	***	***	***	***	***
Product 4	11	***	***	***	***	***	***

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

Note: Percent change is the change from the first quarter to the last quarter of the data collection period.

¹¹ In the original safeguard investigation, prices for all five pricing products decreased during 2012 to 2016 between 48.5 and 73.2 percent for domestic-origin CSPV products. Safeguard publication, vol. II, p. V-26. In the first monitoring investigation, prices for all of the pricing products for which first and last quarter data were available decreased between 39.3 and 54.2 percent for domestic origin CSPV products between January 2016 and June 2019. Monitoring publication, p. VI-25. In the extension investigation, prices for all of the pricing products for which first and last quarter data were available decreased between *** and *** percent for domestic-origin CSPV products between January 2018 and June 2021. Extension confidential report, p. VII-19. In the second monitoring investigation, during January 2020 to June 2023, prices for domestic-origin CSPV products decreased by *** and *** percent for two of the three pricing products for which first and last quarter data were available and increased by *** percent for the third product. Monitoring 2 confidential report, p. VI-1.

¹² Change over period for product 4 is not shown in table 6.5 due to the base reference period beginning in Q3 2023.

Table 6.6 CSPV modules: Indexed U.S. producer prices, by quarter

Index in percent, 2023 Q1 = 100.0 percent

Period	Product 1	Product 2	Product 3	Product 4
2023 Q1	100.0	100.0	100.0	—
2023 Q2	***	***	***	—
2023 Q3	***	***	***	100.0
2023 Q4	***	***	***	***
2024 Q1	***	***	***	***
2024 Q2	***	***	***	***
2024 Q3	***	***	***	***
2024 Q4	***	***	***	***
2025 Q1	***	***	***	***
2025 Q2	***	***	***	***
2025 Q3	***	***	***	***
2025 Q4	***	***	***	***
2026 Q1	***	***	***	***

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

Note: The base reference period for product 4 is 2023 Q3 as price data was not reported for the two prior quarters. Zeroes, null values, and undefined calculations are suppressed and shown as “—”.

Figure 6.5 CSPV modules: Indexed U.S. producer prices, by quarter

* * * * *

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

Part 7: Adjustment efforts and interested party comments on the safeguard

Information on U.S. producers' adjustment plans, post-relief efforts, and comments on the significance of the safeguard relief and their ability to compete after safeguard termination are presented in this section of the report.

Adjustment plans and post-relief efforts

Following the vote on injury in the Commission's safeguard investigation, one U.S. producer (SolarWorld, i.e., prior to acquisition by SunPower) included in its prehearing remedy brief a proposed adjustment plan for implementation in the event of appropriate import relief.¹

The applicable excerpt from that brief is reproduced below {footnotes omitted}.

VII. THE DOMESTIC SOLAR INDUSTRY'S ADJUSTMENT TO IMPORTS

*The relief recommended by the Commission should be aimed giving the U.S. solar products industry the "breathing space" to adjust positively to competition with imports. Elsewhere in this brief, SolarWorld has recommended a variety of options aimed at providing such relief, as well as forestalling and combatting circumvention. Here, SolarWorld lays out its vision for what the solar industry in the United States should look like after safeguard relief is phased out. SolarWorld also recounts the specific actions that the current members of the industry have committed to undertake during the relief period. These efforts, which involve expenditures of approximately \$***, will increase U.S. product range, capacity, and employment, while enabling cost savings that will permit the U.S. industry to compete more effectively against imports. Coupled with effective relief, SolarWorld believes that these efforts are realistically targeted at achieving healthy competitive conditions for the U.S. industry, and enabling the industry to compete effectively against imports on a going-forward basis.*

¹ USITC Publication 5494, February 2024, Inv. No. TA-201-075 (Second Monitoring), pp. 7.1 to 7.7.

*In assessing the domestic solar industry's plan for adjusting to imports, and its commitments to undertake significant investment to achieve such adjustment, the Commission should pay no heed to entities such as the Solar Energy Industry Association, which have complained that U.S. solar manufacturers did not file an adjustment plan within 120 days of the petition. As even SEIA admits, the Trade Act of 1974 does not require the filing of an adjustment plan at all. Moreover, a robust, realistic plan adjustment plan depends on the scope of the injury determination, as well as on a determination of what relief efforts may be most effective given that scope. A{s} such, it would have made little sense for the domestic industry to prematurely present a plan that would be overtaken by events, and which would have to be substantially revised. In this regard, SolarWorld would also like to point out that, ***, incorporating the proposed adjustment plan into the remedy proposal permits greater accuracy as to the proposed adjustments.*

With the benefit of the agency's injury finding, and in light of the domestic industry's evaluation of potential remedies and its own current position as of the date of this filing, SolarWorld is able to present an adjustment plan that it believes is both realistic and achievable. SolarWorld stresses, however, that achievement of this adjustment plan requires effective import relief that enables U.S. producers to achieve profitability during the relief period. Further, in light of the technologically complex and competitive nature of this industry, it is not possible to forecast every investment that will be made by every U.S. producer during the relief period.

Below, SolarWorld first describes the conditions that it believes will characterize a healthy U.S. solar industry, and which form goals for the domestic industry's position as it emerges from the relief period. SolarWorld then recounts the commitments that both SolarWorld and other companies made in their questionnaire responses. Finally, SolarWorld briefly addresses the fact that both its overall vision for the industry, and the ability of individual firms to enact the commitments described in their questionnaire responses, necessarily depend on effective relief.

A. The Conditions That Will Characterize a Healthy Industry

As the Commission has found, the U.S. solar industry has suffered serious injury by reason of global imports of solar products. Many producers have exited the market entirely; factories have closed, jobs have been lost, and profits have sunk, even as demand continues to rise. In order to adapt successfully to imports, the solar industry will need to become profitable once again, increase production, increase the diversity of its product offerings, and revive upstream production that has relocated overseas. Below, SolarWorld describes some of the conditions that will characterize a healthy, post-relief industry that can compete effectively with imports. SolarWorld believes that these conditions form a reasonable goal for the industry, and can be achieved given the commitments described in subsection VII.B below, and given relief that provides an effective breathing space for the industry to recover from the serious injury that it has suffered.

More producers. *SolarWorld envisions that a healthy industry would be comprised of at least 5-6 competing U.S.-based cell/module producers. Each of these producers will have 1 GW or more of capacity, in order to achieve scale and raw material purchasing power. SolarWorld believes that, with a minimum of 5-6 such producers, the U.S. solar products industry will be well placed to provide competitively priced product to consumers across the country, and across distribution channels.*

Lowered production costs. *U.S. production costs have risen as producers exited the market in the face of import competition, and the remaining producers were unable to finance improvements to their facilities that would permit cost savings. A healthy industry, however, will have lowered production costs that not only enable U.S. producers to compete with imports in the U.S. market, but abroad. Given growing global solar demand, SolarWorld expects that a fully adjusted U.S. solar industry will be fully competitive in the U.S. market and able to export a substantial portion of its yearly production by the end of a safeguards remedy period.*

Competitive for government contracts. *A healthy U.S. industry should be fully competitive to supply all U.S. military and federally funded projects. This means an industry that has multiple producers with sufficient production capacity and product diversity to supply such projects, and whose cost structure enables it to compete effectively for such business.*

A revived upstream production chain. It is not only U.S. production of solar cells and modules that has suffered during the past five years. U.S. production operations for upstream inputs into solar production, such as polysilicon, wafers, ribbon, solar glass, and aluminum frames have also suffered, and are currently very limited. SolarWorld envisions a U.S. solar products industry that can access U.S.-based supply for a growing portion of its needs, and becomes progressively less dependent on import supply.

New R&D partnerships. SolarWorld envisions that each U.S. producer in a revived and healthy solar industry will be engaged in research & development partnerships with one or more major U.S. research universities. Such public/private research, including partnerships supported by the U.S. Department of Energy, will lead to new solar patents, new and more efficient solar products, and increased cost savings in production operations. SolarWorld notes that independent commentators have pointed to vigorous R&D as a potent means for restoring U.S. solar competitiveness.

Increased cell and module efficiency. SolarWorld believes that, given effective relief, the U.S. industry can continue to improve cell and module efficiency every year. The continuing development of more efficient products will contribute to the overall competitiveness of U.S. solar products, both in the U.S. market and abroad, and will increase solar product demand.

Long term supply contracts. The enhanced production capacity, product diversity, and cost savings achieved during the relief period will permit U.S. solar companies to form long term, stable commercial supply relationships with major U.S. companies, commercial installers, and corporate leaders. U.S. producers have already developed top-notch customer service and relations programs in an attempt to compete with imports, but have lost ground to the low prices offered by such products, affecting sales, production, and product offerings. During the relief period, the U.S. industry will aim to regain this ground and to transform their superior service into relationships that will enable to industry to effectively compete with imports after the relief period ends.

B. U.S. Solar Producers Have Committed to Significant Adjustment Measures During the Relief Period

*In their responses to the Commission's questionnaires, the remaining members of the domestic solar products industry described in detail specific investments that they would be able to undertake during a relief period. These efforts, which involve expenditures of approximately \$***, will increase U.S. product range, capacity, and employment, while enabling cost savings that will permit the U.S. industry to compete more effectively against imports. Coupled with effective relief, SolarWorld believes that these efforts are realistically targeted at achieving healthy competitive conditions for the U.S. industry, and enabling the industry to compete effectively against imports on a going-forward basis.*

1. SolarWorld is Committed to Engaging in Significant Measures During a Period of Temporary Relief to Allow it to Adjust to Imports

*In its questionnaire response, SolarWorld described approximately \$*** in investments it plans to undertake during the relief period in order to affirmatively adjust to import competition. The proposed investments will increase SolarWorld's ***. Indeed, in the few days since the Commission's injury vote, SolarWorld has already begun hiring back workers and ramping up its production efforts in anticipation of meaningful relief.*

*SolarWorld proposes to use the relief period to implement investments aimed at ***. In particular, SolarWorld proposes to spend more than \$*** to ***. In conjunction with this increase in ***, the company also proposes to increase its ***.*

*In addition to increasing its overall ***, SolarWorld has also committed to *** through an approximately \$*** investment to produce ***. A further \$*** would go toward increasing ***.*

2. Other Producer Commitments

*SolarWorld is not the only U.S. manufacturer that has committed to taking concrete steps to adjust to import competition, and compete more effectively against imports, during the relief period. Producers other than SolarWorld have stated that they will invest a collective \$*** in an effort to adjust to import competition.*

Such adjustments include:

- *\$*** by *** to ***;*
- *\$*** by *** to ***;*
- *\$*** by *** to ***;*
- *\$*** by *** to ***;*
- *\$*** by *** to ***.*
- *\$*** by *** to ***, and a further \$*** aimed at *** by *** to ***.*

C. The Measures Described Above are Based on Estimated Profitability During a Temporary Relief Period

The goals and commitments described above are specific and achievable, but only to the extent that the remedy ultimately recommended and adopted in this case is sufficient to allow the U.S. industry to generate profits during the relief period. The remedy being proposed by the industry is aimed at achieving this goal, thus allowing the relief period to be of maximal effectiveness. Further, in light of the technologically complex and competitive nature of this industry, it is not possible to forecast every investment that will be made by every new or existing producer during the relief period. Nonetheless, the commitments laid out above provide a realistic framework for the U.S. solar industry's actions during the relief period, based on the current status of their facilities and equipment. If the ultimate remedy is sufficient to allow sustained operating profitability during the relief period, these adjustments can be implemented and will equip the producers to compete effectively against imports once relief is phased out.²

Commentary on adjustment plans

U.S. producers were asked in the Commission's questionnaire for this proceeding whether they had submitted adjustment plans to the Commission in connection with the original safeguard investigation on CSPV products, or indicated to USTR since the initiation of the original safeguard investigation that they would make adjustments in their operations that would permit them to compete more effectively with imports after relief expires if they were to receive import relief as a result of that investigation. Below are responses from U.S. producers.

Heliene's adjustment plan

***.

² SolarWorld's prehearing remedy brief, September 27, 2017, pp. 49 to 57.

Suniva's adjustment plan

***.

Post relief efforts

U.S. producers were asked in this proceeding to describe (1) any efforts made by your firm and/or its workers since Feb 7, 2018 to compete more effectively, (2) the year in which the effort was made, (3) the expenditure involved (in thousands of dollars), and (4) the specific competitive advantage acquired (i.e., increased production, cost reduction, quality improvement, increased market share or sales, etc.). Nine firms responded they undertook efforts to compete more effectively in the U.S. market for CSPV products, as reproduced in their entirety below:

American Panel Solutions

***.

Canadian Solar

***.

Hanwha Q Cells USA GA

***.

Heliene

***.

Hounen Solar America

***.

Mission Solar

***.

PowerFilm

***.

Silfab Solar WA

***.

Suniva

***.

T1 Energy

***.

Significance of relief

U.S. producers were asked to describe the significance of the tariff-rate quotas, in terms of their effect on the firms' operations in a number of categories. Firms were also asked to explain how they separated the effects of the safeguard measure from the effects of other factors, such as closure or re-opening of domestic production facilities, changes in demand, exchange rate changes, the COVID-19 pandemic, or antidumping and countervailing duties. U.S. producers' responses are presented in table 7.1.

Table 7.1 CSPV cells and modules: U.S. producers' reported significance of relief, since February 7, 2018, by operational category

Operational category	Firm name and narrative response on significance of relief
Production and trade	***
Production and trade	***
Production and trade	***
Production and trade	***

Table continued.

Table 7.1 Continued CSPV cells and modules: U.S. producers' reported significance of relief, since February 7, 2018, by operational category

Operational category	Firm name and narrative response on significance of relief
Production and trade	***
Production and trade	***
Production and trade	***
Production and trade	***
Production and trade	***
Production and trade	***
Production and trade	***
Production and trade	***

Table continued.

Table 7.1 Continued CSPV cells and modules: U.S. producers' reported significance of relief, since February 7, 2018, by operational category

Operational category	Firm name and narrative response on significance of relief
Production and trade	***
Production and trade	***
Financial performance	***
Financial performance	***
Financial performance	***
Financial performance	***
Financial performance	***

Table continued.

Table 7.1 Continued CSPV cells and modules: U.S. producers' reported significance of relief, since February 7, 2018, by operational category

Operational category	Firm name and narrative response on significance of relief
Financial performance	***
Financial performance	***
Financial performance	***
Financial performance	***
Financial performance	***
Financial performance	***
Financial performance	***
Financial performance	***
Financial performance	***
Collective bargaining agreements	***

Table continued.

Table 7.1 Continued CSPV cells and modules: U.S. producers' reported significance of relief, since February 7, 2018, by operational category

Operational category	Firm name and narrative response on significance of relief
Collective bargaining agreements	***
Collective bargaining agreements	***
Collective bargaining agreements	***
Collective bargaining agreements	***
Collective bargaining agreements	***
Collective bargaining agreements	***
Collective bargaining agreements	***
Collective bargaining agreements	***
Collective bargaining agreements	***
Collective bargaining agreements	***
Collective bargaining agreements	***
Collective bargaining agreements	***
Collective bargaining agreements	***
Collective bargaining agreements	***

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

Ability to compete after safeguard termination

U.S. producers were asked to explain whether they would be able to compete successfully with imports after termination of the safeguard actions. Their responses are presented in table 7.2.

Table 7.2 CSPV cells and modules: U.S. producers' reported ability to compete after safeguard termination

Firm	Narrative response on ability to compete after safeguard termination
***	***
***	***

Tabled continued.

Table 7.2 Continued CSPV cells and modules: U.S. producers' reported ability to compete after safeguard termination

Firm	Narrative response on ability to compete after safeguard termination
***	***
***	***
***	***
***	***

Tabled continued.

Table 7.2 Continued CSPV cells and modules: U.S. producers' reported ability to compete after safeguard termination

Firm	Narrative response on ability to compete after safeguard termination
***	***
***	***
***	***

Tabled continued.

Table 7.2 Continued CSPV cells and modules: U.S. producers' reported ability to compete after safeguard termination

Firm	Narrative response on ability to compete after safeguard termination
***	***

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

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
91 FR 12814 March 17, 2026	Crystalline Silicon Photovoltaic Cells Whether or Not Partially or Fully Assembled Into Other Products: Evaluation of the Effectiveness of Import Relief	https://www.govinfo.gov/content/pkg/FR-2026-03-17/pdf/2026-05170.pdf
91 FR 36000 June 15, 2026	Crystalline Silicon Photovoltaic Cells Whether or Not Partially or Fully Assembled Into Other Products: Evaluation of the Effectiveness of Import Relief; Cancellation of Hearing for Evaluation of the Effectiveness of Import Relief	https://www.govinfo.gov/content/pkg/FR-2026-06-15/pdf/2026-11937.pdf

APPENDIX B

HEARING CANCELLATION

On June 8, 2026, counsel for the Alliance for American Solar Manufacturing and Trade and Hanwha Q Cells USA, Inc. withdrew their requests to appear at the hearing and filed a request that the Commission cancel the scheduled hearing for this proceeding given the lack of witnesses. Consequently, the public hearing in connection with this proceeding, scheduled on June 12, 2026, was cancelled. See 91 FR 36000, June 15, 2026 (attached).

The Commission posed posthearing questions and all interested parties were given an opportunity to submit written responses and present any additional evidence for the Commission to consider.

the respondent, to find the facts to be as alleged in the complaint and this notice and to enter an initial determination and a final determination containing such findings, and may result in the issuance of an exclusion order or a cease and desist order or both directed against the respondent.

By order of the Commission.

Issued: June 10, 2026.

Lisa Barton,

Secretary to the Commission.

[FR Doc. 2026–11934 Filed 6–12–26; 8:45 am]

BILLING CODE 7020–02–P

INTERNATIONAL TRADE COMMISSION

[Investigation No. TA–201–075 (Evaluation)]

Crystalline Silicon Photovoltaic Cells Whether or Not Partially or Fully Assembled Into Other Products: Evaluation of the Effectiveness of Import Relief; Cancellation of Hearing for Evaluation of the Effectiveness of Import Relief

AGENCY: United States International Trade Commission.

ACTION: Notice.

DATES: June 10, 2026.

FOR FURTHER INFORMATION CONTACT:

Celia Feldpausch (202–205–2387), Office of Investigations, U.S. International Trade Commission, 500 E Street SW, Washington, DC 20436. Hearing-impaired individuals are advised that information on this matter can be obtained by contacting the Commission's TDD terminal on 202–205–1810. Persons with mobility impairments who will need special assistance in gaining access to the Commission should contact the Office of the Secretary at 202–205–2000. General information concerning the Commission may also be obtained by accessing its internet server (<https://www.usitc.gov>). The public record for this investigation may be viewed on the Commission's electronic docket (EDIS) at <https://edis.usitc.gov>.

SUPPLEMENTARY INFORMATION: On February 6, 2026, the Commission established a schedule for investigation No. TA–201–075 (Evaluation), Crystalline Silicon Photovoltaic (“CSPV”) Cells (Whether or Not Partially or Fully Assembled Into Other Products) (“CSPV products”), for the purpose of evaluating the effectiveness of the relief action imposed by the President on imports of CSPV products under section 203 of the Trade Act of 1974, which terminated on February 6, 2026 (91 FR 12814, March 17, 2026). On

June 5, 2026, counsel for the Alliance for American Solar Manufacturing and Trade (“the Alliance”) ¹ and Hanwha Q Cells USA, Inc. (“Hanwha”) filed requests to appear at the hearing. No other parties submitted a request to appear at the hearing. On June 8, 2026, counsel for the Alliance and Hanwha withdrew their requests to appear at the hearing and filed a request that the Commission cancel the scheduled hearing for this proceeding. Consequently, the public hearing in connection with this proceeding, scheduled to begin at 9:30 a.m. on June 12, 2026, is cancelled. Parties to this proceeding should respond to any written questions posed by the Commission in their posthearing briefs, which are due to be filed on June 22, 2026.

For further information concerning this proceeding, see the Commission's notice cited above and the Commission's Rules of Practice and Procedure, part 201, subparts A through E (19 CFR part 201), and part 206, subparts A and F (19 CFR part 206).

Authority: This proceeding is being conducted under authority of section 204(d) of the Tariff Act of 1974; this notice is published pursuant to § 206.3 of the Commission's rules.

By order of the Commission.

Issued: June 10, 2026.

Lisa Barton,

Secretary to the Commission.

[FR Doc. 2026–11937 Filed 6–12–26; 8:45 am]

BILLING CODE 7020–02–P

INTERNATIONAL TRADE COMMISSION

[Investigation No. 337–TA–1494]

Certain TOPCon Solar Cells, Modules, Panels, Components Thereof, and Products Containing Same; Notice of a Commission Determination Not To Review an Initial Determination Granting Tesla, Inc.'s Motion To Intervene

AGENCY: U.S. International Trade Commission.

ACTION: Notice.

SUMMARY: Notice is hereby given that the U.S. International Trade Commission has determined not to review an initial determination (“ID”) (Order No. 10) of the presiding administrative law judge (“ALJ”) granting a motion to intervene filed by non-party Tesla, Inc. (“Tesla”).

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

FOR FURTHER INFORMATION CONTACT:

Edward S. Jou, Esq., Office of the General Counsel, U.S. International Trade Commission, 500 E Street SW, Washington, DC 20436, telephone (202) 205–3316. Copies of non-confidential documents filed in connection with this investigation may be viewed on the Commission's electronic docket (EDIS) at <https://edis.usitc.gov>. For help accessing EDIS, please email EDIS3Help@usitc.gov. General information concerning the Commission may also be obtained by accessing its internet server at <https://www.usitc.gov>. Hearing-impaired persons are advised that information on this matter can be obtained by contacting the Commission's TDD terminal, telephone (202) 205–1810.

SUPPLEMENTARY INFORMATION:

The Commission instituted this investigation on March 30, 2026, based on a complaint, as supplemented, filed by First Solar, Inc. (“First Solar”) of Phoenix, Arizona. 91 FR 15632–34 (Mar. 30, 2026). The complaint, as supplemented, alleged violations of section 337 of the Tariff Act of 1930, as amended, 19 U.S.C. 1337, based upon the importation into the United States and the sale of certain TOPCon solar cells, modules, panels, components thereof, and products containing same by reason of the infringement of certain claims of U.S. Patent No. 9,130,074. *Id.* at 15632. The complaint, as supplemented, further alleged that an industry in the United States exists or is in the process of being established. *Id.* The Commission's notice of investigation named as respondents AXITEC, LLC of Radnor, Pennsylvania; AXITEC Energy GmbH & Co. KG of Böblingen, Germany; AXITEC SOLAR, LLC of Newark, Delaware; Canadian Solar Inc. of Ontario, Canada; CSI Solar Co., Ltd. of Suzhou, China; Canadian Solar (USA) Inc. of Walnut Creek, California; Canadian Solar Manufacturing (Thailand) Co., Ltd. of Bo Win, Thailand; Canadian Solar US Module Manufacturing Corporation of Mesquite, Texas; Canadian Solar International Ltd. of Kowloon, Hong Kong; JA Solar Technology Co., Ltd. of Beijing, China; JA Solar USA, Inc. of San Jose, California; JA Solar AZ, LLC of Phoenix, Arizona; JA Solar International, Ltd. of Kowloon, Hong Kong; JA Solar Vietnam Co., Ltd. of Bac Giang, Vietnam; JinkoSolar Holding Co., Ltd. of Jiangxi Province, China; Jinko Solar Co., Ltd. of Jiangxi Province, China; Jinko Solar (Vietnam) Industries Co. Ltd. of Quang Ninh, Vietnam; Jinko Solar Technology Sdn. Bhd. Of Pulau Pinang, Malaysia; Zhejiang Jinko Solar

APPENDIX C

SUMMARY DATA

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Table C.1

CSPV cells and modules: Summary data concerning the U.S. market, by item and period

Quantity=kilowatts; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per kilowatt; Period changes=percent--exceptions noted

Item	Reported data			Period change comparisons		
	2023	Calendar year 2024	2025	2023-25	Calendar year 2023-24	2024-25
U.S. consumption quantity:						
Amount.....	***	***	***	▼***	▲***	▼***
Producers' share (fn1) (fn2).....	***	***	***	▲***	▲***	▲***
Importers' share (fn1):						
Indonesia.....	***	***	***	▲***	▲***	▲***
Laos.....	***	***	***	▲***	▲***	▲***
Thailand.....	***	***	***	▼***	▲***	▼***
Malaysia.....	***	***	***	▼***	▼***	▼***
Vietnam.....	***	***	***	▼***	▲***	▼***
South Korea.....	***	***	***	▼***	▼***	▼***
India.....	***	***	***	▼***	▼***	▼***
Ethiopia.....	***	***	***	▲***	***	▲***
Philippines.....	***	***	***	▲***	▲***	▲***
Singapore.....	***	***	***	▼***	▼***	▲***
All other 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):						
Indonesia.....	***	***	***	▲***	▲***	▲***
Laos.....	***	***	***	▲***	▲***	▲***
Thailand.....	***	***	***	▼***	▼***	▼***
Malaysia.....	***	***	***	▼***	▼***	▼***
Vietnam.....	***	***	***	▼***	▲***	▼***
South Korea.....	***	***	***	▼***	▼***	▼***
India.....	***	***	***	▼***	▼***	▼***
Ethiopia.....	***	***	***	▲***	***	▲***
Philippines.....	***	***	***	▲***	▼***	▲***
Singapore.....	***	***	***	▼***	▼***	▲***
All other sources.....	***	***	***	▼***	▼***	▼***
All import sources.....	***	***	***	▼***	▼***	▼***
U.S. imports from:						
Indonesia:						
Quantity.....	587,469	1,983,568	19,761,309	▲3,263.8	▲237.6	▲896.3
Value.....	220,901	463,879	3,566,254	▲1,514.4	▲110.0	▲668.8
Unit value.....	\$376	\$234	\$180	▼(52.0)	▼(37.8)	▼(22.8)
Laos:						
Quantity.....	45	1,992,480	9,912,380	▲22,210,525.0	▲4,464,440.3	▲397.5
Value.....	8	403,417	1,818,752	▲22,894,561.1	▲5,078,165.9	▲350.8
Unit value.....	\$178	\$202	\$183	▲3.1	▲13.7	▼(9.4)
Thailand:						
Quantity.....	11,380,164	15,935,248	6,244,910	▼(45.1)	▲40.0	▼(60.8)
Value.....	4,245,122	3,548,007	714,206	▼(83.2)	▼(16.4)	▼(79.9)
Unit value.....	\$373	\$223	\$114	▼(69.3)	▼(40.3)	▼(48.6)
Malaysia:						
Quantity.....	11,770,844	12,217,308	5,820,370	▼(50.6)	▲3.8	▼(52.4)
Value.....	3,280,076	2,710,310	991,367	▼(69.8)	▼(17.4)	▼(63.4)
Unit value.....	\$279	\$222	\$170	▼(38.9)	▼(20.4)	▼(23.2)
Vietnam:						
Quantity.....	15,782,124	20,869,756	3,652,238	▼(76.9)	▲32.2	▼(82.5)
Value.....	5,025,003	5,888,113	869,927	▼(82.7)	▲17.2	▼(85.2)
Unit value.....	\$318	\$282	\$238	▼(25.2)	▼(11.4)	▼(15.6)
South Korea:						
Quantity.....	4,326,806	5,024,510	3,388,077	▼(21.7)	▲16.1	▼(32.6)
Value.....	1,321,367	687,797	496,703	▼(62.4)	▼(47.9)	▼(27.8)
Unit value.....	\$305	\$137	\$147	▼(52.0)	▼(55.2)	▲7.1

Table continued.

Table C.1 Continued

CSPV cells and modules: Summary data concerning the U.S. market, by item and period

Quantity=kilowatts; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per kilowatt; Period changes=percent--exceptions noted

Item	Reported data			Period change comparisons		
	2023	2024	2025	2023–25	2023–24	2024–25
U.S. imports from:						
India:						
Quantity.....	4,955,910	4,618,724	3,241,178	▼(34.6)	▼(6.8)	▼(29.8)
Value.....	1,943,603	1,615,447	964,302	▼(50.4)	▼(16.9)	▼(40.3)
Unit value.....	\$392	\$350	\$298	▼(24.1)	▼(10.8)	▼(14.9)
Ethiopia:						
Quantity.....	—	—	1,161,888	▲—	—	▲—
Value.....	—	—	333,147	▲—	—	▲—
Unit value.....	—	—	\$287	▲—	—	▲—
Philippines:						
Quantity.....	2,688	3,794	575,011	▲21,289.4	▲41.1	▲15,057.7
Value.....	2,281	1,962	116,238	▲4,994.9	▼(14.0)	▲5,825.6
Unit value.....	\$849	\$517	\$202	▼(76.2)	▼(39.1)	▼(60.9)
Singapore:						
Quantity.....	645,609	466,225	373,440	▼(42.2)	▼(27.8)	▼(19.9)
Value.....	381,178	160,842	137,803	▼(63.8)	▼(57.8)	▼(14.3)
Unit value.....	\$590	\$345	\$369	▼(37.5)	▼(41.6)	▲7.0
All other sources:						
Quantity.....	10,141,766	6,975,072	888,074	▼(91.2)	▼(31.2)	▼(87.3)
Value.....	3,663,528	2,056,822	241,492	▼(93.4)	▼(43.9)	▼(88.3)
Unit value.....	\$361	\$295	\$272	▼(24.7)	▼(18.4)	▼(7.8)
All import sources:						
Quantity.....	59,593,424	70,086,685	55,018,874	▼(7.7)	▲17.6	▼(21.5)
Value.....	20,083,068	17,536,596	10,250,190	▼(49.0)	▼(12.7)	▼(41.5)
Unit value.....	\$337	\$250	\$186	▼(44.7)	▼(25.8)	▼(25.5)
U.S. producers:						
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).....	***	***	***	▲***	▲***	▲***
Cells: Unit labor costs.....	***	***	***	▲***	▲***	▼***
Modules: Productivity (kilowatts per 1,000 hours).....	***	***	***	▲***	▲***	▼***
Modules: Unit labor costs.....	***	***	***	▼***	▼***	▼***

Table continued.

Table C.1 Continued

CSPV cells and modules: Summary data concerning the U.S. market, by item and period

Quantity=kilowatts; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per kilowatt; Period changes=percent--exceptions noted

Item	Reported data			Period change comparisons		
	2023	2024	2025	2023–25	2023–24	2024–25
U.S. producers':						
Cells and modules:						
Net sales:						
Quantity.....	***	***	***	▲ ***	▲ ***	▲ ***
Value.....	***	***	***	▲ ***	▲ ***	▲ ***
Unit value.....	***	***	***	▼ ***	▼ ***	▲ ***
Cost of goods sold (COGS).....	***	***	***	▲ ***	▲ ***	▲ ***
Gross profit or (loss) (fn3).....	***	***	***	▼ ***	▼ ***	▼ ***
SG&A expenses.....	***	***	***	▲ ***	▲ ***	▲ ***
Operating income or (loss) (fn3).....	***	***	***	▼ ***	▼ ***	▼ ***
Net income or (loss) (fn3).....	***	***	***	▲ ***	▲ ***	▲ ***
Unit COGS.....	***	***	***	▼ ***	▼ ***	▼ ***
Unit SG&A expenses.....	***	***	***	▼ ***	▼ ***	▲ ***
Unit operating income or (loss) (fn3).....	***	***	***	▼ ***	▼ ***	▲ ***
Unit net income or (loss) (fn3).....	***	***	***	▼ ***	▼ ***	▼ ***
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 official U.S. import statistics of the U.S. Department of Commerce Census Bureau using HTS statistical reporting numbers 8541.42.0010, 8541.42.0080, 8541.43.0010, and 8541.43.0080, accessed on April 30, 2025. Imports are based on the imports for consumption data series. Value data reflect landed duty-paid values. 508-compliant tables for these data are contained in parts 3, 4, and 5 of this report.

Note.--Shares and ratios shown as "0.0" percent represent non-zero values less than "0.05" percent (if positive) and greater than "(0.05)" percent (if negative). Zeroes, null values, and undefined calculations are suppressed and shown as "--". Period changes preceded by a "▲" represent an increase, while period changes preceded by a "▼" represent a decrease.

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

fn2.--Quantity for U.S. producers' U.S. shipments 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.--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.

Table C.2

CSPV cells: Summary data concerning the U.S. market, by item and period

Quantity=kilowatts; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per kilowatt; Period changes=percent--exceptions noted

Item	Reported data			Period change comparisons		
	2023	2024	2025	2023-25	2023-24	2024-25
U.S. consumption quantity:						
Amount.....	***	***	***	▲***	▲***	▲***
Producers' share (fn1) (fn2).....	***	***	***	▲***	▲***	▲***
Importers' share (fn1):						
Indonesia.....	***	***	***	▲***	▼***	▲***
Laos.....	***	***	***	▲***	▲***	▲***
Malaysia.....	***	***	***	▼***	▼***	▼***
South Korea.....	***	***	***	▼***	▲***	▼***
Thailand.....	***	***	***	▲***	▲***	▼***
Germany.....	***	***	***	▲***	▲***	▲***
Vietnam.....	***	***	***	▼***	▼***	▼***
India.....	***	***	***	▼***	▼***	▼***
Taiwan.....	***	***	***	▼***	▼***	▼***
Japan.....	***	***	***	▼***	▼***	▲***
All other sources.....	***	***	***	▼***	▼***	▼***
All import sources.....	***	***	***	▼***	▼***	▼***
U.S. consumption value:						
Amount.....	***	***	***	▲***	▲***	▲***
Producers' share (fn1) (fn2).....	***	***	***	▲***	▲***	▲***
Importers' share (fn1):						
Indonesia.....	***	***	***	▲***	▼***	▲***
Laos.....	***	***	***	▲***	▲***	▲***
Malaysia.....	***	***	***	▼***	▼***	▼***
South Korea.....	***	***	***	▼***	▲***	▼***
Thailand.....	***	***	***	▲***	▲***	▼***
Germany.....	***	***	***	▲***	▲***	▲***
Vietnam.....	***	***	***	▼***	▼***	▼***
India.....	***	***	***	▼***	▼***	▼***
Taiwan.....	***	***	***	▼***	▼***	▼***
Japan.....	***	***	***	▼***	▼***	▲***
All other sources.....	***	***	***	▼***	▼***	▼***
All import sources.....	***	***	***	▼***	▼***	▼***
U.S. imports from:						
Indonesia:						
Quantity.....	129,427	150,856	6,450,199	▲4,883.7	▲16.6	▲4,175.7
Value.....	36,245	26,574	832,314	▲2,196.4	▼(26.7)	▲3,032.1
Unit value.....	\$280	\$176	\$129	▼(53.9)	▼(37.1)	▼(26.7)
Laos:						
Quantity.....	45	778,249	4,533,291	▲10,157,625.5	▲1,743,719.6	▲482.5
Value.....	8	100,243	641,642	▲8,076,967.0	▲1,261,767.6	▲540.1
Unit value.....	\$178	\$129	\$142	▼(20.5)	▼(27.6)	▲9.9
Malaysia:						
Quantity.....	1,685,035	4,380,951	3,650,415	▲116.6	▲160.0	▼(16.7)
Value.....	336,898	576,838	421,205	▲25.0	▲71.2	▼(27.0)
Unit value.....	\$200	\$132	\$115	▼(42.3)	▼(34.1)	▼(12.4)
South Korea:						
Quantity.....	1,064,159	4,567,167	3,233,127	▲203.8	▲329.2	▼(29.2)
Value.....	132,981	581,378	453,975	▲241.4	▲337.2	▼(21.9)
Unit value.....	\$125	\$127	\$140	▲12.4	▲1.9	▲10.3
Thailand:						
Quantity.....	22,446	2,769,316	3,029,660	▲13,397.5	▲12,237.6	▲9.4
Value.....	11,386	338,588	226,497	▲1,889.2	▲2,873.6	▼(33.1)
Unit value.....	\$507	\$122	\$75	▼(85.3)	▼(75.9)	▼(38.9)
Germany:						
Quantity.....	1,651	88,145	263,691	▲15,868.0	▲5,237.7	▲199.2
Value.....	6,546	28,342	53,980	▲724.6	▲333.0	▲90.5
Unit value.....	\$3,964	\$322	\$205	▼(94.8)	▼(91.9)	▼(36.3)

Table continued.

Table C.2 Continued

CSPV cells: Summary data concerning the U.S. market, by item and period

Quantity=kilowatts; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per kilowatt; Period changes=percent--exceptions noted

Item	Reported data			Period change comparisons		
	Calendar year			Calendar year		
	2023	2024	2025	2023–25	2023–24	2024–25
U.S. imports from:						
Vietnam:						
Quantity.....	495,455	1,083,691	262,292	▼(47.1)	▲118.7	▼(75.8)
Value.....	91,066	111,942	23,592	▼(74.1)	▲22.9	▼(78.9)
Unit value.....	\$184	\$103	\$90	▼(51.1)	▼(43.8)	▼(12.9)
India:						
Quantity.....	124,468	267,169	109,104	▼(12.3)	▲114.6	▼(59.2)
Value.....	23,285	39,108	10,879	▼(53.3)	▲67.9	▼(72.2)
Unit value.....	\$187	\$146	\$100	▼(46.7)	▼(21.8)	▼(31.9)
Taiwan:						
Quantity.....	127,207	87,204	98,607	▼(22.5)	▼(31.4)	▲13.1
Value.....	38,728	26,961	34,258	▼(11.5)	▼(30.4)	▲27.1
Unit value.....	\$304	\$309	\$347	▲14.1	▲1.6	▲12.4
Japan:						
Quantity.....	64,223	12,998	37,530	▼(41.6)	▼(79.8)	▲188.7
Value.....	12,376	5,655	12,104	▼(2.2)	▼(54.3)	▲114.0
Unit value.....	\$193	\$435	\$323	▲67.4	▲125.8	▼(25.9)
All other sources:						
Quantity.....	139,598	176,156	81,546	▼(41.6)	▲26.2	▼(53.7)
Value.....	31,495	34,089	23,956	▼(23.9)	▲8.2	▼(29.7)
Unit value.....	\$226	\$194	\$294	▲30.2	▼(14.2)	▲51.8
All import sources:						
Quantity.....	3,853,714	14,361,902	21,749,461	▲464.4	▲272.7	▲51.4
Value.....	721,015	1,869,717	2,734,402	▲279.2	▲159.3	▲46.2
Unit value.....	\$187	\$130	\$126	▼(32.8)	▼(30.4)	▼(3.4)
U.S. producers':						
Practical capacity quantity.....	***	***	***	▲***	▲***	▲***
Production quantity.....	***	***	***	▲***	▲***	▲***
Capacity utilization (fn1).....	***	***	***	▲***	▲***	▲***
U.S. shipments:						
Quantity.....	***	***	***	▲***	▲***	▲***
Value.....	***	***	***	▲***	▲***	▲***
Unit value.....	***	***	***	▲***	▲***	▼***
Export shipments:						
Quantity.....	***	***	***	***	***	***
Value.....	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***
Ending inventory quantity.....	***	***	***	▲***	▲***	▲***
Inventories/total shipments (fn1).....	***	***	***	▲***	▲***	▼***
Production workers.....	***	***	***	▲***	▲***	▲***
Hours worked (1,000s).....	***	***	***	▲***	▲***	▲***
Wages paid (\$1,000).....	***	***	***	▲***	▲***	▲***
Hourly wages (dollars per hour).....	***	***	***	▲***	▲***	▼***
Productivity (kilowatts per 1,000 hours).....	***	***	***	▲***	▲***	▲***
Unit labor costs.....	***	***	***	▲***	▲***	▼***

Table continued.

Table C.2 Continued

CSPV cells: Summary data concerning the U.S. market, by item and period

Quantity=kilowatts; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per kilowatt; Period changes=percent--exceptions noted

Item	Reported data			Period change comparisons		
	2023	2024	2025	2023–25	2023–24	2024–25
U.S. producers':						
Net sales:						
Quantity.....	***	***	***	▲***	▲***	▲***
Value.....	***	***	***	▲***	▲***	▲***
Unit value.....	***	***	***	▲***	▲***	▼***
Cost of goods sold (COGS).....	***	***	***	▲***	▲***	▲***
Gross profit or (loss) (fn2).....	***	***	***	▼***	▲***	▼***
SG&A expenses.....	***	***	***	▲***	▲***	▲***
Operating income or (loss) (fn2).....	***	***	***	▼***	▼***	▼***
Net income or (loss) (fn2).....	***	***	***	▼***	▼***	▼***
Unit COGS.....	***	***	***	▲***	▲***	▲***
Unit SG&A expenses.....	***	***	***	▲***	▲***	▼***
Unit operating income or (loss) (fn2).....	***	***	***	▼***	▼***	▲***
Unit net income or (loss) (fn2).....	***	***	***	▼***	▼***	▲***
COGS/sales (fn1).....	***	***	***	▲***	▲***	▲***
Operating income or (loss)/sales (fn1).....	***	***	***	▼***	▼***	▲***
Net income or (loss)/sales (fn1).....	***	***	***	▼***	▼***	▲***

Source: Compiled from data submitted in response to Commission questionnaires and from official U.S. import statistics of the U.S. Department of Commerce Census Bureau using HTS statistical reporting numbers 8541.42.0010 and 8541.42.0080, accessed on April 30, 2025. Imports are based on the imports for consumption data series. Value data reflect landed duty-paid values. 508-compliant tables for these data are contained in parts 3, 4, and 5 of this report.

Note.--Shares and ratios shown as "0.0" percent represent non-zero values less than "0.05" percent (if positive) and greater than "(0.05)" percent (if negative). Zeroes, null values, and undefined calculations are suppressed and shown as "--". Period changes preceded by a "▲" represent an increase, while period changes preceded by a "▼" represent a decrease.

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

fn2.--Percent changes only calculated when both comparison values represent profits; the directional change in profitability provided when one or both comparison values represent a loss.

Table C.3

CSPV modules: Summary data concerning the U.S. market, by item and period

Quantity=kilowatts; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per kilowatt; Period changes=percent--exceptions noted

Item	Reported data			Period change comparisons		
	2023	2024	2025	2023-25	2023-24	2024-25
U.S. consumption quantity:						
Amount.....	***	***	***	▼***	▲***	▼***
Producers' share (fn1) (fn2).....	***	***	***	▲***	▲***	▲***
Importers' share (fn1):						
Indonesia.....	***	***	***	▲***	▲***	▲***
Laos.....	***	***	***	▲***	▲***	▲***
Vietnam.....	***	***	***	▼***	▲***	▼***
Thailand.....	***	***	***	▼***	▲***	▼***
India.....	***	***	***	▼***	▼***	▼***
Malaysia.....	***	***	***	▼***	▼***	▼***
Ethiopia.....	***	***	***	▲***	***	▲***
Philippines.....	***	***	***	▲***	▲***	▲***
Singapore.....	***	***	***	▼***	▼***	▼***
South Korea.....	***	***	***	▼***	▼***	▼***
All other sources.....	***	***	***	▼***	▼***	▼***
All import sources.....	***	***	***	▼***	▼***	▼***
U.S. consumption value:						
Amount.....	***	***	***	▼***	▼***	▼***
Producers' share (fn1) (fn2).....	***	***	***	▲***	▲***	▲***
Importers' share (fn1):						
Indonesia.....	***	***	***	▲***	▲***	▲***
Laos.....	***	***	***	▲***	▲***	▲***
Vietnam.....	***	***	***	▼***	▲***	▼***
Thailand.....	***	***	***	▼***	▼***	▼***
India.....	***	***	***	▼***	▼***	▼***
Malaysia.....	***	***	***	▼***	▼***	▼***
Ethiopia.....	***	***	***	▲***	***	▲***
Philippines.....	***	***	***	▲***	▲***	▲***
Singapore.....	***	***	***	▼***	▼***	▼***
South Korea.....	***	***	***	▼***	▼***	▼***
All other sources.....	***	***	***	▼***	▼***	▼***
All import sources.....	***	***	***	▼***	▼***	▼***
U.S. imports from:						
Indonesia:						
Quantity.....	458,042	1,832,712	13,311,109	▲2,806.1	▲300.1	▲626.3
Value.....	184,656	437,305	2,733,940	▲1,380.6	▲136.8	▲525.2
Unit value.....	\$403	\$239	\$205	▼(49.1)	▼(40.8)	▼(13.9)
Laos:						
Quantity.....	—	1,214,230	5,379,089	▲***	▲***	▲343.0
Value.....	—	303,175	1,177,110	▲***	▲***	▲288.3
Unit value.....	—	\$250	\$219	▲***	▲***	▼(12.4)
Vietnam:						
Quantity.....	15,286,669	19,786,065	3,389,947	▼(77.8)	▲29.4	▼(82.9)
Value.....	4,933,937	5,776,171	846,335	▼(82.8)	▲17.1	▼(85.3)
Unit value.....	\$323	\$292	\$250	▼(22.6)	▼(9.6)	▼(14.5)
Thailand:						
Quantity.....	11,357,718	13,165,932	3,215,250	▼(71.7)	▲15.9	▼(75.6)
Value.....	4,233,736	3,209,419	487,709	▼(88.5)	▼(24.2)	▼(84.8)
Unit value.....	\$373	\$244	\$152	▼(59.3)	▼(34.6)	▼(37.8)
India:						
Quantity.....	4,831,442	4,351,555	3,132,074	▼(35.2)	▼(9.9)	▼(28.0)
Value.....	1,920,318	1,576,339	953,423	▼(50.4)	▼(17.9)	▼(39.5)
Unit value.....	\$397	\$362	\$304	▼(23.4)	▼(8.9)	▼(16.0)
Malaysia:						
Quantity.....	10,085,809	7,836,357	2,169,955	▼(78.5)	▼(22.3)	▼(72.3)
Value.....	2,943,177	2,133,472	570,162	▼(80.6)	▼(27.5)	▼(73.3)
Unit value.....	\$292	\$272	\$263	▼(10.0)	▼(6.7)	▼(3.5)

Table continued.

Table C.3 Continued

CSPV modules: Summary data concerning the U.S. market, by item and period

Quantity=kilowatts; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per kilowatt; Period changes=percent--exceptions noted

Item	Reported data			Period change comparisons		
	Calendar year			Calendar year		
	2023	2024	2025	2023–25	2023–24	2024–25
U.S. imports from:						
Ethiopia:						
Quantity.....	—	—	1,150,988	▲***	—	▲***
Value.....	—	—	331,560	▲***	—	▲***
Unit value.....	—	—	\$288	▲***	—	▲***
Philippines:						
Quantity.....	562	1,493	545,266	▲96,933.1	▲165.7	▲36,418.1
Value.....	244	793	110,262	▲45,134.3	▲225.1	▲13,812.3
Unit value.....	\$434	\$531	\$202	▼(53.4)	▲22.4	▼(61.9)
Singapore:						
Quantity.....	645,243	453,470	373,438	▼(42.1)	▼(29.7)	▼(17.6)
Value.....	381,070	158,724	137,794	▼(63.8)	▼(58.3)	▼(13.2)
Unit value.....	\$591	\$350	\$369	▼(37.5)	▼(40.7)	▲5.4
South Korea:						
Quantity.....	3,262,647	457,343	154,950	▼(95.3)	▼(86.0)	▼(66.1)
Value.....	1,188,387	106,419	42,728	▼(96.4)	▼(91.0)	▼(59.8)
Unit value.....	\$364	\$233	\$276	▼(24.3)	▼(36.1)	▲18.5
All other sources:						
Quantity.....	9,811,579	6,625,625	447,347	▼(95.4)	▼(32.5)	▼(93.2)
Value.....	3,576,529	1,965,062	124,765	▼(96.5)	▼(45.1)	▼(93.7)
Unit value.....	\$365	\$297	\$279	▼(23.5)	▼(18.6)	▼(6.0)
All import sources:						
Quantity.....	55,739,711	55,724,782	33,269,413	▼(40.3)	▼(0.0)	▼(40.3)
Value.....	19,362,053	15,666,878	7,515,788	▼(61.2)	▼(19.1)	▼(52.0)
Unit value.....	\$347	\$281	\$226	▼(35.0)	▼(19.1)	▼(19.6)
U.S. producers:						
Practical capacity quantity.....	***	***	***	▲***	▲***	▲***
Production quantity.....	***	***	***	▲***	▲***	▲***
Capacity utilization (fn1).....	***	***	***	▲***	▲***	▲***
U.S. shipments:						
Quantity.....	***	***	***	▲***	▲***	▲***
Value.....	***	***	***	▲***	▲***	▲***
Unit value.....	***	***	***	▼***	▼***	▲***
Export shipments:						
Quantity.....	***	***	***	***	***	***
Value.....	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***
Ending inventory quantity.....	***	***	***	▲***	▲***	▼***
Inventories/total shipments (fn1).....	***	***	***	▼***	▲***	▼***
Production workers.....	***	***	***	▲***	▲***	▲***
Hours worked (1,000s).....	***	***	***	▲***	▲***	▲***
Wages paid (\$1,000).....	***	***	***	▲***	▲***	▲***
Hourly wages (dollars per hour).....	***	***	***	▼***	▲***	▼***
Productivity (kilowatts per 1,000 hours).....	***	***	***	▲***	▲***	▼***
Unit labor costs.....	***	***	***	▼***	▼***	▼***

Table continued.

Table C.3 Continued

CSPV modules: Summary data concerning the U.S. market, by item and period

Quantity=kilowatts; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per kilowatt; Period changes=percent--exceptions noted

Item	Reported data			Period change comparisons		
	2023	2024	2025	2023–25	2023–24	2024–25
U.S. producers':						
Net sales:						
Quantity.....	***	***	***	▲***	▲***	▲***
Value.....	***	***	***	▲***	▲***	▲***
Unit value.....	***	***	***	▼***	▼***	▲***
Cost of goods sold (COGS).....	***	***	***	▲***	▲***	▲***
Gross profit or (loss) (fn2).....	***	***	***	▼***	▼***	▼***
SG&A expenses.....	***	***	***	▲***	▲***	▲***
Operating income or (loss) (fn2).....	***	***	***	▼***	▼***	▼***
Net income or (loss) (fn2).....	***	***	***	▲***	▲***	▲***
Unit COGS.....	***	***	***	▼***	▼***	▼***
Unit SG&A expenses.....	***	***	***	▼***	▼***	▲***
Unit operating income or (loss) (fn2).....	***	***	***	▼***	▼***	▲***
Unit net income or (loss) (fn2).....	***	***	***	▼***	▼***	▼***
COGS/sales (fn1).....	***	***	***	▲***	▲***	▼***
Operating income or (loss)/sales (fn1).....	***	***	***	▼***	▼***	▲***
Net income or (loss)/sales (fn1).....	***	***	***	▼***	▼***	▼***

Source: Compiled from data submitted in response to Commission questionnaires and from official U.S. import statistics of the U.S. Department of Commerce Census Bureau using HTS statistical reporting numbers 8541.43.0010 and 8541.43.0080, accessed on April 30, 2025. Imports are based on the imports for consumption data series. Value data reflect landed duty-paid values. 508-compliant tables for these data are contained in parts 3, 4, and 5 of this report.

Note.--Shares and ratios shown as "0.0" percent represent non-zero values less than "0.05" percent (if positive) and greater than "(0.05)" percent (if negative). Zeroes, null values, and undefined calculations are suppressed and shown as "—". Period changes preceded by a "▲" represent an increase, while period changes preceded by a "▼" represent a decrease.

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

fn2.--Percent changes only calculated when both comparison values represent profits; the directional change in profitability provided when one or both comparison values represent a loss.

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APPENDIX D

SELECT DATA FROM PRIOR PROCEEDINGS

Select data from prior proceedings

Summary data from original safeguard proceeding	D.3
Summary data from safeguard monitoring proceeding	D.19
Summary data from safeguard extension proceeding	D.33
Summary data from safeguard monitoring 2 proceeding	D.43

SUMMARY DATA FROM ORIGINAL SAFEGUARD PROCEEDING

CSPV products: Total market: COO petition

Table C-1a

CSPV products: Summary data concerning the U.S. market with country-of-origin of imports based on cell manufacture location, 2012-16

(Quantity=KW; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per kilowatt; Period changes=percent—exceptions noted)

	Reported data					Period changes				
	2012	2013	Calendar year 2014	2015	2016	2012-16	2012-13	Between calendar years 2013-14	2014-15	2015-16
U.S. consumption quantity:										
Amount.....	***	***	***	***	***	***	***	***	***	***
Producers' share (fn1).....	***	***	***	***	***	***	***	***	***	***
Importers' share (fn1):										
Canada.....	***	***	***	***	***	***	***	***	***	***
China.....	***	***	***	***	***	***	***	***	***	***
Germany.....	***	***	***	***	***	***	***	***	***	***
Indonesia.....	***	***	***	***	***	***	***	***	***	***
Japan.....	***	***	***	***	***	***	***	***	***	***
Korea.....	***	***	***	***	***	***	***	***	***	***
Malaysia.....	***	***	***	***	***	***	***	***	***	***
Mexico.....	***	***	***	***	***	***	***	***	***	***
Philippines.....	***	***	***	***	***	***	***	***	***	***
Singapore.....	***	***	***	***	***	***	***	***	***	***
Taiwan.....	***	***	***	***	***	***	***	***	***	***
Thailand.....	***	***	***	***	***	***	***	***	***	***
Vietnam.....	***	***	***	***	***	***	***	***	***	***
All other sources.....	***	***	***	***	***	***	***	***	***	***
All import sources.....	***	***	***	***	***	***	***	***	***	***
U.S. consumption value:										
Amount.....	***	***	***	***	***	***	***	***	***	***
Producers' share (fn1).....	***	***	***	***	***	***	***	***	***	***
Importers' share (fn1):										
Canada.....	***	***	***	***	***	***	***	***	***	***
China.....	***	***	***	***	***	***	***	***	***	***
Germany.....	***	***	***	***	***	***	***	***	***	***
Indonesia.....	***	***	***	***	***	***	***	***	***	***
Japan.....	***	***	***	***	***	***	***	***	***	***
Korea.....	***	***	***	***	***	***	***	***	***	***
Malaysia.....	***	***	***	***	***	***	***	***	***	***
Mexico.....	***	***	***	***	***	***	***	***	***	***
Philippines.....	***	***	***	***	***	***	***	***	***	***
Singapore.....	***	***	***	***	***	***	***	***	***	***
Taiwan.....	***	***	***	***	***	***	***	***	***	***
Thailand.....	***	***	***	***	***	***	***	***	***	***
Vietnam.....	***	***	***	***	***	***	***	***	***	***
All other sources.....	***	***	***	***	***	***	***	***	***	***
All import sources.....	***	***	***	***	***	***	***	***	***	***
U.S. imports from:										
Canada:										
Quantity.....	***	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***	***
Ending inventory quantity.....	***	***	***	***	***	***	***	***	***	***
China:										
Quantity.....	326,846	82,264	1,263,270	3,311,513	2,720,193	732.3	(74.8)	1,435.6	162.1	(17.9)
Value.....	291,878	69,976	747,148	1,680,733	1,258,864	331.3	(76.0)	967.7	125.0	(25.1)
Unit value.....	\$893	\$851	\$591	\$508	\$463	(48.2)	(4.7)	(30.5)	(14.2)	(8.8)
Ending inventory quantity.....	***	***	***	***	***	***	***	***	***	***
Germany:										
Quantity.....	***	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***	***
Ending inventory quantity.....	***	***	***	***	***	***	***	***	***	***
Indonesia:										
Quantity.....	***	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***	***
Ending inventory quantity.....	***	***	***	***	***	***	***	***	***	***
Japan:										
Quantity.....	***	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***	***
Ending inventory quantity.....	***	***	***	***	***	***	***	***	***	***
Korea:										
Quantity.....	***	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***	***
Ending inventory quantity.....	***	***	***	***	***	***	***	***	***	***
Malaysia:										
Quantity.....	***	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***	***
Ending inventory quantity.....	***	***	***	***	***	***	***	***	***	***
Mexico:										
Quantity.....	***	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***	***
Ending inventory quantity.....	***	***	***	***	***	***	***	***	***	***
Philippines:										
Quantity.....	***	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***	***
Ending inventory quantity.....	***	***	***	***	***	***	***	***	***	***
Singapore:										
Quantity.....	***	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***	***
Ending inventory quantity.....	***	***	***	***	***	***	***	***	***	***
Taiwan:										
Quantity.....	1,065,160	2,113,220	2,090,974	852,758	1,118,967	5.1	98.4	(1.1)	(59.2)	31.2
Value.....	743,337	1,349,271	1,274,305	467,820	606,449	(18.4)	81.5	(5.6)	(63.3)	29.6
Unit value.....	\$698	\$638	\$609	\$549	\$542	(22.3)	(8.5)	(4.6)	(10.0)	(1.2)
Ending inventory quantity.....	128,249	116,508	200,189	170,345	91,083	(29.0)	(9.2)	71.8	(14.9)	(46.5)
Thailand:										
Quantity.....	***	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***	***
Ending inventory quantity.....	***	***	***	***	***	***	***	***	***	***
Vietnam:										
Quantity.....	***	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***	***
Ending inventory quantity.....	***	***	***	***	***	***	***	***	***	***
All other sources:										
Quantity.....	***	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***	***
Ending inventory quantity.....	***	***	***	***	***	***	***	***	***	***
All import sources:										
Quantity.....	2,162,388	3,101,412	4,582,898	8,430,393	12,813,568	492.6	43.4	47.8	84.0	52.0
Value.....	1,904,664	2,214,457	3,014,861	4,967,865	7,060,489	270.7	16.3	36.1	64.8	42.1
Unit value.....	\$881	\$714	\$658	\$589	\$551	(37.4)	(18.9)	(7.9)	(10.4)	(6.5)
Ending inventory quantity.....	303,409	327,638	560,211	1,107,536	1,238,641	308.2	8.0	71.0	97.7	11.8

Table continued on next page.

Table C-1a--Continued
CSPV products: Summary data concerning the U.S. market with country-of-origin of imports based on cell manufacture location, 2012-16
(Quantity=kW; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per kilowatt; Period changes=percent--exceptions noted)

	Reported data					Period changes				
	Calendar year					Between calendar years				
	2012	2013	2014	2015	2016	2012-16	2012-13	2013-14	2014-15	2015-16
U.S. producers': (fn3)										
Average capacity quantity.....	***	***	***	***	***	***	***	***	***	***
Production quantity.....	***	***	***	***	***	***	***	***	***	***
Capacity utilization (fn1).....	***	***	***	***	***	***	***	***	***	***
U.S. shipments (fn4):										
Quantity.....	***	***	***	***	***	***	***	***	***	***
Value (fn5).....	***	***	***	***	***	***	***	***	***	***
Unit value (fn6).....	***	***	***	***	***	***	***	***	***	***
Export shipments:										
Quantity.....	***	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***	***
Ending inventory quantity.....	***	***	***	***	***	***	***	***	***	***
Inventories/total shipments (fn1).....	***	***	***	***	***	***	***	***	***	***
Production workers.....	***	***	***	***	***	***	***	***	***	***
Hours worked (1,000s).....	***	***	***	***	***	***	***	***	***	***
Wages paid (\$1,000).....	***	***	***	***	***	***	***	***	***	***
Hourly wages (dollars).....	***	***	***	***	***	***	***	***	***	***
Productivity (watts per hour).....	***	***	***	***	***	***	***	***	***	***
Unit labor costs.....	***	***	***	***	***	***	***	***	***	***
Net sales: (fn7)										
Quantity.....	***	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***	***
Cost of goods sold (COGS).....	***	***	***	***	***	***	***	***	***	***
Gross profit or (loss).....	***	***	***	***	***	***	***	***	***	***
SG&A expenses.....	***	***	***	***	***	***	***	***	***	***
Operating income or (loss).....	***	***	***	***	***	***	***	***	***	***
Net income or (loss).....	***	***	***	***	***	***	***	***	***	***
Unit COGS.....	***	***	***	***	***	***	***	***	***	***
Unit SG&A expenses.....	***	***	***	***	***	***	***	***	***	***
Unit operating income or (loss).....	***	***	***	***	***	***	***	***	***	***
Unit net income or (loss).....	***	***	***	***	***	***	***	***	***	***
COGS/sales (fn1).....	***	***	***	***	***	***	***	***	***	***
Operating income or (loss)/sales (fn1).....	***	***	***	***	***	***	***	***	***	***
Net income or (loss)/sales (fn1).....	***	***	***	***	***	***	***	***	***	***

Notes:

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

fn2.--Undefined.

fn3.--Generally the data for U.S. producers in this table are limited to U.S.-origin cells and modules containing U.S.-origin cells.

fn4.--U.S. producers' U.S. shipments include U.S. producers' exports of cells that have been re-imported after being formed into modules and/or laminates in other countries.

fn5.--The value of U.S. producers' U.S. shipments includes value added to foreign-origin cells. See part IV for details.

fn6.--The average unit values of U.S. producers' U.S. shipments are calculated exclusive of the value added to foreign-origin cells. See part IV for details.

fn7.--Financial results in this table include derived module revenue and costs based on relative production using U.S.-origin cells plus the data from merchant market cell operations.

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

Table C-1b
CSPV products: Summary data concerning the U.S. market with country-of-origin of imports based on cell manufacture location except modules assembled in NAFTA countries, 2012-16

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Table C-2
CSPV products: Summary data concerning the merchant U.S. market for cells, 2012-16

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CSPV modules: Total market: COO Petition

Table C-3a

CSPV products: Summary data concerning the total U.S. market for modules with country-of-origin of imports based on cell manufacture location, 2012-16

(Quantity=kW; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per kilowatt; Period changes=percent--exceptions noted)

	Reported data					Period changes				
	2012	2013	Calendar year 2014	2015	2016	2012-16	2012-13	Between calendar years 2013-14	2014-15	2015-16
U.S. consumption quantity:										
Amount.....	***	***	***	***	***	***	***	***	***	***
Producers' share (fn1).....	***	***	***	***	***	***	***	***	***	***
Importers' share (fn1):										
Canada.....	***	***	***	***	***	***	***	***	***	***
China.....	***	***	***	***	***	***	***	***	***	***
Germany.....	***	***	***	***	***	***	***	***	***	***
Indonesia.....	***	***	***	***	***	***	***	***	***	***
Japan.....	***	***	***	***	***	***	***	***	***	***
Korea.....	***	***	***	***	***	***	***	***	***	***
Malaysia.....	***	***	***	***	***	***	***	***	***	***
Mexico.....	***	***	***	***	***	***	***	***	***	***
Philippines.....	***	***	***	***	***	***	***	***	***	***
Singapore.....	***	***	***	***	***	***	***	***	***	***
Taiwan.....	***	***	***	***	***	***	***	***	***	***
Thailand.....	***	***	***	***	***	***	***	***	***	***
Vietnam.....	***	***	***	***	***	***	***	***	***	***
All other sources.....	***	***	***	***	***	***	***	***	***	***
All import sources.....	***	***	***	***	***	***	***	***	***	***
U.S. consumption value:										
Amount.....	***	***	***	***	***	***	***	***	***	***
Producers' share (fn1).....	***	***	***	***	***	***	***	***	***	***
Importers' share (fn1):										
Canada.....	***	***	***	***	***	***	***	***	***	***
China.....	***	***	***	***	***	***	***	***	***	***
Germany.....	***	***	***	***	***	***	***	***	***	***
Indonesia.....	***	***	***	***	***	***	***	***	***	***
Japan.....	***	***	***	***	***	***	***	***	***	***
Korea.....	***	***	***	***	***	***	***	***	***	***
Malaysia.....	***	***	***	***	***	***	***	***	***	***
Mexico.....	***	***	***	***	***	***	***	***	***	***
Philippines.....	***	***	***	***	***	***	***	***	***	***
Singapore.....	***	***	***	***	***	***	***	***	***	***
Taiwan.....	***	***	***	***	***	***	***	***	***	***
Thailand.....	***	***	***	***	***	***	***	***	***	***
Vietnam.....	***	***	***	***	***	***	***	***	***	***
All other sources.....	***	***	***	***	***	***	***	***	***	***
All import sources.....	***	***	***	***	***	***	***	***	***	***
U.S. imports from:										
Canada:										
Quantity.....	***	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***	***
Ending inventory quantity.....	***	***	***	***	***	***	***	***	***	***
China:										
Quantity.....	***	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***	***
Ending inventory quantity.....	***	***	***	***	***	***	***	***	***	***
Germany:										
Quantity.....	***	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***	***
Ending inventory quantity.....	***	***	***	***	***	***	***	***	***	***
Indonesia:										
Quantity.....	***	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***	***
Ending inventory quantity.....	***	***	***	***	***	***	***	***	***	***
Japan:										
Quantity.....	***	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***	***
Ending inventory quantity.....	***	***	***	***	***	***	***	***	***	***
Korea:										
Quantity.....	***	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***	***
Ending inventory quantity.....	***	***	***	***	***	***	***	***	***	***
Malaysia:										
Quantity.....	***	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***	***
Ending inventory quantity.....	***	***	***	***	***	***	***	***	***	***
Mexico:										
Quantity.....	***	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***	***
Ending inventory quantity.....	***	***	***	***	***	***	***	***	***	***
Philippines:										
Quantity.....	***	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***	***
Ending inventory quantity.....	***	***	***	***	***	***	***	***	***	***
Singapore:										
Quantity.....	***	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***	***
Ending inventory quantity.....	***	***	***	***	***	***	***	***	***	***
Taiwan:										
Quantity.....	***	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***	***
Ending inventory quantity.....	***	***	***	***	***	***	***	***	***	***
Thailand:										
Quantity.....	***	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***	***
Ending inventory quantity.....	***	***	***	***	***	***	***	***	***	***
Vietnam:										
Quantity.....	***	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***	***
Ending inventory quantity.....	***	***	***	***	***	***	***	***	***	***
All other sources:										
Quantity.....	***	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***	***
Ending inventory quantity.....	***	***	***	***	***	***	***	***	***	***
All import sources:										
Quantity.....	***	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***	***
Ending inventory quantity.....	***	***	***	***	***	***	***	***	***	***

Table C-3a--Continued

CSPV products: Summary data concerning the total U.S. market for modules with country-of-origin of imports based on cell manufacture location, 2012-16

(Quantity=kW; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per kilowatt; Period changes=percent--exceptions noted)

	Reported data					Period changes				
	Calendar year					Between calendar years				
	2012	2013	2014	2015	2016	2012-16	2012-13	2013-14	2014-15	2015-16
U.S. producers' (fn3)										
Average capacity quantity.....	929,827	913,452	716,900	871,603	1,245,807	34.0	(1.8)	(21.5)	21.6	42.9
Production quantity.....	538,633	447,129	440,259	552,968	669,089	24.2	(17.0)	(1.5)	25.6	21.0
Capacity utilization (fn1).....	57.9	48.9	61.4	63.4	53.7	(4.2)	(9.0)	12.5	2.0	(9.7)
U.S. shipments:										
Quantity.....	***	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***	***
Export shipments:										
Quantity.....	***	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***	***
Ending inventory quantity	***	***	***	***	***	***	***	***	***	***
Inventories/total shipments (fn1) (fn3).....	***	***	***	***	***	***	***	***	***	***
Production workers.....	1,293	1,080	956	1,038	1,253	(3.1)	(16.5)	(11.5)	8.6	20.7
Hours worked (1,000s).....	3,041	2,335	1,781	2,095	2,364	(22.3)	(23.2)	(23.7)	17.6	12.8
Wages paid (\$1,000).....	***	***	***	***	***	***	***	***	***	***
Hourly wages (dollars).....	***	***	***	***	***	***	***	***	***	***
Productivity (watts per hour).....	***	***	***	***	***	***	***	***	***	***
Unit labor costs.....	***	***	***	***	***	***	***	***	***	***
Net sales:										
Quantity.....	581,762	464,771	472,355	527,683	623,846	7.2	(20.1)	1.6	11.7	18.2
Value.....	607,615	410,608	420,661	476,920	484,359	(20.3)	(32.4)	2.4	13.4	1.6
Unit value.....	\$1,044	\$883	\$891	\$904	\$776	(25.7)	(15.4)	0.8	1.5	(14.1)
Cost of goods sold (COGS).....	858,747	545,848	422,575	432,924	488,577	(43.1)	(36.4)	(22.6)	2.4	12.9
Gross profit or (loss).....	(251,132)	(135,240)	(1,914)	43,996	(4,218)	(98.3)	(46.1)	(98.6)	fn2	fn2
SG&A expenses.....	125,946	68,803	56,642	54,526	210,773	67.4	(45.4)	(17.7)	(3.7)	286.6
Operating income or (loss).....	(377,078)	(204,043)	(58,556)	(10,530)	(214,991)	(43.0)	(45.9)	(71.3)	(62.0)	1,941.7
Net income or (loss).....	(551,170)	(217,135)	(54,504)	(21,071)	(224,873)	(59.2)	(60.6)	(74.9)	(61.3)	967.2
Unit COGS.....	\$1,476	\$1,174	\$895	\$820	\$783	(46.9)	(20.4)	(23.8)	(8.3)	(4.5)
Unit SG&A expenses.....	\$216	\$148	\$120	\$103	\$338	56.1	(31.6)	(19.0)	(13.8)	227.0
Unit operating income or (loss).....	\$(648)	\$(439)	\$(124)	\$(20)	\$(345)	(46.8)	(32.3)	(71.8)	(83.9)	1,627.0
Unit net income or (loss).....	\$(947)	\$(467)	\$(115)	\$(40)	\$(360)	(62.0)	(50.7)	(75.3)	(65.4)	802.7
COGS/sales (fn1).....	141.3	132.9	100.5	90.8	100.9	(40.5)	(8.4)	(32.5)	(9.7)	10.1
Operating income or (loss)/sales (fn1).....	(62.1)	(49.7)	(13.9)	(2.2)	(44.4)	17.7	12.4	35.8	11.7	(42.2)
Net income or (loss)/sales (fn1).....	(90.7)	(52.9)	(13.0)	(4.4)	(46.4)	44.3	37.8	39.9	8.5	(42.0)

Notes:

Note.--Share and ratios shown as "0.0" represent values greater than zero but less than "0.05" percent.

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

fn2.--Undefined.

fn3.--U.S. producers' data in this table includes modules assembled from U.S.-origin cells and from foreign-origin cells.

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

CSPV modules: Total market: COO NAFTA

Table C-3b

CSPV products: Summary data concerning the total U.S. market for modules with country-of-origin of imports based on cell manufacture location except modules assembled in NAFTA countries, 2012-16
(Quantity=KW, Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per kilowatt; Period changes=percent—exceptions noted)

	Reported data					Period changes				
	2012	2013	Calendar year 2014	2015	2016	2012-16	2012-13	Between calendar years 2013-14	2014-15	2015-16
U.S. consumption quantity:										
Amount.....	***	***	***	***	***	***	***	***	***	***
Producers' share (fn1).....	***	***	***	***	***	***	***	***	***	***
Importers' share (fn1):										
Canada.....	***	***	***	***	***	***	***	***	***	***
China.....	***	***	***	***	***	***	***	***	***	***
Germany.....	***	***	***	***	***	***	***	***	***	***
Indonesia.....	***	***	***	***	***	***	***	***	***	***
Japan.....	***	***	***	***	***	***	***	***	***	***
Korea.....	***	***	***	***	***	***	***	***	***	***
Malaysia.....	***	***	***	***	***	***	***	***	***	***
Mexico.....	***	***	***	***	***	***	***	***	***	***
Philippines.....	***	***	***	***	***	***	***	***	***	***
Singapore.....	***	***	***	***	***	***	***	***	***	***
Taiwan.....	***	***	***	***	***	***	***	***	***	***
Thailand.....	***	***	***	***	***	***	***	***	***	***
Vietnam.....	***	***	***	***	***	***	***	***	***	***
All other sources.....	***	***	***	***	***	***	***	***	***	***
All import sources.....	***	***	***	***	***	***	***	***	***	***
U.S. consumption value:										
Amount.....	***	***	***	***	***	***	***	***	***	***
Producers' share (fn1).....	***	***	***	***	***	***	***	***	***	***
Importers' share (fn1):										
Canada.....	***	***	***	***	***	***	***	***	***	***
China.....	***	***	***	***	***	***	***	***	***	***
Germany.....	***	***	***	***	***	***	***	***	***	***
Indonesia.....	***	***	***	***	***	***	***	***	***	***
Japan.....	***	***	***	***	***	***	***	***	***	***
Korea.....	***	***	***	***	***	***	***	***	***	***
Malaysia.....	***	***	***	***	***	***	***	***	***	***
Mexico.....	***	***	***	***	***	***	***	***	***	***
Philippines.....	***	***	***	***	***	***	***	***	***	***
Singapore.....	***	***	***	***	***	***	***	***	***	***
Taiwan.....	***	***	***	***	***	***	***	***	***	***
Thailand.....	***	***	***	***	***	***	***	***	***	***
Vietnam.....	***	***	***	***	***	***	***	***	***	***
All other sources.....	***	***	***	***	***	***	***	***	***	***
All import sources.....	***	***	***	***	***	***	***	***	***	***
U.S. imports from:										
Canada:										
Quantity.....	***	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***	***
Ending inventory quantity.....	***	***	***	***	***	***	***	***	***	***
China:										
Quantity.....	***	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***	***
Ending inventory quantity.....	***	***	***	***	***	***	***	***	***	***
Germany:										
Quantity.....	***	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***	***
Ending inventory quantity.....	***	***	***	***	***	***	***	***	***	***
Indonesia:										
Quantity.....	***	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***	***
Ending inventory quantity.....	***	***	***	***	***	***	***	***	***	***
Japan:										
Quantity.....	***	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***	***
Ending inventory quantity.....	***	***	***	***	***	***	***	***	***	***
Korea:										
Quantity.....	***	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***	***
Ending inventory quantity.....	***	***	***	***	***	***	***	***	***	***
Malaysia:										
Quantity.....	***	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***	***
Ending inventory quantity.....	***	***	***	***	***	***	***	***	***	***
Mexico:										
Quantity.....	***	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***	***
Ending inventory quantity.....	***	***	***	***	***	***	***	***	***	***
Philippines:										
Quantity.....	***	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***	***
Ending inventory quantity.....	***	***	***	***	***	***	***	***	***	***
Singapore:										
Quantity.....	***	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***	***
Ending inventory quantity.....	***	***	***	***	***	***	***	***	***	***
Taiwan:										
Quantity.....	***	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***	***
Ending inventory quantity.....	***	***	***	***	***	***	***	***	***	***
Thailand:										
Quantity.....	***	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***	***
Ending inventory quantity.....	***	***	***	***	***	***	***	***	***	***
Vietnam:										
Quantity.....	***	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***	***
Ending inventory quantity.....	***	***	***	***	***	***	***	***	***	***
All other sources:										
Quantity.....	***	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***	***
Ending inventory quantity.....	***	***	***	***	***	***	***	***	***	***
All import sources:										
Quantity.....	***	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***	***
Ending inventory quantity.....	***	***	***	***	***	***	***	***	***	***

Table C-3b--Continued

CSPV products: Summary data concerning the total U.S. market for modules with country-of-origin of imports based on cell manufacture location except modules assembled in NAFTA countries, 2012-16
(Quantity=KW, Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per kilowatt; Period changes=percent--exceptions noted)

	Reported data					Period changes				
	Calendar year					Between calendar years				
	2012	2013	2014	2015	2016	2012-16	2012-13	2013-14	2014-15	2015-16
U.S. producers' (fn3)										
Average capacity quantity.....	929,827	913,452	716,900	871,603	1,245,807	34.0	(1.8)	(21.5)	21.6	42.9
Production quantity.....	538,633	447,129	440,259	552,968	669,089	24.2	(17.0)	(1.5)	25.6	21.0
Capacity utilization (fn1).....	57.9	48.9	61.4	63.4	53.7	(4.2)	(9.0)	12.5	2.0	(9.7)
U.S. shipments:										
Quantity.....	***	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***	***
Export shipments:										
Quantity.....	***	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***	***
Ending inventory quantity.....	***	***	***	***	***	***	***	***	***	***
Inventories/total shipments (fn1) (fn3).....	***	***	***	***	***	***	***	***	***	***
Production workers.....	1,293	1,080	956	1,038	1,253	(3.1)	(16.5)	(11.5)	8.6	20.7
Hours worked (1,000s).....	3,041	2,335	1,781	2,095	2,364	(22.3)	(23.2)	(23.7)	17.6	12.8
Wages paid (\$1,000).....	***	***	***	***	***	***	***	***	***	***
Hourly wages (dollars).....	***	***	***	***	***	***	***	***	***	***
Productivity (watts per hour).....	***	***	***	***	***	***	***	***	***	***
Unit labor costs.....	***	***	***	***	***	***	***	***	***	***
Net sales:										
Quantity.....	581,762	464,771	472,355	527,683	623,846	7.2	(20.1)	1.6	11.7	18.2
Value.....	607,615	410,608	420,661	476,920	484,359	(20.3)	(32.4)	2.4	13.4	1.6
Unit value.....	\$1,044	\$883	\$891	\$904	\$776	(25.7)	(15.4)	0.8	1.5	(14.1)
Cost of goods sold (COGS).....	858,747	545,848	422,575	432,924	488,577	(43.1)	(36.4)	(22.6)	2.4	12.9
Gross profit or (loss).....	(251,132)	(135,240)	(1,914)	43,996	(4,218)	(98.3)	(46.1)	(98.6)	[fn2]	[fn2]
SG&A expenses.....	125,946	68,803	56,642	54,526	210,773	67.4	(45.4)	(17.7)	(3.7)	286.6
Operating income or (loss).....	(377,078)	(204,043)	(58,556)	(10,530)	(214,991)	(43.0)	(45.9)	(71.3)	(62.0)	1,941.7
Net income or (loss).....	(551,170)	(217,135)	(54,504)	(21,071)	(224,873)	(59.2)	(60.6)	(74.9)	(61.3)	967.2
Unit COGS.....	\$1,476	\$1,174	\$895	\$820	\$783	(46.9)	(20.4)	(23.8)	(8.3)	(4.5)
Unit SG&A expenses.....	\$216	\$148	\$120	\$103	\$338	56.1	(31.6)	(19.0)	(13.8)	227.0
Unit operating income or (loss).....	\$(648)	\$(439)	\$(124)	\$(20)	\$(345)	(46.8)	(32.3)	(71.8)	(83.9)	1,627.0
Unit net income or (loss).....	\$(947)	\$(467)	\$(115)	\$(40)	\$(360)	(62.0)	(50.7)	(75.3)	(65.4)	802.7
COGS/sales (fn1).....	141.3	132.9	100.5	90.8	100.9	(40.5)	(8.4)	(32.5)	(9.7)	10.1
Operating income or (loss)/sales (fn1).....	(62.1)	(49.7)	(13.9)	(2.2)	(44.4)	17.7	12.4	35.8	11.7	(42.2)
Net income or (loss)/sales (fn1).....	(90.7)	(52.9)	(13.0)	(4.4)	(46.4)	44.3	37.8	39.9	8.5	(42.0)

Notes:

Note.--Share and ratios shown as "0.0" represent values greater than zero but less than "0.05" percent.

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

fn2.--Undefined.

fn3.--U.S. producers' data in this table includes modules assembled from U.S.-origin cells and from foreign-origin cells.

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

Table C-4

CSPV products: Apparent consumption and market shares for by channel for modules, 2012-16

* * * * *

Table C-5

CSPV products: Apparent consumption and market shares by 60-cell vs 72-cell modules, 2012-16

* * * * *

Table C-6

CSPV products: Apparent consumption and market shares by mono- vs multi-crystalline cell modules 2012-16

* * * * *

SUMMARY DATA FROM SAFEGUARD MONITORING PROCEEDING

Cell and Modules; All Producers; Total Market

Table C-1

CSPV products: Summary data concerning the U.S. total market, 2016-18, January to June 2018, and January to June 2019

(Quantity=kilowatts; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per kilowatt; Period changes=percent--exceptions noted)

	Reported data					Period changes			
	Calendar year		2018	January to June		Calendar year		2017-18	Jan-Jun 2018-19
	2016	2017		2018	2019	2016-18	2016-17		
U.S. consumption quantity:									
Amount.....	***	***	***	***	***	▼***	▼***	▼***	▲***
Producers' share (fn1).....	***	***	***	***	***	▼***	▼***	▼***	▼***
Importers' share (based on origin of cell) (fn1):									
Canada.....	***	***	***	***	***	▲***	▲***	▼***	▼***
China.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Germany.....	***	***	***	***	***	▼***	▼***	▼***	▼***
India.....	***	***	***	***	***	▲***	▼***	▲***	▼***
Indonesia.....	***	***	***	***	***	▼***	▲***	▼***	▲***
Japan.....	***	***	***	***	***	▲***	▲***	▲***	▲***
Korea.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Malaysia.....	***	***	***	***	***	▲***	▲***	▼***	▲***
Mexico.....	***	***	***	***	***	***	***	***	▲***
Philippines.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Singapore.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Taiwan.....	***	***	***	***	***	▼***	▼***	▼***	▲***
Thailand.....	***	***	***	***	***	▲***	▲***	▼***	▼***
Turkey.....	***	***	***	***	***	▲***	***	▲***	▲***
Vietnam.....	***	***	***	***	***	▲***	▲***	▼***	▲***
Other developing countries.....	***	***	***	***	***	***	***	***	▲***
Other non-developing countries.....	***	***	***	***	***	▼***	▼***	▼***	▼***
All import sources.....	***	***	***	***	***	▲***	▲***	▲***	▲***
Importers' share (based on location of module assembly) (fn1):									
Canada.....	***	***	***	***	***	▲***	▲***	▲***	▼***
China.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Mexico.....	***	***	***	***	***	▲***	▼***	▲***	▼***
U.S. consumption value:									
Amount.....	***	***	***	***	***	▼***	▼***	▼***	▲***
Producers' share (fn1).....									
Fully domestic value.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Value added to imports.....	***	***	***	***	***	▲***	▼***	▲***	▲***
Total.....	***	***	***	***	***	▲***	▼***	▲***	▲***
Importers' share (based on origin of cell) (fn1):									
Canada.....	***	***	***	***	***	▲***	▲***	▼***	▼***
China.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Germany.....	***	***	***	***	***	▼***	▼***	▼***	▼***
India.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Indonesia.....	***	***	***	***	***	▼***	▲***	▼***	▼***
Japan.....	***	***	***	***	***	▲***	▲***	▲***	▲***
Korea.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Malaysia.....	***	***	***	***	***	▲***	▲***	▼***	▲***
Mexico.....	***	***	***	***	***	***	***	***	▲***
Philippines.....	***	***	***	***	***	▲***	▼***	▲***	▼***
Singapore.....	***	***	***	***	***	▲***	▼***	▲***	▼***
Taiwan.....	***	***	***	***	***	▼***	▼***	▼***	▲***
Thailand.....	***	***	***	***	***	▲***	▲***	▼***	▼***
Turkey.....	***	***	***	***	***	▲***	***	▲***	▲***
Vietnam.....	***	***	***	***	***	▲***	▲***	▼***	▲***
Other developing countries.....	***	***	***	***	***	***	***	***	▲***
Other non-developing countries.....	***	***	***	***	***	▼***	▼***	▼***	▼***
All import sources.....	***	***	***	***	***	▼***	▲***	▼***	▼***
Importers' share (based on location of module assembly) (fn1):									
Canada.....	***	***	***	***	***	▲***	▲***	▲***	▼***
China.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Mexico.....	***	***	***	***	***	▲***	▼***	▲***	▼***

Table continued on next page.

Table C-1--Continued

CSPV products: Summary data concerning the U.S. total market, 2016-18, January to June 2018, and January to June 2019

(Quantity=kilowatts; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per kilowatt; Period changes=percent--exceptions noted)

	Reported data					Period changes			
	Calendar year			January to June			Calendar year		Jan-Jun
	2016	2017	2018	2018	2019	2016-18	2016-17	2017-18	2018-19
U.S. imports (based on origin of cell) from:									
Canada:									
Quantity.....	***	***	***	***	***	▲***	▲***	▼***	▼***
Value.....	***	***	***	***	***	▲***	▲***	▼***	▼***
Unit value.....	***	***	***	***	***	▲***	▲***	▼***	▼***
China:									
Quantity.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Value.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Unit value.....	***	***	***	***	***	▼***	▼***	▲***	▼***
Germany:									
Quantity.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Value.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Unit value.....	***	***	***	***	***	▲***	▼***	▲***	▼***
India:									
Quantity.....	***	***	***	***	***	▲***	▼***	▲***	▼***
Value.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Unit value.....	***	***	***	***	***	▼***	▲***	▼***	▼***
Indonesia:									
Quantity.....	***	***	***	***	***	▼***	▲***	▼***	▲***
Value.....	***	***	***	***	***	▼***	▲***	▼***	▲***
Unit value.....	***	***	***	***	***	▼***	▲***	▼***	▼***
Japan:									
Quantity.....	***	***	***	***	***	▲***	▲***	▲***	▲***
Value.....	***	***	***	***	***	▲***	▲***	▲***	▲***
Unit value.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Korea:									
Quantity.....	***	***	***	***	***	▼***	▲***	▼***	▲***
Value.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Unit value.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Malaysia:									
Quantity.....	***	***	***	***	***	▼***	▲***	▼***	▲***
Value.....	***	***	***	***	***	▼***	▼***	▼***	▲***
Unit value.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Mexico:									
Quantity.....	***	***	***	***	***	***	***	***	▲***
Value.....	***	***	***	***	***	***	***	***	▲***
Unit value.....	***	***	***	***	***	***	***	***	▲***
Philippines:									
Quantity.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Value.....	***	***	***	***	***	▼***	▼***	▲***	▼***
Unit value.....	***	***	***	***	***	▼***	▼***	▲***	▲***
Singapore:									
Quantity.....	***	***	***	***	***	▼***	▼***	▲***	▼***
Value.....	***	***	***	***	***	▼***	▼***	▲***	▼***
Unit value.....	***	***	***	***	***	▼***	▼***	▲***	▼***
Taiwan:									
Quantity.....	***	***	***	***	***	▼***	▼***	▼***	▲***
Value.....	***	***	***	***	***	▼***	▼***	▼***	▲***
Unit value.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Thailand:									
Quantity.....	***	***	***	***	***	▼***	▲***	▼***	▲***
Value.....	***	***	***	***	***	▼***	▲***	▼***	▲***
Unit value.....	***	***	***	***	***	▼***	▼***	▲***	▼***
Turkey:									
Quantity.....	***	***	***	***	***	▲***	***	▲***	▲***
Value.....	***	***	***	***	***	▲***	***	▲***	▲***
Unit value.....	***	***	***	***	***	▲***	***	▲***	▼***
Vietnam:									
Quantity.....	***	***	***	***	***	▲***	▲***	▼***	▲***
Value.....	***	***	***	***	***	▼***	▲***	▼***	▲***
Unit value.....	***	***	***	***	***	▼***	▼***	▼***	▼***

Table continued on next page.

Table C-1--Continued

CSPV products: Summary data concerning the U.S. total market, 2016-18, January to June 2018, and January to June 2019

(Quantity=kilowatts; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per kilowatt; Period changes=percent--exceptions noted)

	Reported data					Period changes			
	Calendar year		January to June			Calendar year			Jan-Jun
	2016	2017	2018	2018	2019	2016-18	2016-17	2017-18	2018-19
U.S. imports (based on origin of cell) from:--Continued									
All other developing countries:									
Quantity.....	***	***	***	***	***	***	***	***	▲***
Value.....	***	***	***	***	***	***	***	***	▲***
Unit value.....	***	***	***	***	***	***	***	***	▲***
All other non-developing countries:									
Quantity.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Value.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Unit value.....	***	***	***	***	***	▼***	▼***	▼***	▲***
All import sources:									
Quantity.....	11,856,373	10,066,330	6,136,626	2,682,400	5,033,392	▼(48.2)	▼(15.1)	▼(39.0)	▲87.6
Value.....	6,923,693	4,113,432	2,479,151	1,177,300	1,570,461	▼(64.2)	▼(40.6)	▼(39.7)	▲33.4
Unit value.....	\$584	\$409	\$404	\$439	\$312	▼(30.8)	▼(30.0)	▼(1.1)	▼(28.9)
U.S. imports (based on location of module assembly) from:									
Canada:									
Quantity.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Value.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Unit value.....	***	***	***	***	***	▼***	▼***	▼***	▼***
China:									
Quantity.....	***	***	***	***	***	▼***	▼***	▼***	▲***
Value.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Unit value.....	***	***	***	***	***	▼***	▼***	▲***	▼***
Mexico:									
Quantity.....	***	***	***	***	***	▼***	▼***	▲***	▼***
Value.....	***	***	***	***	***	▼***	▼***	▲***	▼***
Unit value.....	***	***	***	***	***	▼***	▼***	▼***	▼***
U.S. producers':									
Cells: Average capacity quantity.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Cells: Production quantity.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Cells: Capacity utilization (fn1).....	***	***	***	***	***	▼***	▼***	▼***	▲***
Modules: Average capacity quantity.....	***	***	***	***	***	▼***	▼***	▲***	▲***
Modules: Production quantity.....	***	***	***	***	***	▼***	▼***	▲***	▲***
Modules: Capacity utilization (fn1).....	***	***	***	***	***	▼***	▼***	▲***	▲***
U.S. shipments (fn2):									
Quantity.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Value:									
Fully domestic value.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Value added to imports.....	***	***	***	***	***	▲***	▼***	▲***	▲***
Total value.....	***	***	***	***	***	▼***	▼***	▲***	▲***
Unit value.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Export shipments:									
Quantity.....	***	***	***	***	***	▼***	▼***	▼***	▲***
Value.....	***	***	***	***	***	▼***	▼***	▼***	▲***
Unit value.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Ending inventory quantity.....	***	***	***	***	***	▼***	▼***	▼***	▲***
Inventories/total shipments (fn1).....	***	***	***	***	***	▼***	▼***	▲***	▲***
Production workers.....	***	***	***	***	***	▼***	▼***	▼***	▲***
Hours worked (1,000s).....	***	***	***	***	***	▼***	▼***	▲***	▲***
Wages paid (\$1,000).....	***	***	***	***	***	▼***	▼***	▲***	▲***
Hourly wages (dollars per hour).....	***	***	***	***	***	▲***	▲***	▲***	▼***
Cells: Productivity (kilowatts per hour).....	***	***	***	***	***	▲***	▲***	▼***	▼***
Cells: Unit labor costs.....	***	***	***	***	***	▼***	▼***	▼***	▲***
Modules: Productivity (kilowatts per hour)	***	***	***	***	***	▲***	▼***	▲***	▲***
Modules: Unit labor costs.....	***	***	***	***	***	▲***	▲***	▼***	▼***

Table continued on next page.

Table C-1--Continued

CSPV products: Summary data concerning the U.S. total market, 2016-18, January to June 2018, and January to June 2019

(Quantity=kilowatts; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per kilowatt; Period changes=percent--exceptions noted)

	Reported data					Period changes			
	Calendar year			January to June			Calendar year		Jan-Jun
	2016	2017	2018	2018	2019	2016-18	2016-17	2017-18	2018-19
U.S. cell and U.S. module producers' results: Regardless of origin of cells:									
Net sales:									
Quantity.....	***	***	***	***	***	▼***	▼***	▲***	▲***
Value.....	***	***	***	***	***	▼***	▼***	▲***	▲***
Unit value.....	***	***	***	***	***	▼***	▼***	▲***	▼***
Cost of goods sold (COGS).....	***	***	***	***	***	▼***	▼***	▲***	▲***
Gross profit or (loss) (fn3).....	***	***	***	***	***	▼***	▼***	▲***	▲***
SG&A expenses.....	***	***	***	***	***	▼***	▼***	▼***	▲***
Operating income or (loss) (fn3).....	***	***	***	***	***	▲***	▲***	▲***	▼***
Net income or (loss) (fn3).....	***	***	***	***	***	▲***	▲***	▼***	▲***
Capital expenditures.....	***	***	***	***	***	▲***	▼***	▲***	▲***
Unit COGS.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Unit SG&A expenses.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Unit operating income or (loss) (fn3).....	***	***	***	***	***	▲***	▼***	▲***	▲***
Unit net income or (loss) (fn3).....	***	***	***	***	***	▲***	▼***	▲***	▲***
COGS/sales (fn1).....	***	***	***	***	***	▲***	▲***	▼***	▼***
Operating income or (loss)/sales (fn1).....	***	***	***	***	***	▲***	▼***	▲***	▲***
Net income or (loss)/sales (fn1).....	***	***	***	***	***	▼***	▼***	▲***	▲***
U.S. cell and U.S. module producers' results: Using U.S.-origin cells:									
Net sales:									
Quantity.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Value.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Unit value.....	***	***	***	***	***	▼***	▼***	▲***	▼***
Cost of goods sold (COGS).....	***	***	***	***	***	▼***	▼***	▼***	▼***
Gross profit or (loss) (fn3).....	***	***	***	***	***	▼***	▼***	▲***	▼***
SG&A expenses.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Operating income or (loss) (fn3).....	***	***	***	***	***	▲***	▼***	▲***	▲***
Net income or (loss) (fn3).....	***	***	***	***	***	▼***	▼***	▼***	▲***
Unit COGS.....	***	***	***	***	***	▲***	▲***	▲***	▲***
Unit SG&A expenses.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Unit operating income or (loss) (fn3).....	***	***	***	***	***	▼***	▼***	▼***	▼***
Unit net income or (loss) (fn3).....	***	***	***	***	***	▼***	▼***	▼***	▲***
COGS/sales (fn1).....	***	***	***	***	***	▲***	▲***	▲***	▲***
Operating income or (loss)/sales (fn1).....	***	***	***	***	***	▼***	▼***	▼***	▼***
Net income or (loss)/sales (fn1).....	***	***	***	***	***	▼***	▼***	▼***	▼***
U.S. module producers' results: Using Foreign-origin cells:									
Net sales:									
Quantity.....	***	***	***	***	***	▲***	▼***	▲***	▲***
Value.....	***	***	***	***	***	▲***	▼***	▲***	▲***
Unit value.....	***	***	***	***	***	▼***	▼***	▲***	▼***
Cost of goods sold (COGS).....	***	***	***	***	***	▲***	▼***	▲***	▲***
Gross profit or (loss) (fn3).....	***	***	***	***	***	▲***	▼***	▲***	▲***
SG&A expenses.....	***	***	***	***	***	▼***	▼***	▼***	▲***
Operating income or (loss) (fn3).....	***	***	***	***	***	▲***	▲***	▲***	▼***
Net income or (loss) (fn3).....	***	***	***	***	***	▲***	▲***	▲***	▼***
Unit COGS.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Unit SG&A expenses.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Unit operating income or (loss) (fn3).....	***	***	***	***	***	▲***	▲***	▲***	▲***
Unit net income or (loss) (fn3).....	***	***	***	***	***	▲***	▲***	▲***	▲***
COGS/sales (fn1).....	***	***	***	***	***	▼***	▲***	▼***	▼***
Operating income or (loss)/sales (fn1).....	***	***	***	***	***	▲***	▲***	▲***	▲***
Net income or (loss)/sales (fn1).....	***	***	***	***	***	▲***	▲***	▲***	▲***

Notes:

Note.--Shares and ratios shown as "0.0" percent represent non-zero values less than "0.05" percent (if positive) and greater than "0.05" percent (if negative). Zeroes, null values, and undefined calculations are suppressed and shown as "--". Period changes preceded by a ▲ represent an increase, while period changes preceded by a ▼ represent a decrease.

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

fn2.-- The quantity for U.S. producers' U.S. shipments reflects the quantity of Solar panels sold in the United States. The value for U.S. producers' reflects the value of Solar panels sold in the United States from producers~ plus the additional value added to either domestic or imported Solar panels from producers. The average unit values presented for U.S. producers' U.S. shipments excluded the value added to imported Solar panels. In measuring consumption and market share this methodology avoids reclassifying and/or double counting merchandise already reported once either by a domestic producer or an importer.

fn3.--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.

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

Modules Only, Total Market

Table C-2

CSPV modules: Summary data concerning the U.S. total market, 2016-18, January to June 2018, and January to June 2019

(Quantity=kilowatts; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per kilowatt; Period changes=percent--exceptions noted)

	Reported data					Period changes			
	Calendar year		2018	January to June		Calendar year		2017-18	Jan-Jun 2018-19
	2016	2017		2018	2019	2016-18	2016-17		
U.S. consumption quantity:									
Amount.....	***	***	***	***	***	▼***	▼***	▼***	▲***
Producers' share (fn1).....	***	***	***	***	***	▲***	▼***	▲***	▲***
Importers' share (fn1):									
Canada.....	***	***	***	***	***	▲***	▲***	▼***	▼***
China.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Germany.....	***	***	***	***	***	▼***	▼***	▼***	▼***
India.....	***	***	***	***	***	▲***	▼***	▲***	▼***
Indonesia.....	***	***	***	***	***	▼***	▲***	▼***	▲***
Japan.....	***	***	***	***	***	▲***	▲***	▼***	▼***
Korea.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Malaysia.....	***	***	***	***	***	▲***	▲***	▼***	▲***
Mexico.....	***	***	***	***	***	***	***	***	▲***
Philippines.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Singapore.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Taiwan.....	***	***	***	***	***	▼***	▼***	▼***	▲***
Thailand.....	***	***	***	***	***	▲***	▲***	▼***	▼***
Turkey.....	***	***	***	***	***	▲***	***	▲***	▲***
Vietnam.....	***	***	***	***	***	▲***	▲***	▼***	▲***
Other developing countries.....	***	***	***	***	***	***	***	***	▲***
Other non-developing countries.....	***	***	***	***	***	▼***	▼***	▼***	▼***
All import sources.....	***	***	***	***	***	▼***	▲***	▼***	▼***
Importers' share (based on location of module assembly) (fn1):									
Canada.....	***	***	***	***	***	▲***	▲***	▲***	▼***
China.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Mexico.....	***	***	***	***	***	▲***	▼***	▲***	▼***
U.S. consumption value:									
Amount.....	***	***	***	***	***	▼***	▼***	▼***	▲***
Producers' share (fn1).....	***	***	***	***	***	▲***	▼***	▲***	▲***
Importers' share (fn1):									
Canada.....	***	***	***	***	***	▲***	▲***	▼***	▼***
China.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Germany.....	***	***	***	***	***	▼***	▼***	▼***	▼***
India.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Indonesia.....	***	***	***	***	***	▼***	▲***	▼***	▼***
Japan.....	***	***	***	***	***	▲***	▲***	▼***	▼***
Korea.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Malaysia.....	***	***	***	***	***	▲***	▲***	▼***	▲***
Mexico.....	***	***	***	***	***	***	***	***	▲***
Philippines.....	***	***	***	***	***	▲***	▼***	▲***	▼***
Singapore.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Taiwan.....	***	***	***	***	***	▼***	▼***	▼***	▲***
Thailand.....	***	***	***	***	***	▲***	▲***	▼***	▼***
Turkey.....	***	***	***	***	***	▲***	***	▲***	▲***
Vietnam.....	***	***	***	***	***	▲***	▲***	▼***	▲***
Other developing countries.....	***	***	***	***	***	***	***	***	▲***
Other non-developing countries.....	***	***	***	***	***	▼***	▼***	▼***	▼***
All import sources.....	***	***	***	***	***	▼***	▲***	▼***	▼***
Importers' share (based on location of module assembly) (fn1):									
Canada.....	***	***	***	***	***	▲***	▲***	▲***	▼***
China.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Mexico.....	***	***	***	***	***	▲***	▼***	▲***	▼***

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Table C-2--Continued

CSPV modules: Summary data concerning the U.S. total market, 2016-18, January to June 2018, and January to June 2019

(Quantity=kilowatts; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per kilowatt; Period changes=percent--exceptions noted)

	Reported data					Period changes			
	Calendar year		2018	January to June		Calendar year		2017-18	Jan-Jun 2018-19
	2016	2017		2018	2019	2016-18	2016-17		
U.S. imports from:									
Canada:									
Quantity.....	***	***	***	***	***	▲***	▲***	▼***	▼***
Value.....	***	***	***	***	***	▲***	▲***	▼***	▼***
Unit value.....	***	***	***	***	***	▲***	▲***	▼***	▼***
China:									
Quantity.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Value.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Unit value.....	***	***	***	***	***	▲***	▼***	▲***	▲***
Germany:									
Quantity.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Value.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Unit value.....	***	***	***	***	***	▲***	▲***	▲***	▼***
India:									
Quantity.....	***	***	***	***	***	▲***	▼***	▲***	▼***
Value.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Unit value.....	***	***	***	***	***	▼***	▲***	▼***	▼***
Indonesia:									
Quantity.....	***	***	***	***	***	▼***	▲***	▼***	▲***
Value.....	***	***	***	***	***	▼***	▲***	▼***	▲***
Unit value.....	***	***	***	***	***	▼***	▲***	▼***	▼***
Japan:									
Quantity.....	***	***	***	***	***	▲***	▲***	▼***	▼***
Value.....	***	***	***	***	***	▲***	▲***	▼***	▼***
Unit value.....	***	***	***	***	***	▲***	▼***	▲***	▼***
Korea:									
Quantity.....	***	***	***	***	***	▼***	▲***	▼***	▼***
Value.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Unit value.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Malaysia:									
Quantity.....	***	***	***	***	***	▼***	▲***	▼***	▲***
Value.....	***	***	***	***	***	▼***	▼***	▼***	▲***
Unit value.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Mexico:									
Quantity.....	***	***	***	***	***	***	***	***	▲***
Value.....	***	***	***	***	***	***	***	***	▲***
Unit value.....	***	***	***	***	***	***	***	***	▲***
Philippines:									
Quantity.....	***	***	***	***	***	▲***	▼***	▲***	▼***
Value.....	***	***	***	***	***	▼***	▼***	▲***	▼***
Unit value.....	***	***	***	***	***	▼***	▼***	▲***	▲***
Singapore:									
Quantity.....	***	***	***	***	***	▼***	▼***	▲***	▼***
Value.....	***	***	***	***	***	▼***	▼***	▲***	▼***
Unit value.....	***	***	***	***	***	▼***	▼***	▲***	▼***
Taiwan:									
Quantity.....	***	***	***	***	***	▼***	▼***	▼***	▲***
Value.....	***	***	***	***	***	▼***	▼***	▼***	▲***
Unit value.....	***	***	***	***	***	▲***	▼***	▲***	▼***
Thailand:									
Quantity.....	***	***	***	***	***	▼***	▲***	▼***	▲***
Value.....	***	***	***	***	***	▼***	▲***	▼***	▲***
Unit value.....	***	***	***	***	***	▼***	▼***	▲***	▼***
Turkey:									
Quantity.....	***	***	***	***	***	▲***	***	▲***	▲***
Value.....	***	***	***	***	***	▲***	***	▲***	▲***
Unit value.....	***	***	***	***	***	▲***	***	▲***	▼***
Vietnam:									
Quantity.....	***	***	***	***	***	▼***	▲***	▼***	▲***
Value.....	***	***	***	***	***	▼***	▲***	▼***	▲***
Unit value.....	***	***	***	***	***	▼***	▼***	▲***	▼***

Table continued on next page.

Table C-2--Continued

CSPV modules: Summary data concerning the U.S. total market, 2016-18, January to June 2018, and January to June 2019

(Quantity=kilowatts; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per kilowatt; Period changes=percent--exceptions noted)

	Reported data					Period changes			
	Calendar year		January to June			Calendar year			Jan-Jun
	2016	2017	2018	2018	2019	2016-18	2016-17	2017-18	2018-19
U.S. imports from:--Continued									
All other developing countries:									
Quantity.....	***	***	***	***	***	***	***	***	▲***
Value.....	***	***	***	***	***	***	***	***	▲***
Unit value.....	***	***	***	***	***	***	***	***	▲***
All other non-developing countries:									
Quantity.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Value.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Unit value.....	***	***	***	***	***	▼***	▼***	▼***	▲***
All import sources:									
Quantity.....	11,590,991	9,787,904	5,299,723	2,374,064	4,082,389	▼(54.3)	▼(15.6)	▼(45.9)	▲72.0
Value.....	6,826,665	4,020,795	2,218,159	1,069,576	1,386,176	▼(67.5)	▼(41.1)	▼(44.8)	▲29.6
Unit value.....	\$589	\$411	\$419	\$451	\$340	▼(28.9)	▼(30.3)	▲1.9	▼(24.6)
U.S. imports (based on location of module assembly) from:									
Canada:									
Quantity.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Value.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Unit value.....	***	***	***	***	***	▼***	▼***	▼***	▼***
China:									
Quantity.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Value.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Unit value.....	***	***	***	***	***	▲***	▼***	▲***	▼***
Mexico:									
Quantity.....	***	***	***	***	***	▼***	▼***	▲***	▼***
Value.....	***	***	***	***	***	▼***	▼***	▲***	▼***
Unit value.....	***	***	***	***	***	▼***	▼***	▼***	▼***
U.S. producers':									
Average capacity quantity.....	***	***	***	***	***	▼***	▼***	▲***	▲***
Production quantity.....	***	***	***	***	***	▼***	▼***	▲***	▲***
Capacity utilization (fn1).....	***	***	***	***	***	▼***	▼***	▲***	▲***
U.S. shipments:									
Quantity.....	***	***	***	***	***	▼***	▼***	▲***	▲***
Value:	***	***	***	***	***	▼***	▼***	▲***	▲***
Unit value.....	***	***	***	***	***	▼***	▼***	▲***	▼***
Export shipments:									
Quantity.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Value.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Unit value.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Ending inventory quantity.....	***	***	***	***	***	▼***	▼***	▼***	▲***
Inventories/total shipments (fn1).....	***	***	***	***	***	▼***	▼***	▼***	▲***
Production workers.....	***	***	***	***	***	▼***	▼***	▲***	▲***
Hours worked (1,000s).....	***	***	***	***	***	▼***	▼***	▲***	▲***
Wages paid (\$1,000).....	***	***	***	***	***	▼***	▼***	▲***	▲***
Hourly wages (dollars per hour).....	***	***	***	***	***	▲***	▲***	▲***	▼***
Productivity (kilowatts per hour).....	***	***	***	***	***	▲***	▼***	▲***	▲***
Unit labor costs.....	***	***	***	***	***	▲***	▲***	▼***	▼***

Table continued on next page.

Table C-2--Continued

CSPV modules: Summary data concerning the U.S. total market, 2016-18, January to June 2018, and January to June 2019

(Quantity=kilowatts; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per kilowatt; Period changes=percent--exceptions noted)

	Reported data					Period changes			
	Calendar year			January to June			Calendar year		Jan-Jun
	2016	2017	2018	2018	2019	2016-18	2016-17	2017-18	2018-19
U.S. module producers' results: Regardless of origin of cells:									
Net sales:									
Quantity.....	***	***	***	***	***	▼***	▼***	▲***	▲***
Value.....	***	***	***	***	***	▼***	▼***	▲***	▲***
Unit value.....	***	***	***	***	***	▼***	▼***	▲***	▼***
Cost of goods sold (COGS).....	***	***	***	***	***	▼***	▼***	▲***	▲***
Gross profit or (loss) (fn2).....	***	***	***	***	***	▲***	▼***	▲***	▲***
SG&A expenses.....	***	***	***	***	***	▼***	▼***	▼***	▲***
Operating income or (loss) (fn2).....	***	***	***	***	***	▲***	▲***	▲***	▲***
Net income or (loss) (fn2).....	***	***	***	***	***	▲***	▲***	▲***	▲***
Capital expenditures.....	***	***	***	***	***	▲***	▼***	▲***	▲***
Unit COGS.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Unit SG&A expenses.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Unit operating income or (loss) (fn2).....	***	***	***	***	***	▲***	▼***	▲***	▲***
Unit net income or (loss) (fn2).....	***	***	***	***	***	▲***	▼***	▲***	▲***
COGS/sales (fn1).....	***	***	***	***	***	▲***	▲***	▼***	▼***
Operating income or (loss)/sales (fn1).....	***	***	***	***	***	▲***	▼***	▲***	▲***
Net income or (loss)/sales (fn1).....	***	***	***	***	***	▲***	▼***	▲***	▲***
U.S. module producers' results: Using U.S.-origin cells:									
Net sales:									
Quantity.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Value.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Unit value.....	***	***	***	***	***	▼***	▼***	▲***	▲***
Cost of goods sold (COGS).....	***	***	***	***	***	▼***	▼***	▲***	▼***
Gross profit or (loss) (fn2).....	***	***	***	***	***	▼***	▼***	▲***	▲***
SG&A expenses.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Operating income or (loss) (fn2).....	***	***	***	***	***	▲***	▼***	▲***	▲***
Net income or (loss) (fn2).....	***	***	***	***	***	▼***	▼***	▼***	▲***
Unit COGS.....	***	***	***	***	***	▼***	▼***	▼***	▲***
Unit SG&A expenses.....	***	***	***	***	***	▲***	▲***	▲***	▲***
Unit operating income or (loss) (fn2).....	***	***	***	***	***	▼***	▼***	▼***	▲***
Unit net income or (loss) (fn2).....	***	***	***	***	***	▼***	▼***	▼***	▲***
COGS/sales (fn1).....	***	***	***	***	***	▲***	▲***	▼***	▼***
Operating income or (loss)/sales (fn1).....	***	***	***	***	***	▼***	▼***	▲***	▲***
Net income or (loss)/sales (fn1).....	***	***	***	***	***	▼***	▼***	▼***	▲***
U.S. module producers' results: Using Foreign-origin cells:									
Net sales:									
Quantity.....	***	***	***	***	***	▲***	▼***	▲***	▲***
Value.....	***	***	***	***	***	▲***	▼***	▲***	▲***
Unit value.....	***	***	***	***	***	▼***	▼***	▲***	▼***
Cost of goods sold (COGS).....	***	***	***	***	***	▲***	▼***	▲***	▲***
Gross profit or (loss) (fn2).....	***	***	***	***	***	▲***	▼***	▲***	▲***
SG&A expenses.....	***	***	***	***	***	▼***	▼***	▼***	▲***
Operating income or (loss) (fn2).....	***	***	***	***	***	▲***	▲***	▲***	▼***
Net income or (loss) (fn2).....	***	***	***	***	***	▲***	▲***	▲***	▼***
Unit COGS.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Unit SG&A expenses.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Unit operating income or (loss) (fn2).....	***	***	***	***	***	▲***	▲***	▲***	▲***
Unit net income or (loss) (fn2).....	***	***	***	***	***	▲***	▲***	▲***	▲***
COGS/sales (fn1).....	***	***	***	***	***	▼***	▲***	▼***	▼***
Operating income or (loss)/sales (fn1).....	***	***	***	***	***	▲***	▲***	▲***	▲***
Net income or (loss)/sales (fn1).....	***	***	***	***	***	▲***	▲***	▲***	▲***

Notes:

Note.--Shares and ratios shown as "0.0" percent represent non-zero values less than "0.05" percent (if positive) and greater than "(0.05)" percent (if negative). Zeroes, null values, and undefined calculations are suppressed and shown as "---". Period changes preceded by a ▲ represent an increase, while period changes preceded by a ▼ represent a decrease.

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

fn2.--Percent changes only calculated when both comparison values represent profits; The directional change in profitability provided when one or both comparison values represent a loss.

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

Cells Only, Merchant Market

Table C-3

CSPV cells: Summary data concerning the U.S. merchant market, 2016-18, January to June 2018, and January to June 2019

(Quantity=kilowatts; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per kilowatt; Period changes=percent--exceptions noted)

	Reported data					Period changes			
	Calendar year		January to June			Calendar year			Jan-Jun
	2016	2017	2018	2018	2019	2016-18	2016-17	2017-18	2018-19
U.S. consumption quantity:									
Amount.....	***	***	***	***	***	▲***	▲***	▲***	▲***
Producers' share (fn1).....	***	***	***	***	***	▲***	▲***	▲***	▼***
Importers' share (fn1):									
Canada.....	***	***	***	***	***	***	***	***	***
China.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Germany.....	***	***	***	***	***	▼***	▼***	▼***	▼***
India.....	***	***	***	***	***	***	***	***	***
Indonesia.....	***	***	***	***	***	***	***	***	***
Japan.....	***	***	***	***	***	▲***	▲***	▼***	▼***
Korea.....	***	***	***	***	***	▲***	▼***	▲***	▲***
Malaysia.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Mexico.....	***	***	***	***	***	***	***	***	***
Philippines.....	***	***	***	***	***	▲***	▲***	▼***	▼***
Singapore.....	***	***	***	***	***	***	***	***	***
Taiwan.....	***	***	***	***	***	▼***	▼***	▼***	▲***
Thailand.....	***	***	***	***	***	▲***	▼***	▲***	▼***
Turkey.....	***	***	***	***	***	***	***	***	***
Vietnam.....	***	***	***	***	***	▲***	▲***	▼***	▼***
Other developing countries.....	***	***	***	***	***	***	***	***	***
Other non-developing countries.....	***	***	***	***	***	▼***	▼***	***	***
All import sources.....	***	***	***	***	***	▼***	▼***	▼***	▲***
U.S. consumption value:									
Amount.....	***	***	***	***	***	▲***	▼***	▲***	▲***
Producers' share (fn1).....	***	***	***	***	***	▲***	▼***	▲***	▼***
Importers' share (fn1):									
Canada.....	***	***	***	***	***	***	***	***	***
China.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Germany.....	***	***	***	***	***	▼***	▼***	▼***	▼***
India.....	***	***	***	***	***	***	***	***	***
Indonesia.....	***	***	***	***	***	***	***	***	***
Japan.....	***	***	***	***	***	▲***	▲***	▼***	▲***
Korea.....	***	***	***	***	***	▲***	▼***	▲***	▲***
Malaysia.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Mexico.....	***	***	***	***	***	***	***	***	***
Philippines.....	***	***	***	***	***	▲***	▲***	▼***	▼***
Singapore.....	***	***	***	***	***	***	***	***	***
Taiwan.....	***	***	***	***	***	▼***	▼***	▼***	▲***
Thailand.....	***	***	***	***	***	▲***	▼***	▲***	▼***
Turkey.....	***	***	***	***	***	***	***	***	***
Vietnam.....	***	***	***	***	***	▲***	▲***	▼***	▲***
Other developing countries.....	***	***	***	***	***	***	***	***	***
Other non-developing countries.....	***	***	***	***	***	▼***	▼***	***	***
All import sources.....	***	***	***	***	***	▼***	▲***	▼***	▲***

Table continued on next page.

Table C-3--Continued

CSPV cells: Summary data concerning the U.S. merchant market, 2016-18, January to June 2018, and January to June 2019

(Quantity=kilowatts; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per kilowatt; Period changes=percent--exceptions noted)

	Reported data					Period changes			
	Calendar year		2018	January to June		Calendar year		2017-18	Jan-Jun 2018-19
	2016	2017		2018	2019	2016-18	2016-17		
U.S. imports from:									
Canada:									
Quantity.....	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***
China:									
Quantity.....	***	***	***	***	***	▲***	▲***	▲***	▲***
Value.....	***	***	***	***	***	▲***	▲***	▲***	▲***
Unit value.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Germany:									
Quantity.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Value.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Unit value.....	***	***	***	***	***	▲***	▼***	▲***	▼***
India:									
Quantity.....	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***
Indonesia:									
Quantity.....	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***
Japan:									
Quantity.....	***	***	***	***	***	▲***	▲***	▲***	▲***
Value.....	***	***	***	***	***	▲***	▲***	▲***	▲***
Unit value.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Korea:									
Quantity.....	***	***	***	***	***	▲***	▼***	▲***	▲***
Value.....	***	***	***	***	***	▲***	▼***	▲***	▲***
Unit value.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Malaysia:									
Quantity.....	***	***	***	***	***	▲***	▲***	▲***	▲***
Value.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Unit value.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Mexico:									
Quantity.....	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***
Philippines:									
Quantity.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Value.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Unit value.....	***	***	***	***	***	▲***	▲***	▼***	▼***
Singapore:									
Quantity.....	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***
Taiwan:									
Quantity.....	***	***	***	***	***	▼***	▼***	▼***	▲***
Value.....	***	***	***	***	***	▼***	▼***	▼***	▲***
Unit value.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Thailand:									
Quantity.....	***	***	***	***	***	▲***	▼***	▲***	▼***
Value.....	***	***	***	***	***	▲***	▼***	▲***	▼***
Unit value.....	***	***	***	***	***	▼***	▲***	▼***	▼***
Turkey:									
Quantity.....	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***
Vietnam:									
Quantity.....	***	***	***	***	***	▲***	▲***	▲***	▲***
Value.....	***	***	***	***	***	▲***	▲***	▲***	▲***
Unit value.....	***	***	***	***	***	▲***	▲***	▼***	▼***

Table continued on next page.

Table C-3--Continued

CSPV cells: Summary data concerning the U.S. merchant market, 2016-18, January to June 2018, and January to June 2019

(Quantity=kilowatts; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per kilowatt; Period changes=percent--exceptions noted)

	Reported data					Period changes			
	Calendar year			January to June			Calendar year		Jan-Jun
	2016	2017	2018	2018	2019	2016-18	2016-17	2017-18	2018-19
U.S. imports from:--Continued									
All other developing countries:									
Quantity.....	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***
All other non-developing countries:									
Quantity.....	***	***	***	***	***	▼***	▼***	***	***
Value.....	***	***	***	***	***	▼***	▼***	***	***
Unit value.....	***	***	***	***	***	▼***	▼***	***	***
All import sources:									
Quantity.....	265,382	278,426	836,903	308,336	951,003	▲215.4	▲4.9	▲200.6	▲208.4
Value.....	97,028	92,637	260,992	107,724	184,285	▲169.0	▼(4.5)	▲181.7	▲71.1
Unit value.....	\$366	\$333	\$312	\$349	\$194	▼(14.7)	▼(9.0)	▼(6.3)	▼(44.5)
U.S. cell producers':									
Average capacity quantity.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Production quantity.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Capacity utilization (fn1).....	***	***	***	***	***	▼***	▼***	▼***	▲***
Commercial U.S. shipments:									
Quantity.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Value:	***	***	***	***	***	▲***	▼***	▲***	▼***
Unit value.....	***	***	***	***	***	▼***	▼***	▲***	▼***
Export shipments:									
Quantity.....	***	***	***	***	***	▼***	▼***	▼***	▲***
Value.....	***	***	***	***	***	▼***	▼***	▼***	▲***
Unit value.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Ending inventory quantity.....	***	***	***	***	***	▼***	▼***	▼***	▲***
Inventories/total shipments (fn1).....	***	***	***	***	***	▼***	▼***	▼***	▲***
Production workers.....	***	***	***	***	***	▼***	▼***	▼***	▲***
Hours worked (1,000s).....	***	***	***	***	***	▼***	▼***	▼***	▲***
Wages paid (\$1,000).....	***	***	***	***	***	▼***	▼***	▼***	▼***
Hourly wages (dollars per hour).....	***	***	***	***	***	▼***	▲***	▼***	▼***
Productivity (kilowatts per hour).....	***	***	***	***	***	▲***	▲***	▼***	▼***
Unit labor costs.....	***	***	***	***	***	▼***	▼***	▼***	▲***
U.S. cell producers' merchant market results:									
Net sales:									
Quantity.....	***	***	***	***	***	▼***	▼***	▼***	▲***
Value.....	***	***	***	***	***	▼***	▼***	▼***	▲***
Unit value.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Cost of goods sold (COGS).....	***	***	***	***	***	▼***	▼***	▲***	▲***
Gross profit or (loss) (fn2).....	***	***	***	***	***	▼***	▼***	▼***	▼***
SG&A expenses.....	***	***	***	***	***	▼***	▼***	▼***	▲***
Operating income or (loss) (fn2).....	***	***	***	***	***	▼***	▲***	▼***	▼***
Net income or (loss) (fn2).....	***	***	***	***	***	▼***	▲***	▼***	▼***
Capital expenditures.....	***	***	***	***	***	▲***	▼***	▲***	▼***
Unit COGS.....	***	***	***	***	***	▲***	▼***	▲***	▼***
Unit SG&A expenses.....	***	***	***	***	***	▲***	▼***	▲***	▼***
Unit operating income or (loss) (fn2).....	***	***	***	***	***	▼***	▼***	▼***	▲***
Unit net income or (loss) (fn2).....	***	***	***	***	***	▼***	▼***	▼***	▲***
COGS/sales (fn1).....	***	***	***	***	***	▼***	▲***	▲***	▼***
Operating income or (loss)/sales (fn1).....	***	***	***	***	***	▼***	▼***	▼***	▲***
Net income or (loss)/sales (fn1).....	***	***	***	***	***	▼***	▼***	▼***	▲***

Notes:

Note.--Shares and ratios shown as "0.0" percent represent non-zero values less than "0.05" percent (if positive) and greater than "(0.05)" percent (if negative). Zeroes, null values, and undefined calculations are suppressed and shown as "----". Period changes preceded by a ▲ represent an increase, while period changes preceded by a ▼ represent a decrease.

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

fn2.--Percent changes only calculated when both comparison values represent profits; The directional change in profitability provided when one or both comparison values represent a loss.

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

Table C-4

CSPV products: Channels of distribution by type for U.S. producers and importers, 2016-18, January to June 2018, and January to June 2019

(Quantity=kilowatts; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per kilowatt; Period changes=percent--exceptions noted)

	Reported data					Period changes			
	Calendar year		January to June			Calendar year		Jan-Jun	
	2016	2017	2018	2018	2019	2016-18	2016-17	2017-18	2018-19
Commercial and Residential:									
Quantity:									
United States.....	***	***	***	***	***	▼***	▼***	▼***	▲***
Import sources.....	***	***	***	***	***	▼***	▼***	▼***	▲***
All sources.....	***	***	***	***	***	▼***	▼***	▼***	▲***
Share of quantity (fn1).....									
United States.....	***	***	***	***	***	▼***	▼***	▲***	▲***
Import sources.....	***	***	***	***	***	▲***	▲***	▼***	▼***
All sources.....	***	***	***	***	***	***	***	***	***
Ratio to overall apparent consumption (fn1)									
United States.....	***	***	***	***	***	▼***	▼***	▲***	▲***
Import sources.....	***	***	***	***	***	▲***	▲***	▲***	▼***
All sources.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Utilities:									
Quantity:									
United States.....	***	***	***	***	***	▼***	▼***	▲***	▲***
Import sources.....	***	***	***	***	***	▼***	▼***	▼***	▲***
All sources.....	***	***	***	***	***	▼***	▼***	▼***	▲***
Share of quantity (fn1).....									
United States.....	***	***	***	***	***	▲***	▼***	▲***	▲***
Import sources.....	***	***	***	***	***	▼***	▲***	▼***	▼***
All sources.....	***	***	***	***	***	***	***	***	***
Ratio to overall apparent consumption (fn1)									
United States.....	***	***	***	***	***	▲***	▼***	▲***	▲***
Import sources.....	***	***	***	***	***	▼***	▼***	▼***	▲***
All sources.....	***	***	***	***	***	▼***	▼***	▼***	▲***

Notes:

Note.--Shares and ratios shown as "0.0" percent represent non-zero values less than "0.05" percent (if positive) and greater than "(0.05)" percent (if negative). Zeroes, null values, and undefined calculations are suppressed and shown as "--". Period changes preceded by a ▲" represent an increase, while period changes preceded by a ▼" represent a decrease.

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

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

SUMMARY DATA FROM SAFEGUARD EXTENSION PROCEEDING

CSPV cells

Table C-1

CSPV cells: Summary data concerning the U.S. market, by item and by period

Quantity=kilowatts; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per kilowatt; Period changes=percent—exceptions noted

	Reported data					Period changes			
	Calendar year		Jan-Jun			Comparison years			Jan-Jun
	2018	2019	2020	2020	2021	2018-20	2018-19	2019-20	2020-21
U.S. consumption quantity:									
Amount.....	***	***	***	***	***	▲***	▲***	▼***	▼***
Producers' share (fn1).....	***	***	***	***	***	▼***	▼***	▼***	***
Importers' share (fn1):									
China.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Japan.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Korea.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Malaysia.....	***	***	***	***	***	▼***	▼***	▲***	▲***
Philippines.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Taiwan.....	***	***	***	***	***	▲***	▲***	▼***	▲***
Thailand.....	***	***	***	***	***	▼***	▼***	***	▲***
Vietnam.....	***	***	***	***	***	▼***	▼***	▼***	▲***
All other sources.....	***	***	***	***	***	▼***	▼***	▲***	▲***
All import sources.....	***	***	***	***	***	▲***	▲***	▲***	***
U.S. consumption value:									
Amount.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Producers' share (fn1).....	***	***	***	***	***	▼***	▼***	▼***	***
Importers' share (fn1):									
China.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Japan.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Korea.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Malaysia.....	***	***	***	***	***	▼***	▼***	▲***	▲***
Philippines.....	***	***	***	***	***	▼***	▼***	▼***	▲***
Taiwan.....	***	***	***	***	***	▲***	▲***	▼***	▲***
Thailand.....	***	***	***	***	***	▼***	▼***	***	▲***
Vietnam.....	***	***	***	***	***	▲***	▲***	▼***	▲***
All other sources.....	***	***	***	***	***	▼***	▼***	▲***	▲***
All import sources.....	***	***	***	***	***	▲***	▲***	▲***	***
U.S. imports from:									
China:									
Quantity.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Value.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Unit value.....	***	***	***	***	***	▼***	▼***	▼***	▲***
Japan:									
Quantity.....	***	***	***	***	***	▼***	▲***	▼***	▼***
Value.....	***	***	***	***	***	▼***	▲***	▼***	▼***
Unit value.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Korea:									
Quantity.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Value.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Unit value.....	***	***	***	***	***	▼***	▼***	▲***	▼***
Malaysia:									
Quantity.....	***	***	***	***	***	▲***	▲***	▲***	▲***
Value.....	***	***	***	***	***	▼***	▼***	▲***	▲***
Unit value.....	***	***	***	***	***	▼***	▼***	▲***	▼***
Philippines:									
Quantity.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Value.....	***	***	***	***	***	▼***	▼***	▼***	▲***
Unit value.....	***	***	***	***	***	▼***	▼***	▼***	▲***
Taiwan:									
Quantity.....	***	***	***	***	***	▲***	▲***	▼***	▲***
Value.....	***	***	***	***	***	▲***	▲***	▼***	▲***
Unit value.....	***	***	***	***	***	▼***	▼***	▼***	▲***
Thailand:									
Quantity.....	***	***	***	***	***	▼***	▼***	***	▲***
Value.....	***	***	***	***	***	▼***	▼***	***	▲***
Unit value.....	***	***	***	***	***	▼***	▼***	***	▲***
Vietnam:									
Quantity.....	***	***	***	***	***	▲***	▲***	▼***	▲***
Value.....	***	***	***	***	***	▲***	▲***	▼***	▲***
Unit value.....	***	***	***	***	***	▲***	▲***	▼***	▼***

Table continued.

Table C-1 continued

CSPV cells: Summary data concerning the U.S. market, by item and by period

Quantity=kilowatts; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per kilowatt; Period changes=percent—exceptions noted

	Reported data					Period changes			
	2018	Calendar year 2019	2020	Jan-Jun 2020	2021	2018-20	Comparison years 2018-19	2019-20	Jan-Jun 2020-21
U.S. imports from:—Continued									
All other sources:									
Quantity.....	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	▼***	▲***	▲***
Unit value.....	***	***	***	***	***	***	▼***	▲***	▲***
All import sources:									
Quantity.....	754,939	2,189,237	2,172,166	1,290,324	1,145,810	▲187.7	▲190.0	▼(0.8)	▼(11.2)
Value.....	231,554	430,197	467,648	273,794	218,858	▲102.0	▲85.8	▲8.7	▼(20.1)
Unit value.....	\$307	\$197	\$215	\$212	\$191	▼(29.8)	▼(35.9)	▲9.6	▼(10.0)
U.S. producers':									
Average capacity quantity.....	***	***	***	***	***	▼***	▼***	▲***	▼***
Production quantity.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Capacity utilization (fn1).....	***	***	***	***	***	▼***	▲***	▼***	▼***
U.S. shipments:									
Quantity.....	***	***	***	***	***	▼***	▼***	▼***	***
Value.....	***	***	***	***	***	▼***	▼***	▼***	***
Unit value.....	***	***	***	***	***	▼***	▲***	▼***	***
Export shipments:									
Quantity.....	***	***	***	***	***	▲***	▲***	▼***	▼***
Value.....	***	***	***	***	***	▲***	▲***	▼***	▼***
Unit value.....	***	***	***	***	***	▲***	▲***	▼***	▼***
Ending inventory quantity.....	***	***	***	***	***	▼***	▼***	▼***	***
Inventories/total shipments (fn1).....	***	***	***	***	***	▼***	▲***	▼***	***
Production workers.....	***	***	***	***	***	▼***	▼***	***	▼***
Hours worked (1,000s).....	***	***	***	***	***	▼***	▲***	▼***	▼***
Wages paid (\$1,000).....	***	***	***	***	***	▼***	▼***	▼***	▼***
Hourly wages (dollars per hour).....	***	***	***	***	***	▼***	▼***	▲***	▼***
Productivity (watts per hour).....	***	***	***	***	***	▼***	▼***	▲***	▼***
Unit labor costs.....	***	***	***	***	***	▲***	▲***	▼***	▼***
Open market net sales (fn3):									
Quantity.....	***	***	***	***	***	▲***	▲***	▼***	▼***
Value.....	***	***	***	***	***	▲***	▲***	▼***	▼***
Unit value.....	***	***	***	***	***	▲***	▲***	▼***	▼***
Cost of goods sold (COGS).....	***	***	***	***	***	▼***	▲***	▼***	▼***
Gross profit or (loss) (fn2).....	***	***	***	***	***	▲***	▲***	▲***	▲***
SG&A expenses.....	***	***	***	***	***	▼***	▲***	▼***	▼***
Operating income or (loss) (fn2).....	***	***	***	***	***	▲***	▲***	▲***	▲***
Net income or (loss) (fn2).....	***	***	***	***	***	▲***	▲***	▲***	▲***
Unit COGS.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Unit SG&A expenses.....	***	***	***	***	***	▼***	▲***	▼***	▼***
Unit operating income or (loss) (fn2).....	***	***	***	***	***	▲***	▲***	▲***	▲***
Unit net income or (loss) (fn2).....	***	***	***	***	***	▲***	▲***	▲***	▲***
COGS/sales (fn1).....	***	***	***	***	***	▼***	▼***	▼***	▼***
Operating income or (loss)/sales (fn1).....	***	***	***	***	***	▲***	▲***	▲***	▲***
Net income or (loss)/sales (fn1).....	***	***	***	***	***	▲***	▲***	▲***	▲***
Capital expenditures.....	***	***	***	***	***	▼***	▼***	***	***
Research and development expenses.....	***	***	***	***	***	***	***	***	***
Net assets.....	***	***	***	***	***	▼***	▲***	▼***	***

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

Note.—Shares and ratios shown as "0.0" percent represent non-zero values less than "0.05" percent (if positive) and greater than "(0.05)" percent (if negative). Zeroes, null values, and undefined calculations are suppressed and shown as "—". Period changes preceded by a "▲" represent an increase, while period changes preceded by a "▼" represent a decrease.

fn1.—Reported data are in percent and period changes are in percentage points.

fn2.—Percent changes only calculated when both comparison values represent profits; The directional change in profitability provided when one or both comparison values represent a loss.

fn3.—Financial results in Commission questionnaires were limited to open market sales.

CSPV modules

Table C-2

CSPV modules: Summary data concerning the U.S. market, by item and by period

Quantity=kilowatts; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per kilowatt; Period changes=percent—exceptions noted

	Reported data					Period changes			
	Calendar year		Jan-Jun			Comparison years			Jan-Jun
	2018	2019	2020	2020	2021	2018-20	2018-19	2019-20	2020-21
U.S. consumption quantity:									
Amount.....	5,378,322	13,626,937	21,026,155	10,848,276	11,617,468	▲290.9	▲153.4	▲54.3	▲7.1
Producers' share (fn1).....	8.5	14.2	10.2	10.3	9.6	▲1.7	▲5.7	▼(4.0)	▼(0.7)
Importers' share (fn1):									
Cambodia.....	***	***	***	***	***	▲***	▲***	▲***	▲***
China.....	***	***	***	***	***	▲***	▲***	▲***	▼***
India.....	***	***	***	***	***	▼***	▼***	▲***	▲***
Indonesia.....	***	***	***	***	***	▼***	▼***	▼***	***
Japan.....	***	***	***	***	***	▼***	▼***	***	***
Korea.....	***	***	***	***	***	▼***	▼***	▲***	▼***
Malaysia.....	***	***	***	***	***	▼***	▲***	▼***	▼***
Philippines.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Singapore.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Taiwan.....	***	***	***	***	***	▲***	▲***	▼***	▼***
Thailand.....	***	***	***	***	***	▲***	▲***	▲***	▲***
Turkey.....	***	***	***	***	***	▼***	▼***	▼***	***
Vietnam.....	***	***	***	***	***	▲***	▲***	▲***	▲***
All other sources.....	***	***	***	***	***	▼***	▼***	▼***	***
All import sources.....	91.5	85.8	89.8	89.7	90.4	▼(1.7)	▼(5.7)	▲4.0	▲0.7
U.S. consumption value:									
Amount.....	2,269,525	4,504,165	6,573,873	3,467,286	3,349,041	▲189.7	▲98.5	▲46.0	▼(3.4)
Producers' share (fn1).....	11.1	19.3	13.6	13.8	13.6	▲2.6	▲8.2	▼(5.7)	▼(0.2)
Importers' share (fn1):									
Cambodia.....	***	***	***	***	***	▲***	▲***	▲***	▲***
China.....	***	***	***	***	***	▲***	▲***	▲***	▼***
India.....	***	***	***	***	***	▼***	▼***	▲***	▲***
Indonesia.....	***	***	***	***	***	▼***	▼***	▼***	***
Japan.....	***	***	***	***	***	▼***	▼***	***	***
Korea.....	***	***	***	***	***	▼***	▼***	▲***	▼***
Malaysia.....	***	***	***	***	***	▼***	▲***	▼***	▼***
Philippines.....	***	***	***	***	***	▼***	▼***	▼***	▲***
Singapore.....	***	***	***	***	***	▼***	▼***	▼***	▲***
Taiwan.....	***	***	***	***	***	▲***	▲***	▼***	▼***
Thailand.....	***	***	***	***	***	▲***	▲***	▲***	▲***
Turkey.....	***	***	***	***	***	▼***	▼***	▼***	***
Vietnam.....	***	***	***	***	***	▲***	▲***	▲***	▲***
All other sources.....	***	***	***	***	***	▼***	▼***	▼***	***
All import sources.....	88.9	80.7	86.4	86.2	86.4	▼(2.6)	▼(8.2)	▲5.7	▲0.2
U.S. imports from:									
Cambodia:									
Quantity.....	***	***	***	***	***	▲***	▲***	▲***	▲***
Value.....	***	***	***	***	***	▲***	▲***	▲***	▲***
Unit value.....	***	***	***	***	***	▲***	▲***	▼***	▲***
China:									
Quantity.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Value.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Unit value.....	***	***	***	***	***	▼***	▼***	▼***	▼***
India:									
Quantity.....	***	***	***	***	***	▼***	▼***	▲***	▲***
Value.....	***	***	***	***	***	▼***	▼***	▲***	▲***
Unit value.....	***	***	***	***	***	▲***	▲***	▲***	▲***
Indonesia:									
Quantity.....	***	***	***	***	***	▼***	▼***	▼***	***
Value.....	***	***	***	***	***	▼***	▲***	▼***	***
Unit value.....	***	***	***	***	***	▼***	▲***	▼***	***
Japan:									
Quantity.....	***	***	***	***	***	▼***	▼***	***	***
Value.....	***	***	***	***	***	▼***	▼***	***	***
Unit value.....	***	***	***	***	***	▼***	▼***	***	***
Korea:									
Quantity.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Value.....	***	***	***	***	***	▲***	▼***	▲***	▼***
Unit value.....	***	***	***	***	***	▼***	▼***	▼***	▼***

Table continued.

Table C-2 continued

CSPV modules: Summary data concerning the U.S. market, by item and by period

Quantity=kilowatts; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per kilowatt; Period changes=percent—exceptions noted

	Reported data					Period changes			
	Calendar year			Jan-Jun		Comparison years			Jan-Jun
	2018	2019	2020	2020	2021	2018-20	2018-19	2019-20	2020-21
U.S. imports from:--Continued									
Malaysia:									
Quantity.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Value.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Unit value.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Philippines:									
Quantity.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Value.....	***	***	***	***	***	▼***	▼***	▼***	▲***
Unit value.....	***	***	***	***	***	▼***	▲***	▼***	▲***
Singapore:									
Quantity.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Value.....	***	***	***	***	***	▼***	▼***	▲***	▲***
Unit value.....	***	***	***	***	***	▼***	▼***	▲***	▲***
Taiwan:									
Quantity.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Value.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Unit value.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Thailand:									
Quantity.....	***	***	***	***	***	▲***	▲***	▲***	▲***
Value.....	***	***	***	***	***	▲***	▲***	▲***	▲***
Unit value.....	***	***	***	***	***	▼***	▼***	▲***	▼***
Turkey:									
Quantity.....	***	***	***	***	***	▼***	▼***	▼***	***
Value.....	***	***	***	***	***	▼***	▼***	▼***	***
Unit value.....	***	***	***	***	***	▼***	▼***	▼***	***
Vietnam:									
Quantity.....	***	***	***	***	***	▲***	▲***	▲***	▲***
Value.....	***	***	***	***	***	▲***	▲***	▲***	▲***
Unit value.....	***	***	***	***	***	▼***	▼***	▲***	▼***
All other sources:									
Quantity.....	***	***	***	***	***	▼***	▲***	▼***	***
Value.....	***	***	***	***	***	▼***	▲***	▼***	***
Unit value.....	***	***	***	***	***	▲***	▲***	▲***	***
All import sources:									
Quantity.....	4,921,483	11,696,707	18,882,847	9,731,910	10,500,717	▲283.7	▲137.7	▲61.4	▲7.9
Value.....	2,018,133	3,633,775	5,676,766	2,990,435	2,894,517	▲181.3	▲80.1	▲56.2	▼(3.2)
Unit value.....	\$410	\$311	\$301	\$307	\$276	▼(26.7)	▼(24.2)	▼(3.2)	▼(10.3)
U.S. producers:									
Average capacity quantity.....	1,121,200	3,703,017	3,830,309	1,901,447	1,766,521	▲241.6	▲230.3	▲3.4	▼(7.1)
Production quantity.....	469,829	2,077,344	2,216,759	1,160,948	1,117,057	▲371.8	▲342.1	▲6.7	▼(3.8)
Capacity utilization (fn1).....	41.9	56.1	57.9	61.1	63.2	▲16.0	▲14.2	▲1.8	▲2.2
U.S. shipments:									
Quantity.....	456,839	1,930,230	2,143,308	1,116,366	1,116,751	▲369.2	▲322.5	▲11.0	▲0.0
Value.....	251,392	870,390	897,107	476,851	454,524	▲256.9	▲246.2	▲3.1	▼(4.7)
Unit value.....	\$550	\$451	\$419	\$427	\$407	▼(23.9)	▼(18.1)	▼(7.2)	▼(4.7)
Export shipments:									
Quantity.....	***	***	***	***	***	▲***	▲***	▼***	▲***
Value.....	***	***	***	***	***	▲***	▲***	▼***	▲***
Unit value.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Ending inventory quantity.....	12,500	118,041	168,692	151,993	155,734	▲1,249.5	▲844.3	▲42.9	▲2.5
Inventories/total shipments (fn1).....	***	***	***	***	***	▲***	▲***	▲***	▲***
Production workers.....	1,097	2,644	2,583	2,489	2,305	▲135.5	▲141.0	▼(2.3)	▼(7.4)
Hours worked (1,000s).....	1,584	4,367	4,239	2,250	1,941	▲167.6	▲175.7	▼(2.9)	▼(13.7)
Wages paid (\$1,000).....	50,085	106,071	91,357	46,596	47,951	▲82.4	▲111.8	▼(13.9)	▲2.9
Hourly wages (dollars per hour).....	\$31.62	\$24.29	\$21.55	\$20.71	\$24.70	▼(31.8)	▼(23.2)	▼(11.3)	▲19.3
Productivity (watts per hour).....	296.6	475.7	522.9	516.0	575.5	▲76.3	▲60.4	▲9.9	▲11.5
Unit labor costs.....	\$107	\$51	\$41	\$40	\$43	▼(61.3)	▼(52.1)	▼(19.3)	▲7.0

Table continued.

Table C-2 continued

CSPV modules: Summary data concerning the U.S. market, by item and by period

Quantity=kilowatts; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per kilowatt; Period changes=percent—exceptions noted

	Reported data					Period changes			
	Calendar year		Jan-Jun			Comparison years			Jan-Jun
	2018	2019	2020	2020	2021	2018-20	2018-19	2019-20	2020-21
U.S. producers':—Continued									
Net sales:									
Quantity.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Value.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Unit value.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Cost of goods sold (COGS).....	***	***	***	***	***	▲***	▲***	▲***	▼***
Gross profit or (loss) (fn2).....	***	***	***	***	***	▼***	▲***	▼***	▲***
SG&A expenses.....	***	***	***	***	***	▲***	▲***	▼***	▲***
Operating income or (loss) (fn2).....	***	***	***	***	***	▼***	▲***	▼***	▲***
Net income or (loss) (fn2).....	***	***	***	***	***	▲***	▲***	▼***	▲***
Unit COGS.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Unit SG&A expenses.....	***	***	***	***	***	▼***	▼***	▼***	▲***
Unit operating income or (loss) (fn2).....	***	***	***	***	***	▲***	▲***	▼***	▲***
Unit net income or (loss) (fn2).....	***	***	***	***	***	▲***	▲***	▼***	▲***
COGS/sales (fn1).....	***	***	***	***	***	▼***	▼***	▲***	▼***
Operating income or (loss)/sales (fn1).....	***	***	***	***	***	▲***	▲***	▼***	▲***
Net income or (loss)/sales (fn1).....	***	***	***	***	***	▲***	▲***	▼***	▲***
Capital expenditures.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Research and development expenses.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Net assets (fn3).....	***	***	***	***	***	▲***	▲***	▼***	***

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

Note.—Shares and ratios shown as “0.0” percent represent non-zero values less than “0.05” percent (if positive) and greater than “(0.05)” percent (if negative). Zeroes, null values, undefined calculations, and unmeaningfully large percent changes are suppressed and shown as “—”. Period changes preceded by a “▲” represent an increase, while period changes preceded by a “▼” represent a decrease.

fn1.—Reported data are in percent and period changes are in percentage points.

fn2.—Percent changes only calculated when both comparison values represent profits; The directional change in profitability provided when one or both comparison values represent a loss.

fn3.—Total module net asset also includes cell assets used to produce cells consumed in module production.

CSPV products (cells and modules)

Table C-3

CSPV products: Summary data on U.S. imports and U.S. producers, by item and by period

Quantity=kilowatts; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per kilowatt; Period changes=percent—exceptions noted

	Reported data					Period changes			
	Calendar year		Jan-Jun			Comparison years			Jan-Jun
	2018	2019	2020	2020	2021	2018-20	2018-19	2019-20	2020-21
U.S. imports from:									
Cambodia:									
Quantity.....	***	***	***	***	***	▲***	▲***	▲***	▲***
Value.....	***	***	***	***	***	▲***	▲***	▲***	▲***
Unit value.....	***	***	***	***	***	▲***	▲***	▼***	▲***
China:									
Quantity.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Value.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Unit value.....	***	***	***	***	***	▼***	▼***	▼***	▲***
India:									
Quantity.....	***	***	***	***	***	▼***	▼***	▲***	▲***
Value.....	***	***	***	***	***	▼***	▼***	▲***	▲***
Unit value.....	***	***	***	***	***	▲***	▲***	▲***	▲***
Indonesia:									
Quantity.....	***	***	***	***	***	▼***	▼***	▼***	***
Value.....	***	***	***	***	***	▼***	▲***	▼***	***
Unit value.....	***	***	***	***	***	▼***	▲***	▼***	***
Japan:									
Quantity.....	***	***	***	***	***	▼***	▲***	▼***	▼***
Value.....	***	***	***	***	***	▼***	▲***	▼***	▼***
Unit value.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Korea:									
Quantity.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Value.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Unit value.....	***	***	***	***	***	▼***	▼***	▲***	▼***
Malaysia:									
Quantity.....	***	***	***	***	***	▲***	▲***	▲***	▲***
Value.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Unit value.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Philippines:									
Quantity.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Value.....	***	***	***	***	***	▼***	▼***	▼***	▲***
Unit value.....	***	***	***	***	***	▼***	▲***	▼***	▲***
Singapore:									
Quantity.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Value.....	***	***	***	***	***	▼***	▼***	▲***	▲***
Unit value.....	***	***	***	***	***	▼***	▼***	▲***	▲***
Taiwan:									
Quantity.....	***	***	***	***	***	▲***	▲***	▼***	▼***
Value.....	***	***	***	***	***	▲***	▲***	▼***	▼***
Unit value.....	***	***	***	***	***	▼***	▼***	▲***	▼***
Thailand:									
Quantity.....	***	***	***	***	***	▲***	▲***	▲***	▲***
Value.....	***	***	***	***	***	▲***	▲***	▲***	▲***
Unit value.....	***	***	***	***	***	▼***	▼***	▲***	▼***
Turkey:									
Quantity.....	***	***	***	***	***	▼***	▼***	▼***	***
Value.....	***	***	***	***	***	▼***	▼***	▼***	***
Unit value.....	***	***	***	***	***	▼***	▼***	▼***	***
Vietnam:									
Quantity.....	***	***	***	***	***	▲***	▲***	▲***	▲***
Value.....	***	***	***	***	***	▲***	▲***	▲***	▲***
Unit value.....	***	***	***	***	***	▼***	▼***	▲***	▼***
All other sources:									
Quantity.....	***	***	***	***	***	▼***	▲***	▼***	***
Value.....	***	***	***	***	***	▼***	▲***	▼***	▲***
Unit value.....	***	***	***	***	***	▲***	▲***	▲***	▲***
All import sources:									
Quantity.....	5,676,422	13,885,944	21,055,013	11,022,234	11,646,527	▲270.9	▲144.6	▲51.6	▲5.7
Value.....	2,249,687	4,063,972	6,144,414	3,264,229	3,113,375	▲173.1	▲80.6	▲51.2	▼(4.6)
Unit value.....	\$396	\$293	\$292	\$296	\$267	▼(26.4)	▼(26.2)	▼(0.3)	▼(9.7)

Table continued.

Table C-3 continued

CSPV products: Summary data concerning the U.S. market, by item and by period

Quantity=kilowatts; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per kilowatt; Period changes=percent—exceptions noted

	Reported data					Period changes			
	Calendar year		Jan-Jun			Comparison years			Jan-Jun
	2018	2019	2020	2020	2021	2018-20	2018-19	2019-20	2020-21
U.S. producers':									
CSPV cells:									
Average capacity quantity.....	***	***	***	***	***	▼***	▼***	▲***	▼***
Production quantity.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Capacity utilization (fn1).....	***	***	***	***	***	▼***	▲***	▼***	▼***
CSPV modules:									
Average capacity quantity.....	1,121,200	3,703,017	3,830,309	1,901,447	1,766,521	▲241.6	▲230.3	▲3.4	▼(7.1)
Production quantity.....	469,829	2,077,344	2,216,759	1,160,948	1,117,057	▲371.8	▲342.1	▲6.7	▼(3.8)
Capacity utilization (fn1).....	41.9	56.1	57.9	61.1	63.2	▲16.0	▲14.2	▲1.8	▲2.2
CSPV cells:									
U.S. shipments:									
Quantity.....	***	***	***	***	***	▼***	▼***	▼***	***
Value.....	***	***	***	***	***	▼***	▼***	▼***	***
Unit value.....	***	***	***	***	***	▼***	▲***	▼***	***
CSPV modules:									
U.S. shipments:									
Quantity.....	456,839	1,930,230	2,143,308	1,116,366	1,116,751	▲369.2	▲322.5	▲11.0	▲0.0
Value.....	251,392	870,390	897,107	476,851	454,524	▲256.9	▲246.2	▲3.1	▼(4.7)
Unit value.....	\$550	\$451	\$419	\$427	\$407	▼(23.9)	▼(18.1)	▼(7.2)	▼(4.7)
CSPV products:									
Export shipments:									
Quantity.....	***	***	***	***	***	▲***	▲***	▼***	▼***
Value.....	***	***	***	***	***	▲***	▲***	▼***	▼***
Unit value.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Ending inventory quantity.....	***	***	***	***	***	▲***	▲***	▲***	▲***
Production workers.....	***	***	***	***	***	▲***	▲***	▼***	▼***
Hours worked (1,000s).....	***	***	***	***	***	▲***	▲***	▼***	▼***
Wages paid (\$1,000).....	***	***	***	***	***	▲***	▲***	▼***	▲***
Hourly wages (dollars per hour).....	***	***	***	***	***	▼***	▼***	▼***	▲***
CSPV cells:									
Productivity (watts per hour).....	***	***	***	***	***	▼***	▼***	▲***	▼***
Unit labor costs.....	***	***	***	***	***	▲***	▲***	▼***	▼***
CSPV modules:									
Productivity (watts per hour).....	***	***	***	***	***	▲***	▲***	▲***	▲***
Unit labor costs.....	***	***	***	***	***	▼***	▼***	▼***	▲***
CSPV products:									
Productivity (watts per hour).....	***	***	***	***	***	▲***	▲***	▲***	▲***
Unit labor costs.....	***	***	***	***	***	▼***	▼***	▼***	▲***
Net sales:									
Quantity.....	481,156	2,048,798	2,191,402	1,152,826	1,114,087	▲355.4	▲325.8	▲7.0	▼(3.4)
Value.....	261,380	900,356	904,397	484,262	451,082	▲246.0	▲244.5	▲0.4	▼(6.9)
Cost of goods sold (COGS).....	300,098	896,089	933,735	513,472	459,893	▲211.1	▲198.6	▲4.2	▼(10.4)
SG&A expenses.....	37,912	62,376	56,941	26,932	28,109	▲50.2	▲64.5	▼(8.7)	▲4.4
Operating income or (loss) (fn2).....	(76,630)	(58,109)	(86,279)	(56,142)	(36,920)	▼---	▲---	▼---	▲---
Net income or (loss) (fn2).....	(163,503)	(65,280)	(89,209)	(59,038)	(35,920)	▲---	▲---	▼---	▲---
COGS/sales (fn1).....	114.8	99.5	103.2	106.0	102.0	▼(11.6)	▼(15.3)	▲3.7	▼(4.1)
Operating income or (loss)/sales (fn1).....	(29.3)	(6.5)	(9.5)	(11.6)	(8.2)	▲19.8	▲22.9	▼(3.1)	▲3.4
Net income or (loss)/sales (fn1).....	(62.6)	(7.3)	(9.9)	(12.2)	(8.0)	▲52.7	▲55.3	▼(2.6)	▲4.2
Capital expenditures.....	***	***	***	***	***	▼***	▼***	▼***	▼***
Research and development expenses	***	***	***	***	***	▼***	▼***	▼***	▼***
Net assets.....	386,215	500,659	387,631	n.a.	n.a.	▲0.4	▲29.6	▼(22.6)	n.a.

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

Note.—Shares and ratios shown as “0.0” percent represent non-zero values less than “0.05” percent (if positive) and greater than “(0.05)” percent (if negative). Zeroes, null values, undefined calculations, and unmeaningfully large percent changes are suppressed and shown as “—”. Period changes preceded by a “▲” represent an increase, while period changes preceded by a “▼” represent a decrease.

fn1.—Reported data are in percent and period changes are in percentage points.

fn2.—Percent changes only calculated when both comparison values represent profits; The directional change in profitability provided when one or both comparison values represent a loss.

SUMMARY DATA FROM SAFEGUARD MONITORING 2 PROCEEDING

CSPV cells

Table C-1

CSPV cells: Summary data concerning the U.S. market, by item and by period

Quantity=kilowatts; Value=1,000 dollars; Unit values=dollars per kilowatt; Period changes=percent--exceptions noted

Item	Reported data					Period changes			
	2020	Calendar year 2021	2022	2022 Jan-Jun	2023	2020-22	Comparison years 2020-21	2021-22	Jan-Jun 2022-23
U.S. consumption quantity:									
Amount.....	2,138,882	2,675,156	2,499,320	1,252,697	1,346,074	▲16.9	▲25.1	▼(6.6)	▲7.5
Producers' share (fn1).....	---	---	---	---	---	---	---	---	---
Importers' share (fn1):									
Bifacial cells.....	***	23.2	88.9	82.1	99.7	▲***	▲***	▲65.7	▲17.6
Non-bifacial cells.....	***	76.8	11.1	17.9	0.3	▼***	▼***	▼(65.7)	▼(17.6)
All CSPV cells.....	100.0	100.0	100.0	100.0	100.0	---	---	---	---
U.S. consumption value:									
Amount.....	464,924	562,505	675,156	285,534	305,659	▲45.2	▲21.0	▲20.0	▲7.0
Producers' share (fn1).....	---	---	---	---	---	---	---	---	---
Importers' share (fn1):									
Bifacial cells.....	***	21.4	88.4	77.0	99.6	▲***	▲***	▲67.0	▲22.6
Non-bifacial cells.....	***	78.6	11.6	23.0	0.4	▼***	▼***	▼(67.0)	▼(22.6)
All CSPV cells.....	100.0	100.0	100.0	100.0	100.0	---	---	---	---
U.S. importers' U.S. shipments of:									
Bifacial cells:									
Quantity.....	***	619,951	2,221,967	1,028,218	1,341,774	▲***	▲***	▲258.4	▲30.5
Value.....	***	120,238	596,988	219,910	304,411	▲***	▲***	▲396.5	▲38.4
Unit value.....	***	\$194	\$269	\$214	\$227	▲***	▲***	▲38.5	▲6.1
Ending inventory quantity.....	***	***	***	***	***	▲***	▲***	▲***	▲***
Non-bifacial cells:									
Quantity.....	***	2,055,205	277,353	224,479	4,300	▼***	▲***	▼(86.5)	▼(98.1)
Value.....	***	442,267	78,168	65,624	1,248	▼***	▲***	▼(82.3)	▼(98.1)
Unit value.....	***	\$215	\$282	\$292	\$290	▲***	▼***	▲31.0	▼(0.7)
Ending inventory quantity.....	***	***	***	***	***	▼***	▼***	▼***	▼***
All CSPV cells:									
Quantity.....	2,138,882	2,675,156	2,499,320	1,252,697	1,346,074	▲16.9	▲25.1	▼(6.6)	▲7.5
Value.....	464,924	562,505	675,156	285,534	305,659	▲45.2	▲21.0	▲20.0	▲7.0
Unit value.....	\$217	\$210	\$270	\$228	\$227	▲24.3	▼(3.3)	▲28.5	▼(0.4)
Ending inventory quantity.....	126,771	278,986	209,929	144,732	225,451	▲65.6	▲120.1	▼(24.8)	▲55.8

Source: Compiled from data submitted in response to Commission questionnaires. 508-compliant tables containing these data are contained in parts III, IV, and V 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. There was one producer of CSPV cells that exported 100% of its production still operating in 2020 (***) as it was exiting the industry. For information on these operations see Office of Investigation, memorandum INV-TT-131: Investigation No. TA-201-075 (Extension): Crystalline Silicon Photovoltaic Cells, Whether or Not Partially or Fully Assembled Into Other Products--Staff Report, November 19, 2021.

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

CSPV modules

Table C-2

CSPV modules: Summary data concerning U.S. market, by item and by period

Quantity=kilowatts; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per kilowatt; Period changes=percent—exceptions noted

Item	Reported data					Period changes			
	2020	Calendar year 2021	2022	2022 Jan-Jun	2023	2020-22	Comparison years 2020-21	2021-22	Jan-Jun 2022-23
U.S. consumption quantity:									
Amount.....	18,337,101	18,635,819	19,818,012	8,179,403	14,833,492	▲8.1	▲1.6	▲6.3	▲81.4
Producers' share (fn1).....	11.7	13.2	12.8	15.9	8.1	▲1.1	▲1.5	▼(0.4)	▼(7.8)
Importers' share (fn1):									
Bifacial modules.....	33.7	57.9	64.2	59.6	80.4	▲30.5	▲24.2	▲6.3	▲20.8
Non-bifacial modules.....	54.5	28.9	23.0	24.5	11.5	▼(31.5)	▼(25.7)	▼(5.9)	▼(13.0)
All CSPV modules.....	88.3	86.8	87.2	84.1	91.9	▼(1.1)	▼(1.5)	▲0.4	▲7.8
U.S. consumption value:									
Amount.....	6,901,235	6,827,330	8,792,394	3,786,393	5,843,698	▲27.4	▼(1.1)	▲28.8	▲54.3
Producers' share (fn1).....	13.0	15.9	16.6	17.9	10.2	▲3.6	▲2.8	▲0.8	▼(7.7)
Importers' share (fn1):									
Bifacial modules.....	31.6	52.9	57.2	49.1	76.7	▲25.7	▲21.4	▲4.3	▲27.5
Non-bifacial modules.....	55.4	31.2	26.2	33.0	13.2	▼(29.2)	▼(24.2)	▼(5.1)	▼(19.8)
All CSPV modules.....	87.0	84.1	83.4	82.1	89.8	▼(3.6)	▼(2.8)	▼(0.8)	▲7.7
U.S. importers' U.S. shipments of:									
Bifacial modules:									
Quantity.....	6,185,269	10,789,111	12,726,826	4,876,809	11,923,560	▲105.8	▲74.4	▲18.0	▲144.5
Value.....	2,177,340	3,614,226	5,032,320	1,860,914	4,479,738	▲131.1	▲66.0	▲39.2	▲140.7
Unit value.....	\$352	\$335	\$395	\$382	\$376	▲12.3	▼(4.8)	▲18.0	▼(1.5)
Ending inventory quantity.....	1,394,440	2,032,965	3,922,904	1,965,655	4,391,168	▲181.3	▲45.8	▲93.0	▲123.4
Non-bifacial modules:									
Quantity.....	9,997,775	5,378,977	4,553,384	2,003,683	1,711,403	▼(54.5)	▼(46.2)	▼(15.3)	▼(14.6)
Value.....	3,823,338	2,130,816	2,299,599	1,247,854	770,210	▼(39.9)	▼(44.3)	▲7.9	▼(38.3)
Unit value.....	\$382	\$396	\$505	\$623	\$450	▲32.1	▲3.6	▲27.5	▼(27.7)
Ending inventory quantity.....	1,416,469	1,045,355	1,546,511	1,261,230	1,290,702	▲9.2	▼(26.2)	▲47.9	▲2.3
All CSPV modules:									
Quantity.....	16,183,044	16,168,088	17,280,210	6,880,492	13,634,963	▲6.8	▼(0.1)	▲6.9	▲98.2
Value.....	6,000,678	5,745,042	7,331,919	3,108,768	5,249,948	▲22.2	▼(4.3)	▲27.6	▲68.9
Unit value.....	\$371	\$355	\$424	\$452	\$385	▲14.4	▼(4.2)	▲19.4	▼(14.8)
Ending inventory quantity.....	2,810,909	3,078,320	5,469,415	3,226,885	5,681,870	▲94.6	▲9.5	▲77.7	▲76.1

Table continued.

Table C-2 Continued

CSPV modules: Summary data concerning U.S. market, by item and by period

Quantity=kilowatts; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per kilowatt; Period changes=percent—exceptions noted

Item	Reported data					Period changes			
	2020	Calendar year 2021	2022	2022 Jan-Jun	2023	2020-22	Comparison years 2020-21	2021-22	Jan-Jun 2022-23
U.S. producers' of bifacial modules:									
Practical capacity quantity.....	238,618	234,199	695,812	416,958	***	▲191.6	▼(1.9)	▲197.1	▼***
Production quantity.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Capacity utilization (fn1).....	***	***	***	***	***	▲***	▲***	▼***	▼***
U.S. shipments:									
Quantity.....	***	***	***	***	***	▲***	▼***	▲***	▼***
Value.....	***	***	***	***	***	▲***	▼***	▲***	▼***
Unit value.....	***	***	***	***	***	▲***	▲***	▼***	▲***
Export shipments:									
Quantity.....	***	***	***	***	***	▲***	***	▲***	▼***
Value.....	***	***	***	***	***	▲***	***	▲***	▼***
Unit value.....	***	***	***	***	***	▲***	***	▲***	▼***
Ending inventory quantity.....	***	***	***	***	***	▼***	▲***	▼***	▲***
Inventories/total shipments (fn1).....	***	***	***	***	***	▼***	▲***	▼***	▲***
Net sales:									
Quantity.....	***	***	***	***	***	▲***	▼***	▲***	▼***
Value.....	***	***	***	***	***	▲***	▼***	▲***	▼***
Unit value.....	***	***	***	***	***	▼***	▲***	▼***	▲***
Cost of goods sold (COGS).....	***	***	***	***	***	▲***	▼***	▲***	▼***
Gross profit or (loss) (fn2).....	***	***	***	***	***	▼***	▲***	▼***	▼***
SG&A expenses.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Operating income or (loss) (fn2).....	***	***	***	***	***	▼***	▲***	▼***	▼***
Net income or (loss) (fn2).....	***	***	***	***	***	▼***	▲***	▼***	▼***
Unit COGS.....	***	***	***	***	***	▲***	▼***	▲***	▲***
Unit SG&A expenses.....	***	***	***	***	***	▼***	▲***	▼***	▲***
Unit operating income or (loss) (fn2).....	***	***	***	***	***	▼***	▲***	▼***	▼***
Unit net income or (loss) (fn2).....	***	***	***	***	***	▲***	▲***	▼***	▼***
COGS/sales (fn1).....	***	***	***	***	***	▲***	▼***	▲***	▲***
Operating income or (loss)/sales (fn1).....	***	***	***	***	***	▼***	▲***	▼***	▼***
Net income or (loss)/sales (fn1).....	***	***	***	***	***	▲***	▲***	▼***	▼***
U.S. producers' of non-bifacial modules:									
Practical capacity quantity.....	3,946,437	3,445,960	3,774,854	1,931,663	***	▼(4.3)	▼(12.7)	▲9.5	▲***
Production quantity.....	***	***	***	***	***	▲***	▲***	▼***	▲***
Capacity utilization (fn1).....	***	***	***	***	***	▲***	▲***	▼***	▲***
U.S. shipments:									
Quantity.....	***	***	***	***	***	▲***	▲***	▼***	▲***
Value.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Unit value.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Export shipments:									
Quantity.....	***	***	***	***	***	▼***	▼***	▲***	▼***
Value.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Unit value.....	***	***	***	***	***	▲***	▲***	▲***	▲***
Ending inventory quantity.....	***	***	***	***	***	▼***	▼***	▼***	▲***
Inventories/total shipments (fn1).....	***	***	***	***	***	▼***	▼***	▼***	▲***
Net sales:									
Quantity.....	***	***	***	***	***	▲***	▲***	▼***	▲***
Value.....	***	***	***	***	***	▲***	▲***	▲***	▲***
Unit value.....	***	***	***	***	***	▲***	▲***	▲***	▲***
Cost of goods sold (COGS).....	***	***	***	***	***	▲***	▲***	▲***	▲***
Gross profit or (loss) (fn2).....	***	***	***	***	***	▲***	▼***	▲***	▲***
SG&A expenses.....	***	***	***	***	***	▲***	▲***	▲***	▲***
Operating income or (loss) (fn2).....	***	***	***	***	***	▲***	▼***	▲***	▼***
Net income or (loss) (fn2).....	***	***	***	***	***	▼***	▼***	▲***	▼***
Unit COGS.....	***	***	***	***	***	▲***	▲***	▲***	▲***
Unit SG&A expenses.....	***	***	***	***	***	▲***	▼***	▲***	▲***
Unit operating income or (loss) (fn2).....	***	***	***	***	***	▲***	▼***	▲***	▼***
Unit net income or (loss) (fn2).....	***	***	***	***	***	▲***	▼***	▲***	▼***
COGS/sales (fn1).....	***	***	***	***	***	▼***	▲***	▼***	▼***
Operating income or (loss)/sales (fn1).....	***	***	***	***	***	▲***	▼***	▲***	▼***
Net income or (loss)/sales (fn1).....	***	***	***	***	***	▲***	▼***	▲***	▼***

Table continued.

Table C-2 Continued

CSPV modules: Summary data concerning U.S. market, by item and by period

Quantity=kilowatts; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per kilowatt; Period changes=percent—exceptions noted

Item	Reported data					Period changes			
	2020	Calendar year 2021	2022	2022 Jan-Jun	2023	2020-22	Comparison years 2020-21	2021-22	Jan-Jun 2022-23
U.S. producers' of all CSPV modules:									
Practical capacity quantity.....	4,185,055	3,680,159	4,470,666	2,348,621	2,237,251	▲6.8	▼(12.1)	▲21.5	▼(4.7)
Production quantity.....	2,226,242	2,508,270	2,486,822	1,251,222	1,405,098	▲11.7	▲12.7	▼(0.9)	▲12.3
Capacity utilization (fn1).....	53.2	68.2	55.6	53.3	62.8	▲2.4	▲15.0	▼(12.5)	▲9.5
U.S. shipments:									
Quantity.....	2,154,057	2,467,731	2,537,802	1,298,911	1,198,529	▲17.8	▲14.6	▲2.8	▼(7.7)
Value.....	900,557	1,082,288	1,460,475	677,625	593,750	▲62.2	▲20.2	▲34.9	▼(12.4)
Unit value.....	\$418	\$439	\$575	\$522	\$495	▲37.7	▲4.9	▲31.2	▼(5.0)
Export shipments:									
Quantity.....	***	***	***	***	***	▲***	▼***	▲***	▼***
Value.....	***	***	***	***	***	▲***	▲***	▲***	▼***
Unit value.....	***	***	***	***	***	▲***	▲***	▲***	▲***
Ending inventory quantity.....	167,288	188,268	108,965	126,850	308,444	▼(34.9)	▲12.5	▼(42.1)	▲143.2
Inventories/total shipments (fn1).....	***	***	***	***	***	▼***	▼***	▼***	▲***
Production workers.....	2,286	2,064	2,080	1,942	2,472	▼(9.0)	▼(9.7)	▲0.8	▲27.3
Hours worked (1,000s).....	4,395	4,021	4,053	1,920	2,536	▼(7.8)	▼(8.5)	▲0.8	▲32.1
Wages paid (\$1,000).....	102,934	106,316	118,865	61,206	64,330	▲15.5	▲3.3	▲11.8	▲5.1
Hourly wages (dollars per hour).....	\$23.42	\$26.44	\$29.33	\$31.88	\$25.37	▲25.2	▲12.9	▲10.9	▼(20.4)
Productivity (kilowatts per 1,000 hours).....	506.5	623.8	613.6	651.7	554.1	▲21.1	▲23.1	▼(1.6)	▼(15.0)
Unit labor costs.....	\$46.24	\$42.39	\$47.80	\$48.92	\$45.78	▲3.4	▼(8.3)	▲12.8	▼(6.4)
Net sales:									
Quantity.....	2,164,218	2,487,011	2,566,125	1,312,640	1,205,619	▲18.6	▲14.9	▲3.2	▼(8.2)
Value.....	901,263	1,084,705	1,720,179	685,805	676,377	▲90.9	▲20.4	▲58.6	▼(1.4)
Unit value.....	\$416	\$436	\$670	\$522	\$561	▲61.0	▲4.7	▲53.7	▲7.4
Cost of goods sold (COGS).....	923,744	1,131,001	1,607,130	656,366	635,914	▲74.0	▲22.4	▲42.1	▼(3.1)
Gross profit or (loss) (fn2).....	(22,481)	(46,296)	113,049	29,439	40,463	▲—	▼—	▲—	▲37.4
SG&A expenses.....	55,305	62,648	184,594	64,066	92,616	▲233.8	▲13.3	▲194.7	▲44.6
Operating income or (loss) (fn2).....	(77,786)	(108,944)	(71,545)	(34,627)	(52,153)	▲—	▼—	▲—	▼—
Net income or (loss) (fn2).....	(81,946)	(111,697)	(93,559)	(52,944)	(64,588)	▼—	▼—	▲—	▼—
Unit COGS.....	\$427	\$455	\$626	\$500	\$527	▲46.7	▲6.5	▲37.7	▲5.5
Unit SG&A expenses.....	\$26	\$25	\$72	\$49	\$77	▲181.5	▼(1.4)	▲185.6	▲57.4
Unit operating income or (loss) (fn2).....	\$(36)	\$(44)	\$(28)	\$(26)	\$(43)	▲—	▼—	▲—	▼—
Unit net income or (loss) (fn2).....	\$(38)	\$(45)	\$(36)	\$(40)	\$(54)	▲—	▼—	▲—	▼—
COGS/sales (fn1).....	102.5	104.3	93.4	95.7	94.0	▼(9.1)	▲1.8	▼(10.8)	▼(1.7)
Operating income or (loss)/sales (fn1).....	(8.6)	(10.0)	(4.2)	(5.0)	(7.7)	▲4.5	▼(1.4)	▲5.9	▼(2.7)
Net income or (loss)/sales (fn1).....	(9.1)	(10.3)	(5.4)	(7.7)	(9.5)	▲3.7	▼(1.2)	▲4.9	▼(1.8)
Capital expenditures.....	29,085	28,242	48,561	14,514	48,391	▲67.0	▼(2.9)	▲71.9	▲233.4
Research and development expenses.....	***	***	***	***	***	▲***	▲***	▲***	▲***
Net assets.....	458,765	438,982	450,887	NA	NA	▼(1.7)	▼(4.3)	▲2.7	NA

Source: Compiled from data submitted in response to Commission questionnaires. 508-compliant tables containing these data are contained in part V 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. The vast majority of CSPV cells imported in cell form shown here are used by U.S. producers of CSPV modules.

fn1.—Reported data are in percent and period changes are in percentage points.

fn2.—Percent changes only calculated when both comparison values represent profits; The directional change in profitability provided when one or both comparison values represent a loss.

CSPV products (cells and modules)

Table C-3

CSPV products: Summary data concerning the U.S. shipments of imports, by item and period

Quantity=kilowatts; Value=1,000 dollars; Period changes=percent—exceptions noted

Item	Reported data					Period changes			
	2020	Calendar year 2021	2022	Jan-Jun 2022	2023	2020-22	Comparison years 2020-21	2021-22	Jan-Jun 2022-23
U.S. importers' U.S. shipments of:									
Bifacial cells:									
Quantity.....	***	619,951	2,221,967	1,028,218	1,341,774	▲***	▲313.5	▲258.4	▲30.5
Value.....	***	120,238	596,988	219,910	304,411	▲***	▲335.6	▲396.5	▲38.4
Unit value.....	***	\$194	\$269	\$214	\$227	▲***	▲5.3	▲38.5	▲6.1
Ending inventory quantity.....	***	***	***	***	***	▲***	▲***	▲***	▲***
Non-bifacial cells:									
Quantity.....	***	2,055,205	277,353	224,479	4,300	▼***	▲3.3	▼(86.5)	▼(98.1)
Value.....	***	442,267	78,168	65,624	1,248	▼***	▲1.1	▼(82.3)	▼(98.1)
Unit value.....	***	\$215	\$282	\$292	\$290	▲***	▼(2.1)	▲31.0	▼(0.7)
Ending inventory quantity.....	***	***	***	***	***	▼***	▼***	▼***	▼***
All CSPV cells:									
Quantity.....	2,138,882	2,675,156	2,499,320	1,252,697	1,346,074	▲16.9	▲25.1	▼(6.6)	▲7.5
Value.....	464,924	562,505	675,156	285,534	305,659	▲45.2	▲21.0	▲20.0	▲7.0
Unit value.....	\$217	\$210	\$270	\$228	\$227	▲24.3	▼(3.3)	▲28.5	▼(0.4)
Ending inventory quantity.....	126,771	278,986	209,929	144,732	225,451	▲65.6	▲120.1	▼(24.8)	▲55.8
Bifacial modules:									
Quantity.....	6,185,269	10,789,111	12,726,826	4,876,809	11,923,560	▲105.8	▲74.4	▲18.0	▲144.5
Value.....	2,177,340	3,614,226	5,032,320	1,860,914	4,479,738	▲131.1	▲66.0	▲39.2	▲140.7
Unit value.....	\$352	\$335	\$395	\$382	\$376	▲12.3	▼(4.8)	▲18.0	▼(1.5)
Ending inventory quantity.....	1,394,440	2,032,965	3,922,904	1,965,655	4,391,168	▲181.3	▲45.8	▲93.0	▲123.4
Non-bifacial modules:									
Quantity.....	9,997,775	5,378,977	4,553,384	2,003,683	1,711,403	▼(54.5)	▼(46.2)	▼(15.3)	▼(14.6)
Value.....	3,823,338	2,130,816	2,299,599	1,247,854	770,210	▼(39.9)	▼(44.3)	▲7.9	▼(38.3)
Unit value.....	\$382	\$396	\$505	\$623	\$450	▲32.1	▲3.6	▲27.5	▼(27.7)
Ending inventory quantity.....	1,416,469	1,045,355	1,546,511	1,261,230	1,290,702	▲9.2	▼(26.2)	▲47.9	▲2.3
All CSPV modules:									
Quantity.....	16,183,044	16,168,088	17,280,210	6,880,492	13,634,963	▲6.8	▼(0.1)	▲6.9	▲98.2
Value.....	6,000,678	5,745,042	7,331,919	3,108,768	5,249,948	▲22.2	▼(4.3)	▲27.6	▲68.9
Unit value.....	\$371	\$355	\$424	\$452	\$385	▲14.4	▼(4.2)	▲19.4	▼(14.8)
Ending inventory quantity.....	2,810,909	3,078,320	5,469,415	3,226,885	5,681,870	▲94.6	▲9.5	▲77.7	▲76.1
All CSPV products:									
Quantity.....	18,321,926	18,843,244	19,779,530	8,133,189	14,981,037	▲8.0	▲2.8	▲5.0	▲84.2
Value.....	6,465,602	6,307,547	8,007,075	3,394,302	5,555,607	▲23.8	▼(2.4)	▲26.9	▲63.7
Unit value.....	\$353	\$335	\$405	\$417	\$371	▲14.7	▼(5.1)	▲20.9	▼(11.1)
Ending inventory quantity.....	2,937,680	3,357,306	5,679,344	3,371,617	5,907,321	▲93.3	▲14.3	▲69.2	▲75.2

Source: Compiled from data submitted in response to Commission questionnaires. 508-compliant tables containing these data are contained in part V of this report.

Note.—Shares and ratios shown as "0.0" percent represent non-zero values less than "0.05" percent (if positive) and greater than "(0.05)" percent (if negative). Zeroes, null values, and undefined calculations are suppressed and shown as "—". Period changes preceded by a "▲" represent an increase, while period changes preceded by a "▼" represent a decrease.

fn1.—Reported data are in percent and period changes are in percentage points.

fn2.—Percent changes only calculated when both comparison values represent profits; The directional change in profitability provided when one or both comparison values represent a loss.

APPENDIX E

U.S. PRODUCERS' FINANCIAL DATA FOR CELL AND MODULE PRODUCTION

Table E.1 CSPV cells: U.S. producers' results of operations, by item and period

Quantity in kilowatts; value in 1,000 dollars; ratio in percent

Item	Measure	2023	2024	2025
Total net sales	Quantity	***	***	***
Total net sales	Value	***	***	***
COGS: Polysilicon or ingots	Value	***	***	***
COGS: Wafers	Value	***	***	***
COGS: Other material inputs	Value	***	***	***
COGS: Raw materials, total	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, total	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 E.1 (Continued) CSPV cells: U.S. producers' results of operations, by item and period

Shares in percent; unit values in dollars per kilowatt; count in number of firms reporting

Item	Measure	2023	2024	2025
COGS: Raw materials, total	Share	***	***	***
COGS: Direct labor	Share	***	***	***
COGS: Other factory	Share	***	***	***
COGS: Total	Share	***	100.0	100.0
Total net sales	Unit value	***	***	***
COGS: Raw materials, total	Unit value	***	***	***
COGS: Direct labor	Unit value	***	***	***
COGS: Other factory	Unit value	***	***	***
COGS: Total	Unit value	***	***	***
Gross profit or (loss)	Unit value	***	***	***
SG&A expenses	Unit value	***	***	***
Operating income or (loss)	Unit value	***	***	***
Net income or (loss)	Unit value	***	***	***
Operating losses	Count	***	***	***
Net losses	Count	***	***	***
Data	Count	***	***	***

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

Note: Shares represent the share of COGS.

Table E.2 CSPV cells: Changes in AUVs between comparison periods

Changes in percent

Item	2022 to 2024	2022 to 2023	2023 to 2023
Total net sales	***	***	***
COGS: Raw materials	***	***	***
COGS: Direct labor	***	***	***
COGS: Other factory	***	***	***
COGS: Total	***	***	***

Table continued.

Table E.2 (Continued) CSPV cells: Changes in AUVs between comparison periods

Changes in dollars per kilowatt

Item	2022 to 2024	2022 to 2023	2023 to 2024
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: Period changes preceded by a “▲” represent an increase, while period changes preceded by a “▼” represent a decrease.

Table E.3 CSPV modules: U.S. producers' results of operations, by item and period

Quantity in kilowatts; value in 1,000 dollars; ratio in percent

Item	Measure	2023	2024	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 E.3 (Continued) CSPV modules: U.S. producers' results of operations, by item and period

Shares in percent; unit values in dollars per kilowatt; count in number of firms reporting

Item	Measure	2023	2024	2025
COGS: Raw materials	Share	***	***	***
COGS: Direct labor	Share	***	***	***
COGS: Other factory	Share	***	***	***
COGS: Total	Share	100.0	100.0	100.0
Total net sales	Unit value	***	***	***
COGS: Raw materials	Unit value	***	***	***
COGS: Direct labor	Unit value	***	***	***
COGS: Other factory	Unit value	***	***	***
COGS: Total	Unit value	***	***	***
Gross profit or (loss)	Unit value	***	***	***
SG&A expenses	Unit value	***	***	***
Operating income or (loss)	Unit value	***	***	***
Net income or (loss)	Unit value	***	***	***
Operating losses	Count	5	9	8
Net losses	Count	4	4	6
Data	Count	6	10	13

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

Note: Shares represent the share of COGS.

Table E.4 CSPV modules: Changes in AUVs between comparison periods

Changes in percent

Item	2022 to 2024	2022 to 2023	2023 to 2024
Total net sales	***	***	***
COGS: Raw materials	***	***	***
COGS: Direct labor	***	***	***
COGS: Other factory	***	***	***
COGS: Total	***	***	***

Table continued.

Table E.4 (Continued) CSPV modules: Changes in AUVs between comparison periods

Changes in dollars per kilowatt

Item	2022 to 2024	2022 to 2023	2023 to 2024
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: Period changes preceded by a “▲” represent an increase, while period changes preceded by a “▼” represent a decrease.

