Crystalline Silicon Photovoltaic Cells and Modules From China

Investigation Nos. 701-TA-481 and 731-TA-1190 (Final)

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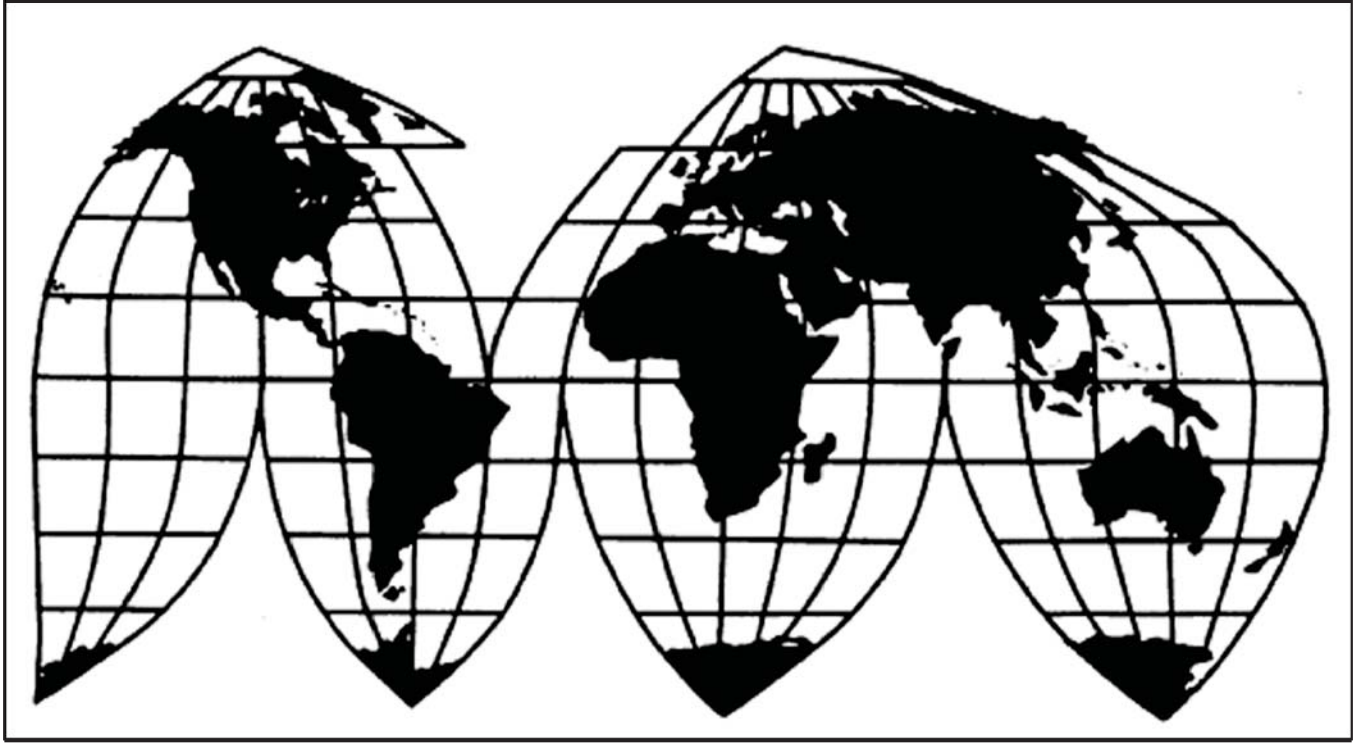
U.S. International Trade Commission



Washington, DC 20436

U.S. International Trade Commission

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Note.--Information that would reveal confidential operations of individual concerns may not be published and therefore has been deleted from this report. Such deletions are indicated by asterisks.

UNITED STATES INTERNATIONAL TRADE COMMISSION

Investigation Nos. 701-TA-481 and 731-TA-1190 (Final)

CRYSTALLINE SILICON PHOTOVOLTAIC CELLS AND MODULES FROM CHINA

DETERMINATIONS

On the basis of the record[1] developed in the subject investigations, the United States International Trade Commission (Commission) determines, pursuant to sections 705(b) and 735(b) of the Tariff Act of 1930 (19 U.S.C. § 1671d(b)) and (19 U.S.C. § 1673d(b)) (the Act), that an industry in the United States is materially injured by reason of imports of crystalline silicon photovoltaic cells and modules from China, provided for in subheadings 8501.31.80, 8501.61.00, 8507.20.80, and 8541.40.60 of the Harmonized Tariff Schedule of the United States, that the U.S. Department of Commerce (Commerce) has determined are subsidized and sold in the United States at less than fair value.[2]

BACKGROUND

The Commission instituted these investigations effective October 19, 2011, following receipt of petitions filed with the Commission and Commerce by Solar World Industries America, Hillsboro, OR. The final phase of these investigations was scheduled by the Commission following notification of preliminary determinations by Commerce that imports of crystalline silicon photovoltaic cells and modules from China were subsidized within the meaning of section 703(b) of the Act (19 U.S.C. § 1671b(b)) and dumped within the meaning of 733(b) of the Act (19 U.S.C. § 1673b(b)). Notice of the scheduling of the final phase of the Commission's investigations and of a public hearing to be held in connection therewith was given by posting copies of the notice in the Office of the Secretary, U.S. International Trade Commission, Washington, DC, and by publishing the notice in the *Federal Register* on June 13, 2012 (77 FR 35425). The hearing was held in Washington, DC, on October 3, 2012, and all persons who requested the opportunity were permitted to appear in person or by counsel.

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

[2] All six Commissioners voted in the affirmative. Commissioners Daniel R. Pearson, Shara L. Aranoff, David S. Johanson, and Meredith M. Broadbent also find 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 crystalline silicon photovoltaic cells and modules from China. Chairman Irving A. Williamson and Commissioner Dean A. Pinkert made affirmative critical circumstances determinations with respect to all imports subject to Commerce's affirmative critical circumstances determinations.

VIEWS OF THE COMMISSION

Based on the record in these investigations, we find that an industry in the United States is materially injured by reason of imports of crystalline silicon photovoltaic ("CSPV") cells and modules from China that the U.S. Department of Commerce ("Commerce") has determined are subsidized and sold in the United States at less than fair value. We also determine that critical circumstances do not exist with respect to subject imports from China that are covered by affirmative critical circumstances determinations in Commerce's final antidumping and countervailing duty investigations.[1]

I. BACKGROUND

On October 19, 2011, domestic producer SolarWorld Industries America, Inc. ("SolarWorld") filed antidumping and countervailing duty petitions covering CSPV cells and modules from China.[2] SolarWorld submitted prehearing and posthearing briefs; representatives from SolarWorld and its counsel appeared at the hearing.[3] Representatives from domestic producer Helios Solar Works ("Helios"),[4] Mountain View Solar (a purchaser/builder of energy-conserving homes),[5] McNaughton-McKay Electronic Company (a distributor of various solar products),[6] Energy Independent Solutions (a purchaser/installer of solar panels),[7] and the Oregon Military Department[8] also appeared at the hearing in support of the petitions.

In opposition to imposition of duties, the Chinese Chamber of Commerce for Import and Export of Machinery and Electronic Products ("the CCCME Respondents"), an association of producers/ exporters of the subject merchandise, submitted prehearing and posthearing briefs. Counsel for the CCCME Respondents appeared at the hearing along with counsel for domestic producer/subject producer/exporter Suntech and purchaser SunEdison LLC.[9] Representatives from Suntech Power; Suntech America; SunEdison; Canadian Solar (USA), Inc., the U.S. importer affiliate of a producer/ exporter of subject merchandise in China;[10] subject producer/exporter Trina Solar (Changzhou) Science & Technology Co., Ltd./Changzhou Trina Solar Energy Co., Ltd. ("Trina");[11] Yingli Green Energy Americas, Inc., the importing arm of the subject producer/exporter with the largest global module manufacturing facility;[12] and Inerjys, a firm that provides capital and project financing for the deployment of underappreciated new energy technologies such as solar panels,[13] also participated in the hearing. Representatives from Upsolar America Inc. (an importer of subject merchandise)[14] and LDK Solar Tech

[1] Chairman Irving A. Williamson and Commissioner Dean A. Pinkert voted in the affirmative with respect to critical circumstances. See Dissenting Views of Chairman Irving A. Williamson and Commissioner Dean A. Pinkert on Critical Circumstances. They join sections I to V.D.1.a of these Views, except as otherwise noted.

[2] The Coalition for American Solar Manufacturing, which also includes domestic producers ***, supported the petitions. Confidential Report, Memorandum INV-KK-103 (Oct. 25, 2012), as supplemented by Memorandum INV-KK-107 (Nov. 6, 2012) ("CR") at I-1; Crystalline Silicon Photovoltaic Cells and Modules from China, Invs. Nos. 701-TA-481 & 731-TA-1190 (Final), USITC Pub. 4360 (Nov. 2012) ("PR") at I-1.

[3] Revised and Corrected Transcript of the Commission's October 3, 2012 Hearing ("Hearing Tr.") at 26 (Brinser), 32 (Kilkelly).

[4] Hearing Tr. at 38 (Ostrenga).

[5] Hearing Tr. at 48 (McKechnie).

[6] Hearing Tr. at 51 (Ferda).

[7] Hearing Tr. at 55 (Morinville).

[8] Hearing Tr. at 44 (Caldwell).

[9] Hearing Tr. at 175 (Lapidus).

[10] Hearing Tr. at 186 (King).

[11] Hearing Tr. at 190-91 (Young); CR at I-5; PR at I-5.

[12] Hearing Tr. at 180 (Petrina).

[13] Hearing Tr. at 164 (Shah).

[14] Hearing Tr. at 199 (Dalbey).

USA, Inc./LDK Solar Hi-Tech (Nanchang) Co., Ltd./LDK Solar Hi-Tech (Suzhou) Co., Ltd. (collectively "LDK") (subject producers/exporters/U.S. importer) submitted prehearing and posthearing briefs and appeared at the hearing accompanied by counsel.[15] A representative from ProVision Solar, Inc. (a purchaser) also appeared at the hearing.[16]

II. DOMESTIC LIKE PRODUCT

A. In General

In determining whether an industry in the United States is materially injured or threatened with material injury by reason of imports of subject merchandise, the Commission first defines the "domestic like product" and the "industry."[17] Section 771(4)(A) of the Tariff Act of 1930, as amended ("the Tariff Act"), defines the relevant domestic industry as the "producers as a whole of a domestic like product, or those producers whose collective output of a domestic like product constitutes a major proportion of the total domestic production of the product."[18] In turn, the Tariff Act defines "domestic like product" as "a product which is like, or in the absence of like, most similar in characteristics and uses with, the article subject to an investigation."[19]

The decision regarding the appropriate domestic like product in an investigation is a factual determination, and the Commission has applied the statutory standard of "like" or "most similar in characteristics and uses" on a case-by-case basis.[20] No single factor is dispositive, and the Commission may consider other factors it deems relevant based on the facts of a particular investigation.[21] The Commission looks for clear dividing lines among possible like products and disregards minor variations.[22] Although the Commission must accept Commerce's determination as to the scope of the imported merchandise that is subsidized or sold at less than fair value,[23] the Commission determines what domestic product is like the imported articles Commerce has identified.[24]

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[15] Hearing Tr. at 3 (Lasky).

[16] Hearing Tr. at 210 (Mangelsdorf).

[17] 19 U.S.C. § 1677(4)(A).

[18] 19 U.S.C. § 1677(4)(A).

[19] 19 U.S.C. § 1677(10).

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

[21] S. Rep. No. 96-249 at 90-91 (1979).

[22] Nippon, 19 CIT at 455; Torrington, 747 F. Supp. at 748-49; see also S. Rep. No. 96-249 at 90-91 (1979) (Congress has indicated that the like product standard should not be interpreted in "such a narrow fashion as to permit minor differences in physical characteristics or uses to lead to the conclusion that the product and article are not 'like' each other, nor should the definition of 'like product' be interpreted in such a fashion as to prevent consideration of an industry adversely affected by the imports under consideration.").

[23] USEC, Inc. v. United States, 34 Fed. Appx. 725, 730 (Fed. Cir. 2002) ("The ITC may not modify the class or kind of imported merchandise examined by Commerce."); Algoma Steel Corp. v. United States, 688 F. Supp. 639, 644 (Ct. Int'l Trade 1988), aff'd, 865 F.3d 240 (Fed. Cir.), cert. denied, 492 U.S. 919 (1989).

[24] Hosiden Corp. v. Advanced Display Mfrs., 85 F.3d 1561, 1568 (Fed. Cir. 1996) (the Commission may find a single like product corresponding to several different classes or kinds defined by Commerce); Cleo, 501 F.3d at 1298 n.1 ("Commerce's {scope} finding does not control the Commission's {like product} determination.");

B. Product Description

Commerce defined the imported merchandise within the scope of these investigations as follows:

> {CSPV} cells, and modules, laminates, and panels, consisting of {CSPV} cells, whether or not partially or fully assembled into other products, 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.
>
> Subject merchandise may be described at the time of importation as parts for final finished products that are assembled after importation, including, but not limited to, modules, laminates, panels, building-integrated modules, building-integrated panels, or other finished goods kits. Such parts that otherwise meet the definition of subject merchandise are included in the scope of this investigation.
>
> Excluded from the scope of this investigation are thin film photovoltaic products produced from amorphous silicon (a-Si), cadmium telluride (CdTe), or copper indium gallium selenide (CIGS).
>
> Also excluded from the scope of this investigation are {CSPV} cells, not exceeding 10,000 mm^2 in surface area, that are permanently integrated into a consumer good whose function is other than power generation and that consumes the electricity generated by the integrated {CSPV} cell. Where more than one cell is permanently integrated into a consumer good, the surface area for purposes of this exclusion shall be the total combined surface area of all cells that are integrated into the consumer good.
>
> Modules, laminates, and panels produced in a third-country from cells produced in the PRC are covered by this investigation; however, modules laminates, and panels produced in the PRC from cells produced in a third-country are not covered by this investigation.[25] [26]

CSPV cells typically measure 5 by 5 inches or 6 by 6 inches, have an output of 3 to 4.5 watts, and have a positive layer, a negative layer, and a positive-negative junction ("p/n junction").[27] CSPV cells use either monocrystalline silicon or multicrystalline silicon to convert sunlight into electricity.[28]

In order to achieve the desired wattage and power requirements, manufacturers solder cells together in strings and then lay them in a rectangular matrix on ***.[29] Ordinarily, manufacturers

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Torrington, 747 F. Supp. at 748-52 (affirming the Commission's determination defining six like products in investigations in which Commerce found five classes or kinds).

[25] For convenience and Customs purposes, Commerce noted that the merchandise covered by these investigations is currently classified in the Harmonized Tariff System of the United States ("HTSUS") under subheadings 8501.61.0000, 8507.20.80, 8541.40.6020 and 8541.40.6030, although it emphasized that the written description of the scope is dispositive. 77 Fed. Reg. 63,791 (Oct. 17, 2012); 77 Fed. Reg. 63,788 (Oct. 17, 2012).

[26] In its final definition, Commerce resolved the uncertainty about the scope that existed at the time of the Commission's preliminary determinations by providing that the scope includes CSPV modules made in a third country from CSPV cells manufactured in China but does not include CSPV modules made in China from CSPV cells manufactured in third countries. The scope then, as now, includes CSPV cells manufactured in China and CSPV modules made in China using CSPV cells manufactured in China. USITC Pub. 4295 at 20; CR at I-8 to I-10; PR at I-7 to I-8; 77 Fed. Reg. 63791, 63792-93 (Oct. 17, 2012) (final AD determination); 77 Fed. Reg. 63788, 63790 (Oct. 17, 2012) (final CVD determination) .

[27] CR at I-11; PR at I-9.

[28] Monocrystalline cells are made from a single grown crystal, have a single crystal lattice, and tend to have a higher conversion efficiency than multicrystalline cells, which have a random crystal structure, a variable crystal lattice pattern, and a lower conversion efficiency. CR at I-12; PR at I-10; CR/PR at Table I-1. Conversion efficiency is the percent of sunlight that is converted to electricity. CR at I-12 n.24; PR at I-10 n.24.

strengthen and waterproof the product by adding a sealant such as ethyl vinyl acetate ("EVA") and then a back sheet before laminating the cells in a vacuum and curing the product.[30] The "laminate" is then attached to a frame, and a junction box is mounted on the back.[31] The resulting CSPV modules (also referred to as panels) route electricity generated by the interconnected cells to the junction box.[32] Some manufacturers use CSPV cells to make building-integrated photovoltaics, which are building materials that incorporate solar cells, such as solar shingles or solar windows.[33]

CSPV modules are the main component of solar CSPV systems that use crystalline silicon to convert sunlight into electricity either for on-site use or for distribution through the electric grid.[34] The other components of solar CSPV system installations, referred to as the balance of system ("BOS"), are items such as the inverter and the racking on which the system is installed as well as the labor costs, permitting fees, and other expenses associated with installing a photovoltaic ("PV") system.[35] CSPV modules may be used in on- and off-grid applications for residential, non-residential, and utility purposes in ground- or roof-mounted systems.[36]

C. Definitions in the Preliminary Investigations and Party Arguments

Based on the record in the preliminary investigations, the Commission defined a single domestic like product, CSPV cells and modules (collectively "CSPV products"), that is coextensive with the scope of the investigations.[37] In so doing, the Commission considered whether to treat CSPV cells and CSPV modules as separate domestic like products, and it considered whether to define "off-grid" CSPV modules as a separate domestic like product. No party had advocated in favor of finding any of these items to be separate domestic like products, and the Commission found no basis on that record to do so.[38] In these final investigations, no party disagrees with, and the record continues to support, the Commission's findings on these two issues from its preliminary determinations.[39] Consequently, we do not treat CSPV cells and CSPV modules as separate domestic like products, nor do we define "off-grid" CSPV modules as a separate domestic like product.

In the preliminary investigations, the CCCME Respondents asked to define the domestic like product more broadly than the scope to include thin-film products, which Petitioner opposed. Based on that record, the Commission did not include thin-film products in the domestic like product, but stated it would revisit this issue after concluding this was "a close question" at the time.[40]

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[29] CR at I-23; PR at I-19.

[30] CR at I-23; PR at I-19.

[31] CR at I-23; PR at I-19.

[32] The junction box can be attached to other modules, an inverter (which converts the direct current generated by the system to alternating current), or, in the case of off-grid modules, a charge controller (which controls battery charging) and battery. CR at I-11; PR at I-9.

[33] CR at I-12; PR at I-10.

[34] CR at I-10; PR at I-9.

[35] CR at I-14 & n.32; PR at I-12 & n.32.

[36] CR at I-10, I-14; PR at I-9, I-12.

[37] USITC Pub. 4295 at 5-12.

[38] USITC Pub. 4295 at 10-12.

[39] USITC Pub. 4295 at 10-11; CR at I-11 to I-18, I-22 to I-23, III-4, V-1; PR at I-9 to I-15, I-18 to I-19, III-3, V-1; CR/PR at Table III-5 (indicating that nearly all CSPV cells are dedicated to produce CSPV modules, that both cells and modules share the same primary physical characteristics and are sold for integration into PV solar systems that convert sunlight into electricity, that cells represent a substantial portion of the cost and value of finished modules, and that cells undergo only one major manufacturing step to become modules); USITC Pub. 4295 at 11-12; CR at I-13 n.26; PR at I-11 n.26 (finding no "off-grid" module production in the United States and that the most similar domestically produced article is grid-connected CSPV cells and modules).

[40] USITC Pub. 4295 at 7-10.

In the final investigations, the CCCME Respondents again ask the Commission to define a single domestic like product that includes CSPV cells and CSPV modules as well as thin-film photovoltaic products ("thin-film products").[41] Based on the Commission's usual six-factor analysis, they argue that CSPV and thin-film products are part of the same domestic like product.[42] Petitioner SolarWorld contends that the Commission should define a single domestic like product consisting of CSPV cells and modules and not including thin-film products.[43]

[41] CCCME Respondents' Preh'g Brief at 4-18; see also LDK's Posth'g Brief at 1-2 (agreeing that thin-film products should be included in the domestic like product). In their prehearing brief, the CCCME Respondents rely heavily on the Commission's domestic like product discussion in Liquid Crystal Display Television Receivers from Japan ("LCD TVs"), Inv. No. 751-TA-14 (Changed Circumstances Review), USITC Pub. 2042 (Dec. 1987), in support of the notion that the Commission considers products as a whole and makes its like-product determinations based on the overall functionality of the items. Commission determinations, however, are sui generis, particularly in proceedings involving entirely different products. E.g., Nucor Corp. v. United States, 414 F.3d 1331, 1340 (Fed. Cir. 2005); Ugine-Savoie Imphy v. United States, 248 F. Supp. 2d 1208, 1220 (Ct. Int'l Trade 2002). Not only did LCD TVs involve a different product, LCD TVs had a different posture and different factual predicates than the current investigations.

[42] The CCCME Respondents argue that CSPV and thin-film products each consist of laminated photovoltaic layers, although thin-film products require less silicon. They note that both products are fitted with junction boxes, connected through inverters, and then combined with BOS equipment for mounting on the ground or roof. They acknowledge that thin-film products convert sunlight into electricity at a lower efficiency range per square meter than multi- and mono-crystalline CSPV products, but they argue that thin-film products work more efficiently in hot-weather conditions and during periods of lower sunlight. In commercial reality, both technologies compete directly to serve large-utility, commercial, and residential-rooftop applications, and both are sold directly to large utilities and through wholesalers and distributors for commercial and residential applications. Whereas one technology may not be used as a "drop-in substitute" for the other and the two technologies would not be mixed within a particular project, the CCCME Respondents argue that both are interchangeable and compete with one another for new solar projects and for government subsidies. They contend that according to industry publications, marketing brochures, annual reports, and questionnaire data, customers and producers perceive both technologies to be competitors, particularly for utility applications, although they admit there is at most minimal overlap in terms of production facilities, processes, and employees. They argue that CSPV and thin-film products are both priced in dollars/kilowatt and that CSPV solar systems compete on a price basis with thin-film solar systems, even if thin-film components tend to be less expensive than CSPV components in a system and thin-film systems cost more to install to achieve the same energy output as CSPV systems. They argue that the price differential for the two systems has declined since 2009 as polysilicon prices dropped. CCCME Respondents' Preh'g Brief at 4-18.

[43] In terms of physical differences, SolarWorld asserts that thin-film products consist of an unbroken layer of photovoltaic material applied directly to a substrate, whereas CSPV modules are made by stringing together CSPV cells. Due to differences in their underlying raw materials and production processes, SolarWorld notes that thin-film products typically measured 2 by 4 feet between 2009 and 2011 and had an average rated power of 75 to 80 watts, whereas typical CSPV modules measured 3 by 6 feet and had a much higher wattage and better efficiency. SolarWorld argues that such differences affect usage and limit the interchangeability of thin-film and CSPV products. It argues that thin-film products' lower efficiencies limit their use to environments with high temperatures and/or without space constraints, largely restricting them to utility applications, a segment that SolarWorld claims accounted for a relatively limited portion of U.S. installations in the first quarter of 2012. SolarWorld contends that competition within the utility segment is further limited because thin-film products tend to be sold through bilateral negotiations whereas CSPV products tend to be sold through reverse auctions. SolarWorld argues that consumers and producers perceive thin-film products to be a different technology than CSPV products. SolarWorld asserts that no U.S. manufacturer produces both thin-film and CSPV products using the same manufacturing facilities, processes, or employees and that the manufacturing process for CSPV products is more complex. SolarWorld argues that thin-film products cost less to produce, have lower efficiencies, and are generally lower-priced on a per-watt basis; it claims that the higher BOS costs associated with thin-film products lessen the disparity between thin-film and CSPV systems. Petitioner's Preh'g Brief at 8-14 & Exhibit 8; Petitioner's Posth'g Brief at Exh. 15.

D. Analysis and Conclusion

Based on the current record, we again define a single domestic like product consisting of CSPV cells and CSPV modules but not including thin-film products.

Physical Characteristics and Uses. CSPV and thin-film products each are produced in a range of physical characteristics and each has a range of operational capabilities. There are significant differences in physical characteristics and capabilities between CSPV and thin-film products that are related to differences in their underlying raw materials and production processes. Typical on-grid CSPV modules consist of a 34- to 62-pound framed glass laminate that measures 62 to 78 inches long, 32 to 39 inches wide, and 1.2 to 2 inches thick and that is comprised of 60 to 72 cells.[44] Off-grid CSPV modules are often smaller.[45] Thin-film modules consist of a glass or flexible substrate such as stainless steel or plastic with a surface layer of amorphous silicon ("a-Si"), cadmium telluride ("CdTe"), and/or copper indium (gallium) (di)selenide ("CIGS").[46] Thin-film modules generally have smaller dimensions and in particular are thinner.[47] They tend to weigh less, and the variety of substrates used to make thin-film modules provides more flexibility and a broader range of possible sizes, including some that are considerably longer than on-grid CSPV modules.[48]

Typical on-grid CSPV modules have a power output of 120 to more than 400 watts.[49] Off-grid CSPV modules usually have an output lower than 200 watts, sometimes using fewer cells than on-grid modules, and sometimes divided cells, to achieve that output.[50] Thin-film products generally range from 60 to 350 watts, although their output varies depending on the substrate used and the module's size.[51]

For CSPV modules, conversion efficiencies vary somewhat depending on the type of module.[52] Overall, thin-film products tend to have a considerably lower conversion rate, despite the fact that thin-film products are able to generate power in low-light conditions.[53]

In terms of end uses, CSPV products convert sunlight into electricity for use on-site or for distribution through the grid; CSPV modules route electricity generated by the interconnected cells to the junction box, which can be attached to other modules, an inverter, or, in the case of off-grid modules, a charge controller and battery.[54] Thin-film products also convert sunlight into electricity for use on-site or for distribution through the electric grid.[55] Some CSPV cells are used for building-integrated photovoltaics such as solar shingles or solar windows, and thin-film products are also sometimes used in

[44] CR at I-11 to I-12; PR at I-9 to I-10.

[45] CR at I-13 to I-14; PR at I-11 to I-12.

[46] CR at I-25; PR at I-20.

[47] CR at I-25 to I-26; PR at I-20 to I-21.

[48] A typical CdTe thin-film module weighs between 26.5 and 28.7 pounds and measures 47 inches long, 24 inches wide, and 0.27 to 0.32 inches thick; Sharp's multi-injunction A-Si and mc-Si on glass thin-film module weighs about 42 pounds and measures 56 inches long, 40 inches wide, and 1.8 inches thick. One of United Solar's thin-film products weighed either 8.5 or 16.2 pounds and was available in lengths of 109.1 or 213.1 inches, width of 14.7 inches, and thickness of 0.12 inches. CR at I-25 to I-26; PR at I-20 to I-21.

[49] CR at I-11 to I-12; PR at I-9 to I-10.

[50] CR at I-13 to I-14; PR at I-11 to I-12.

[51] For example, typical CdTe thin-film modules have an output ranging from 65 to 88 watts, whereas one of United Solar's CIGS thin-film products was available with a power output of 68 watts (for the shorter module) or 136 or 144 watts (for the longer version). CR at I-25 to I-26; PR at I-20 to I-21.

[52] CR/PR at Table I-1 (indicating that *** percent of monocrystalline modules had a conversion efficiency of *** percent in 2012, whereas *** percent of multicrystalline modules had a conversion efficiency of less than *** percent in 2012); CCCME Respondents' Prehearing Brief at 35-36.

[53] CR at I-26 to I-27; PR at I-20 to I-22; CR/PR at Table I-2 (showing a-Si thin-film conversion efficiencies of 4 to 8 percent in 2010, 10 to 11 percent for CdTe thin-film modules, 7 to 12 percent for CIGS thin-film modules, and 7 to 9 percent for multijunction amorphous silicon and monocrystalline silicon thin-film products).

[54] CR at I-11; PR at I-9.

[55] CR at I-27; PR at I-22.

solar shingles.[56] Although Respondents argue that both CSPV and thin-film products convert sunlight into energy, this characteristic is also shared by other products.[57]

In their questionnaire responses, 9 of 19 U.S. producers of CSPV and/or thin-film products reported that the two products have different physical characteristics and uses, as did 21 of 49 responding importers.[58] In terms of physical differences, U.S. producers and importers pointed to thin-film products' thinness and lighter weight, the fact that CSPV modules are silicon-based whereas thin-film products are chemical-based, and differences between the two products in terms of sizes, proportion, voltage, conversion efficiency, and quality.[59] They reported that CSPV modules tend to be framed whereas thin-film modules tend to be frameless, meaning that CSPV modules are less flexible than thin-film modules.[60] Aesthetically, U.S. producers reported that CSPV modules have a more-defined cell pattern than thin-film products, which appear to be one large semiconductor.[61] Moreover, thin-film products are more suited to installation in larger quantities on flat roofs, on less-expensive land (deserts), or in projects without space restrictions that limit the number of modules to achieve a particular wattage.[62]

Manufacturing Facilities, Production Processes and Employees. The record showed no overlap in the manufacturing facilities, production processes, or employees used to produce CSPV and thin-film products.[63] Only *** reported producing both CSPV and thin-film products during the POI, but ***.[64]

Other record data confirm differences in the manufacturing facilities, production processes, and employees. As indicated earlier, CSPV products are made from refined polysilicon that is formed into ingots, sliced into wafers, converted into cells, and then assembled into modules.[65] The cells in CSPV modules use either mono- or multi-crystalline silicon; when sunlight hits the modules, it knocks loose electrons that flow into the cells' thin metal "fingers" and conduct electricity to the busbars.[66] The CSPV cells are soldered together in strings and arranged in a rectangular matrix, sealed with an EVA sheet, joined to a back sheet, laminated, framed, and then mounted to a junction box.[67] In contrast, manufacturers generally make thin-film products by applying a layer of photosensitive material such as a-Si, CdTe, and/or CIGS to glass or to a flexible substrate such as stainless steel or plastic.[68] In their

[56] CR at I-12, I-26; PR at I-10.

[57] For example, concentrated solar power systems use reflected sunlight to generate steam or vapor that turns a turbine to generate electricity. CR at I-10 n.17; PR at I-9 n.17.

[58] CR at I-35; PR at I-28.

[59] CR/PR at Appendix E.a.

[60] CR/PR at Appendix E.a.

[61] CR/PR at Appendix E.a.

[62] CR/PR at Appendix E.a.

[63] CR at I-34; PR at I-28 (identifying leading U.S. thin-film producers as First Solar (240 MW), MiaSole (60 MW), United Solar (50 MW), Abound Solar (40 MW), and Solyndra (40 MW), of which the latter three have filed for bankruptcy); CR/PR at Table I-3 to I-4 (listing thin-film manufacturers); CR/PR at Tables III-1 to III-4 (listing CSPV cell and CSPV module manufacturers). The CCCME Respondents argue that, when the supply of polysilicon was limited, Suntech "experimented with thin-film module production." CCCME Respondents' Preh'g Brief at 16. The record, however, suggests that this experiment did not occur in the United States or during January 2009 to June 2012 (the period of investigation or "the POI"). Id. at Exh. 10.

[64] ***. CR/PR at Table I-3 n.2. ***. *** accounted for ***. CR/PR at Table I-3, Table I-4 n.2.

[65] CR at I-18; PR at I-15.

[66] CR at I-10 to I-12; PR at I-9 to I-10.

[67] CR at I-23; PR at I-18 to I-19.

[68] CR at I-25; PR at I-20; CCCME Respondents' Preh'g Brief at 32 (noting thin-film CIGS production by Solyndra, Missole, Global Solar, a-Si thin-film production by United Solar, and CdTe thin-film production by First Solar). In general, the photosensitive material is layered onto the substrate using physical-vapor, chemical-vapor, or electrochemical deposition, or some combination thereof, although the process varied somewhat by producer. For CdTe modules on glass, Abound Solar used a continuous, automated process that entered a new piece of glass into production every 10 seconds and produced a complete module in about 2 hours. First Solar made CdTe modules by applying a layer of cadmium sulfide then a layer of cadmium telluride, creating interconnected cells using lasers, then adding busbars, an inter-laminate material, and a rear piece of glass, then laminating the module and adding a

questionnaire responses, 18 of 19 U.S. producers of CSPV and/or thin-film products reported that the two products use different manufacturing facilities, production processes, and employees, as did 37 of 49 responding importers.[69]

Channels of Distribution. In their questionnaire responses, 12 of 19 U.S. producers of CSPV and/or thin-film products reported that the two products share the same channels of distribution, as did 34 of 49 responding importers.[70] CSPV modules used in residential grid-connected systems are typically installed on the roof and connected to an inverter (either central inverter or individual module micro-inverters) to provide electricity for the individual home or feed energy back into the grid when solar generation exceeds home use; typical residential installations were 5.7 kilowatts ("KW") in 2011.[71] CSPV modules are also used in non-residential systems installed on commercial, industrial, government, or similar buildings; these installations are typically larger and have been increasing in size (about 81 KW in 2010 and about 43 percent higher a year later), but they function similarly to residential installations.[72] CSPV modules also may be used in utility solar systems that averaged more than 1,450 KW per installation in 2010; these systems are generally ground-mounted, use central inverters rather than micro-inverters, and provide electricity directly to the grid for sale to customers rather than for on-site use.[73] Additionally, CSPV modules may be used in off-grid applications such as water-pumping and purification systems, street lights, emergency phones, homes in remote locations, telecommunications systems, and military applications.[74] Thin-film modules also may be used in residential, non-residential, and utility on-grid as well as off-grid applications.[75]

According to questionnaire data, between 2009 and 2011, the majority of U.S.-manufactured CSPV modules were sold to commercial installers; in the first half of 2012, a majority of shipments were to distributors. A smaller but growing share of CSPV products were sold to residential installers and to utility co/developers throughout the POI.[76] In 2011, shipments of thin-film modules to the residential, non-residential, and utility segments totaled 35 MW, 50 MW, and 86 MW, respectively.[77] In its questionnaire response, *** reported that "CSPV modules are used more commonly in the space- and weight-constrained commercial and residential market segments than thin-film modules (thus requiring different distribution channels), while thin-film modules are used more commonly in the utility-scale market (and are thus dependent on the distribution channels serving that market)."[78]

Interchangeability. In their questionnaire responses, 11 of 19 U.S. producers of CSPV and/or thin-film products reported that the two products are not interchangeable, as did 27 of 49 responding

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junction box and wires. For flexible substrate modules, producers use a roll-to-roll manufacturing process by unrolling the plastic or stainless steel substrate as photosensitive material is deposited on the roll. In some cases, a more manual assembly process is used as the roll is cut into individual cells that are interconnected and then laminated to form the module. CR at I-28 to I-29; PR at I-23.

[69] CR at I-36; PR at I-29.

[70] CR at I-38; PR at I-30; CR/PR at App. E.d.

[71] CR at I-14; PR at I-12. A kilowatt equals 1,000 watts, whereas a megawatt equals 1,000 kilowatts or 1 million watts, and a gigawatt equals 1,000 megawatts, 1 million kilowatts, or 1 billion watts.

[72] CR at I-15; PR at I-12 to I-13.

[73] CR at I-16; PR at I-13.

[74] CR at I-17; PR at I-14.

[75] Flexible a-Si and CIGS thin-film modules tend to be used in residential and non-residential applications, particularly the building-integrated market and on rooftops that are unable to hold much weight. CdTe modules on glass are primarily sold for non-residential and utility applications. CIGS modules are used in all on- as well as off-grid uses. CR at I-27 to I-28; PR at I-22 to I-23.

[76] CR/PR at Table II-1. CSPV shipments to the residential segment in 2011 totaled 715 MW compared to 1,346 MW for non-residential shipments and 631 MW for utility shipments. CR/PR at Figure II-1. As discussed below, however, questionnaire data understate CSPV shipments to the utility segment ***. Petitioner's Posth'g Brief at Exh. 3, Attachment 3-A.

[77] CR at I-27; PR at I-22.

[78] CR/PR at App. E.d.

importers.[79] At the design phase, CSPV products may be interchangeable with thin-film products, depending on the project.[80] Nonetheless, thin-film products have different balance of system requirements than CSPV products.[81] Moreover, due to their lower conversion efficiencies and lower wattage output, thin-film products need more surface area to generate the same energy as CSPV modules, making thin-film products somewhat more attractive for projects in environments with high temperatures and significant amounts of sunlight. Thin-film products also may be more suitable for utility as opposed to residential and smaller non-residential applications, except for those projects needing a lighter product for mounting on a lower-strength roof or a more flexible product.[82] Several firms reported that for most projects in the eastern United States, where land is more expensive and less available, CSPV products are more suitable.[83]

Producer and Customer Perceptions. In their questionnaire responses, 11 of 19 U.S. producers of CSPV and/or thin-film products and 23 of 49 responding importers reported that their customers perceive the products to have different physical characteristics, flexibility, efficiency, power outage, space requirements, bankability,[84] environmental concerns, climate suitability, performance characteristics, reliability, durability, and established nature.[85] Respondents argue that First Solar, the world's largest thin-film producer, identified CSPV producers among its main competitors in its 2010 annual report.[86] As SolarWorld points out, ***, reported that thin-film products are a different technology than CSPV products.[87] Although a number of purchasers considered both products for their purchases, many reported that they considered either CSPV or thin-film products but not both.[88]

Price. In their questionnaire responses, 12 of 19 U.S. producers of CSPV and/or thin-film products reported that CSPV products are generally priced higher than thin-film products, as did 35 of 49 responding importers.[89] Several reported that the price differential between CSPV products and thin-film products narrowed during the POI, with the decline in polysilicon prices as well as the influx of lower-priced imports of CSPV products from China.[90]

Conclusion. As noted above, in the preliminary determinations, the Commission did not define the domestic like product to include thin-film products. In these final investigations, we have had the opportunity to survey domestic producers, importers, and purchasers on this issue. Based on the current record, we again conclude that thin-film products should not be included in the same domestic like product as CSPV cells and CSPV modules. The record demonstrates a number of differences between CSPV and thin-film products. Specifically, the two products are manufactured using different raw materials, manufacturing facilities, manufacturing processes, and production employees. Differences

[79] CR at I-37; PR at I-29.

[80] CR/PR at App. E.b.

[81] CR/PR at App. E.b.

[82] CR at I-36 to I-37; PR at I-29 to I-30; CR/PR at App. E.b; Sun Edison's Postconference Brief at 9-10 (admitting thin-film products are not used as prevalently in residential and non-residential rooftops, but identifying some examples where they have been used for such applications). *** reported that it does not accept thin-film products for ground-mount projects due to low efficiency, *** reported that thin-film products are less expensive but produce insufficient power for residential applications, and *** reported that thin-film products used to be cost-competitive in 2009 but are now more expensive even when factoring in the cost of racking the CSPV modules. CR at II-23; PR at II-16 to II-17.

[83] CR at II-23; PR at II-17.

[84] According to the CCCME Respondents, bankability encompasses both the financial viability of a supplier and the product's performance reliability, especially in the CSPV industry where manufacturers provide 25-year product warranties. CCCME Respondents' Preh'g Brief at 44-45; CCCME Respondents' Posth'g Brief at Exh. 4.

[85] CR at I-38; PR at I-30; CR/PR at Appendix E.e.

[86] CCCME Respondents' Preh'g Brief at 15.

[87] Petitioner's Preh'g Brief at 13.

[88] CR at II-23; PR at II-17.

[89] CR at I-39; PR at I-31; CR/PR at Appendix E.f.

[90] CR/PR at App. E.f.

between the two products in terms of chemical composition, weight, size, conversion efficiency, output, inherent properties, and other factors limit their interchangeability after the design phase and in specific projects, and they also limit overlap in distribution channels, particularly for non-utility sales. A number of market participants reported viewing CSPV and thin-film products as sometimes competitive, but generally different products; they reported CSPV products to be generally higher-priced than thin-film products. On balance, we find that the differences between CSPV and thin-film products are more significant than their similarities in today's evolving marketplace and weigh in favor of a finding of a single domestic like product consisting of the CSPV products within the scope of the investigations.

III. DOMESTIC INDUSTRY

A. Legal Standards

The domestic industry is defined as the domestic "producers as a whole of a domestic like product, or those producers whose collective output of a domestic like product constitutes a major proportion of the total domestic production of the product."[91] In defining the domestic industry, the Commission's general practice has been to include in the industry producers of all domestic production of the like product, whether toll-produced, captively consumed, or sold in the domestic merchant market.

In these final investigations, two firms reported data on their U.S. CSPV cell production operations,[92] and 14 reported data on their U.S. CSPV module production operations.[93] There are two domestic industry issues: (1) whether firms that assemble CSPV cells into CSPV modules engage in sufficient production-related activities to be included in the domestic industry as producers, and (2) whether it is appropriate to exclude any producer of the domestic like product from the domestic industry as a related party pursuant to 19 U.S.C. § 1677(4)(B).

B. Sufficient Production-Related Activities

In deciding whether a firm qualifies as a domestic producer of the domestic like product, the Commission generally analyzes the overall nature of a firm's U.S. production-related activities, although production-related activity at minimum levels could be insufficient to constitute domestic production.[94] In the preliminary investigations, Petitioner argued that U.S. firms that assembled CSPV cells into CSPV modules engaged in sufficient production-related activities to be considered part of the domestic industry.[95] Respondents did not raise any arguments regarding this issue.[96] In its preliminary

[91] 19 U.S.C. § 1677(4)(A).

[92] CR at I-3; PR at I-3; CR/PR at Table III-1 (identifying Petitioner SolarWorld and Suniva, Inc. ("Suniva")).

[93] The 14 firms submitting questionnaire data on their U.S. CSPV module operations in these final investigations include: Advanced Solar Photonics ("ASP"); GE Energy (USA), LLC ("GE"); Helios; Kyocera Solar, Inc. ("Kyocera"); Mage Solar Products, Inc. ("Mage"); Motech Americas LLC ("Motech"); MX Solar USA LLC ("MX Solar"); Schott Solar PV, Inc. ("Schott"); Sharp Manufacturing Co. of America ("Sharp"); Silicon Energy, LLC ("Silicon Energy"); SolarWorld; Solon Corp. ("Solon"); Suniva; and Suntech Arizona, Inc. ("Suntech"). CR at I-3; PR at I-3; CR/PR at Table III-1.

[94] The Commission generally considers six factors: (1) source and extent of the firm's capital investment; (2) technical expertise involved in U.S. production activities; (3) value added to the product in the United States; (4) employment levels; (5) quantity and type of parts sourced in the United States; and (6) any other costs and activities in the United States directly leading to production of the like product. No single factor is determinative and the Commission may consider any other factors it deems relevant in light of the specific facts of any investigation. Diamond Sawblades and Parts Thereof from China and Korea, Invs. Nos. 731-TA-1092 to 1093 (Final), USITC Pub. 3862 at 8-11 (Jul. 2006).

[95] USITC Pub. 4295 at 12, 14.

[96] USITC Pub. 4295 at 12-17.

determinations, the Commission found that U.S. firms assembling CSPV cells into modules engage in sufficient production-related activities to include these firms in the domestic industry.[97]

In these final investigations, no party objects to including module assemblers in the domestic industry.[98] Based on the final record, module operations involve not-insubstantial capital expenditures, ongoing research and development ("R&D") expenses, some automation and technical expertise, and higher employment levels, albeit generally less technically skilled workers than for CSPV cell production.[99] CSPV module operations provide lower value-added than CSPV cell manufacturing but still provide meaningful value-added; although a relatively large portion of U.S.-made CSPV modules used CSPV cells imported from non-subject or subject sources, the majority were made from domestically produced CSPV cells by the end of the POI.[100] On balance, absent contrary argument, we again find that U.S. firms assembling CSPV cells into modules engage in sufficient production-related activities to include these firms in the domestic industry (and thus to treat their finished products as shipments of the domestic like product).

C. Related Party Issues

We must determine whether any producer of the domestic like product should be excluded from the domestic industry pursuant to 19 U.S.C. § 1677(4)(B). Section 1677(4)(B) of the Tariff Act allows the Commission, if appropriate circumstances exist, to exclude from the domestic industry producers that are related to an exporter or importer of subject merchandise or which are themselves importers.[101] Exclusion of such a producer is within the Commission's discretion based upon the facts presented in each investigation.[102]

In the preliminary investigations, Petitioner argued that appropriate circumstances existed to exclude four firms (Evergreen, Suntech, Motech, and Wanxiang) from the domestic industry as related parties.[103] Respondents did not raise any arguments regarding this issue.[104] In its preliminary

[97] USITC Pub. 4295 at 17.

[98] Petitioner's Preh'g Brief at 14-18.

[99] U.S. firms generally made lower annual capital expenditures for CSPV module operations than for CSPV cell operations, but CSPV module manufacturing nonetheless is capital-intensive, accounting for $*** to $*** of capital expenditures between 2009 and 2011 compared to $*** to $*** for CSPV cell manufacturing. CR/PR at Table VI-7. Some firms utilize more automation in their module assembly operations than other CSPV module assemblers, but in general, module assembly accounts for a greater portion of overall labor in the production of the domestic like product, whereas CSPV cell production tends to involve more skilled technicians and employees with advanced degrees and fewer manual laborers than module operations. CR at I-20 to I-23; PR at I-16 to I-19; CR/PR at Tables C-1, C-7, C-8, VI-7.

[100] As a percent of total cost of goods sold ("COGS"), the overall weighted-average cost to convert the relevant CSPV raw material costs into modules (direct labor and overheard) was 24.7 percent; value-added ranged from 18.4 percent in full-year 2011 and interim 2011 to 34.4 percent in 2009. The decline in value added, at least in part, reflects improvements in manufacturing efficiency and reduction in relative overhead costs. CR/PR at Table VI-2 at n.2. The percentage of domestically manufactured cells used to produce CSPV modules increased from *** percent in 2009 to *** percent in 2011, but a substantial share of the cells originated in non-subject countries (and to a much smaller degree China). CR/PR at Table C-1. On a weighted-average basis, purchased CSPV cells accounted for approximately *** percent of the total raw material of CSPV modules, whereas CSPV cells internally produced by integrated domestic producers accounted for approximately *** percent of total module raw material costs. CR at VI-19; PR at VI-7; CR/PR at Table VI-2.

[101] 19 U.S.C. § 1677(4)(B).

[102] See Torrington Co. v. United States, 790 F. Supp. at 1168; Sandvik AB v. United States, 721 F. Supp. 1322, 1331-32 (Ct. Int'l Trade 1989), aff'd mem., 904 F.2d 46 (Fed. Cir. 1990); Empire Plow Co. v. United States, 675 F. Supp. 1348, 1352 (Ct. Int'l Trade 1987).

[103] USITC Pub. 4295 at 12, 14.

[104] USITC Pub. 4295 at 12-17.

determinations, the Commission considered whether to exclude nine domestic producers that qualified as related parties. It concluded that the issue was moot with respect to ***, both of which reported importing subject merchandise after the period for which data were collected. The Commission also concluded that another firm, ***, was ineligible for inclusion in the industry because the firm had not reported any U.S. production of the domestic like product.[105] The Commission did not find appropriate circumstances to exclude ***, Evergreen, ***, ***, SunTech, or Motech from the domestic industry as related parties, but indicated it would revisit this issue in any final investigations.[106]

In these final investigations, Petitioner argues that two U.S. producers, Suntech and Motech, import subject merchandise from their affiliates in China and asks the Commission to exclude both from the domestic industry as related parties based on the claim that these firms' interests do not principally lie in domestic production.[107] The CCCME Respondents disagree, arguing that Suntech's primary interest is in domestic production, as shown by its $10 million investment in the Arizona facility, receipt of $3 million in government incentives, creation of 100 new manufacturing jobs, and ***.[108] They assert that Suntech imported CSPV cells in order to produce and sell modules in the United States.[109] The CCCME Respondents argue that ***.[110] We now examine whether appropriate circumstances exist to exclude Suntech and/or Motech from the domestic industry.[111] [112]

Suntech. Suntech is a wholly owned subsidiary of Suntech Power Holdings Co. of California, which in turn is a wholly owned subsidiary of Suntech Power Holdings Co., Ltd. of China. Suntech Power Holdings Co., Ltd. has four wholly owned subsidiaries that produce/export subject CSPV cells and

[105] USITC Pub. 4295 at 14.
[106] USITC Pub. 4295 at 14-17.
[107] Petitioner's Preh'g Brief at 18-22; Petitioner's Posth'g Brief at Exh. 18 at 3.
[108] CCCME Respondents' Preh'g Brief at 18-21.
[109] CCCME Respondents' Preh'g Brief at 19.
[110] CCCME Respondents' Preh'g Brief at 20-21.
[111] Commissioner Pinkert does not rely upon related parties' financial performance as a factor in determining whether there are appropriate circumstances to exclude them from the domestic industry in these investigations. The record is not sufficient to infer from their profitability on U.S. operations whether they have derived a specific benefit from their status as related parties. See Allied Mineral Products v. United States, 28 CIT 1861, 1865-67 (2004).
[112] *** other producers may be subject to exclusion from the domestic industry as related parties, although Petitioner SolarWorld did not argue in favor of excluding them. We conclude that appropriate circumstances do not exist to exclude any of them from the domestic industry as related parties.

*** assemblers of CSPV modules that qualify as related parties by virtue of their imports of subject merchandise. *** ratio of subject imports to domestic production, whereas ***. *** invested in capital expenditures on its U.S. production operations, although *** incurring R&D expenses for these facilities. The record does not show that these firms benefitted from their imports of subject merchandise. Moreover, *** accounted for a relatively small share of U.S. production during the POI, and we do not find that including or excluding these firms would skew the domestic industry's performance. CR/PR at Tables III-1, III-2, III-3, III-8, VI-4, VI-7.

*** is ***. *** is an assembler of CSPV modules but does not manufacture any CSPV cells in the United States. *** accounted for *** percent of reported U.S. production of CSPV modules in 2011. *** reported sourcing the cells used in its U.S. module operations from ***. *** the petitions in these investigations. The volume of its subject imports was ***. ***. In terms of capital expenditures, ***. CR/PR at Tables III-1, III-2, III-3, III-8, VI-4, VI-7. On balance, given the size of the firm's operations and available evidence on other factors, we do not find appropriate circumstances exist to exclude *** from the domestic industry.

*** assembler of CSPV modules. *** accounted for *** percent of reported U.S. production of CSPV modules in 2011. *** the petitions in these investigations. *** is a related party by virtue of its imports. The volume of its subject imports was ***. Its financial performance ***. Moreover, *** capital expenditures and incurred *** R&D expenses for its U.S. facility. CR/PR at Tables III-1, III-2, III-3, III-8, VI-4, VI-7. Consequently, we do not find appropriate circumstances to exclude *** from the domestic industry as a related party.

CSPV modules in China: Wuxi Suntech Power Co., Ltd.; Wuxi Sun-Shine Power Co., Ltd.; Luoyang Suntech Power Co., Ltd.; and Suntech Power Co., Ltd.. Suntech does not manufacture CSPV cells in the United States but is an assembler of CSPV modules.[113]

Suntech commenced U.S. production of CSPV modules in October 2010 and accounted for *** percent of reported U.S. CSPV module production in 2011.[114] Suntech *** the petitions in these investigations.[115] Suntech reported sourcing the cells used in its U.S. CSPV module operations from ***.[116] The ratio of Suntech's total subject imports from China to its domestic production (based on kilowatts) was *** percent in 2009, *** percent in 2010, *** percent in 2011, *** percent in the first six months of 2011 ("interim 2011"), and *** percent in the first six months of 2012 ("interim 2012").[117] Suntech's ratio of operating income to net sales was ***.[118] [119] ***, its operating performance was *** the industry average ***.[120] Suntech invested $***.[121]

Suntech is a related party both by virtue of its imports of subject merchandise and because its corporate grandparent also wholly owns four subsidiaries in China that produce/export subject merchandise to the United States, meaning that Suntech Power Holdings Co., Ltd. of China has a controlling interest in both domestic producer Suntech and four producers/exporters of subject merchandise. Suntech *** the petitions in these investigations. As evidence that its interests lie more with importing than with domestic production, its subject imports were ***. In addition, the firm ***. Moreover, Suntech's financial performance ***. Although the firm invested ***. For these reasons, we find appropriate circumstances exist to exclude Suntech from the domestic industry pursuant to the related party provision of the Tariff Act.[122]

Motech: Motech is a wholly owned subsidiary of Motech Industries Co., Ltd. of Taiwan, which also wholly owns a producer of subject merchandise in China, Motech Suzhou New Energy.[123] In

[113] CR/PR at Table III-1.

[114] CR/PR at Table III-1 & n.12.

[115] CR/PR at Table III-1.

[116] CR/PR at Table III-2, Table III-8 ***.

[117] Suntech's CSPV module production was *** in 2009, *** KW in 2010, *** KW in 2011, *** KW in interim 2011, and *** KW in interim 2012. Suntech's subject CSPV cell imports were *** KW in 2009, *** KW in 2010, *** KW in 2011, *** KW in interim 2011, and *** KW in interim 2012. Suntech's CSPV module imports were *** KW in 2009, *** KW in 2010, *** KW in 2011, *** KW in interim 2011, and *** KW in interim 2012. CR/PR at Table III-8.

[118] CR/PR at Table VI-4.

[119] Consistent with her practice in past investigations and reviews, Commissioner Shara L. Aranoff does not rely on individual-company operating income margins, which reflect a domestic producer's financial operations related to production of the domestic like product, in assessing whether a related party has benefitted from importation of subject merchandise. Rather, she determines whether to exclude a related party based principally on its ratio of subject imports to domestic production and whether its primary interests lie in domestic production or importation.

[120] CR/PR at Table VI-4.

[121] CR/PR at Table VI-7.

[122] Commissioner Meredith Broadbent notes that, although she joins in the decision to exclude Suntech from the domestic industry as a related party, the record shows that Suntech was a significant producer of CSPV modules during the period (accounting for *** percent of domestic production in 2011), that it made significant investments in its U.S. production facility when the facility started up in 2010 (Suntech invested *** in the facility in 2010), and that Suntech employs a relatively significant number of employees in the United States. Nonetheless, because Suntech imported *** during the period of investigation, she believes that Suntech's primary focus during the period was on its importation activities rather than its U.S. production efforts, warranting its exclusion from the domestic industry. She notes that this decision did not have a significant impact on her injury and causation analysis determination because exclusion of the company from the industry did not significantly change the trends in the industry's overall condition during the period of investigation.

[123] CR/PR at Table III-1 & n.6.

January 2010, Motech acquired GE's Delaware CSPV module manufacturing facility.[124] Motech does not manufacture CSPV cells in the United States but is an assembler of CSPV modules.[125]

Motech accounted for *** percent of reported U.S. CSPV module production in 2011.[126] Motech *** the petitions in these investigations.[127] Motech reported sourcing the cells used in its U.S. CSPV module operations from ***.[128] As a ratio to domestic production, its total subject imports from China were *** percent in 2009, *** percent in 2010, *** percent in 2011, *** percent in interim 2011, and *** percent in interim 2012.[129] *** ratio of operating income to net sales was ***.[130] Its operating performance was *** the industry average ***.[131] In terms of capital expenditures, Motech invested $***.[132]

Although Petitioner argues otherwise, we do not find appropriate circumstances exist to exclude Motech from the domestic industry. Motech is a related party by virtue of its imports of subject merchandise and because it is wholly owned by the same firm that wholly owns a subject producer/ exporter in China, meaning that the parent firm has a controlling interest in both domestic producer Motech and a subject producer/exporter. Motech *** the petitions in these investigations. Its total subject imports were ***. Nevertheless, Motech's ***, supporting our conclusion that the firm's primary interest is in domestic production. It is not apparent from its financial performance ***. On balance, in light of these factors and ***, we do not find it appropriate to exclude Motech from the domestic industry as a related party.

D. Conclusion

Consequently, based on our definition of the domestic like product and our analysis of sufficient production-related activities and related party issues, we define the domestic industry as all U.S. producers of CSPV cells and modules, except for Suntech.

III. MATERIAL INJURY BY REASON OF SUBJECT IMPORTS

A. Legal Standards

In final antidumping and countervailing duty investigations, the Commission determines whether an industry in the United States is materially injured or threatened with material injury by reason of the imports under investigation.[133] In making this determination, the Commission must consider the volume of subject imports, their effect on prices for the domestic like product, and their impact on domestic producers of the domestic like product, but only in the context of U.S. production operations.[134] The

[124] CR/PR at Table III-1 n.3.
[125] CR/PR at Table III-1.
[126] CR/PR at Table III-1 & n.12.
[127] CR/PR at Table III-1.
[128] CR/PR at Table III-2.
[129] Motech's U.S. CSPV module production was *** KW in 2009, *** KW in 2010, *** KW in 2011, *** KW in interim 2011, and *** KW in interim 2012. Motech's subject CSPV cell imports were *** KW in 2009, *** KW in 2010, *** KW in 2011, *** KW in interim 2011, and *** KW in interim 2012. Motech's subject CSPV module imports were *** KW in 2009, *** KW in 2010, *** KW in 2011, *** KW in interim 2011, and *** KW in interim 2012. CR/PR at Table III-8.
[130] CR/PR at Table VI-4.
[131] CR/PR at Table VI-4.
[132] CR/PR at Table VI-7.
[133] 19 U.S.C. §§ 1671d(b), 1673d(b).
[134] 19 U.S.C. § 1677(7)(B)(i). The Commission "may consider such other economic factors as are relevant to the determination" but shall "identify each {such} factor ... and explain in full its relevance to the determination." 19 U.S.C. § 1677(7)(B).

statute defines "material injury" as "harm which is not inconsequential, immaterial, or unimportant."[135] In assessing whether the domestic industry is materially injured by reason of subject imports, we consider all relevant economic factors that bear on the state of the industry in the United States.[136] No single factor is dispositive, and all relevant factors are considered "within the context of the business cycle and conditions of competition that are distinctive to the affected industry."[137]

Although the statute requires the Commission to determine whether the domestic industry is "materially injured by reason of" unfairly traded imports,[138] it does not define the phrase "by reason of," indicating that this aspect of the injury analysis is left to the Commission's reasonable exercise of its discretion.[139] In identifying a causal link, if any, between subject imports and material injury to the domestic industry, the Commission examines the facts of record that relate to the significance of the volume and price effects of the subject imports and any impact of those imports on the condition of the domestic industry. This evaluation under the "by reason of" standard must ensure that subject imports are more than a minimal or tangential cause of injury and that there is a sufficient causal, not merely a temporal, nexus between subject imports and material injury.[140]

In many investigations, there are other economic factors at work, some or all of which may also be having adverse effects on the domestic industry. Such economic factors might include non-subject imports; changes in technology, demand, or consumer tastes; competition among domestic producers; or management decisions by domestic producers. The legislative history explains that the Commission must examine factors other than subject imports to ensure that it is not attributing injury from other factors to the subject imports, thereby inflating an otherwise tangential cause of injury into one that satisfies the statutory material injury threshold.[141] In performing its examination, however, the Commission need not isolate the injury caused by other factors from injury caused by unfairly traded imports.[142] Nor does the

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[135] 19 U.S.C. § 1677(7)(A).

[136] 19 U.S.C. § 1677(7)(C)(iii).

[137] 19 U.S.C. § 1677(7)(C)(iii).

[138] 19 U.S.C. §§ 1671d(a), 1673d(a).

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

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

[141] Statement of Administrative Action ("SAA") on Uruguay Round Agreements Act ("URAA"), H.R. Rep. 103-316, Vol. I at 851-52 (1994) ("{T}he Commission must examine other factors to ensure that it is not attributing injury from other sources to the subject imports."); S. Rep. 96-249 at 75 (1979) (the Commission "will consider information which indicates that harm is caused by factors other than less-than-fair-value imports."); H.R. Rep. 96-317 at 47 (1979) ("in examining the overall injury being experienced by a domestic industry, the ITC will take into account evidence presented to it which demonstrates that the harm attributed by the petitioner to the subsidized or dumped imports is attributable to such other factors;" those factors include "the volume and prices of nonsubsidized imports or imports sold at fair value, contraction in demand or changes in patterns of consumption, trade restrictive practices of and competition between the foreign and domestic producers, developments in technology and the export performance and productivity of the domestic industry"); accord Mittal Steel, 542 F.3d at 877.

[142] SAA at 851-52 ("{T}he Commission need not isolate the injury caused by other factors from injury caused by unfair imports."); Taiwan Semiconductor Industry Ass'n v. USITC, 266 F.3d 1339, 1345 (Fed. Cir. 2001) ("{T}he Commission need not isolate the injury caused by other factors from injury caused by unfair imports ... . Rather, the Commission must examine other factors to ensure that it is not attributing injury from other sources to the subject

"by reason of" standard require that unfairly traded imports be the "principal" cause of injury or contemplate that injury from unfairly traded imports be weighed against other factors, such as non-subject imports, which may be contributing to overall injury to an industry.[143] It is clear that the existence of injury caused by other factors does not compel a negative determination.[144]

Assessment of whether material injury to the domestic industry is "by reason of" subject imports "does not require the Commission to address the causation issue in any particular way" as long as "the injury to the domestic industry can reasonably be attributed to the subject imports" and the Commission "ensure{s} that it is not attributing injury from other sources to the subject imports."[145] [146] Indeed, the Federal Circuit has examined and affirmed various Commission methodologies and has disavowed "rigid adherence to a specific formula."[147]

The Federal Circuit's decisions in Gerald Metals, Bratsk, and Mittal Steel all involved cases where the relevant "other factor" was the presence in the market of significant volumes of price-competitive non-subject imports. The Commission interpreted the Federal Circuit's guidance in Bratsk as requiring it to apply a particular additional methodology following its finding of material injury in cases involving commodity products and a significant market presence of price-competitive non-subject imports.[148] The additional "replacement/benefit" test looked at whether non-subject imports might have replaced subject imports without any benefit to the U.S. industry. The Commission applied that specific

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imports." (emphasis in original)); Asociacion de Productores de Salmon y Trucha de Chile AG v. United States, 180 F. Supp. 2d 1360, 1375 (Ct. Int'l Trade 2002) ("{t}he Commission is not required to isolate the effects of subject imports from other factors contributing to injury" or make "bright-line distinctions" between the effects of subject imports and other causes.); see also Softwood Lumber from Canada, Invs. Nos. 701-TA-414 and 731-TA-928 (Remand), USITC Pub. 3658 at 100-01 (Dec. 2003) (Commission recognized that "{i}f an alleged other factor is found not to have or threaten to have injurious effects to the domestic industry, i.e., it is not an 'other causal factor,' then there is nothing to further examine regarding attribution to injury"), citing Gerald Metals, Inc. v. United States, 132 F.3d 716, 722 (Fed. Cir. 1997) (the statute "does not suggest that an importer of LTFV goods can escape countervailing duties by finding some tangential or minor cause unrelated to the LTFV goods that contributed to the harmful effects on domestic market prices.").

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

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

[145] Mittal Steel, 542 F.3d at 877-78; see also id. at 873 ("While the Commission may not enter an affirmative determination unless it finds that a domestic industry is materially injured 'by reason of' subject imports, the Commission is not required to follow a single methodology for making that determination ... {and has} broad discretion with respect to its choice of methodology.") citing United States Steel Group v. United States, 96 F.3d 1352, 1362 (Fed. Cir. 1996) and S. Rep. 96-249 at 75.

[146] Commissioner Pinkert does not join this paragraph or the following three paragraphs. He points out that the Federal Circuit, in Bratsk, 444 F.3d 1369, and Mittal, held that the Commission is required, in certain circumstances when considering present material injury, to undertake a particular kind of analysis of nonsubject imports, albeit without reliance upon presumptions or rigid formulas. Mittal explains as follows:

> What Bratsk held is that "where commodity products are at issue and fairly traded, price-competitive, nonsubject imports are in the market," the Commission would not fulfill its obligation to consider an important aspect of the problem if it failed to consider whether non-subject or non-LTFV imports would have replaced LTFV subject imports during the POI without a continuing benefit to the domestic industry. 444 F.3d at 1369. Under those circumstances, Bratsk requires the Commission to consider whether replacement of the LTFV subject imports might have occurred during the POI, and it requires the Commission to provide an explanation of its conclusion with respect to that factor.

542 F.3d at 878.

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

[148] Mittal Steel, 542 F.3d at 875-79.

additional test in subsequent cases, including the Carbon and Certain Alloy Steel Wire Rod from Trinidad and Tobago determination that underlies the Mittal Steel litigation.

Mittal Steel clarifies that the Commission's interpretation of Bratsk was too rigid and makes clear that the Federal Circuit does not require the Commission to apply an additional test nor any one specific methodology; instead, the court requires the Commission to have "evidence in the record" to "show that the harm occurred 'by reason of' the LTFV imports," and requires that the Commission not attribute injury from non-subject imports or other factors to subject imports.[149] Accordingly, we do not consider ourselves required to apply the replacement/benefit test that was included in Commission opinions subsequent to Bratsk.

The progression of Gerald Metals, Bratsk, and Mittal Steel clarifies that, in cases involving commodity products where price-competitive non-subject imports are a significant factor in the U.S. market, the Court will require the Commission to give full consideration, with adequate explanation, to non-attribution issues when it performs its causation analysis.[150]

The question of whether the material injury threshold for subject imports is satisfied notwithstanding any injury from other factors is factual, subject to review under the substantial evidence standard.[151] Congress has delegated this factual finding to the Commission because of the agency's institutional expertise in resolving injury issues.[152]

E. Data Sources and Data-Related Questions

1. Data Sources

The Commission's report in these final investigations quantifies imports from subject and non-subject countries using data from importer questionnaire responses rather than official import statistics on imports under the relevant U.S. tariff subheadings. No party contests this approach.[153]

We have chosen to use importer questionnaire data over the official import statistics used in the preliminary determinations for several reasons. First, unlike questionnaire responses, which segregated data for CSPV cells and CSPV modules, official import statistics may include some imports of out-of-scope thin-film products in addition to imports of subject CSPV cells and CSPV modules.[154] At the time of the preliminary determinations, Respondents reported no knowledge of significant U.S. exports of thin-

[149] Mittal Steel, 542 F.3d at 873 (quoting from Gerald Metals, 132 F.3d at 722), 875-79 & n.2 (recognizing the Commission's alternative interpretation of Bratsk as a reminder to conduct a non-attribution analysis).

[150] To that end, after the Federal Circuit issued its decision in Bratsk, the Commission began to present published information or send out information requests in final investigations to producers in non-subject countries that accounted for substantial shares of U.S. imports of subject merchandise (if, in fact, there were large non-subject import suppliers). In order to provide a more complete record for the Commission's causation analysis, these requests typically seek information on capacity, production, and shipments of the product under investigation in the major source countries that export to the United States. The Commission plans to continue utilizing published or requested information in final investigations in which there are substantial levels of non-subject imports.

[151] We provide in our respective discussions of volume, price effects, and impact a full analysis of other factors alleged to have caused any material injury experienced by the domestic industry.

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

[153] CR at I-4 n.7, IV-1 n.2, IV-6 nn.3-4; USITC Pub. 4295 at 21; PR at I-3 n.7, IV-1 n.2, IV-5 nn.3-4; Respondents' Postconference Brief at 30; Petitions, Vol. I at 15 n.28.

[154] CR at I-4 n.7, IV-1 n.2, IV-6 nn.3-4; USITC Pub. 4295 at 21; PR at I-3 n.7, IV-1 n.2, IV-5 nn.3-4; Respondents' Postconference Brief at 30; Petitions, Vol. I at 15 n.28.

film products from China, but the record indicated that imports from non-subject sources might include thin-film products.[155]

Second, as Respondents argued in the preliminary investigations, official import statistics measure imports of modules in terms of units and define modules as "solar cells assembled into modules or panels." As a consequence, the reported units for official import statistics might refer to the number of modules and not the number of cells imported into the United States, such that summing imports of cells and imports of modules might not accurately yield the total volume of imported cells.[156] In the questionnaires issued in these final investigations, however, the Commission asked parties to report data in consistent units – kilowatts.[157]

Third, the definitions in the questionnaires that formed the basis for data collection in these final investigations were tailored to Commerce's revised scope language, which specified the country of origin of modules according to the country where the cells were manufactured. By contrast, official import statistics might not have classified imports consistently with the country-of-origin definitions identified in Commerce's scope.[158]

2. Data Coverage

The Commission's data in these final investigations reflect questionnaire responses from: (1) two firms that accounted for *** percent of U.S. CSPV cell production in 2011; [159] (2) 14 firms that accounted for *** percent of U.S. CSPV module production in 2011;[160] and (3) 49 firms that imported CSPV products from China or non-subject countries during the POI, with those importing from China accounting for 67.1 percent of total U.S. imports of CSPV products in 2011 by quantity.[161] Eighteen firms submitted foreign producer questionnaire responses and accounted for approximately *** percent of 2011 CSPV cell production in China and *** percent of 2011 CSPV module production in China.[162] The Commission received 53 questionnaire responses from firms that purchased CSPV cells and modules during the POI. Of the 48 firms providing useable purchase data, four reported cell purchases totaling $31.4 million (29,103 KW);[163] forty-five reported module purchases totaling $623.0 million (524,413 KW) in 2011.[164]

[155] CR at I-4 n.7, IV-1 n.2, IV-6 nn.3-4; USITC Pub. 4295 at 21; PR at I-3 n.7, IV-1 n.2, IV-5 nn.3-4; Respondents' Postconference Brief at 30; Petitions, Vol. I at 15 n.28.

[156] CR at I-4 n.7, IV-1 n.2, IV-6 nn.3-4; USITC Pub. 4295 at 21; PR at I-3 n.7, IV-1 n.2, IV-5 nn.3-4; Respondents' Postconference Brief at 30; Petitions, Vol. I at 15 n.28.

[157] CR at I-4 n.7, IV-1 n.2, IV-6 nn.3-4; USITC Pub. 4295 at 21; PR at I-3 n.7, IV-1 n.2, IV-5 nn.3-4; Respondents' Postconference Brief at 30; Petitions, Vol. I at 15 n.28.

[158] CR at I-4 n.7, I-7 to I-10, IV-1 n.2, IV-6 nn.3-4; PR at I-3 n.7, I-6 to I-9, IV-5 nn.3-4; USITC Pub. 4295 at 21; Respondents' Postconference Brief at 30; Petitions, Vol. I at 15 n.28.

[159] CR at I-3; PR at I-3; CR/PR at Table III-1.

[160] CR at I-3, PR at I-3; CR/PR at Table III-1.

[161] CR at I-3; PR at I-3.

[162] CR at VII-2 & n.3; PR at VII-2 & n.3.

[163] The largest cell purchaser was *** of 2011 cell purchases by quantity. The other three cell purchasers were *** of 2011 cell purchases by quantity, *** of 2011 cell purchases by quantity, and *** of 2011 cell purchases by quantity. CR at II-7 to II-8; PR at II-5 to II-6.

[164] CR at II-7; PR at II-5. The largest module purchaser was *** of 2011 module purchases by quantity. The second largest module purchaser was ***. Other notable module purchasers were ***, each accounting for approximately *** of 2011 module purchases by quantity, respectively. Twenty-seven purchasers reported that they were commercial installers; 17 residential installers; 14 utility company/developers; 14 distributors of modules; 4 module manufacturers; 3 end users; 1 engineering, procurement, and construction (EPC) contractor; 1 reseller; and two purchasers reported manufacturing off-grid products. CR at II-8; PR at II-6.

3. Negligible Imports

During the most-recent 12-month period prior to the filing of the petitions for which data were collected (full-year 2010), subject imports from China constituted 57.1 percent of total imports of CSPV products, by kilowatts.[165] Because this figure exceeds the 3 percent statutory negligibility threshold, we find that U.S. imports of CSPV products from subject producers in China are not negligible under 19 U.S.C. § 1677(24).

B. Conditions of Competition and Business Cycle[166]

The following conditions of competition inform our analysis in these final investigations.

1. Demand Conditions and Business Cycle in the U.S. Market

CSPV cells are used to make CSPV modules, and CSPV modules are used in solar power systems that generate electricity from sunlight.[167] Demand for CSPV products is derived from the demand for solar electricity, which is affected by factors such as total energy consumption, environmental concerns, cost competitiveness with traditional energy sources, and the availability of Federal, state, and local incentives, as discussed below.[168]

a. Conventional and Renewable Sources of Electricity

Electricity demand in the United States is supplied by conventional sources, such as coal and natural gas, as well as renewable sources such as solar, wind, geothermal, and biomass.[169] Renewable sources of solar energy include CSPV modules, thin-film, and concentrated solar power systems.[170]

Electricity providers using renewable energy sources seek to achieve "grid parity" with other sources of electricity (the point at which the levelized cost of electricity generated from renewable

[165] CR/PR at Table IV-2.

[166] Based on our definition of the domestic like product, our decision to include firms assembling CSPV cells into modules in the domestic industry as domestic producers, and our decision to exclude Suntech from the domestic industry as a related party, we have relied on Table C-1 when considering the volume of CSPV cell imports and the financial and trade data for domestic producers of CSPV cells, but have relied on Table C-7 when analyzing the volume of CSPV module imports and the financial and trade data for domestic CSPV module producers.

When considering the overall picture of the domestic industry's financial condition, however, we have relied on Table C-8 that combines the financial data for CSPV cell and module operations, and when analyzing apparent U.S. consumption, market share, and trade data, we have relied on the data in Table C-7. By relying on Table C-7 for apparent U.S. consumption, we ensured that we did not double-count either CSPV cells manufactured in the United States (the vast majority of which are internally consumed to manufacture CSPV modules) or imported CSPV cells from subject and non-subject sources that are consumed in the United States to manufacture CSPV modules. Even though some U.S. module assemblers consume some CSPV cells imported from subject or non-subject sources to manufacture their CSPV modules, the consequence of finding that module assemblers engage in sufficient production-related activities to qualify as domestic producers is that their finished products are considered shipments of the domestic like product, not imports from the country where the cells were manufactured. CR at I-3 n.4; PR at I-3 n.4.

[167] CR at I-4, I-10; PR at I-3, I-9.

[168] CR at II-14; PR at II-1 to II-12; CCCME Respondents' Preh'g Brief at 31. Questionnaire respondents most frequently identified incentive programs and weather as factors affecting CSPV product business cycles, with most responding firms reporting that CSPV product demand generally declines in the winter due to difficulties installing systems on snowy or icy roofs in northern states. CR at II-16; PR at II-13.

[169] CR at II-21 to II-22; PR at II-17 to II-18.

[170] CR at I-10 n.17; PR at I-9 n.17.

sources equals the cost of conventional electricity from the grid).[171] The levelized cost of electricity varies by region, by time of the day, and by availability of other electricity sources.[172] During periods of non-peak electricity demand in the United States, only lowest-cost "baseload" generators (traditionally coal and nuclear plants) will be able to sell electricity to the grid, whereas during peak electricity demand periods, even generators with somewhat higher costs may be able to sell electricity into the transmission or distribution grid.[173] For peak periods, natural-gas generated electricity sets the levelized cost of electricity that CSPV solar systems and other renewable systems must seek to meet, especially for sales to the utility segment.[174]

During the POI, increases in the use of "fracking" technologies and shale drilling expanded the supply of natural gas in the United States.[175] This caused natural gas prices to decline and stimulated demand for natural gas-fueled electricity for peak periods at the expense of other electricity sources such as CSPV products.[176] Competition with renewable-energy electricity-generators such as thin-film solar systems also affects demand for CSPV solar systems and their components.[177] Declining polysilicon prices eroded the advantage thin-film products may have had over CSPV products in terms of price, but thin-film producers have continued to improve their efficiencies to stay competitive.[178]

b. Federal, State, and Local Government Incentives and Regulations

Changes in the availability and scope of Federal, state, and local government incentives and regulations played an important role in demand for CSPV products during the POI.[179] [180] In order to help make solar a viable alternative energy source, Federal, state, and local governments created programs intended to reduce the cost of solar-generated electricity (and electricity generated by other renewable energy sources). These programs use various means to stimulate demand for renewable-energy-powered electricity with the goal of assisting solar power developers to achieve sufficient economies of scale to become competitive with conventional energy sources.[181] These programs and their benefits were designed to decline over time, as the cost to generate solar-powered electricity declined.[182] During the POI, Federal, state, and local incentives successfully stimulated demand for CSPV products in the United

[171] CCCME Respondents' Preh'g Brief at 30-31, 42-44; CCCME Respondents' Posth'g Brief at 5-10, Exh. 2 at 3-12, Exh. 3 at 1-2. Levelized cost means the sum of all costs over the life of an energy system divided by the quantity of electricity that system would be expected to generate during the period the system is financed. Hearing Tr. at 165-66.

[172] CCCME Respondents' Posth'g Brief at 6-7, Exhs. 21-22.

[173] CCCME Respondents' Posth'g Brief at 6-7; Exhs. 21-22.

[174] CCCME Respondents' Posth'g Brief at Exh. 2 at 5-12; Hearing Tr. at 167.

[175] CCCME Respondents' Preh'g Brief at 42-44, 57; CCCME Respondents' Posth'g Brief at 8-10, Exh. 2 at 3-14, Exh. 22, Exh. 24.

[176] CCCME Respondents' Preh'g Brief at 42-44, 57; CCCME Respondents' Posth'g Brief at 8-10, Exh. 2 at 3-14, Exh. 22, Exh. 24.

[177] CCCME Respondents' Preh'g Brief at 40-41; CCCME Respondents' Posth'g Brief at 8, 10, Exh. 2 at 3-14.

[178] CCCME Respondents' Posth'g Brief at Exh. 2 at 11-12, Exh. 3 at 5-6.

[179] CCCME Respondents' Preh'g Brief at 21-27; CR at II-16 to II-18; PR at II-11 to II-12; CR/PR at Table II-4.

[180] Commissioner Pearson and Commissioner Broadbent note that the existence of these incentive programs in the U.S. and other global markets, such as those in the European Community, has likely caused a growth in demand for solar energy products that is significantly in excess of the growth that would have occurred absent the incentive programs. By putting in place these incentive programs, the United States, the European Community, and other nations have altered structural demand conditions that would otherwise have been in place in these markets and encouraged solar energy producers in other markets, including China, to increase their capacity to produce CSPV products beyond the level these markets would typically be expected to support.

[181] CCCME Respondents' Preh'g Brief at 21-27, 39-40; CCCME Respondents' Posth'g Brief at 11-12.

[182] CCCME Respondents' Posth'g Brief at 8, 11-12, Exh. 2 at 3-12, Exh. 5 at 1-2, 4-7; CCCME Respondents' Preh'g Brief at 22-27, 39-40.

States,[183] with industry publications reporting that Federal incentives caused an "application boom" and an "installation boom" of solar projects,[184] and questionnaire respondents also generally reporting that Federal, state, and local incentives increased demand for CSPV products since 2009.[185]

Federal Incentives: The Department of Energy has set targets for solar energy to provide 14 percent of U.S. electricity output by 2030 and 27 percent by 2050.[186] Consistent with these goals, during the POI, the United States had in place two major tax incentives that provided benefits to systems owners (as opposed to manufacturers of solar products): the Federal Investment Tax Credit ("FITC") and the Grant in Lieu of Tax Credit, also known as the Section 1603 Treasury Program ("GLTC").[187]

The FITC program was first established in 2005, continued in 2006, and was significantly extended under the Emergency Economic Stabilization Act of 2008 ("the EESA").[188] The earlier versions provided a 30-percent investment tax credit to commercial and residential customers installing solar energy systems, but did not extend the credit to public utilities.[189] In 2008, the EESA extended the 30-percent solar energy tax credit through December 31, 2016, after which the credit is expected to decline to 10 percent. The EESA also waived the public utility exemption, thereby allowing utilities to invest directly in solar facilities for the first time.[190] According to the CCCME Respondents, utilities immediately began proposing utility-owned solar programs to their regulators, but many experienced declining profits related to the economic recession and thus owed insufficient taxes to take advantage of the FITC.[191]

In 2009, to provide a more direct means for commercial solar property owners to finance solar projects in a struggling economy, Congress passed the GLTC program via Section 1603 of the American Recovery and Reinvestment Act.[192] The GLTC program provided 30-percent cash grants for commercial solar facilities that were (1) placed in service in 2009 or 2010, or (2) placed in service between January 1, 2010 and January 1, 2017, so long as construction began in 2009 or 2010.[193] At the end of December 2010, as the GLTC program was on the verge of expiring, Congress extended it, allowing applicants to receive cash grants so long as construction of the commercial solar facilities commenced by the end of December 2011 and finished by December 2016.[194] Consistent with the pendency of these Federal programs, demand for CSPV products increased in 2010 and in 2011, as discussed below.[195]

[183] Petitioner's Preh'g Brief at 22-23; CCCME Respondents' Preh'g Brief at 21-27, 39-40; CCCME Respondents' Posth'g Brief at 8-12, Exh. 2 at 3-12, Exh. 5 at 1-2, 4-7.

[184] CR at II-1, nn.5-6; PR at II-1, nn.5-6.

[185] CR/PR at Table II-6. Most producers (11 of 14), importers (36 of 46), and purchasers (27 of 44) reported that state and local government incentives increased demand since January 2009. CR at II-20; PR at II-14 to II-15; CR/PR at Table II-6. Responding firms most often identified the California Solar Initiative, the Solar Renewable Energy Credit program offered in New Jersey and Connecticut, Renewable Portfolio Standards, and various tax credits and rebates offered by state and local governments. Most producers (11 of 15), importers (37 of 49), and purchasers (34 of 45) reported that Federal government incentives increased demand (at least temporarily) since January 2009. CR at II-20; PR at II-14 to II-15; CR/PR at Table II-6.

[186] CCCME Respondents' Preh'g Brief at 23, Exh. 1 at 26.

[187] CR/PR at Table II-4; CCCME Respondents' Preh'g Brief at 23-25.

[188] CCCME Respondents' Preh'g Brief at 23-24 (citing The Energy Policy Act of 2005, P.L. 109-58; The Tax Relief and Health Care Act of 2006, P.L. 109-432; The Emergency Economic Stabilization Act of 2008, P.L. 110-343).

[189] CCCME Respondents' Preh'g Brief at 23-24.

[190] CCCME Respondents' Preh'g Brief at 23-24.

[191] CCCME Respondents' Preh'g Brief at 23-24.

[192] CCCME Respondents' Preh'g Brief at 24 (citing Pub. L. 111-5 (2009)).

[193] CCCME Respondents' Preh'g Brief at 24.

[194] CCCME Respondents' Preh'g Brief at 24; Petitioner's Posth'g Brief at Exh. 2 at 9.

[195] CR/PR at Table C-7.

Thereafter, Congress did not renew the GLTC program, although the FITC program remains in effect.[196] The CCCME Respondents argue that Congress is unlikely to renew the GLTC program, so in the absence of up-front Federal cash-grant financing for new commercial solar projects, they argue that demand will be lower unless manufacturers ensure that CSPV solar systems are economically viable without cash grants.[197]

State and Local Incentives: Thirty-six states, the District of Columbia, Puerto Rico, and some local governments encourage the use of solar and other renewable energy sources through various Renewable Portfolio Standards ("RPS") or renewable energy standards programs.[198] State and local incentives vary in scope and duration.[199] These programs generally require retail electricity suppliers to procure a minimum amount of renewable energy, such as wind and solar, usually as a percentage of their total energy generation by a given date, or suffer a non-compliance penalty.[200] Even though some states set RPS targets to increase renewable energy production, state regulatory commissions scrutinize public-utility purchases to ensure that rate payers receive the best electricity price.[201] Moreover, even state programs with specific mandates for renewable or solar energy do not specify which technology must be used to generate that electricity, meaning that if CSPV products are priced too high, there is no guarantee that they will be used, despite the existence of the mandates.[202]

c. Apparent U.S. Consumption Trends

Despite a severe downturn in macroeconomic conditions, the parties agree that demand for CSPV products grew at a very high rate during the POI. They attribute the increase to lower prices due to increased U.S. production and increased imports from China; Federal, state, and local government incentives (e.g., Federal tax credits and state RPS programs); increasing power rates and energy consumption; environmental concerns and the general movement toward "green energy" alternatives; cost competitiveness with traditional energy sources; increases in large-scale solar utility farms; improved technology; lower costs and higher efficiency; and increased availability of financing.[203] Based on the record in these final investigations, apparent U.S. consumption, as measured by the sum of U.S. shipments of the domestic like product and imports from subject and non-subject sources of CSPV products, increased from *** MW in 2009 to *** MW in 2010, and *** MW in 2011, and was *** MW in interim 2011 and *** MW in interim 2012.[204] The U.S. CSPV modules market was considerably larger than the U.S. market for CSPV cells.[205] In the future, demand for CSPV products is expected to continue to increase, but at a somewhat slower rate than it did over the POI.[206]

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[196] CCCME Respondents' Preh'g Brief at 23, 25.

[197] CCCME Respondents' Preh'g Brief at 25, 39-40.

[198] CR/PR at Table II-4; CCCME Respondents' Preh'g Brief at 25.

[199] CCCME Respondents' Preh'g Brief at 25-27. The CCCME Respondents argue that the California Solar Initiative was so successful that it achieved target production levels faster than anticipated, meaning that residential incentive rates declined from $2.80/watt in December 2006 to $0.20 to $0.35/watt currently, depending on the utility territory. Likewise, Arizona's up-front residential solar PV system installations program provided $2.50/watt in 2009 but only $0.20/watt currently. Id. at 27.

[200] A number of states allow utilities to demonstrate compliance by purchasing renewable-sourced electricity from independent power providers or by purchasing Renewable Energy Credits ("REC") from other solar-electricity power producers. Independent solar power generators sell RECs on the market to others in order to finance their own solar projects. CCCME Respondents' Preh'g Brief at 25-26, Exh. 13.

[201] CCCME Respondents' Preh'g Brief at 31 n.98, Exh. 13.

[202] CCCME Respondents' Posth'g Brief at 12.

[203] CR at II-19; PR at II-14.

[204] CR/PR at Table C-7.

[205] Compare CR/PR at Table C-7 (modules market) with CR/PR at Table C-1 (cells market).

[206] CCCME Respondents' Preh'g Brief at 21-31; Petitioner's Preh'g Brief at 24-25; Petitioner's Posth'g Brief at Exh. 7.

d. Market Segments

As discussed above, CSPV products are sold for on- and off-grid applications.[207] The three grid-connected market segments are for residential, non-residential, and utility applications.[208] Installation size varies by segment, with an average residential PV installation of 5.7 KW in 2010 and 2011, compared to 81 KW in 2010 and 116 KW in 2011 for non-residential installations, and more than 1,450 KW per utility installation in 2010.[209] According to questionnaire data, between January 2009 and June 2011, the largest share of U.S. commercial shipments (up to 45.3 percent) were to commercial installers, after which time the largest share (42.3 percent) were to utility co-developers. During the POI, a somewhat smaller share of CSPV modules were sold to distributors (14.6 to 35.3 percent) and to residential installers (12.4 to 18.5 percent).[210] The share of shipments from all sources to utility co-developers increased from 5.2 percent in 2009 to 12.3 percent in 2010, and 29.8 percent in 2011, and was 17.6 percent in interim 2011 and 42.3 percent in interim 2012, driven in large part by the availability of incentive programs.[211] After increasing 1,977.4 percent between 2009 and 2011, utilities are projected to account for 54 percent of total installations by the end of 2012.[212]

2. Supply Conditions in the U.S. Market

During the POI, the U.S. market was supplied by the domestic industry, subject imports, and imports from non-subject countries. The domestic industry's share of the U.S. market declined from *** percent in 2009 to *** percent in 2011; its share of the market was *** percent in interim 2011 and *** percent in interim 2012.[213] Subject imports from China rose from *** percent market share in 2009 to *** percent in 2011, while the market share of non-subject imports declined from *** percent in 2009 to *** percent in 2011; in interim 2011, subject imports' market share was *** percent compared to *** percent for non-subject imports, and by interim 2012, subject imports' share was *** percent, and non-subject imports' was *** percent.[214]

As discussed above, two domestic producers reported data on their CSPV cell operations, and 14 reported data on their CSPV module operations.[215] During a time of very significant demand growth in

[207] Off-grid uses include water-pumping and purification systems, street lights, emergency phones, remotely located homes, telecommunication systems, and military applications. CR at I-14, I-17; PR at I-12, I-14.

[208] CR at I-14; PR at I-11.

[209] CR at I-14 to I-16; PR at I-13. Large-scale solar projects such as those involved in the utility segment can take years of planning before the project has been completed. Petitioner's Posth'g Brief at Exh. 3 at 17. Utility-scale projects often involve a bidding process. CR at II-1 at n.4; PR at II-1 n.4. Respondents reported that for utility projects, ***. Id. (citing CCCME Respondents' Posth'g Brief, Exh. 2 at 15).

[210] CR/PR at Table II-1. Shipments of CSPV products to the residential segment in 2011 totaled 715 MW compared to 1,346 MW for non-residential shipments and 631 MW for utility shipments. CR/PR at Figure II-1. As discussed below, however, questionnaire data understate CSPV product shipments to the utility segment, ***. Petitioner's Posth'g Brief at Exh. 3, Attachment 3-A.

[211] CR/PR at Table II-1; CR at II-3; PR at II-2 to II-3.

[212] CR at II-3 to II-4; PR at II-2 to II-3.

[213] CR/PR at Table C-7.

[214] CR/PR at Table C-7. Eighteen questionnaire respondents reported an increase in supply in the U.S. market. Seven firms attributed this increase in supply to an increased presence in the U.S. market of CSPV products made in China, and three firms noted a decrease in European demand as a driver for increased U.S. supply. CR at II-17; PR at II-12. Several responding firms also identified an increase in U.S. production as driving down prices in the U.S. market resulting in changes in conditions of competition. Id.

[215] CR at III-1; PR at III-1; CR/PR at Table III-1. In these final investigations, cell producers SolarWorld and Suniva provided data on their operations. ***, cell producers Evergreen, Calisolar, and SPI ***, but Evergreen declared bankruptcy and no longer produces CSPV cells in the United States. CR at I-3 n.6, VI-1 n.1; PR at I-3 n.6, VI-1 n.1. Calisolar, after a reorganization, no longer produces CSPV cells in the United States but is now known as

the U.S. market,[216] a number of firms began manufacturing CSPV cells and/or CSPV modules in the United States. At the same time, a substantial number of domestic producers also shuttered facilities and/or declared bankruptcy.[217] Petitioner reported that additional producers continued to fail even after the end of the POI.[218] During the POI, SolarWorld was the dominant domestic producer of both CSPV cells and CSPV modules.[219] The domestic industry supplied the U.S. market with both mono- and multi-crystalline modules in a range of wattages and sizes (including, 60-, 72-, and 96-cells), as did importers of subject merchandise from China.[220]

The industry in China was by far the largest global producer of CSPV cells, and individual producers in China ranked among the largest of all global CSPV cell producers.[221] The industry in China accounted for *** percent of global solar module production in 2011 (a figure that includes non-subject thin-film products), and firms in China ranked among the largest module producers in the world.[222] Collectively, subject producers in China had substantial capacity and substantial unused capacity throughout the POI, and they continued to increase their capacity and unused capacity throughout this time. The largest CSPV product manufacturers in China reported large capacity and large unused capacity as well.[223] Capacity to manufacture CSPV products in China far exceeded the relatively small but growing size of the market for CSPV products in China (2,200 MW of PV installations or 7.4 percent of global PV installations in 2011).[224]

CSPV cells and modules imported from non-subject sources were present in the U.S. market throughout the POI.[225] Non-subject sources supplying CSPV cells to the U.S. market included Taiwan, Korea, Japan, and Germany, whereas non-subject sources supplying the U.S. market with CSPV modules included Taiwan, Korea, Mexico, Canada, Singapore, and Japan.[226]

The domestic industry participated in all segments of the U.S. market (including the residential, non-residential, and utilities segments), as did imports from subject and non-subject sources.[227] Moreover, as discussed below, the domestic industry supplied a variety of modules to purchasers in the market, including mono- and multi-crystalline modules, lower- and higher-wattage CSPV modules, as

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Silicor Materials, a producer of silicon used in the solar industry. SPI, or a portion of it, appears to have been liquidated since the preliminary investigations. CR at I-3 n.6; PR at I-3 n.6. Additionally, GE sold its CSPV facility to Motech. CR/PR at Table III-3.

[216] CR/PR at Table C-7.

[217] CR/PR at Tables III-1, III-3 to III-4; CR at III-4 at n.4, VI-1 at nn.1-2; PR at VI-1 at nn.1-2; Petitioner's Preh'g Brief at 65-69; CCCME Respondents' Postconf. Brief at 29; Petitioner's Postconf. Brief at 25-28, Exh. 1 at 49-53; Petition, Vol. I at 35-37.

[218] Petitioner's Preh'g Brief at 30-32.

[219] CR/PR at Table III-1.

[220] Petitioner's Posth'g Brief at Exh. 3, 5, 6; Hearing Tr. at 27 (Brinser), 33-34 (Kilkelly), 38-39 (Ostrenga), 85-86 (Ferda), 88-89 (Ostrenga), 89 (Brinser), 110 (Ferda), 141 (Brightbill), 147-50 (Brinser, Brightbill, Kilkelly, Ostrenga), 155-56 (Brinser, Brightbill), 187 (King), 298-99 (Beebe); CR at II-6; PR at II-3 to II-4; CR/PR at Table I-1, II-2; CCCME Respondents' Preh'g Brief at 37 n.127.

[221] CR/PR at Table VII-11 (indicating that the industry in China increased its share of global CSPV cell production from 45.1 percent in 2009 to 53.4 percent in 2010 and 64.0 percent in 2011, whereas no other industry accounted for more than 14 percent during this period).

[222] CR at VII-21; PR at VI-16.

[223] CR at VII-2 to VII-13; CR/PR at Tables VII-1 to VII-5.

[224] CR at VII-2 to VII-13, VII-18 to VI-22; CR/PR at Tables VII-1 to VII-5, VII-11, Figures VII-2, VII-3.

[225] CR/PR at Table C-7.

[226] CR at II-13 to II-14; PR at II-10.

[227] CR/PR at Table II-1, Figure II-2; CR at II-5 n.17; PR at II-3 n.17; Hearing Tr. at 216-17. Questionnaire data understate the domestic industry's market share in the utility segment because ***. CR at II-5 n.17; PR at II-3 n.17.

well as 60-, 72-, and even 96-cell CSPV modules.[228] Furthermore, industry participants in all market segments purchased CSPV modules of varying types, meaning that products of particular wattage or cell-type or size were not limited to specific segments of the U.S. market.[229] For example, the Commission collected pricing information on five pricing products that encompassed CSPV modules with peak-power wattage of 200 to above 280 watts.[230] Both the domestic industry and importers of subject merchandise from China reported selling all five products to the residential, non-residential, and utilities segments of the U.S. market. Purchasers in the utility segment reported purchasing both lower- and higher-wattage products.[231] Additionally, Respondents reported that thin-film products, which generally have lower wattage and less efficiency, also competed for sales, including to the utility segment.[232]

3. Substitutability

Both the domestic industry and importers of subject merchandise reported nationwide sales of CSPV products.[233] Their sales were primarily concentrated in the Northeast and on the Pacific Coast, which is consistent with GTM Research data that highlighted California, New Jersey, Massachusetts, and Hawaii as states with high installation rates.[234]

Purchasers reported considering a variety of factors when purchasing CSPV cells and modules.[235] At least two-thirds of the responding 53 purchasers identified the following as "very important" factors: price (51 firms); quality meets industry standards (48); availability (45); reliability of supply (42); product consistency (41); warranty (38); bankability (35), and delivery time (34).[236] Purchasers cited price most frequently as the most important purchase factor (21 firms), and reported quality most frequently as the second-most important factor (19 firms).[237]

Most importers (25 of 42) and purchasers (26 of 45) reported that differences other than price were "sometimes" important in comparing products made in the United States and China.[238] The most commonly identified factor other than price was "bankability."[239] One U.S. producer (***) reported that producers in China were seen as more "bankable" because of ease of access to credit from "state-owned"

[228] Petitioner's Posth'g Brief at Exh. 3, 5, 6; Hearing Tr. at 27 (Brinser), 33 (Kilkelly), 38-39 (Ostrenga), 85-86 (Ferda), 88-89 (Ostrenga), 89 (Brinser), 110 (Ferda), 141 (Brightbill), 147-50 (Brinser, Brightbill, Kilkelly, Ostrenga), 155-56 (Brinser, Brightbill); Notes from Commission's Field Trips.

[229] CR/PR at Table II-2; Petitioner's Posth'g Brief at Exh. 3, 5, 6; Hearing Tr. at 141, 147-50 (Brinser, Ostrenga, Kilkelly, Brightbill).

[230] CR at II-6, V-7; PR at II-4, V-5; CR/PR at Table II-2.

[231] CR at II-6; PR at II-4; CR/PR at Table II-2; Petitioner's Posth'g Brief at Exh. 5.

[232] Hearing Tr. at 298-99 (Beebe).

[233] CR at II-8; PR at II-6; CR/PR at Table II-3.

[234] CR at II-8 to II-9; PR at II-6.

[235] CR at II-27; PR at II-19 to II-20.

[236] CR at II-29 to II-33; PR at II-19 to II-24; CR/PR at Table II-11.

[237] CR at II-27; PR at II-20; CR/PR at Table II-10.

[238] CR at II-40; PR at II-29; CR/PR at Table II-15.

[239] CR at II-40; PR at II-29; CR/PR at Table II-15. For purposes of these investigations, we understand "bankability" to refer to the perceived stability of a CSPV manufacturer's finances and technology, such that the producer can be expected to meet warranty commitments for the useful life of the products, which averages 25 years. CR at II-30 to II-31; PR at II-22; Petitioners' Posth'g Brief at Exh. 12; CCCME Respondents' Posth'g Brief at Exh. 4; Hearing Tr. at 106-107, 110-14, 221, 224-29. Bankability matters not only to those financing utility-scale electric power projects but also to firms that finance residential installations, whereby a third party pays for, installs, and maintains the solar system in exchange for a fee the homeowner pays for the electricity generated. CCCME Respondents' Posth'g Brief at 14-19; Hearing Tr. at 221, 224-29. When designing or considering a new project, purchasers also consider factors such as customer demands, space constraints, and the product's heat index, light quality, and innovativeness. CCCME Respondents' Preh'g Brief at 13; CCCME Respondents' Posth'g Brief at Exh. 4.

banks, low risk of bankruptcy, and ability to fulfill warranties. Another producer (***) reported that U.S. purchasers pay attention to the likelihood of a manufacturer remaining a "going concern" for the life of the 25-year warranty.[240] At the hearing, witnesses for Respondents reported that the major CSPV product manufacturers in the United States and China qualified as "bankable" suppliers.[241]

In addition to bankability, other identified factors besides price include quality, reliability, technical support, and warranty.[242] Almost all responding purchasers reported that CSPV products made in the United States and China at least "usually" meet minimum quality specifications.[243] Moreover, 12 of 13 responding producers, 37 of 45 responding importers, and 37 of 42 responding purchasers reported that products made in the United States and China are "always" or "frequently" interchangeable.[244] When comparing the two sources, most responding purchasers reported that the U.S. product was comparable to product made in China for all characteristics except for price, for which the product from China was rated as superior (e.g., lower-priced).[245] Consequently, based on this record, we find a high degree of substitutability between CSPV products made in the United States and imported from China.[246]

4. Other Factors

Polysilicon is a key raw material used in the production of CSPV products.[247] According to questionnaire responses and other record evidence, in 2003, the global supply of polysilicon was inadequate to meet global demand by the semiconductor industry and particularly the CSPV industry, so spot prices of polysilicon rose from $35/kg in 2003 to a high of $500/kg in 2008 (and contract prices rose from $25/kg to $85/kg in this period). By 2008, global supply exceeded global demand, and polysilicon spot and contract prices then fell substantially to an estimated $35/kg by 2012.[248] Petitioner reported *** for silver paste used in CSPV cell production and aluminum frames used in CSPV module production, ***.[249] During the POI, commodity prices of silver and aluminum increased by *** percent and *** percent, respectively.[250]

C. Volume of Subject Imports

Section 771(7)(C)(i) of the Tariff Act provides that the "Commission shall consider whether the volume of imports of the merchandise, or any increase in that volume, either in absolute terms or relative to production or consumption in the United States, is significant."[251]

As discussed above, U.S. demand for CSPV products experienced a very high rate of growth between January 2009 and June 2012, although growth in apparent U.S. consumption slowed somewhat toward the end of the POI.[252] U.S. shipments of subject imports overtook the domestic industry's U.S.

[240] CR at II-40; PR at II-29; CR/PR at Table II-15.
[241] Hearing Tr. at 224, 297-98.
[242] CR at II-40; PR at II-29; CR/PR at Table II-15.
[243] CR at II-41; PR at II-30; CR/PR at Table II-16.
[244] CR at II-39; PR at II-28; CR/PR at Table II-14.
[245] CR at II-36; PR at II-26; CR/PR at Table II-13.
[246] CR at II-26; PR at II-19.
[247] Reportedly, polysilicon accounts for approximately one-quarter of the cost to manufacture CSPV modules. CR at V-1 n.3; PR at V-1 n.3.
[248] CR at II-16, V-1 to V-4; PR at II-11 to II-12, V-1 to V-3; CR/PR at Figures V-1 to V-2; CCCME Respondents' Preh'g Brief at 38-39, Exh. 26; CCCME Respondents' Posth'g Brief at 8, 12-13; Petitioner's Preh'g Brief at 36-37; Petitioner's Posth'g Brief at Exh. 14..
[249] CR at V-1; PR at V-1.
[250] CR at V-1; PR at V-1.
[251] 19 U.S.C. § 1677(7)(C)(i).
[252] Apparent U.S. consumption, by quantity, increased from *** MW in 2009 to *** MW in 2010, and *** MW in 2011, and was *** MW in interim 2011 and *** MW in interim 2012. CR/PR at Table C-7.

shipments as of 2010.[253] Indeed, the volume of U.S. shipments of subject imports increased substantially faster than the explosive growth in apparent U.S. consumption throughout the POI, with subject imports' growth of *** percent between 2009 and 2011 being more than double the very significant *** percent growth of apparent U.S. consumption during this period.[254]

As demand increased overall between 2009 and 2011, subject imports from China steadily increased their market share by *** percentage points, and their market share in interim 2012 was *** percentage points higher than in interim 2011.[255] Most of subject imports' increase in market share came at the domestic industry's expense, with the domestic industry losing *** percentage points of market share between 2009 and 2011, and losing an additional *** percentage points between interim 2011 and interim 2012.[256]

Subject imports from China maintained such a substantial and growing presence in the U.S. market because, as discussed above, they were highly substitutable for the domestic like product and competed in the same geographic markets and same U.S. market segments as the domestic industry.[257] The domestic industry also lost market share to subject imports in each of the major U.S. market segments (residential, non-residential, and utility).[258]

The substantial and increasing presence of subject imports in the U.S. market during the POI is also apparent when U.S. shipments of subject imports from China are considered relative to U.S. production.[259] Despite numerous closures of U.S. manufacturing facilities, the domestic industry progressively increased capacity and had available production capacity throughout the POI, indicating that it was capable of supplying additional demand.[260] Nonetheless, the ratio of subject imports to domestic production grew significantly over the period, increasing from *** percent in 2008 to ***percent in 2011, and *** percent in interim 2012.[261] Although Respondents argued that purchasers and groups financing purchases of solar systems limited purchases and financing to those firms considered "bankable," as even Respondents conceded at the hearing, domestic producers as well as

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[253] U.S. shipments of subject imports increased from *** MW in 2009 to *** MW in 2010, and *** MW in 2011, and were *** MW in interim 2011 and *** MW in interim 2012. The domestic industry's U.S. shipments increased from *** MW in 2009 to *** MW in 2010, and *** MW in 2011, and were *** MW in interim 2011 and *** MW in interim 2012. CR/PR at Table C-7.

[254] CR/PR at Table C-7. U.S. shipments of subject imports increased *** percent between 2009 and 2010, *** percent between 2010 and 2011, and were *** percent higher in interim 2012 than in interim 2011. By contrast, apparent U.S. consumption increased *** percent between 2009 and 2010, *** percent between 2010 and 2011, and was *** percent higher in interim 2012 than in interim 2011. Id.

[255] U.S. shipments of subject CSPV products imported from China steadily increased their share of apparent U.S. consumption from *** percent in 2009 to *** percent in 2010 and *** percent in 2011, and their market share was *** percent in interim 2011 and *** percent in interim 2012. CR/PR at Table C-7.

[256] Non-subject imports lost *** percentage points of market share between 2009 and 2011, although their market share was *** percentage points higher in interim 2012 compared to interim 2011 (which slightly exceeded subject imports' increase of *** percentage points between interim periods). CR/PR at Table C-7.

[257] CR at II-6, II-8 to II-9; PR at II-4 to II-6, II-3 n.17; CR/PR at Table II-1, II-2, Figure II-2.

[258] CR/PR at Figure II-2. As noted above, questionnaire data understate the domestic industry's presence in the utility market. CR at II-5 n.17; PR at II-3 n.17; Petitioner's Posth'g Brief at Exh. 3 (reporting how SolarWorld sells both directly and indirectly to the utility segment and identifying special products developed by SolarWorld specifically for the utility segment). Growing faster than any other segment, the utility segment grew from the smallest segment of the U.S. market in 2009 to the largest by interim 2012. CR/PR at Table II-1, Figure II-2. Although the domestic industry increased its U.S. shipments to the utility segment, any growth in its shipments to this segment pales in comparison to the growth of subject imports. Subject imports were the predominant source of CSPV modules in the utility segment during the POI. CR/PR at Figures II-1 to II-2; CR at II-4 to II-5; PR at II-3.

[259] The ratio of U.S. shipments of subject imports to domestic production was *** percent in 2009, *** percent in 2010, *** percent in 2011, *** percent in interim 2011 and *** percent in interim 2012. Derived from CR/PR at Table C-7.

[260] CR/PR at Table C-7; Hearing Tr. at 121-22, 153-56.

[261] CR/PR at Table C-7.

subject producers were among those deemed bankable. Moreover, even some of the domestic producers considered "bankable" ended up shutting operations or having to declare bankruptcy during the POI.[262]

Based on these considerations, we conclude that the volume of subject CSPV products imported into the United States from China is significant, absolutely and relative to consumption and production in the United States, and that the increase in subject import volume absolutely and relative to domestic production and apparent U.S. consumption is also significant.

D. Price Effects of the Subject Imports

Section 771(C)(ii) of the Tariff Act provides that, in evaluating the price effects of subject imports,

> the Commission shall consider whether – (I) there has been significant price underselling by the imported merchandise as compared with the price of domestic like products of the United States, and (II) the effect of imports of such merchandise otherwise depresses prices to a significant degree or prevents price increases, which otherwise would have occurred, to a significant degree.[263]

Most questionnaire respondents reported that CSPV products account for about 30 to 60 percent of the total cost of solar systems, regardless of the segment of the U.S. market in which they are utilized.[264] As discussed above, purchasers reported considering a variety of factors when purchasing CSPV cells and modules.[265] They reported price as the most important factor in purchasing decisions (21 firms), and quality as the second-most important factor (19 firms).[266] Almost all responding purchasers reported that CSPV products made in the United States and imported from China at least "usually" meet minimum quality specifications.[267] Moreover, 12 of 13 responding producers, 37 of 45 responding importers, and 37 of 42 responding purchasers reported that products made in the United States and China are "always" or "frequently" interchangeable.[268] When comparing the two sources, most responding purchasers reported that CSPV products made in the United States are comparable to subject imports from China for all characteristics except for price, for which the product from China was rated as superior (that is, lower-priced).[269] Consequently, given the high substitutability between the domestic like product and subject imports,[270] we find that competition in the U.S. CSPV market primarily depends on price.[271]

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[262] CR at II-40; PR at II-29; CR/PR at Table II-15; Hearing Tr. at 224, 297-98. We note further that the vast majority of responding purchasers identified the two sources – CSPV products made in the United States and China – as comparable in terms of "bankability." CR/PR at Table II-13.

[263] 19 U.S.C. § 1677(7)(C)(ii).

[264] CR/PR at Table II-8; CR at II-24 to II-25; PR at II-17.

[265] CR at II-27; PR at II-19 to II-20.

[266] CR at II-27; PR at II-19 to II-20; CR/PR at Table II-10.

[267] CR at II-41; PR at II-30; CR/PR at Table II-16.

[268] CR at II-39; PR at II-29; CR/PR at Table II-14.

[269] CR at II-36; PR at II-26; CR/PR at Table II-13.

[270] CR at II-26; PR at II-19.

[271] The majority of purchasers (44 of 53) contact at least two or three suppliers before making a purchase. Forty-five of 52 purchasers reported negotiating with the supplier when purchasing CSPV cells and modules. Twenty-seven purchasers reported that negotiations are based on price. CR at II-35; PR at II-25. Twenty-six of 52 purchasers reported "always" or "usually" purchasing CSPV cells and modules offered at the lowest price, and an additional 17 purchasers reported "sometimes" purchasing the lowest-priced CSPV cells and modules. CR at II-28; PR at II-20; see also Hearing Tr. at 131 (financialization of sales to utilities and through leases increases importance of price).

The Commission usually analyzes underselling and price depression based on weighted-average quarterly pricing data on specific pricing products.[272] In these investigations, eight U.S. producers and 23 importers of subject merchandise from China provided usable quarterly net U.S. f.o.b. selling price data for five CSPV module products for the period January 2009 through June 2012.[273] By quantity, pricing data reported by these firms accounted for approximately 44.0 percent of the domestic industry's reported U.S. shipments of CSPV modules and 93.7 percent of importers' reported U.S. shipments of subject merchandise imported from China during the POI.[274] As a majority of these comparisons show, subject imports pervasively undersold the domestic like product at sizeable margins throughout the POI.[275] Specifically, subject imports from China undersold the domestic like product in 35 of 46 possible quarterly comparisons, or 76.0 percent of the time, at margins ranging as high as *** percent.[276]

The CCCME Respondents argue that the quarterly pricing data do not show significant underselling because almost half of the CSPV products imported from China were sold to the utility segment, which they argue corresponds to products 4 and 5, whereas less than 5 percent of the volume of domestic shipments was reported as sales of these two pricing products.[277] For the utility segment, which they contend is the fastest-growing of the U.S. market segments, the CCCME Respondents assert that there was limited head-to-head competition with subject imports, because the domestic industry failed to offer or to commercially manufacture higher-wattage CSPV products.[278] In addition, the CCCME Respondents assert that pricing products 1, 2, and 3 correspond to lower-wattage products sold to distributor, residential, and commercial installer segments, where ***.[279]

We acknowledge that the record shows that the higher-wattage modules (products 4 and 5) accounted for a large share of the pricing data reported by U.S. importers for their U.S. shipments of subject modules from China (48 percent) and only a relatively small share of the domestic industry's pricing data on U.S. module shipments (about 3 percent).[280] As these data indicate, however, the domestic industry offered and sold higher-wattage products during the POI. Even for these products, subject imports undersold the domestic industry to a large degree, in 7 of 10 possible observations at average underselling margins of 27.0 percent for product 4 and 10.8 percent for product 5.[281]

Furthermore, the record shows that the lower-wattage modules (products 1, 2, and 3) accounted for a large share of the pricing data reported by the domestic industry on its U.S. CSPV module shipments (97.0 percent by quantity for the POI) and 52 percent of the pricing data reported by U.S. importers for their U.S. shipments of subject modules from China.[282] Consequently, the record shows significant head-to-head competition between the domestic like product and the subject imports for these products.

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[272] Sodium Metal from France, Inv. No. 731-TA-1135 (Final), USITC Pub. 4045 at 18 (Nov. 2008); Certain Ceramic Station Post Insulators from Japan, Inv. No. 731-TA-1023 (Final), USITC Pub. 3655 at 15 n.104 (Dec. 2003); see also Celanese Chemicals Ltd. v. United States, 2007 WL 735024 at *12 to *15, Slip Op. 07-16 at 27-33 (Ct. Int'l Trade Jan. 29, 2007).

[273] The pricing products included the following: (1) crystalline silicon module, with a peak power wattage of 220 to 219, inclusive, P-max or Wp; (2) crystalline silicon module, with a peak power wattage of 220 to 239, inclusive, P-max or Wp; (3) crystalline silicon module, with a peak power wattage of 240 to 259, inclusive, P-max or Wp; (4) crystalline silicon module, with a peak power wattage of 260 to 279, inclusive, P-max or Wp; (5) crystalline silicon module, with a peak power wattage of 280 and above, P-max or Wp. CR at V-7; PR at V-5.

[274] CR at V-7; PR at V-5. We note that Suntech reported pricing data only for its imported CSPV modules, so we did not need to adjust the domestic industry's pricing data to reflect our decision to exclude Suntech from the domestic industry as a related party.

[275] CR/PR at Tables V-2 to V-8, Figure V-3.

[276] CR/PR at Tables V-2 to V-8, Figure V-3; CR at V-8; PR at V-5 to V-6.

[277] CCCME Respondents' Preh'g Brief at 49-52; CCCME Respondents' Posth'g Brief at 3.

[278] CCCME Respondents' Preh'g Brief at 50; CCCME Respondents' Posth'g Brief at 3.

[279] CCCME Respondents' Preh'g Brief at 52; CCCME Respondents' Posth'g Brief at 4.

[280] CR at V-8; PR at V-5 to V-6.

[281] CR/PR at Table V-8.

[282] CR at V-7 to V-8; PR at V-5 to V-6.

For pricing products 1, 2, and 3, subject imports undersold the domestic like product in 28 of 36 possible comparisons, at average underselling margins of 20.7 percent for product 1, 13.5 percent for product 2, and 14.0 percent for product 3.[283] The domestic industry increased its sales volumes for these products over the POI, but not to the same degree as subject imports.[284]

The pricing data do not show attenuated competition between subject imports and the domestic like products. In particular, we reject the notion that the pricing data illustrate a lack of competition between subject imports and the domestic like product in the utility or any other segment of the U.S. market. Contrary to the assertion by the CCCME Respondents, higher-wattage products 4 and 5 are not necessarily sold to the utility segment any more than lower-wattage products 1, 2, and 3 are necessarily sold to non-utility customers.[285] For example, *** of the *** importers reporting pricing data and sales by channels of distribution for products 4 and/or 5 reported not shipping any of their subject imports of these two pricing products to utilities.[286] Indeed, the record shows that imports of pricing products 4 and 5 from China were sold in all market segments.[287] Moreover, subject imports of both lower- and higher-wattage products pervasively undersold the domestic like product at wide margins in sales to all segments of the U.S. market -- residential, non-residential, and utility.[288]

We also reject the CCCME Respondents' argument that underselling by subject imports is not significant because any price differential between the products likely reflects their claim that a significant portion of the domestic industry's pricing data consists of higher -cost monocrystalline modules whereas subject imports largely reflect multicrystalline modules that do not command comparable prices.[289] The record demonstrates that the domestic industry (including Petitioner SolarWorld), like importers of subject merchandise from China, sold mono- and multi-crystalline CSPV products in the U.S. market,[290] so the substantial underselling margins do not merely reflect price differentials between mono- and multi-crystalline modules.

Other record data demonstrate underselling trends by the subject imports. For example, purchasers generally ranked products imported from China as superior in terms of price compared to the domestic like product (i.e., they are lower priced).[291] Purchasers also reported initially choosing or switching to imports from China based on price.[292] The record also reflects that domestic producers were forced to lower prices to compete with low-priced subject imports from China.[293] Moreover, record evidence indicates not only that subject imports increased their sales to utilities (which Respondents admit is the fastest growing U.S. market segment) but also that subject imports were able to do so using lower

[283] CR/PR at Table V-8.

[284] CR/PR at Tables V-2 to V-4.

[285] Petitioner's Posth'g Brief at Exh. 3 at 14-15 (list of firms reporting pricing data for products 4 and 5 is not limited to firms in the utility segment); see also CR/PR at Table II-2 (showing sales of all pricing products sold in all U.S. market segments).

[286] See Importer Questionnaire Responses to Questions III-2a and III-3; see also Petitioner's Posth'g Brief at Exh. 3 at 14-15; see also id. at Exh. 3 at 3-4 (refuting the argument that utilities prefer 72-cell modules, noting subject producer Canadian Solar's announcement that it was delivering 26 MW of 60-cell modules for a utility project), and 6 (channels of distribution do not correspond precisely with market segments because, as *** reported, many customers operate in multiple channels).

[287] CR/PR at Table II-2.

[288] CR/PR at Tables V-2 to V-8.

[289] CCCME Respondents' Preh'g Brief at 54-55.

[290] Petitioner's Posth'g Brief at Exh. 3, 6; Hearing Tr. at 27 (Brinser), 33 (Kilkelly), 168-69 (Shah), 187 (King). Overall, few purchasers reported that certain watts/types/sizes of CSPV products were available from only one source (either domestic or foreign), and there was no consensus among those who did report such examples that mono- or multi-cyrstalline modules or certain sizes of modules were only available from China or from the United States. CR at II-28 to II-29, II-33 to II-35, V-21 to V-39; PR at II-20 to II-21, II-24 to II-25, V-12 to V-18.

[291] CR at II-36; PR at II-26; CR/PR at Table II-13.

[292] CR at II-33 to II-35; PR at II-24 to II-25.

[293] CR at V-21 to V-39; PR at V-12 to V-18; Hearing Tr. at 97-99.

prices.[294] Finally, the record shows that that domestic producers lost sales and revenues due to competition from low-priced subject imports.[295]

Based on this evidence, we conclude that there has been significant underselling of the domestic like product by subject imports from China. This underselling enabled subject importers to gain market share at the expense of the domestic industry.

We also considered movements in the prices of products 1 to 5 during the POI. The quarterly pricing data show a steady decline in domestic like product and subject import prices, as the domestic industry lowered its prices in response to low-priced CSPV products from China.[296] Overall, f.o.b. prices of all U.S.-produced CSPV modules fell substantially (*** percent) between the first quarter of 2009 and the second quarter of 2012.[297] At the same time, f.o.b. prices of all CSPV modules imported from China, which already were priced lower than the domestic like product, fell by *** percent between the first quarter of 2009 and the second quarter of 2012.[298] Various industry sources also reported declining CSPV module prices as well as declining CSPV solar system prices.[299] In addition, narrative responses from purchasers show that domestic producers were forced to lower prices to compete with low-priced subject imports from China.[300] Confirmed lost revenue allegations further indicate that domestic producers had to lower their prices due to low-priced competition from CSPV products imported from China.[301] We thus find that low-priced subject imports from China have depressed prices of the domestic like product in the U.S. market to a significant degree.

We also considered whether low-priced subject imports prevented increases in the price of the domestic like product that otherwise would have occurred. The domestic industry's ratio of COGS to net sales was high between January 2009 and June 2012, and it increased overall during this period.[302] Despite the fact that the domestic industry's unit COGS declined overall during the POI,[303] we find that its extremely high and increasing COGS-to-net-sales ratio demonstrates that the substantial and increasing volume of low-priced subject imports from China undersold the domestic industry at substantial margins and prevented the domestic industry from pricing the domestic like product at levels that would permit it to recover its costs during the POI.

We have considered whether there are other factors that have had an impact on the domestic industry's prices during the POI. The CCCME Respondents argue that technological improvements in CSPV product manufacturing, declining prices for the raw material polysilicon, the need to attain grid parity in the face of declining natural gas prices and competition from thin-film products, and the decline of Federal, state, and local incentives explain the observed price declines, whereas subject imports do not.[304]

Although we acknowledge that there may have been additional factors exerting downward pricing pressure on CSPV products, we find that subject imports were a significant cause of the decline in the

[294] CR/PR at Figures II-1 to II-2; CR at II-4 to II-5, V-21 to V-39; PR at II-3 to II-4, V-12 to V-18.
[295] CR at II-33 to II-35, V-21 to V-39; PR at II-24 to II-25, V-12 to V-18; CR/PR at Table V-9.
[296] CR/PR at Tables V-2 to V-6, Figure V-3; CR at V-8; PR at V-5 to V-6.
[297] CR/PR at Tables V-2 to V-6, Figure V-3; CR at V-8; PR at V-5 to V-6.
[298] CR/PR at Tables V-2 to V-6, Figure V-3; CR at V-8; PR at V-5 to V-6.
[299] CR at II-24 to II-26, V-20; PR at II-17 to II-18, V-12; CR/PR at Figure II-6, II-7, V-4.
[300] CR at V-21 to V-39; PR at V-12 to V-18; CR/PR at Table V-10.
[301] CR at V-21 to V-39; PR at V-12 to V-18; CR/PR at Table V-10. Indeed, at the hearing, Respondents' witnesses acknowledged that prices would likely rise if antidumping and countervailing duty orders were placed on imports of CSPV products from China. Hearing Tr. at 239-46.
[302] The COGS-to-net-sales ratio increased overall, and was *** percent in 2009, *** percent in 2010, *** percent in 2011, *** percent in interim 2011, and *** percent in interim 2012. CR/PR at Table C-8.
[303] CR/PR at Table C-8 (showing that the domestic industry's unit COGS declined from $*** per KW in 2009 to $*** per KW in 2010, and $*** per KW in 2011, and was $*** per KW in interim 2011 and $*** per KW in interim 2012).
[304] CCCME Respondents' Posth'g Brief at 4-14, Exh. 2 at 3-14, Exh. 5 at 10-13, Exh. 7 at 7-11; CCCME Respondents' Preh'g Brief at 55-59.

prices of CSPV products during the POI. In general, as technology improved, the price of PV products has trended downward since the 1990s, despite a period of increasing prices between 2003 and 2008.[305] According to the record, beginning in 2003, when global supply of polysilicon was inadequate to meet demand by both the semiconductor and CSPV industries, polysilicon prices rose substantially.[306] Spot prices of polysilicon rose from $35/kg in 2003 to a high of $500/kg in 2008 (and contract prices rose from $25/kg to $85/kg in this period).[307] By 2008, global supply exceeded global demand, and polysilicon spot and contract prices then fell substantially to $75/kg (spot) and $60/kg (contract) in 2009, $55/kg (estimated spot and contract) in 2010, $45/kg (estimated spot) and $40/kg (estimated contract) in 2011, and $35/kg (estimated spot and contract) by 2012.[308] Although industry publications show that the price of solar modules sold in the United States also declined dramatically during the POI, by 50 percent in 2011,[309] this decline (and the declines in prices of the domestic like product observed in the pricing data)[310] exceeded declines in the cost of the polysilicon raw materials used to produce CSPV products (up to *** percent between 2010 and 2011 based on published polysilicon pricing data or about *** percent based on reported domestic industry costs of polysilicon ingots and wafers).[311]

We further recognize the goal for CSPV products to attain grid parity, which largely means matching the levelized cost of natural-gas-generated electricity provided to the grid during peak periods, as discussed above. Nevertheless, the impetus toward grid parity fails to explain the significant underselling by subject imports demonstrated on this record. Moreover, when asked about the role of conventional energy sources such as natural gas and coal on changes in demand during the POI, the majority of questionnaire respondents either reported "no change" in demand for CSPV products related to changes in the price of conventional energy sources or that CSPV product "demand increased" (despite the fact that natural gas prices declined during the POI, as noted above).[312] Similarly, although some purchasers reported evaluating both CSPV and thin-film products for the same end use or project, most responding domestic producers and the majority of responding importers and purchasers reported that thin-film products, which accounted for a considerably smaller share of the U.S. solar market, did not affect the price of CSPV cells and modules.[313]

Finally, we acknowledge that the overall mix of Federal, state, and local incentives available to those investing in CSPV solar systems fluctuated over the POI and that cash grants under Section 1603 of the GLTC program expired except for commercial facilities that began construction by the end of December 2011. We nevertheless find that, during much of the POI, the overall mix of incentives was

[305] Hearing Tr. at 81-83, 117, 127-29.

[306] Polysilicon is the primary raw material used to make CSPV products. CR at V-1; PR at V-1.

[307] CR at II-16, V-1 to V-4; PR at II-11 to II-12, V-1 to V-2; CR/PR at Figures V-1 to V-2; CCCME Respondents' Preh'g Brief at 38-39, Exh. 26.

[308] CR at II-16, V-1 to V-4; PR at II-11 to II-12, V-1 to V-2; CR/PR at Figures V-1 to V-2; CCCME Respondents' Preh'g Brief at 38-39, Exh. 26; CCCME Respondents' Posth'g Brief at 12; Petitioner's Preh'g Brief at 36; Petitioner's Posth'g Brief at Exh. 14.

[309] CR at V-20, VI-5 to VI-9 & n.17, VI-19, VI-21, VI-23 to VI-24; PR at V-12, VI-2 to VI-3 & n.17, VI-7; CR/PR at Figure V-4, Table VI-2; Hearing Tr. at 15, 24-25, 36, 41, 53, 61-63.

[310] Prices of product 1 declined *** percent between the first quarter of 2010 and the fourth quarter of 2011, prices of product 2 declined *** percent between the first quarter of 2010 and the fourth quarter of 2011, and for those products accounting for a smaller share of the domestic industry's overall shipments, prices of product 3 declined *** percent between the second quarter of 2010 and the fourth quarter of 2011 and prices of product 5 declined *** percent between the third quarter of 2010 and the fourth quarter of 2011. CR/PR at Tables V-2 to V-6.

[311] CR at V-20, VI-5 to VI-9 & n.17, VI-19, VI-21, VI-23 to VI-24; PR at V-12, VI-2 to VI-3 & n.17, VI-7; CR/PR at Figure V-4, Tables V-2 to V-8, VI-1, VI-2; Hearing Tr. at 15, 24-25, 36, 41, 53, 61-63, 265-66; Petitioner's Preh'g Brief at 36; Petitioner's Posth'g Brief at Exh. 14.

[312] CR/PR at Table II-7.

[313] CR at I-27, II-23; PR at I-22, II-16 to II-17; CR/PR at Table II-1; compare, e.g., CR/PR at Table C-5 (thin-film data) with CR/PR at Tables C-6 (thin-film plus CSPV products), Table C-7 (CSPV trade data without Suntech), Table C-8 (CSPV financial data without Suntech).

very favorable and stimulated demand substantially. Furthermore, a number of incentives remained available at the Federal, state, and/or local level even at the end of the POI,[314] and apparent U.S. consumption continued to increase.[315] Moreover, the record does not show that the availability of these incentives during the POI or the partial termination or phase-out of some led to any significant imbalance in supply and demand that would have caused the observed declines in prices of the domestic like product.[316]

We find that the factors Respondents cite, all of which would have affected both the domestic like product and subject imports from China, do not individually or collectively account for the substantial margins of underselling by subject imports, the accelerating decline in prices in the U.S. market during the POI, the inability of the domestic industry to price its products at levels that would permit the recovery of its costs during a period of very significant demand growth, or the pace at which subject imports captured additional shares of this growing market at the domestic industry's expense throughout the POI. In sum, the significant and growing volume of low-priced subject imports from China competed directly with the domestic like product, was sold in the same channels of distribution to the same segments of the U.S. market, and undersold the domestic like product at significant margins, causing domestic producers to lose revenue and market share and leading to significant depression and suppression of the domestic industry's prices.

E. Impact of the Subject Imports[317]

Section 771(7)(C)(iii) of the Tariff Act provides that the Commission, in examining the impact of the subject imports on the domestic industry, "shall evaluate all relevant economic factors which have a bearing on the state of the industry."[318] These factors include output, sales, inventories, capacity utilization, market share, employment, wages, productivity, profits, cash flow, return on investment, ability to raise capital, research and development, and factors affecting domestic prices. No single factor is dispositive and all relevant factors are considered "within the context of the business cycle and conditions of competition that are distinctive to the affected industry."[319]

We find that subject imports had a significant adverse impact on the domestic industry during the POI. Some of the domestic industry's performance factors appeared to improve during the POI, except when viewed in light of the significant growth in demand for CSPV products. By contrast, the domestic industry's financial performance was very poor and deteriorating because of the significant volume and adverse price effects of subject imports.

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[314] CR/PR at Table II-4.

[315] CR/PR at Table C-7.

[316] Domestic production capacity increased over the POI, but at a lower rate than apparent U.S. consumption, and domestic production did not exceed apparent U.S. consumption. CR/PR at Table C-7.

[317] We have considered the magnitude of the antidumping and countervailing duty margins found by Commerce in its final determinations. In its final determination of sales at less than fair value, Commerce found the following weighted-average dumping margins: 18.32 percent for Trina; 31.73 percent for Wuxi Suntech Power Co., Ltd.; 25.96 percent for 59 foreign producers/exporters listed in Commerce's notice; and 249.46 percent for all others. In its final countervailing duty determination, Commerce found the following weighted-average ad valorem subsidy rates: 15.97 percent for Trina; 14.78 percent for Wuxi Suntech Power Co., Ltd.; and 15.24 percent for all others. CR at I-5 to I-6; PR at I-4 to I-5 (citing 77 Fed. Reg. 63,791 (Oct. 17, 2012); 77 Fed. Reg. 63,788 (Oct. 17, 2012)).

[318] 19 U.S.C. § 1677(7)(C)(iii); see also SAA at 851 and 885 ("In material injury determinations, the Commission considers, in addition to imports, other factors that may be contributing to overall injury. While these factors, in some cases, may account for the injury to the domestic industry, they also may demonstrate that an industry is facing difficulties from a variety of sources and is vulnerable to dumped or subsidized imports.")

[319] 19 U.S.C. § 1677(7)(C)(iii); see also SAA at 851, 885; Live Cattle from Canada and Mexico, Invs. Nos. 701-TA-386, 731-TA-812-813 (Prelim.), USITC Pub. 3155 at 25 n.148 (Feb. 1999).

During the POI, as apparent U.S. consumption flourished,[320] the domestic industry's U.S. shipments increased.[321] Nevertheless, its share of the U.S. market declined significantly,[322] and towards the end of the period, even its net sales quantities fell.[323] [324]

In response to the rapid demand growth, the domestic industry increased its overall production capacity.[325] A number of U.S. firms began CSPV manufacturing operations during the POI, but a substantial number of domestic producers shuttered facilities and/or declared bankruptcy.[326] Petitioner reported that additional producers continued to fail even after the end of the POI.[327] Although production increased from 2009 to 2011,[328] the domestic industry's overall capacity utilization fell dramatically during the POI.[329] The domestic industry initially reduced end-of-period inventories, but its end-of-period inventories were increasing by the end of the POI.[330] Employment levels declined at the end of the POI. By contrast, hourly wages and productivity increased overall.[331]

Despite remarkable demand increases throughout the period, the domestic industry's financial condition was not strong at the beginning of the period and continued to deteriorate throughout the POI, with the domestic industry incurring operating losses during the entire POI.[332] The industry's net sales value declined in 2011 and interim 2012,[333] and the domestic industry's capital and R&D expenditures declined steadily over the course of the POI.[334] Several domestic producers reported recognizing asset

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[320] Apparent U.S. consumption increased from *** MW in 2009 to *** MW in 2010, and *** MW in 2011, and was *** MW in interim 2011 and *** MW in interim 2012. CR/PR at Table C-7.

[321] The domestic industry's U.S. shipments were *** MW in 2009, *** MW in 2010, and *** MW in 2011, *** MW in interim 2011, and *** MW in interim 2012. CR/PR at Table C-7.

[322] The domestic industry's overall market share declined from *** percent in 2009 to *** percent in 2011 and was *** percent in interim 2011 and *** percent in interim 2012, and the domestic industry also lost ground in the residential, non-residential, and utility segments of the U.S. market, as discussed above. CR/PR at Table C-7.

[323] The domestic industry's net sales were *** MW in 2009, *** MW in 2010, *** MW in 2011, *** MW in interim 2011, and *** MW in interim 2012. CR/PR at Table C-8.

[324] Given the similarity in the data and trends, Commissioner Johanson and Commissioner Broadbent note that they would reach the same conclusion with or without the inclusion of Suntech's data. CR/PR at Tables C-2, C-3 (data with Suntech), Tables C-7, C-8 (data without Suntech).

[325] The domestic industry's average production capacity was *** MW in 2009, *** MW in 2010, *** MW in 2011, *** MW in interim 2011, and *** MW in interim 2012. CR/PR at Table C-7.

[326] CR/PR at Tables III-1, III-3 to III-4; CR at III-4 at n.4, VI-1 at nn.1-2; Petitioner's Preh'g Brief at 65-69; CCCME Respondents' Postconf. Brief at 29; Petitioner's Postconf. Brief at 25-28, Exh. 1 at 49-53; Petition, Vol. I at 35-37.

[327] Petitioner's Preh'g Brief at 30-32.

[328] The domestic industry produced *** MW in 2009, *** MW in 2010, *** MW in 2011, *** MW in interim 2011, and *** MW in interim 2012. CR/PR at Table C-7.

[329] Its capacity utilization was *** percent in 2009, *** percent in 2010, *** percent in 2011, *** percent in interim 2011, and *** percent in interim 2012. CR/PR at Table C-7.

[330] Domestic industry end-of-period inventories decreased from *** KW in 2009 to *** KW in 2010, and ballooned to *** KW in 2011. Such inventories were *** KW in interim 2011 and *** KW in interim 2012. CR/PR at Table C-7.

[331] The average number of PRWs was *** in 2009, *** in 2010, *** in 2011, *** in interim 2011 and *** in interim 2012. Hourly wages increased from $*** in 2009 to $*** in 2011, and were $*** in interim 2010 and $*** in interim 2012. The industry's productivity was *** KW/hour in 2009, 2010, and interim 2011, and improved to *** KW/hour in 2011 and interim 2012. CR/PR at Table C-7.

[332] Its operating losses were $*** in 2009, $*** in 2010, $*** in 2011, $*** in interim 2011, and $*** in interim 2012. CR/PR at Table C-8.

[333] The domestic industry's net sales were $*** in 2009, $*** in 2010, $*** in 2011, $*** in interim 2011, and $*** in interim 2012. CR/PR at Table C-8.

[334] The domestic industry's capital expenditures declined from $*** in 2009 to $*** in 2010, and $*** in 2011, and were $*** in interim 2011 and $*** in interim 2012. R&D expenditures were $*** in 2009, $*** in 2010, $*** in 2011, $*** in interim 2011, and $*** in interim 2012. Derived from CR/PR at Table VI-7.

write-offs and/or costs related to the closure of their production facilities,[335] inventory revaluations when balance sheet costs assigned to inventories exceeded market or net realizable values,[336] and/or asset impairments.[337]

In addition to the factors discussed in our price effects analysis, we have considered whether other factors had an impact on the domestic industry during the POI. Notwithstanding Respondents' claims that the domestic industry was unable or unwilling to supply the products demanded by the utility segment, the record shows that the domestic industry supplied higher-wattage modules as well as mono- and multi-crystalline modules.[338] The record similarly does not support Respondents' contention that the utility segment prefers 72-cell modules, as significant volumes of 60-cell modules and the lower-wattage pricing products were sold to utilities/developers during the POI.[339] Moreover, the domestic industry's declining market share was not limited to the utility segment. As also discussed above, due to consistent and substantial underselling by subject imports, the domestic industry also lost market share in the residential and non-residential segments of the U.S. market,[340] and non-subject imports also lost market share to increasing volumes of low-priced subject imports.[341]

Respondents also suggested that the domestic industry was adversely affected by its use of unfavorable long-term polysilicon contracts. The record, however, indicates that polysilicon prices began their substantial declines well prior to the POI, domestic producers with long-term contracts had termination provisions or were able to renegotiate their contracts, and some producers did not purchase polysilicon through long-term contracts during the POI.[342] Consequently, the domestic industry's polysilicon raw materials costs declined over the POI as did its overall costs,[343] which indicate that such contracts did not significantly burden the domestic industry during the POI.[344]

Respondents further allege that domestic producers made "bad bets" on technology and this led to the domestic industry's poor performance over the POI.[345] The record shows, however, that almost all purchasers reported U.S. CSPV modules as being superior or comparable in terms of conversion efficiency and quality.[346] Some purchasers reported increasing their purchases from one or more domestic producers for quality and performance reasons, and purchasers did not identify poor technology as the reason for increasing their purchases of subject merchandise from China but instead generally reported that products from China were lower-priced.[347] Moreover, as discussed above, domestic producers continue to make technological innovations to improve their products' efficiency and features, they offer various sizes and types of CSPV modules, and they compete in all segments of the market.[348]

We have also closely examined the role of non-subject imports in these investigations. Non-subject sources supplying CSPV cells to the U.S. market included Taiwan, Korea, Japan, and Germany,

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[335] CR at VI-2 at n.5 (SolarWorld), n.6 (Evergreen), VI-21 (***), VI-23 ***, VI-26 & n.32 (***); PR at VI-1 at n.5, VI-2 at n.6, VI-7, VI-8 & n.32.

[336] CR at VI-23 & n.25 (discussing ***); PR at VI-7 & n.25.

[337] CR at VI-25 n.29 (***), VI-26 & n.32 (***); PR at VI-8 nn.29, 32.

[338] Petitioner's Posth'g Brief at Exh. 3, 5, 6; Hearing Tr. at 85-86 (Ferda), 88-89 (Ostrenga for Helios), 27, 89 (Brinser).

[339] CR/PR at Tables II-1, II-2, Figures II-1, II-2; see also Petitioners' Posth'g Brief at Exh. 3 at 3-4 (noting Canadian Solar's sale of 26 MW of its 60-cell modules for a utility project), 5, 6; Hearing Tr. at 85-86 (Ferda) (discussing domestic producer Helios' sale of 60-cell modules to the utility segment), 298-99 (Beebe).

[340] CR/PR at Figure II-2.

[341] CR/PR at Table C-7.

[342] CR at V-1 to V-4; PR at V-1 to V-3; Hearing Tr. at 125-27; Petitioner's Posth'g Brief at Exh. 14.

[343] CR at VI-9 n.17; PR at VI-3 n.17.

[344] CR at V-1 to V-4; PR at V-1 to V-3.

[345] CCCME Respondents' Preh'g Brief at 32-35.

[346] Petitioner's Posth'g Brief at 10; CR/PR at Table II-13; Hearing Tr. at 31, 33, 39, 83-86, 127-29, 139, 145-50 (discussing technological improvements).

[347] CR at II-33 to II-35; PR at II-24 to II-25; CR/PR at Table II-12.

[348] Petitioner's Posth'g Brief at Exhs. 3, 5, 6; Hearing Tr. at 31, 33, 39, 83-86, 127-29, 139, 145-50.

and non-subject sources supplying the U.S. market with CSPV modules included Taiwan, Korea, Mexico, Canada, Singapore, and Japan.[349] Unlike subject imports, non-subject imports were considerably smaller in magnitude, and their volume declined overall during the POI, both in absolute and relative terms.[350] Furthermore, unlike subject imports from China, non-subject imports frequently oversold the domestic like product.[351] [352]

Consequently, the picture emerges of a domestic industry: (1) with a steadily declining market share despite phenomenal demand growth, (2) that has lost market share due primarily to the significant and increasing volume of subject imports from China, (3) that has faced significant underselling by subject imports from China and depressed and suppressed prices, (4) that consistently lost money throughout the POI despite the tremendous demand growth and significant cost reductions, (5) that by the end of the POI experienced declines even in many of the performance indicators that previously had shown some improvement, and (6) that reported recognizing asset write-offs and/or costs related to the closure of production facilities, revalued inventories, and/or asset impairments. Based on the foregoing trends, we find that there is a causal nexus between subject imports and the poor condition of the domestic industry and that the domestic industry is materially injured by reason of subject imports.

IV. CRITICAL CIRCUMSTANCES[353]

A. Legal Standards and Party Arguments

In its final antidumping and countervailing duty determinations concerning CSPV cells and modules from China, Commerce found that critical circumstances exist with respect to certain subject producers/exporters.[354] Because we have determined that the domestic industry is materially injured by reason of subject imports from China, we must further determine "whether the imports subject to the affirmative {Commerce critical circumstances} determination . . . are likely to undermine seriously the

[349] CR at II-13 to II-14; PR at II-10. The industry in Mexico was the leading non-subject CSPV product supplier to the U.S. market during 2009 and 2011, although imports from Malaysia surpassed those from Mexico in 2011. CR at VII-22; PR at VII-16 to VII-17. The industry in Japan was the second largest non-subject supplier to the U.S. market during 2009 to 2011. CR at VII-24; PR at VII-18. Malaysia was the third-largest non-subject source of U.S. imports during 2009 to 2011, but imports from Malaysia surpassed those from Mexico to become the largest source of non-subject imports in 2011. CR at VII-26; PR at VII-19. Taiwan was the largest non-subject CSPV industry in 2011 and the fourth-largest non-subject supplier to the U.S. market during 2009 to 2011. CR at VII-26; PR at VII-19.

[350] As a share of apparent U.S. consumption, non-subject imports declined from *** percent in 2009 to *** percent in 2010, and *** percent in 2011, and were *** percent in interim 2011 and *** percent in interim 2012. As a share of total imports, imports of non-subject merchandise decreased from 67.7 percent of total imports in kilowatts in 2009 to 42.9 percent in 2010, and 29.2 percent in 2011, and they were 37.4 percent in interim 2011 and 41.9 percent in interim 2012. CR/PR at Table IV-2, C-7.

[351] CR/PR at App. D.

[352] Based on the record evidence in these investigations, Commissioner Pinkert finds that price-competitive, nonsubject imports were a significant factor in the U.S. market for CSPV products during the POI. He also finds, however, that, regardless of whether CSPV cells and modules constitute a commodity product, nonsubject imports would not have replaced the subject imports without benefit to the domestic industry had the subject imports exited the market during the POI. He notes that the information in CR/PR at Appendix D suggests that any such replacement by nonsubject imports would have been in most instances at higher prices than those of the subject imports, thus providing a benefit to the domestic industry.

[353] Chairman Williamson and Commissioner Pinkert voted in the affirmative with respect to critical circumstances. See Dissenting Views of Chairman Irving A. Williamson and Commissioner Dean A. Pinkert on Critical Circumstances. They join sections V.A to V.D.1.a of this discussion, except as otherwise noted.

[354] 77 Fed. Reg. 63971, 63973 (Oct. 17, 2012) (AD notice); 77 Fed. Reg. 63788, 63788 (Oct. 17, 2012) (CVD notice); Commerce's Issues and Decision Memorandum for Antidumping Duty Investigation at Comment 10; Commerce's Issues and Decision Memorandum for Countervailing Duty Investigation at 10, Comments 3-5.

remedial effect of the antidumping {and/or countervailing duty} order{s} to be issued."[355] The SAA indicates that the Commission is to determine "whether, by massively increasing imports prior to the effective date of relief, the importers have seriously undermined the remedial effect of the order" and specifically "whether the surge in imports prior to the suspension of liquidation, rather than the failure to provide retroactive relief, is likely to seriously undermine the remedial effect of the order."[356] The legislative history for the critical circumstances provision indicates that the provision was designed "to deter exporters whose merchandise is subject to an investigation from circumventing the intent of the law by increasing their exports to the United States during the period between initiation of an investigation and a preliminary determination by {Commerce}."[357] An affirmative critical circumstances determination by the Commission, in conjunction with an affirmative determination of material injury by reason of subject imports, would normally result in the retroactive imposition of duties for those imports subject to the affirmative Commerce critical circumstances determination for a period 90 days prior to the suspension of liquidation.[358]

The statute provides that, in making this determination, the Commission shall consider, among other factors it considers relevant, –

> (I) the timing and the volume of the imports,
> (II) a rapid increase in inventories of the imports, and
> (III) any other circumstances indicating that the remedial effect of the {order} will be seriously undermined.[359]

In considering the timing and volume of subject imports, the Commission's practice is to consider import quantities prior to the filing of the petition with those subsequent to the filing of the petition using monthly statistics on the record regarding those firms for which Commerce has made an affirmative critical circumstance determination.[360]

Petitioner SolarWorld argues that the Commission should make an affirmative finding of critical circumstances.[361] It contends that subject producers rushed to increase their U.S. exports before Commerce's preliminary determinations, as shown by increased U.S. imports and higher U.S. inventories, both of which it claimed far exceeded what the U.S. market demanded.[362]

Respondents argue that the increase in subject imports was not "sufficiently massive," subject imports lost market share after the petition filings, and inventories *** even though demand had increased.[363] They argue that any increase in subject imports was not to circumvent the law.[364] Instead, they argue that questionnaire responses and Treasury data on actual awards of cash grants demonstrate that increased imports from China responded to unique U.S. market circumstances wherein demand surged to meet expiring U.S. government programs.[365]

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[355] 19 U.S.C. §§ 1671d(b)(4)(A)(i), 1673d(b)(4)(A)(i).
[356] SAA at 877.
[357] ICC Industries, Inc. v. United States, 812 F.2d 694, 700 (Fed. Cir. 1987), quoting H.R. Rep. No. 317, 96th Cong., 1st Sess. 63 (1979), affirming 632 F. Supp. 36 (Ct. Int'l Trade 1986).
[358] See 19 U.S.C. §§ 1671b(e)(2), 1673b(e)(2).
[359] 19 U.S.C. §§ 1671d(b)(4)(A)(ii), 1673d(b)(4)(A)(ii).
[360] See Lined Paper School Supplies from China, India, and Indonesia, Invs. Nos. 701-TA-442 to 443, 731-TA-1095 to 1097 (Final), USITC Pub. 3884 at 46-48 (Sept. 2006); Carbazole Violet Pigment from China and India, Invs. Nos. 701-TA-437 & 731-TA-1060 to 1061 (Final), USITC Pub. 3744 at 26 (Dec. 2004); Certain Frozen Fish Fillets from Vietnam, Inv. No. 731-TA-1012 (Final), USITC Pub. 3617 at 20-22 (Aug. 2003).
[361] Petitioner's Preh'g Brief at 38-42; Petitioner's Posth'g Brief at Exh. 2.
[362] Petitioner's Preh'g Brief at 38-42; Petitioner's Posth'g Brief at Exh. 2.
[363] CCCME Respondents' Preh'g Brief at 82-88; Upsolar's Preh'g Brief at 7-11; Upsolar's Posth'g Brief at 8-14.
[364] CCCME Respondents' Preh'g Brief at 88-94; Upsolar's Preh'g Brief at 1-7; Upsolar's Posth'g Brief at 5-8.
[365] CCCME Respondents' Preh'g Brief at 88-94; Upsolar's Preh'g Brief at 1-7; Upsolar's Posth'g Brief at 5-8.

We discuss below several issues relevant to our critical circumstances analysis: (1) whether to conduct the analysis on a firm-by-firm basis; (2) whether to analyze subsidized and less-than-fair value imports separately; and (3) whether to depart from our usual practice of comparing six-month periods before and after the filing of the petitions.

B. Whether to Analyze Critical Circumstances on a Firm-by-Firm Basis

Respondent LDK has asked the Commission to analyze critical circumstances on a firm-by-firm basis.[366] It contends that the statute is ambiguous but permits a firm-by-firm analysis.[367] It asserts that the Commission has conducted a firm-by-firm analysis previously.[368] In contrast, the CCCME Respondents "did not intend to suggest" a firm-by-firm analysis.[369] Petitioner SolarWorld contends that a firm-by-firm analysis would contravene the statute, has no support in prior Commission investigations, and would be prohibitively difficult to conduct in cases with numerous subject producers/exporters.[370]

As a legal matter, the statute does not instruct the Commission to analyze this issue on a firm-by-firm basis, and LDK concedes this fact.[371] Indeed, in the examples LDK cites to support its arguments, as well as in other prior investigations, the Commission merely subtracted from subject country totals data of individual firms for which Commerce's critical circumstances determination was negative. This comports with the statutory requirement to determine "whether the imports subject to the affirmative {Commerce critical circumstances} determination are likely to undermine seriously the remedial effect of the {order} to be issued."[372] As a practical matter, the Commission ordinarily would not have data on U.S. imports and inventories of subject merchandise segregated by all possible subject producers/exporters. Consequently, in these investigations, consistent with the statutory requirement to determine whether the imports subject to Commerce's affirmative critical circumstances determination are likely to undermine seriously the remedial effect of the orders, we do not conduct our analysis on a firm-by-firm basis. We instead conduct our analysis using data on those imports that are subject to Commerce's affirmative critical circumstances determinations.

C. Whether to Analyze Subsidized and Less-Than-Fair Value Imports Separately

Commerce's affirmative critical circumstances finding in its final countervailing duty determination applies to all U.S. imports of subject CSPV cells and modules from China,[373] but Commerce's affirmative critical circumstances finding in its final antidumping duty determination applies only to a subset of these firms.[374] Specifically, in its affirmative antidumping duty determination, Commerce found critical circumstances with respect to U.S. imports of subject CSPV cells and modules from subject producer/exporter Trina Solar, the separate rate respondents, and the PRC-wide entity, but not for U.S. imports from subject producer/exporter Wuxi Suntech.[375]

No party presented any argument concerning how to analyze critical circumstances in situations where the universe of imports subject to affirmative critical circumstances determinations differs between Commerce's antidumping and countervailing duty determinations. Given that the statute calls for the Commission to make its critical circumstances determinations on the basis of imports subject to the

[366] LDK Solar's Preh'g Brief at 1-3.
[367] LDK Solar's Posth'g Brief at 1-8.
[368] LDK Solar's Posth'g Brief at 1-8.
[369] CCCME Respondents' Posth'g Brief at Exh. 2 at 20.
[370] Petitioner's Posth'g Brief at Exh. 2 at 12-13.
[371] 19 U.S.C. §§ 1671d(b)(4)(A)(i), 1673d(b)(4)(A)(i).
[372] 19 U.S.C. §§ 1671d(b)(4)(A)(i), 1673d(b)(4)(A)(i).
[373] 77 Fed. Reg. 63788 (Oct. 17, 2012).
[374] 77 Fed. Reg. 63791 (Oct. 17, 2012).
[375] 77 Fed. Reg. 63791 (Oct. 17, 2012).

particular Commerce affirmative determinations and in light of the differences here between the imports subject to each of Commerce's affirmative critical circumstances determinations,[376] we examine below the question of critical circumstances separately for each investigation.

E. Analysis

1. Imports Subject to Affirmative Critical Circumstances Determination in Commerce's Final Countervailing Duty Investigation

a. Choice of Time Period

The petitions in these investigations were filed effective October 19, 2011,[377] and Commerce published its preliminary critical circumstances determination in the countervailing duty investigation on February 3, 2012.[378] Commerce published its preliminary countervailing duty determination on March 26, 2012.[379] Consequently, for those U.S. imports from China of subject CSPV cells and modules that are subject to an affirmative critical circumstances determination in Commerce's countervailing duty investigation (which encompasses all subject imports from China), the 90-day period for which retroactive suspension would occur includes the period from December 27, 2011 to March 25, 2012.

The CCCME Respondents ask the Commission to analyze critical circumstances by comparing import and inventory data for six month periods (May to October 2011 versus November 2011 to April 2012).[380] LDK compared data for April to September 2011 with data for November 2011 to April 2012.[381]

On the other hand, SolarWorld asks the Commission to depart from its usual comparison of six-month periods in favor of comparisons based on shorter, four-month periods.[382] Since Commerce issued its preliminary countervailing duty determination in March 2012, Petitioner argues that comparisons of four-month periods would better enable the Commission to analyze subject import increases in the period between initiation of these investigations and Commerce's preliminary countervailing duty determination and would eliminate what it claimed was the effect of Commerce's preliminary determination (namely, that some firms ceased importing).[383] Based on a comparison of four months of data (June to September 2011 versus November 2011 through February 2012), SolarWorld argues that imports and inventories of the subject merchandise increased massively.[384] Even based on a comparison of six-month periods (April to September 2011 compared to November 2011 through April 2012), however, Solar World argues that subject imports and inventories increased dramatically.[385] Furthermore, it argues that the Commission would reach the same conclusion even if it were to include October in the six-month post-petition period.[386]

In analyzing critical circumstances in its countervailing duty investigation, Commerce examined whether subject imports from China were massive between September and December 2011 and between October and December 2011.[387] Either way, Commerce concluded that imports from China were massive

[376] 19 U.S.C. §§ 1671d(4)(a), 1673d(4)(a).
[377] CR/PR at I-1.
[378] 77 Fed. Reg. 5487 (Feb. 3, 2012).
[379] 77 Fed. Reg. 17439 (Mar. 26, 2012).
[380] CCCME Respondents' Preh'g Brief at 86.
[381] LDK Solar's Preh'g Brief at 4-9; LDK Solar's Posth'g Brief at 1-8.
[382] Petitioner's Preh'g Brief at 40-41; Petitioner's Posth'g Brief at Exh. 2 at 3-4.
[383] Petitioner's Preh'g Brief at 40-41; Petitioner's Posth'g Brief at Exh. 2 at 3-4.
[384] Petitioner's Preh'g Brief at 40-41; Petitioner's Posth'g Brief at Exh. 2 at 3-4.
[385] Petitioner's Preh'g Brief at 39-40.
[386] Petitioner's Preh'g Brief at 39-40.
[387] SolarWorld points out that in this case, Commerce "took the unusual step of making an expedited affirmative determination on critical circumstances over a month prior to" its preliminary countervailing duty determination.

and that respondents received subsidies that are inconsistent with the WTO Agreement on Subsidies and Countervailing Measures.[388] The Commission is not required to analyze the same period that Commerce examined.[389] Unless the industry under investigation involves seasonality or the Commission decides that circumstances warrant otherwise, [390] the Commission generally compares six months of data gathered from the periods immediately preceding and following the petitions' filing, with the earlier period including the month in which the petitions were filed.[391] In these investigations, we are not persuaded by SolarWorld's argument that we should diverge from our normal practice of comparing data for six-month periods. In any event, comparisons of data for four-month periods show similar trends as comparisons of data for our normal six-month periods.[392] Absent a compelling reason to depart from our normal practice, we analyze data for six-month periods and, given the timing of the petition filings (mid-month, the 19th), shipment practices in this industry, including the likelihood that imports were already ordered before the filing of the petitions, we include the month in which the petitions were filed (October 2011) in the initial comparison period.[393]

b. Analysis

Based on a comparison of subject imports over the six-month periods before and after the October 19, 2011 petition filings, we do not find a surge in subject imports warranting an affirmative critical circumstances determination. Imports of subject merchandise from China subject to an affirmative critical circumstances finding in Commerce's countervailing duty investigation increased from *** KW for the period May to October 2011 to *** KW for the six-month post-petition period of November 2011 through April 2012, an increase of *** percent.[394] Notwithstanding its magnitude, this increase occurred during a period of strong growth in apparent U.S. consumption, fueled at least in part by the expiration of the GLTC program, which had permitted systems owners such as utilities to receive a 30-percent cash grant for commercial solar facilities that were, inter alia, placed in service after 2010, so

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Petitioner's Posth'g Brief, Exh. 2 at 3. Commerce examined a period that began prior to the October 19, 2011 petition filings after concluding that importers, exporters, and foreign producers had reason to believe that a U.S. trade remedy proceeding was likely as of September 2011. Commerce's Issues and Decision Memorandum in Countervailing Duty Investigation at 10.

[388] Commerce's Issues and Decision Memorandum in Countervailing Duty Investigation at 10.

[389] Certain Polyester Staple Fiber from China, Inv. No. 731-TA-1104 (Final), USITC Pub. 3922 at 35 (June 2007); Steel Concrete Reinforcing Bars from Turkey, Inv. No. 731-TA-745 (Final), USITC Pub. 3034 at 34 (Apr. 1997).

[390] Certain Polyester Staple Fiber from China, Inv. No. 731-TA-1104 (Final), USITC Pub. 3922 at 35 (June 2007) (declining to analyze different periods absent seasonality); Lined Paper School Supplies from China et al., Invs. Nos. 701-TA-442 to 443, 731-TA-1095 to 1097 (Final), USITC Pub. 3884 at 46-48 (Sept. 2006) (also analyzing period suggested by petitioner but finding any increase consistent with seasonal nature of industry); Steel Concrete Reinforcing Bars from Turkey, Inv. No. 731-TA-745 (Final), USITC Pub. 3034 (April 1997) (seasonal product).

[391] Laminated Woven Sacks from China, Invs. Nos. 701-TA-450 & 731-TA-1122 (Final), USITC Pub. 4025 at 48-50 (Jul. 2008); Light-Walled Rectangular Pipe from China et al.; Invs. Nos. 701-TA-459 & 731-TA-1118 to 1120 (Final), USITC Pub. 4024 at 18-19 (Jul. 2008); Certain Steel Nails from China, Inv. No. 731-TA-1114 (Final), USITC Pub. 4022 at 28-29 (July 2008); Polyester Staple Fiber from China, Inv. No. 731-TA-1104 (Final), USITC Pub. 3922 at 35 (June 2007); Chlorinated Isocyanurates from China and Spain, Invs. Nos. 731-TA-1082 and 1083 (Final), USITC Pub. 3782 at 35-37 (June 2005); Alloy Magnesium from China, Inv. No. 731-TA-1071 (Final), USITC Pub. 4182 at 24 (Sept. 2010); Stainless Steel Butt-Weld Pipe Fittings from Italy, Malaysia, and the Phillippines, Invs. Nos. 731-TA-865 to 867 (Final), USITC Pub. 3387 at 13-16 (Jan. 2001); Certain Warmwater Shrimp and Prawns et seq., Invs. Nos. 731-TA-1063 to 1068 (Final), USITC Pub. 3748 at 36-37 (Jan. 2005).

[392] CR/PR at Table IV-3.

[393] Chairman Williamson and Commissioner Pinkert do not join the remainder of section V. See Dissenting Views of Chairman Irving A. Williamson and Commissioner Dean A. Pinkert on Critical Circumstances.

[394] Derived from CR/PR at Table IV-3.

long as construction had commenced by the end of December 2011 and was completed by December 2016.[395] As discussed above, apparent U.S. consumption increased overall between 2009 and 2011 by *** percent, with incremental increases of *** percent between 2009 and 2010, *** percent between 2010 and 2011, and *** percent between interim 2011 and interim 2012.[396] As apparent U.S. consumption continued to expand, subject imports increased through 2011. They continued to enter the U.S. market at the end of 2011, after the petitions were filed and into 2012, but the growth of subject imports slowed somewhat towards the end of the POI as demand growth also slowed.[397] Thus, the increase in subject imports occurred during a time of tremendous demand increases.

Moreover, we do not find that these post-petition U.S. imports of CSPV cells and modules from China warrant an affirmative critical circumstances determination or that the impact of these imports is likely to continue after Commerce issues a countervailing duty order. According to data on the relevant six-month periods, U.S. importers' end-of-period inventories of subject merchandise from China in April 2012 (***) were lower than in October 2011 (***).[398] These data are inconsistent with the conclusion that U.S. importers were stockpiling CSPV cells and modules from China after the October 2011 filing of the petitions. Thus, these end-of-period inventory data confirm that the post-petition subject imports would not seriously undermine the remedial effect of the order.

Consequently, while we recognize the domestic industry's condition, the adverse price effects of subject imports during the POI, and the high degree of substitutability among subject imports and the domestic like product, for the reasons discussed above, we do not find evidence of a massive surge in subject imports that would warrant retroactive application of suspension of liquidation – and imposition of duties – for a 90-day period. We do not find that the subject imports that entered the U.S. market after the petition filings would seriously undermine the remedial effect of the countervailing duty order. We determine that critical circumstances do not exist with respect to subject imports from China of CSPV cells and modules covered by the affirmative critical circumstances determination in Commerce's final countervailing duty investigation.

2. Imports Subject to Affirmative Critical Circumstances Determination in Commerce's Final Antidumping Duty Investigation

The petitions in these investigations were filed effective October 19, 2011,[399] and Commerce published its preliminary antidumping duty determination on May 25, 2012.[400] Consequently, for those

[395] CCCME Respondents' Preh'g Brief at 21-27, 39-40; CR at II-16 to II-18; PR at II-11-12; CR/PR at Table II-4; Petitioner's Preh'g Brief at 22-23; CCCME Respondents' Posth'g Brief at 8-12, Exh. 2 at 3-12, Exh. 5 at 1-2, 4-7.

[396] CR/PR at Table C-7.

[397] CR/PR at Table C-7. Subject imports continued to grow throughout the period, but their growth slowed somewhat at the end. U.S. shipments of subject imports increased *** percent overall between 2009 and 2011, *** percent between 2009 and 2010, *** percent between 2010 and 2011, and *** percent between interim 2011 and interim 2012. Subject imports' market share increased *** percent overall between 2009 and 2011, *** percent between 2009 and 2010, *** percent between 2010 and 2011, and *** percent between interim 2011 and interim 2012. CR/PR at Table C-7.

[398] Derived from CR/PR at Table IV-3. As a share of U.S. shipments U.S. imports of CSPV cells and modules from China declined overall between 2009 and 2011, being *** percent in 2009 , *** percent in 2010, and *** percent in 2011, and they were lower in interim 2012 (*** percent) than in interim 2011 (***) percent. CR/PR at Table VII-6.

[399] CR/PR at I-1.

[400] 77 Fed. Reg. 31309 (May 25, 2012). Commerce based the affirmative critical circumstances determination in its final antidumping duty investigation on a comparison of data for September 2011 through May 2012 against the base period, because it found that importers had knowledge as early as September 2011 that petitions might be filed. Commerce's Issue and Decision Memorandum in Antidumping Duty Investigation. As indicated above, we are not bound to use the same comparison periods as Commerce; we analyzed this issue using our usual six-month comparison periods.

U.S. imports from China of subject CSPV cells and modules that are subject to an affirmative critical circumstances determination in Commerce's final antidumping duty investigation (which encompasses all subject imports from China except those manufactured/exported by Suntech), the 90-day period for which retroactive suspension would occur includes the period from February 25, 2012 to May 24, 2012.

Based on a comparison of subject imports over the six-month periods before and after the October 19, 2011 petition filings, we do not find a surge of subject imports warranting an affirmative critical circumstances determination. Imports of subject merchandise from China subject to Commerce's affirmative critical circumstances finding in the antidumping duty investigation increased from *** KW for the period May to October 2011 to *** KW for the six-month post-petition period of November 2011 through April 2012, an increase of *** percent.[401] As we found above, this increase in subject imports subject to the critical circumstances finding occurred during a period of tremendous demand increases.[402]

Moreover, we do not find that this post-petition increase in U.S. imports of CSPV cells and modules from China warrants affirmative critical circumstances determinations or that the impact of this increase is likely to continue after Commerce issues an antidumping duty order. U.S. importers' end-of-period inventories of subject merchandise from China in April 2012 (***) were lower than in October 2011 (***).[403] These data are inconsistent with the conclusion that U.S. importers were stockpiling CSPV cells and modules from China after the October 2011 filing of the petitions. Thus, these end-of-period inventory data confirm that the post-petition subject imports would not seriously undermine the remedial effect of the order.

Consequently, as discussed with respect to the countervailing duty order, while we recognize the domestic industry's condition, the adverse price effects of subject imports during the POI, and the high degree of substitutability among subject imports and the domestic like product, we similarly do not find evidence of a massive surge in subject imports that would warrant retroactive application of suspension of liquidation – and imposition of duties – for a 90-day period. We do not find that the subject imports that entered the U.S. market after the petition filings would seriously undermine the remedial effect of the antidumping duty order. We determine that critical circumstances do not exist with respect to subject imports from China of CSPV cells and modules covered by the affirmative critical circumstances determination in Commerce's final antidumping duty investigation.

4. Conclusion

Accordingly, we make negative critical circumstances determinations concerning all subject imports from China that are covered by affirmative critical circumstances determinations in Commerce's final antidumping and countervailing duty investigations.

CONCLUSION

For the foregoing reasons, we determine that the domestic industry producing CSPV cells and modules is materially injured by reason of subject imports from China that Commerce found were sold in the U.S. market at less-than-fair value and subsidized by the Government of China. We also determine that critical circumstances do not exist with respect to subject imports from China that are covered by

[401] Derived from CR/PR at Table IV-3.

[402] CCCME Respondents' Preh'g Brief at 21-27, 39-40; CR at II-16 to II-18; PR at II-11-12; CR/PR at Table II-4; Petitioner's Preh'g Brief at 22-23; CCCME Respondents' Posth'g Brief at 8-12, Exh. 2 at 3-12, Exh. 5 at 1-2, 4-7. As discussed above, apparent U.S. consumption increased overall between 2009 and 2011 by *** percent, for overall increases of *** percent between 2009 and 2010, *** percent between 2010 and 2011, and *** percent between interim 2011 and interim 2012. CR/PR at Table C-7.

[403] Derived from CR/PR at Table IV-3.

affirmative critical circumstances determinations in Commerce's final antidumping and countervailing duty investigations.[404]

[404] Chairman Williamson and Commissioner Pinkert determine that critical circumstances do exist with respect to subject imports from China that are covered by affirmative critical circumstances determinations in Commerce's final antidumping and countervailing duty investigations.

DISSENTING OPINION OF CHAIRMAN IRVING A. WILLIAMSON AND COMMISSIONER DEAN A. PINKERT ON CRITICAL CIRCUMSTANCES

Although we join in sections V.A.-V.D.1.a of the Commission's views, we make affirmative determinations on critical circumstances and thus dissent on that issue. We make separate critical circumstances determinations with respect to countervailing duties and antidumping duties because the imports covered by Commerce's countervailing duty critical circumstances determination are distinct from those covered by its antidumping duty critical circumstances determination.[1] For purposes of our analyses, we compare data from two periods: May 2011-October 2011 and November 2011-April 2012.

1. Imports Subject To Commerce's Countervailing Duty Critical Circumstances Determination

The imports subject to Commerce's countervailing duty critical circumstances determination increased dramatically from *** KW during the first six-month period under consideration to *** KW during the second six-month period, an increase of *** KW.[2] The monthly data show that the imports began to surge in November 2011, after the petition was filed, and stopped surging in March 2012, after Commerce's suspension of liquidation. They rose from *** KW in October 2011 to *** KW in January 2012 and then dropped to *** KW in March 2012 and *** KW in April 2012.[3] The domestic industry lost market share as a result of the surge, particularly in the second half of 2011.[4]

Although Respondents argue that the surge was caused by an improvement in demand triggered by the expiration of the Section 1603 Treasury Program at the end of 2011,[5] the increase in imports plainly outpaced demand, increasing by *** percent between the two six-month periods, while apparent consumption increased by only *** percent from the second half of 2011 to the first half of 2012.[6] Moreover, the 1603 Treasury Program was initially set to expire at the end of 2010 and its extension was not announced until December of that year, yet there was no surge at the end of 2010 comparable to that which occurred at the end of 2011.[7]

End-of-period inventories increased sharply in tandem with the increase in imports, going from *** KW in October 2011 to *** KW in February 2012.[8] This sharp increase occurred during a time of increasing demand that, but for the surge, would have kept inventories stable and, perhaps, have reduced them. We note that the resulting overhang has ongoing implications for the robustness of the U.S.

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[1] Commerce's final countervailing duty critical circumstances determination covers all subject imports, but its final antidumping duty critical circumstances determination does not cover imports manufactured or exported by Suntech.

[2] Calculated from CR/PR at Table IV-3.

[3] The monthly volumes of U.S. imports subject to Commerce's countervailing duty critical circumstances determination during the two six-month periods are as follows: May 2011 *** KW; June 2011 *** KW; July 2011 *** KW; August 2011 *** KW; September 2011 *** KW; October 2011 *** KW; November 2011 *** KW; December 2011 *** KW; January 2012 *** KW; February 2012 *** KW; March 2012 *** KW; and April 2012 *** KW. Based on CR/PR at Table IV-3.

[4] CR/PR at Table C-7 (Suntech excluded from the domestic industry).

[5] CCCME Posthearing Brief at 14.

[6] Calculated from CR/PR at Table IV-3 and Table C-7.

[7] See Petitioner's Posthearing Brief at Exhibit 2 at 9 & Attachment A.

[8] Calculated from CR/PR at Table IV-3.

market. By April 2012, although inventories had fallen, they remained high, at *** KW, which is equivalent to *** percent of domestic producer U.S. shipments of modules in interim 2012.[9]

The surging imports, which are highly interchangeable with domestic producers' shipments, put downward pressure on U.S. prices. Thus, relative to the remainder of the period of investigation, the data show uncharacteristically high margins of underselling, corresponding to large import volumes, for pricing products 2, 3, and 5 in either the last quarter of 2011 or the first quarter of 2012.[10]

We find that these imports beset a domestic industry that was undeniably struggling and incurring significant operating losses throughout the period of investigation – even Respondents do not deny the industry's underperformance.[11]

We conclude that the surge of imports subject to the countervailing duty critical circumstances determination that occurred between the filing of the petition and the suspension of liquidation as well as the corresponding increase in inventories and underselling activity indicate that the imports subject to the determination are likely to undermine substantially the remedial effect of the countervailing duty order. Accordingly, we make an affirmative determination of critical circumstances with respect to such imports.

2. Imports Subject To Commerce's Antidumping Duty Critical Circumstances Determination

The imports subject to Commerce's antidumping duty critical circumstances determination increased dramatically from *** KW during the first six-month period under consideration to *** KW during the second six-month period, an increase of *** KW.[12] The monthly data show that the imports began to surge in November 2011, after the petition was filed, and stopped surging in March 2012, after Commerce's suspension of liquidation.[13] They rose from *** KW in October 2011 to *** KW in February 2012 and then dropped to *** KW in March 2012 and *** KW in April 2012.[14] The domestic industry lost market share as a result of the surge, particularly in the second half of 2011.[15] As explained above, we do not agree with Respondents that the expiration of the Section 1603 Treasury Program at the end of 2011 accounts for these facts.

End-of-period inventories increased sharply in tandem with the increase in imports, going from *** KW in October 2011 to *** KW in March 2012.[16] This sharp increase occurred during a time of increasing demand that, but for the surge, would have kept inventories stable and, perhaps, have reduced them. We note that the resulting overhang has ongoing implications for the robustness of the U.S.

[9] Calculated from CR/PR at Table IV-3 and Table C-7.

[10] CR/PR at Tables V-3, V-4, V-6, and V-8.

[11] CR/PR at Table C-8. CCCME Posthearing Brief at 7, Exhibit 3 at 6-7.

[12] Calculated from CR/PR at Table IV-3.

[13] All of the imports subject to Commerce's antidumping duty suspension of liquidation were also subject to its countervailing duty suspension of liquidation. Because the countervailing duty suspension came first, in March 2012, it is unsurprising that the relevant trends in import volumes and inventories for **all** of the imports subject to Commerce's critical circumstances determinations were driven primarily by the countervailing duty suspension.

[14] The monthly volumes of U.S. imports subject to Commerce's antidumping duty critical circumstances determination during the two six-month periods are as follows: May 2011 *** KW; June 2011 *** KW; July 2011 *** KW; August 2011 *** KW; September 2011 *** KW; October 2011 *** KW; November 2011 *** KW; December 2011 *** KW; January 2012 *** KW; February 2012 *** KW; March 2012 *** KW; and April 2012 *** KW. Based on CR/PR at Table IV-3.

[15] CR/PR at Table C-7.

[16] Calculated from CR/PR at Table IV-3.

market. By April 2012, although inventories had fallen, they remained high, at *** KW, which is equivalent to *** percent of domestic producer U.S. shipments of modules in interim 2012.[17]

The surging imports, which are highly interchangeable with domestic producers' shipments, put downward pressure on U.S. prices. Thus, relative to the remainder of the period of investigation, the data show uncharacteristically high margins of underselling, corresponding to large import volumes, for pricing products 2, 3, and 5 in either the last quarter of 2011 or the first quarter of 2012.[18]

We find that these imports beset a domestic industry that was undeniably struggling and incurring significant operating losses throughout the period of investigation – even Respondents do not deny the industry's underperformance.[19]

We conclude that the surge of imports subject to the antidumping duty critical circumstances determination that occurred between the filing of the petition and the suspension of liquidation as well as the corresponding increase in inventories and underselling activity indicate that the imports subject to the determination are likely to undermine substantially the remedial effect of the antidumping duty order. Accordingly, we make an affirmative determination of critical circumstances with respect to such imports.

[17] Calculated from CR/PR at Table IV-3 and Table C-7.

[18] CR/PR at Tables V-3, V-4, V-6, and V-8.

[19] CR/PR at Table C-8. CCCME Posthearing Brief at 7, Exhibit 3 at 6-7.

PART I: INTRODUCTION

BACKGROUND

These investigations result from petitions filed on October 19, 2011, by SolarWorld Industries America, Inc. ("SolarWorld")[1], alleging that an industry in the United States is materially injured or is threatened with material injury, by reason of imports from China of crystalline silicon photovoltaic cells and modules ("CSPV cells and modules")[2] that are sold in the United States at less-than-fair-value ("LTFV") and subsidized by the Government of China. Information relating to the background of these investigations is provided below.[3]

Effective date	Action
October 19, 2011	Petitions filed with Commerce and the Commission; Commission institutes investigations (76 FR 66748, October 27, 2011)
December 5, 2011	Commission's preliminary determinations (76 FR 78313, December 16, 2011)
March 26, 2012	Commerce's preliminary countervailing duty determination (77 FR 17439)
May 25, 2012	Commerce's preliminary antidumping determination (77 FR 31309)
May 25, 2012	Commission's scheduling of its final phase investigations (77 FR 35425, June 13, 2012)
October 3, 2012	Commission's hearing[1]
October 17, 2012	Commerce's final antidumping and countervailing determinations (77 FR 63788, 63791)
November 7, 2012	Commission's vote
November 30, 2012	Commission's determinations and views transmitted to Commerce
[1] A list of witnesses that appeared at the hearing is presented in app. B.	

ORGANIZATION OF REPORT

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

> *shall consider (I) the volume of imports of the subject merchandise, (II) the effect of imports of that merchandise on prices in the United States for domestic like products, and (III) the impact of imports of such merchandise on domestic producers of domestic like products, but only in the context of production operations within the*

[1] The petitions stated that they are also supported by the Coalition for American Solar Manufacturing, which includes U.S. producers SolarWorld, ***. The members of the coalition, with the exception of SolarWorld, wish their identities to remain confidential.

[2] A complete description of the imported product subject to these investigations is presented in *The Subject Product* section located in Part I of this report.

[3] *Federal Register* notices cited in the tabulation are listed in app. A.

United States; and. . . may consider such other economic factors as are relevant to the determination regarding whether there is material injury by reason of imports.

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

In evaluating the volume of imports of merchandise, the Commission shall consider whether the volume of imports of the merchandise, or any increase in that volume, either in absolute terms or relative to production or consumption in the United States is significant.

. . .

In evaluating the effect of imports of such merchandise on prices, the Commission shall consider whether . . . (I) there has been significant price underselling by the imported merchandise as compared with the price of domestic like products of the United States, and (II) the effect of imports of such merchandise otherwise depresses prices to a significant degree or prevents price increases, which otherwise would have occurred, to a significant degree.

. . .

In examining the impact required to be considered under subparagraph (B)(i)(III), the Commission shall evaluate (within the context of the business cycle and conditions of competition that are distinctive to the affected industry) all relevant economic factors which have a bearing on the state of the industry in the United States, including, but not limited to

. . .

(I) actual and potential declines in output, sales, market share, profits, productivity, return on investments, and utilization of capacity, (II) factors affecting domestic prices, (III) actual and potential negative effects on cash flow, inventories, employment, wages, growth, ability to raise capital, and investment, (IV) actual and potential negative effects on the existing development and production efforts of the domestic industry, including efforts to develop a derivative or more advanced version of the domestic like product, and (V) in {an antidumping investigation}, the magnitude of the margin of dumping.

Information on the subject merchandise, margins of dumping and subsidies, and domestic like product is presented in *Part I*. Information on conditions of competition and other relevant economic factors is presented in *Part II*. *Part III* presents information on the condition of the U.S. industry, including data on capacity, production, shipments, inventories, and employment. The volume of imports of the subject merchandise is presented in *Part IV* and pricing of domestic and imported products is presented in *Part V*. *Part VI* presents information on the financial experience of U.S. producers. Information obtained for use in the Commission's consideration of the question of threat of material injury is presented in *Part VII*.

U.S. MARKET SUMMARY

The U.S. market for CSPV modules[4] totaled approximately $3.0 billion and 2.0 million kilowatts[5] in 2011. The Commission received responses from two firms that produce CSPV cells in the United States, the petitioner, SolarWorld, and Suniva, which accounted for *** percent of total U.S. CSPV cell production in 2011.[6] The Commission received 12 responses from firms that produce only CSPV modules in the United States. Reporting U.S. producers of CSPV modules accounted for *** percent of total 2011 U.S. production of CSPV modules. Forty-nine firms have reported importing CSPV cells or modules from China or nonsubject countries during the period of investigation. Reported U.S. imports accounted for 67.1 percent of total 2011 U.S. imports from China by quantity.

Responding U.S. producers' U.S. shipments of CSPV modules totaled 453,378 kilowatts valued at $790 million in 2011, and accounted for 23.1 percent of apparent U.S. consumption by quantity (26.2 percent by value). U.S. shipments of imports of CSPV modules from China totaled 1.2 million kilowatts valued at $1.7 billion in 2011, and accounted for 62.2 percent of apparent U.S. consumption by quantity (57.4 percent by value). U.S. shipments of imports from all other sources combined totaled 287,548 kilowatts valued at $494 million, and accounted for 14.7 percent of apparent consumption by quantity (16.4 percent by value). CSPV cells and modules are generally used in integrated solar power generating systems for large utilities and commercial and residential roof-top applications.

SUMMARY DATA AND DATA SOURCES

A summary of data collected in these investigations is presented in appendix C, tables C-1 (cells), C-2 (modules), and C-3 (cells and modules). U.S. industry data are based on questionnaire responses of two U.S. producers of CSPV cells and 14 U.S. producers of CSPV modules that accounted for a majority of U.S. production of CSPV cells and modules during the period of investigation. Data for U.S. imports from China and nonsubject countries are based on responses to the Commission's U.S. importer's questionnaire.[7] Foreign industry data are based on responses to the Commission's foreign producer's

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[4] Throughout the main body of this report, the apparent consumption of the U.S. market and U.S. market shares are measured using the data compiled for CSPV modules. The use of solely CSPV module data addresses two potential issues of double counting. First, the vast majority of U.S. shipments of CSPV cells manufactured in the United States are internally consumed to produce CSPV modules. For example, in 2011, SolarWorld reported that *** percent of its total shipments were commercial sales of CSPV cells with *** percent being internally consumed to produce modules, and *** percent exported. Second, because U.S. shipments of imports of CSPV cells are used to produce CSPV modules in the United States, there may be double counting as the cell is counted and the module to which it is assembled. Additionally, in its determinations in the preliminary phase of these investigations, the Commission found that U.S. module assemblers engaged in sufficient production related activities to include them as part of the domestic industry and their finished products as shipments of the domestic like product even though the assemblers sometimes used imported CSPV cells to manufacture the CSPV modules.

[5] A kilowatt is equal to 1,000 watts. A megawatt is equal to 1,000 kilowatts or 1 million watts. A gigawatt is equal to 1,000 megawatts, 1 million kilowatts, or 1 billion watts.

[6] A number of U.S. CSPV cell producers that provided the Commission with a questionnaire response in its preliminary phase of these investigations have since exited the market. For example, Evergreen declared bankruptcy and no longer produces CSPV cells in the United States. Calisolar, after a reorganization, is now Silicor Materials, a producer of polysilicon used in the solar industry.

[7] In the preliminary phase of these investigations, petitioner and respondents observed that the volumes reported in the official Commerce statistics under HTS 8541.40.6020 (modules) most likely report the number of modules and not the number of cells imported into the United States. This may result in quantities that when summed do not accurately reflect the total volume of imported cells. Petition, p. 15, fn. 28. In the preliminary phase, respondents

(continued...)

questionnaire. Appendix C, table C-4 presents domestic industry data without a number of U.S. producers of CSPV modules who are related to Chinese foreign producers. Appendix C, table C-5 presents data gathered by the Commission regarding U.S. producers of thin film solar products and table C-6 combines the U.S. industry data for both U.S. producers of CSPV modules and U.S. producers of thin film solar products.

PREVIOUS AND RELATED INVESTIGATIONS

There have been no previous antidumping or countervailing duty investigations on CSPV cells or modules.[8]

NATURE AND EXTENT OF SALES AT LTFV

On October 17, 2012, Commerce published a notice in the *Federal Register* announcing its final affirmative determination in its antidumping investigation of CSPV cells and modules from China.[9] The estimated weighted-average dumping margins (in percent *ad valorem*), as reported by Commerce are summarized in the tabulation below.

Foreign producer/exporter	Estimated dumping margin (*percent ad valorem*)
Trina Solar (Changzhou) Science & Technology Co., Ltd.; Changzhou Trina Solar Energy Co., Ltd.	18.32
Wuxi Suntech Power Co., Ltd.	31.73
List of 59 named foreign producers/exporters[1]	25.96
All others	249.46

[1] *See* 77 FR 63791, 63795 for list of Chinese foreign producers/exporters named by Commerce.

Source: *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules, from the People's Republic of China: Final Determination of Sales at Less Than Fair Value, and Affirmative Final Determination of Critical Circumstances, in Part*, 77 FR 63791, October 17, 2012.

[7] (...continued)
urged the Commission not to rely on official Commerce statistics as a measure of U.S. imports because of the inconsistency and unreliability of the volumes reported in "units" and that official Commerce statistics, although most likely overwhelmingly reporting imports of CSPV products, may include some thin-film solar products. Respondent CCCME's postconference brief, p. 30. The Commission recognized the data issue in its preliminary views. *Crystalline Silicon Photovoltaic Cells and Modules from China*, Inv. Nos. 701-TA-481 and 731-TA-1190 (Preliminary), USITC Pub. 4295, December 2011, p. 21. Therefore, throughout this report, U.S. import volume data are compiled using "kilowatts" compiled from U.S. importer questionnaire responses.

[8] On November 2, 2011, the Commission instituted a Section 337 investigation on certain integrated solar power systems. This investigation involves the alleged patent infringement of an Andalay Solar, Inc. patent on its solar panel mounting system technology. Canadian Solar is a respondent in the investigation. The specific solar mounting system is not at issue in these investigations. *See Certain Integrated Solar Power Systems and Components Thereof: Notice of Institution of Investigation Pursuant to 19 U.S.C. 1337,* 76 FR 69284, November 8, 2011.

[9] *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules, from the People's Republic of China: Final Determination of Sales at Less Than Fair Value, and Affirmative Final Determination of Critical Circumstances, in Part*, 77 FR 63791, October 17, 2012.

NATURE OF COUNTERVAILABLE SUBSIDIES

On October 17, 2012, Commerce published a notice in the *Federal Register* setting forth its final affirmative determination in its countervailing duty investigation of CSPV cells and modules from China.[10] The countervailable subsidy rates (in percent *ad valorem*), as reported by Commerce, are presented in the tabulation below.

Foreign producer/exporter	Subsidy rate (*percent ad valorem*)
Changzhou Trina Solar Energy Co., Ltd.; Trina Solar (Changzhou) Science & Technology Co., Ltd. (collectively, "Trina")	15.97
Wuxi Suntech Power Co., Ltd.	14.78
All others	15.24

Source: *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, from the People's Republic of China: Final Affirmative Countervailing Duty Determination and Final Affirmative Critical Circumstances Determination*, 77 FR 63788, October 17, 2012.

In its notice, Commerce listed the following programs that it determined provided countervailable subsidies to producers of CSPV cells and modules in China, determined were not used by the respondents during the period of investigation, or did not provide benefits during POI:[11]

A. Programs Determined To Be Countervailable

1. Golden Sun Demonstration Program
2. Preferential Policy Lending
3. Provision of Polysilicon for Less Than Adequate Remuneration ("LTAR")
4. Provision of Land for LTAR
5. Provision of Electricity for LTAR
6. "Two Free, Three Half" Program for Foreign-Invested Enterprises ("FIEs")
7. Preferential Tax Program for High or New Technology Enterprises ("HNTEs")
8. Enterprise Income Tax Law, Research and Development ("R&D") Program
9. Import Tariff and Value Added Tax ("VAT") Exemptions for Use of Imported Equipment
10. VAT Rebates on FIE Purchases of Chinese-Made Equipment
11. Discovered Grants
12. Export Credit Subsidy Programs: Export Buyer's Credits

B. Programs Determined To Be Not Used by the Respondents During the POI or To Not Provide Benefits During the POI

1. Export Product Research and Development Fund
2. Subsidies for Development of "Famous Brands" and "China World Top Brands"
3. Sub-Central Government Subsidies for Development of "Famous Brands" and "China World Top Brands"

[10] *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, from the People's Republic of China: Final Affirmative Countervailing Duty Determination and Final Affirmative Critical Circumstances Determination*, 77 FR 63788, October 17, 2012.

[11] Ibid.

4. Special Energy Fund (Established by Shandong Province)
5. Funds for Outward Expansion of Industries in Guangdong Province
6. Government Provision of Aluminum for LTAR
7. Income Tax Reductions for Export-Oriented FIEs
8. Income Tax Benefits for FIEs Based on Geographic Location
9. Local Income Tax Exemption and Reduction Programs for "Productive" FIEs
10. Tax Refunds for Reinvestment of FIE Profits in Export-Oriented Enterprises
11. Tax Reductions for High and New-Technology Enterprises Involved in Designated Projects
12. Preferential Income Tax Policy for Enterprises in the Northeast Region
13. Guangdong Province Tax Programs
14. VAT and Tariff Exemptions for Purchases of Fixed Assets Under the Foreign Trade and Development Fund Program
15. Tax Reductions for FIEs Purchasing Chinese-Made Equipment
16. Export Guarantees and Insurance for Green Technology
17. Export Credit Subsidy Program: Export Seller's Credits
18. Discovered Grants
19. Provision of Float Glass for LTAR
20. The Over-Rebate of VAT Program

THE SUBJECT PRODUCT

Commerce's Scope

Commerce has defined the scope of these investigations as follows:

> The merchandise covered by this investigation are crystalline silicon photovoltaic cells, and modules, laminates, and panels, consisting of crystalline silicon photovoltaic cells, whether or not partially or fully assembled into other products, including, but not limited to, modules, laminates, panels and building integrated materials.
>
> This investigation covers crystalline silicon photovoltaic cells of thickness equal to or greater than 20 micrometers, having a p/n junction formed by any means, whether or not the cell has undergone other processing, including, but not limited to, cleaning, etching, coating, and/or addition of materials (including, but not limited to, metallization and conductor patterns) to collect and forward the electricity that is generated by the cell.
>
> Subject merchandise may be described at the time of importation as parts for final finished products that are assembled after importation, including, but not limited to, modules, laminates, panels, building-integrated modules, building integrated panels, or other finished goods kits. Such parts that otherwise meet the definition of merchandise under consideration are included in the scope of this investigation.
>
> Excluded from the scope of this investigation are thin film photovoltaic products produced from amorphous silicon (a-Si), cadmium telluride (CdTe), or copper indium gallium selenide (CIGS).
>
> Also excluded from the scope of this investigation are crystalline silicon photovoltaic cells, not exceeding 10,000mm^2 in surface area, that are permanently integrated into a consumer good whose function is other than power generation and that consumes the

> electricity generated by the integrated crystalline silicon photovoltaic cell. Where more than one cell is permanently integrated into a consumer good, the surface area for purposes of this exclusion shall be the total combined surface area of all cells that are integrated into the consumer good.
>
> Modules, laminates, and panels produced in a third-country from cells produced in the People's Republic of China are covered by this investigation; however, modules, laminates, and panels produced in China from cells produced in a third country are not covered by this investigation.
>
> Merchandise covered by this investigation is currently classified in the Harmonized Tariff System of the United States (''HTSUS'') under subheadings 8501.61.0000, 8507.20.80, 8541.40.6020, 8541.40.6030, and 8501.31.8000. These HTSUS subheadings are provided for convenience and customs purposes; the written description of the scope of this investigation is dispositive.

Scope Issues at Commerce

During the preliminary phase of these investigations, on November 7, 2011, petitioner submitted to Commerce a scope clarification, which attempted to add the following paragraph to the original scope definition:

> These proceedings cover crystalline silicon PV cells, whether exported directly to the United States or via third countries; crystalline silicon PV modules/panels produced in the PRC, regardless of country of manufacture of the cells used to produce the modules or panels, and whether exported directly to the United States or via third countries, and crystalline silicon PV modules or panels produced in a third country from crystalline silicon PV cells manufactured in the PRC, whether exported directly to the United States or via third countries.

Commerce did not adopt this specific revision in its notice of initiation and invited parties to comment on the revision during the 20 day scope comment period. Commerce stated in its notice of initiation:

> Because Petitioner's November 7, 2011, scope submission was filed one day prior to the statutory deadline for initiation, the Department has had neither the time nor the administrative resources to evaluate Petitioner's proposed language regarding merchandise produced using inputs from third-country markets, or merchandise processed in third-country markets.[12]

The original scope definition and the proposed revision essentially raised the issue of whether four separate product categories may be included in the final scope definition. These categories are: (1) CSPV cells produced in China; (2) CSPV modules produced in China using CSPV cells produced in China; (3) CSPV modules produced in China using CSPV cells produced in a third-country; and (4) CSPV modules produced in a third country using CSPV cells produced in China. During the preliminary phase of these investigations, the parties appeared to agree that the first two product categories were properly covered by the original scope definition. At the staff conference, however, petitioner claimed that product categories 3 and 4 were always intended to be included in the original scope definition, but

[12] *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules from the People's Republic of China: Initiation of Antidumping Duty Investigation;* 76 FR 70960, November 16, 2011.

submitted the November 7, 2011 scope revision to Commerce to clarify its intention. Respondents claimed that according to their reading of the original scope definition only the first two product categories were properly within the scope of these investigations and the inclusion of product categories 3 and 4 would increase the scope of these investigations.[13]

After consideration of scope comments, Commerce, in its preliminary determinations, added the following language to the scope of these investigations:

> Modules, laminates, and panels produced in a third-country from cells produced in the People's Republic of China are covered by this investigation; however, modules, laminates, and panels produced in China from cells produced in a third country are not covered by this investigation.

Of the four product categories described above, this additional language added product category (4) to the scope of these investigations. Therefore, as defined by Commerce the scope includes the following categories: (1) CSPV cells produced in China; (2) CSPV modules produced in China using CSPV cells produced in China; and (4) CSPV modules produced in a third country using CSPV cells produced in China. In its preliminary determination, Commerce did not include, but instead explicitly excluded product category (3), which is CSPV modules produced in China using CSPV cells produced in a third-country.[14] In its final determination, Commerce did not modify the definition of the scope of these investigations from its preliminary phase investigation determination.[15]

Tariff Treatment

The subject merchandise is provided for in subheadings 8541.40.60 (statistical reporting numbers 8541.40.60.20 ("solar cells, assembled into modules or made up into panels") and 8541.40.60.30 ("solar cells, other")) of the Harmonized Tariff Schedule of the United States ("HTS"), and is free of duty under the general duty rate.[16] These products may also be imported as parts or subassemblies of goods provided for in subheadings 8501.31.80.00, 8501.61.00.00 and 8507.20.80.

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[13] Respondent CCCME's postconference brief, pp. 1-6.

[14] *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From the People's Republic of China: Preliminary Determination of Sales at Less Than Fair Value, Postponement of Final Determination and Affirmative Preliminary Determination of Critical Circumstances;* 77 FR 31309, May 25, 2012; *See also Scope Clarification: Antidumping and Countervailing Duty Investigations of Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, from the People's Republic of China,* Memorandum to Gary Taverman, Acting Deputy Assistant Secretary for Antidumping and Countervailing Duty Operations, March 19, 2012 (Commerce found that module assembly did not substantially transform the solar cell and thereby, the module's country of origin is the country of origin of the solar cell.).

[15] *See Issues and Decision Memorandum for the Final Determination in the Antidumping Duty Investigation of Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules, from the People's Republic of China,* Christian Marsh, Deputy Assistant Secretary for Antidumping and Countervailing Duty Operations, October 9, 2012, pp. 4-9 (affirming its preliminary substantial transformation determination).

[16] Generally, CSPV cells enter under HTS 8541.40.60.30 and solar modules under 8541.40.60.20.

Physical Characteristics and Uses

Solar CSPV systems convert sunlight into electricity for on-site use or for distribution through the electric grid. The main components of CSPV systems are modules (also commonly referred to as panels), which are comprised of cells that use crystalline silicon to convert sunlight into electricity. 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.[17]

Physical Characteristics

CSPV cells use crystalline silicon to convert sunlight to electricity and are the basic elements of a PV module (figure I-1). They have a positive layer, a negative layer and a positive-negative junction (p/n junction). Electricity is generated when sunlight strikes the cell, knocking electrons loose that flow onto thin metal "fingers" that run across the cell and conduct electricity to the busbars.[18] Most cells are five inches by five inches or six inches by six inches and have an output of 3 to 4.5 watts.[19]

Figure I-1
CSPV cell (left) and module (right)

Source: Petition, Exhibit I-11.

CSPV cells are interconnected and encapsulated between a backing material and a glass front. A frame is often added and a junction box is attached to form a complete module.[20] The junction box can be attached to other modules, an inverter (which converts the direct current generated by the system to alternating current), or, in the case of off-grid modules, a charge controller (which controls battery charging) and battery.[21] Typical on-grid modules have 60 to 72 cells and a power output of between 120 watts and more than 400 watts. They are generally around 62 to 78 inches long, 32 to 39 inches wide,

[17] Photovoltaics (PV) do not include solar water heat and concentrated solar power (CSP). While PV uses a photosensitive semiconductor material to convert sunlight directly to electricity, solar water heat uses sunlight to heat water and CSP uses reflected sunlight to generate steam or a vapor that turns a turbine to generate electricity. Petition, p. 21.

[18] Conference transcript, pp. 69–70 (Gordon); Petition, pp. 7–8, 17; Stephanie Chasteen and Rima Chaddha, "Inside a Solar Cell," http://www.pbs.org/wgbh/nova/solar/insi-nf.html.

[19] European Photovoltaic Industry Association (EPIA), *Solar Generation 6*, 2011, p. 20.

[20] Petition, pp. 8–9.

[21] Conference transcript, p. 73–74 (Brinser); Petition, exh. I-11, p. 14.

and 1.2 to 2 inches thick. Modules generally weigh between 34 and 62 pounds.[22] In addition to standard size modules, CSPV cells can be used in building integrated PV (BIPV), which are building materials that incorporate solar cells, such as solar shingles or solar windows (figure I-2).[23]

Figure I-2
Building integrated CSP

Source: Photos courtesy of U.S. Department of Energy (DOE)/National Renewable Energy Lab (NREL), credit Spire Solar Chicago (left) and Atlantis Energy, Inc. (right).

The two main types of CSPV cells and modules are monocrystalline silicon and multicrystalline (or polycrystalline) silicon. Monocrystalline cells are made from a single grown crystal and tend to have a higher conversion efficiency. Multicrystalline cells have a random crystal structure and tend to have a lower conversion efficiency (table I-1).[24]

[22] EPIA, *Solar Generation 6*, 2011, p. 20; Petitioners' postconference brief, Exhibit 28; Suntech, 290 Watt Polycrystalline Solar Module brochure; Suntech, 190 Watt Monocrystalline Solar Module brochure; Yingli, YGE 285 Series brochure; Trina Web site, http://www.trinasolar.com/us/products-us/mono-series-us?tab=Mono%20Series (accessed November 16, 2011); SunPower, E19/425 Solar Panel brochure.

[23] Petition, p. 8.

[24] Conversion efficiency is the percent of sunlight that is converted to electricity. String-ribbon cells are a type of multicrystalline cell produced via a different production method, as discussed below. Respondents' conference exh., p. 2; Petition, p. 8, 17; EPIA, *Solar Generation 6*, 2011, p. 25.

Table I-1
Share of monocrystalline and multicrystalline modules with efficiencies in each range, 2012

Module Efficiency	Multicrystalline (percent)	Monocrystalline (percent)
13% or less	***	***
13.1 to 14%	***	***
14.1 to 15%	***	***
15.1 to 16%	***	***
16.1 to 17%	***	***
17.1 to 18%	***	***
18.1% or higher	***	***
Total	100.0	100.0

Note: ***

Sources: ***

CSPV modules for grid-connected applications, whether residential, nonresidential, or utility, are generally the same regardless of the application, though the sizes that are most commonly used in each type of application may differ.[25] Off-grid CSPV modules are usually less than 200 watts and are often smaller than on-grid modules.[26] Off-grid modules may have different output voltages in order to charge batteries and often use fewer cells, and sometimes divided cells, to achieve the desired output.[27] Modules typically used in on-grid applications, such as a standard 240 watt monocrystalline module, may also be used in off-grid applications if that wattage module is required.[28] For example, a house that is not connected to the grid could use the same modules as a house that is connected to the grid.[29]

Uses

There are four primary market segments for CSPV cells and modules. There are three grid-connected market segments–residential, nonresidential, and utility–and an off-grid market. In the grid-connected market, installations are usually either ground-mounted or roof-mounted.[30] In addition to the

[25] Conference transcript, pp. 109 (Kilkelly) and pp. 221–222 (Efird).

[26] During the preliminary phase of these investigations, SolarOne Solutions, Inc. of Needham, MA, a seller of off-the-grid solar products testified that U.S. producers do not produce these products in the United States and that the Commission should find that these products are a separate domestic like product. Conference transcript, pp. 165-169 (Azzam). Petitioner stated that it did not produce these products in the United States and was not aware of any domestic production. Petitioner argued and the Commission determined that since there is no U.S. production of off-the-grid products, there can be no separate domestic like product and the issue is more appropriately addressed by Commerce as a scope exclusion request. Petitioner's postconference brief, exh. 1, pp. 20-21; Petitioner's prehearing brief, p. 14; *Crystalline Silicon Photovoltaic Cells and Modules from China*, Inv. Nos. 701-TA-481 and 731-TA-1190 (Preliminary), USITC Pub. 4295, December 2011, p. 11.

[27] Conference transcript, pp. 58–60 (Brinser and Kilkelly), 166–167 and 233–234 (Azzam), and 232 (King).

[28] Conference transcript, pp. 58–59 (Brinser).

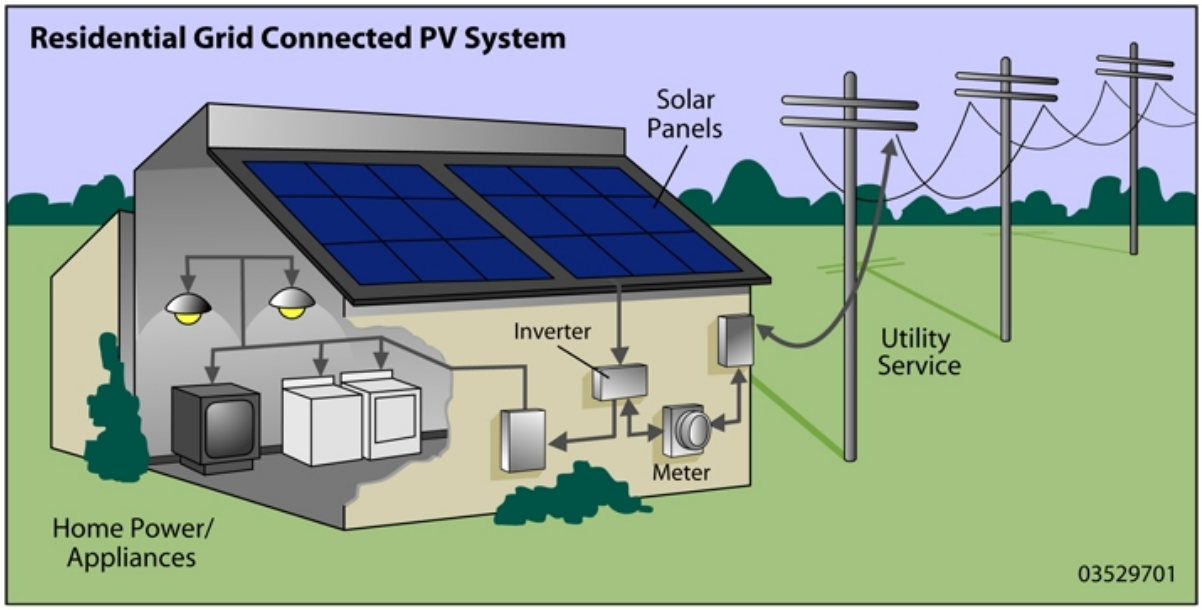
[29] Conference transcript, pp. 232–233 (King).

[30] Petition, pp. 17, 19; EPIA, *Solar Generation 6*, 2011, pp. 12–13.

module, there are a number of other components of the installation called the balance of system (BOS). The BOS includes components such as the inverter,[31] and the racking on which the system is installed.[32]

Residential grid-connected systems are installed at individual homes (figure I-3). CSPV modules are typically installed on the roof, though they can also be ground-mounted, and connected to an inverter. The system can use a central inverter, which converts the power from multiple modules, or each module can have its own microinverter attached. The electricity generated by the system is used for power in the individual home. Homeowners use grid energy when solar electricity generation is not sufficient to meet demand and often feed energy back into the grid when solar electricity generation exceeds home use. In the United States, the average size of a residential PV installation was 5.7 kilowatts (kW) in 2011, the same as in 2010.[33]

Figure I-3
Residential grid connected CSPV system



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

Nonresidential systems are installed at commercial, industrial, government, and similar buildings and sites (figure I-4). Nonresidential installations are typically larger than residential installations, with an average size of 81 kW in 2010, and are increasing in size, with the size of an average installation increasing by 43 percent from 2010 to 2011. However, they function similarly to residential installations,

[31] The inverter represented about 9.5 percent of the installed system cost for distributed PV systems in 2010. Galen Barbose, Naim Darghouth, Ryan Wiser, and Joachim Seel, *Tracking the Sun IV*, Lawrence Berkeley National Lab, September 2011, p. 16.

[32] The balance of system also includes the labor costs, permitting fees, etc. for installing a PV system. EPIA, *Solar Generation 6*, 2011, pp. 18–19; Sun Edison's postconference brief, DOE, *$1/W Photovoltaic Systems*, p. 18.

[33] CCCME postconference brief, exh. 41, Larry Sherwood, *U.S. Solar Market Trends 2010*, June 2011, pp. 5–7; Larry Sherwood, *U.S. Solar Market Trends 2011*, August 2012, p. 7; EPIA, *Solar Generation 6*, 2011, p. 12; Joseph McCabe, "Solar Electric System Basics," October 1, 2011, http://ases.org/index.php?option=com_content&view=article&id=1492&Itemid=211 (accessed November 16, 2011).

providing electricity to meet onsite needs, pulling additional electricity from the grid when needed, and feeding excess electricity back into the grid when it is not needed.[34]

Figure I-4
Installation of a nonresidential CSPV system

Source: Photos courtesy of DOE/NREL, credit Dennis Schroeder.

Utility systems are generally the largest systems, averaging more than 1,450 kW per installation in 2010, and provide electricity directly to the electric grid for sale to customers rather than for on-site use (figure I-5). These systems are generally ground-mounted and currently tend to use central inverters rather than microinverters.[35]

[34] CCCME postconference brief, exh. 41, Larry Sherwood, *U.S. Solar Market Trends 2010*, June 2011, pp. 5–7; EPIA, *Solar Generation 6*, 2011, p. 12; Larry Sherwood, *U.S. Solar Market Trends 2011*, August 2012, p. 7.

[35] CCCME postconference brief, exh. 41, Larry Sherwood, *U.S. Solar Market Trends 2010*, June 2011, pp. 5–7; Petition, p. 19; MJ Shiao, "Can Micro-Inverters Penetrate the Megawatt-Scale PV Market?" Greentech Solar, July 21, 2010, http://www.greentechmedia.com/articles/read/can-micro-inverters-penetrate-the-megawatt-scale-pv-market (accessed November 16, 2011).

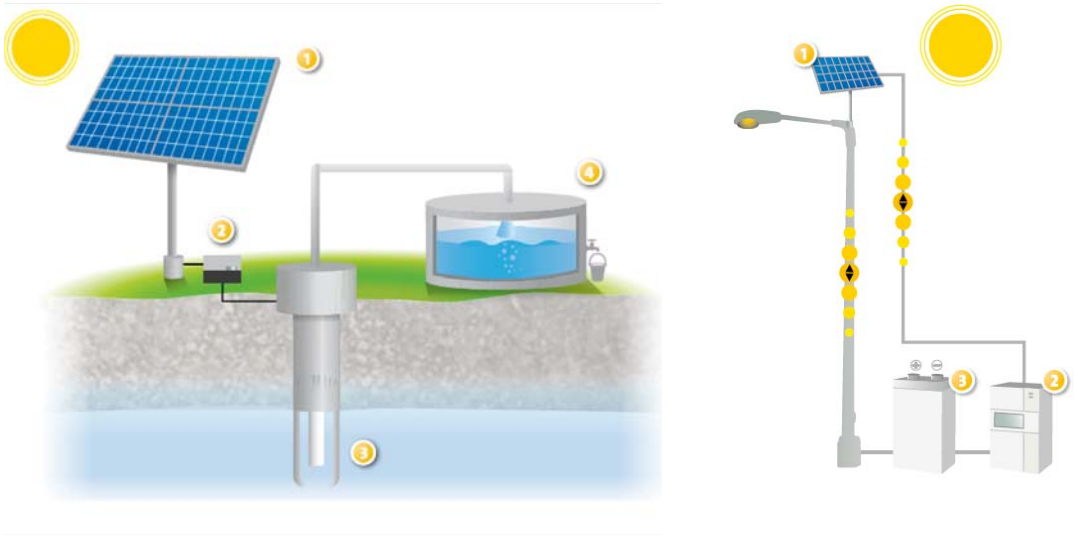
Figure I-5
LA Ola PV plant, a utility CSPV system on Lanai, Hawaii

Source: Photo courtesy of DOE/NREL, credit Jamie Keller.

The off-grid market includes a range of uses such as water pumping and purification systems, street lights, emergency phones, homes in remote locations, telecommunications systems, and military applications (figure I-6). These systems often have additional balance of system components, such as a battery and charge controller, though inverters are not needed for all off-grid applications.[36]

[36] SolarWorld, "Sunmodule for Off-grid Systems," pp. 3–6; Conference transcript, pp. 58–61 (Brinser and Kilkelly) and 166–67 (Azzam).

Figure I-6
Off-grid water pumping system (left) and light system (right)



1. Module
2. Control unit
3. Solar water pump
4. Water reservoir

1. Module
2. Charge controller
3. Battery

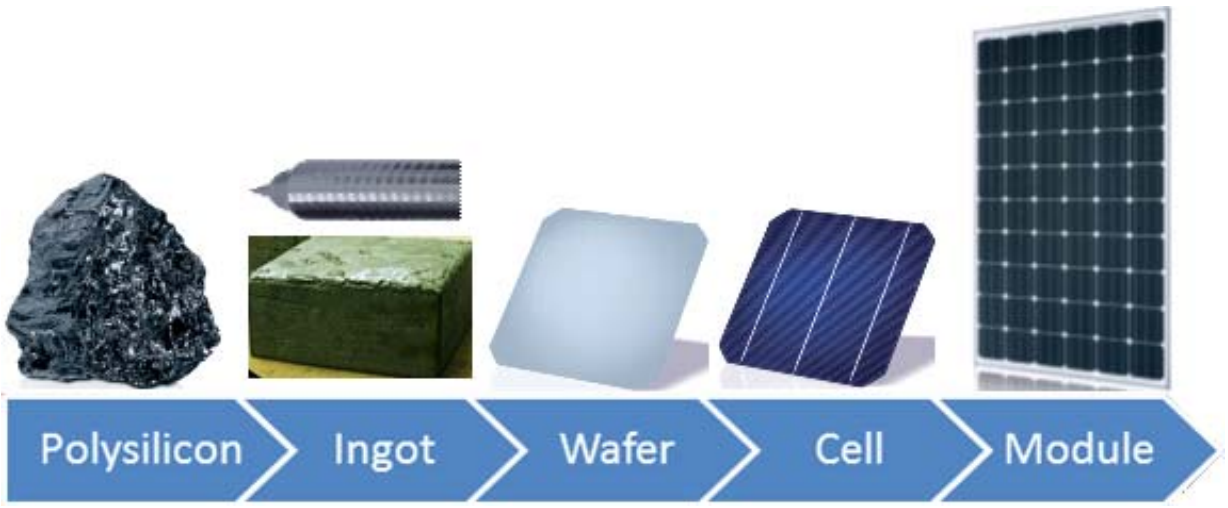
Source: SolarWorld, "Sunmodule for Off-grid Systems," 3.

Production Process

There are five principal stages of the CSPV value chain. First, polysilicon is refined, then it is formed into ingots, which are sliced into wafers, which are converted to cells that are assembled into modules, the finished product (figure I-7). These are discrete production steps that may be done in different plants or locations. Companies may source products at each stage of the value chain or produce the products in-house.[37] ***.[38] The ingot and wafer production process differs for monocrystalline and polycrystalline cells, as discussed below.

[37] Conference transcript, p. 116 (Brinser and Brightbill); Petitioner's postconference brief, p. 11.
[38] ***.

Figure I-7
CSPV production process



Note: For ingots, the top picture is a crystal used in monocrystalline wafers, while the bottom picture is an ingot used in making multicrystalline wafers.

Source: Petition, exh. I-11; ingot photo courtesy of DOE/NREL, credit John Wohlgemuth, Solarex; Petitioner's conference handouts, p. 6.

Silicon refining

The first step in the CSPV value chain is refining polysilicon. There are multiple approaches to polysilicon refining, but this discussion will focus on the Siemens method, which was used for almost 80 percent of the polysilicon produced in 2009.[39]

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 or more. Hydrogen and trichlorosilane gas are fed into the reactor. The silicon from the trichlorosilane is deposited onto the rods, which steadily increase in size until they are removed from the reactor about a week later. The resulting products are polysilicon chunks or rocks with purity of 99.9999 percent to 99.999999 percent (or 6N to 8N).[40]

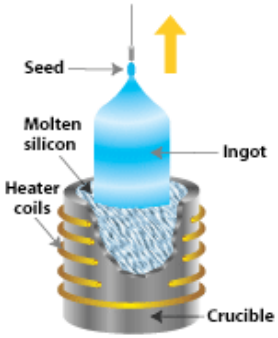
[39] Nitol Web site, http://www.nitolsolar.com/entechnologies (accessed November 6, 2011).

[40] REC Web site, "Glossary," http://www.recgroup.com/tech/glossary; Wacker Polysilicon, "The History of the Future: Fifty Years of Wacker Polysilicon," p. 7; Centrotherm Web Site, http://www.centrotherm.de/en/products-services/silicon-wafer/technology.html (accessed November 6, 2011); Nitol Web site, http://www.nitolsolar.com/entechnologies (accessed November 6, 2011).

Ingots and wafers for monocrystalline cells

In the Czochralski process[41] for producing crystals used in monocrystalline wafers, polysilicon rocks are first placed into a quartz crucible along with a small amount of boron, which is used to provide a positive electric orientation (figure I-8). The crucible is then loaded into a Czochralski furnace and heated to about 2,500 degree 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.[42] ***.[43]

Figure I-8
Czochralski process



Source: DOE, EERE Web site, http://www.eere.energy.gov/basics/renewable_energy/types_silicon.html (accessed November 5, 2011).

Once the crystal has cooled, it is processed into wafers. The top and tail (each end of the cylindrical crystal) are cut off ***. The remaining portion of the crystal (or ingot) is cut into equal length pieces *** and squared. In squaring, the rounded sides of the ingot are cut into four flat sides, leaving only rounded corners. A wire saw then cuts the ingots into wafers. ***.[44]

[41] The Czochralski process is discussed here as it is used by the petitioners and several of the respondents. Another process is the float-zone process which "produces purer crystals than the Czochralski method because the crystals are not contaminated by a crucible. In the float-zone process, a silicon rod is set atop a seed crystal and then lowered through an electromagnetic coil. The coil's magnetic field induces an electric field in the rod, which heats and melts the interface between the rod and the seed. Single-crystal silicon forms at the interface and grows upward as the coils are slowly raised." DOE, EERE Web site, http://www.eere.energy.gov/basics/renewable_energy/types_silicon.html (accessed November 5, 2011); Trina Solar, "Form 20-F," April 18, 2011, p. 39; Suntech, "Form 20-F," May 9, 2011, p. 37; Petition, Exhibit I-11.

[42] Petition, pp. 9–10 and exh. I-11; Suntech, "Form 20-F," May 9, 2011, p. 37.

[43] ***.

[44] Petition, p. 10 and exh. I-11; Suntech, "Form 20-F," May 9, 2011, p. 37; ***.

Ingots and wafers for multicrystalline cells

For multicrystalline ingots,[45] the first step is also loading polysilicon into a crucible. This crucible is then loaded into a directional solidification systems (DSS) furnace. In this furnace, the polysilicon is "cast into multicrystalline ingots under precise heating and cooling conditions."[46]

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. Finally, the blocks are sliced into wafers using a wire saw.[47] This process results in square wafers, while the multicrystalline process results in wafers with rounded corners.

Cells

The monocrystalline and polycrystalline wafers, which are 180 to 200 micrometers thick, are next processed into cells.[48] This step of the process is the "most capital intensive part of the manufacturing process."[49] It is "a highly automated, capital intensive, and technologically sophisticated process, requiring skilled technicians and employees with advanced degrees."[50] ***.[51]

First, the wafers are cleaned, then the surface of the wafer undergoes a chemical treatment which reduces the reflection of sunlight and increases light absorption.[52] In the next step, "phosphorus is diffused into a thin layer of the wafer surface. The molecular-level impregnation occurs as the wafer surface is exposed to phosphorus gas at a high heat, a step that gives the surface a negative potential electrical orientation. The combination of that layer and the boron-doped layer below creates a positive-negative, or P/N, junction–a critical partition in the functioning of a PV cell."[53]

Following diffusing, an antireflective coating is added to the PV cells and metals are then printed on the solar cell to collect the electricity. On the front of the cell these metals are printed in thin metal strips called fingers, which are connected to the rest of the module via busbars. ***. The final step in the process is the testing and sorting of the cells.[54]

Modules

The cells are next assembled into modules. Module assembly accounts for the majority of labor costs in the production process.[55] Petitioners note that module assembly "is more labor intensive than cell production, but nonetheless is still a highly automated and sophisticated process."[56] There is a trend in the industry toward more automation in module assembly, but some companies employ highly automated

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[45] Multicrystalline wafers can be produced using string-ribbon wafers, though this only accounts for a small share of global production. These were the types of products produced by Evergreen Solar. The wafers used in string-ribbon silicon cells are produced by "growing thin strips of silicon that are then cut into wafers." String-ribbon wafers use less silicon than other multicrystalline silicon wafers. Petition, exh. I-10, "Year of the Tiger," *Photon International*, March 2011, p. 208; Evergreen Solar, "Form 10-K," March 9, 2011, pp. 3–4.

[46] There is also increasing production of quasi-mono (also called mono-like or monocast) ingots and wafers. *** GT Advanced Technologies Inc., "Form 10-K," May 25, 2011, p. 9; ***.

[47] Suntech, "Form 20-F," May 9, 2011," p. 37; Yingli, "Form 10-K," May 5, 2011, p. 50.

[48] CCCME postconference brief, Exhibit 1, p. 25.

[49] Conference transcript, p. 42 (Brinser).

[50] Petition, p. 20.

[51] ***.

[52] Petition, exh. I-11; Suntech, "Form 20-F," May 9, 2011, p. 38; Yingli, "Form 20-F," May 5, 2011, p. 53.

[53] Petition, exh. I-11.

[54] Petition, exh. I-11; Suntech, "Form 20-F," May 9, 2011, p. 38; Yingli, "Form 20-F," May 5, 2011, 53; Conference transcript, p. 40 (Brinser); ***.

[55] Conference transcript, p. 231 (King).

[56] Petitioner's postconference brief, p. 6.

processes while others balance automation and manual labor.[57] Respondents note that module assembly in China and the United States use similar levels of automation.[58]

First, a string of cells is soldered together. ***. The cells are laid out in a rectangular matrix, *** that will provide the appropriate wattage and power requirements.[59] Typically a sealant is added, often EVA, and a back sheet is added.[60] The cells are then laminated in a vacuum and are cured.[61] At this stage the cells are referred to as a "laminate."[62] Frames are then usually attached to the laminate, and a junction box is attached to the back.[63] In the final step, modules are cleaned and inspected.[64]

DOMESTIC LIKE PRODUCT ISSUES

CSPV Cells & Modules vs. Thin Film Solar Products

During the preliminary and final phases of these investigations, the petitioner contended that the Commission should find one domestic like product coextensive with the scope of the investigations as identified by Commerce.[65] Respondents argued that the Commission should expand the definition of the domestic like product to include thin film solar products and include in the domestic industry those firms that produce those products.[66]

In its preliminary views, the Commission determined not to expand the domestic like product to include thin film solar products, but stated its intention to revisit the issue in the final phase of these investigations. Specifically, the Commission stated:

> We find that whether to expand the domestic like product beyond the scope to include thin film products is a close question. CSPV products and thin film products have different chemical compositions and physical characteristics that affect the inherent properties of each and may limit their interchangeability. In particular, thin film products tend to be less efficient than CSPV modules and thin film systems require more panels than CSPV systems to achieve comparable efficiencies and output. To a large degree, these distinctions result in the sales of thin film products being concentrated in the utility segment of the market, while CSPV systems are not so limited and are used more broadly in all market segments. When serving different market segments, they are generally sold in different channels of distribution. Finally, the parties agree that prices for CSPV and thin film products differ on a per watt basis, with a total film system generally more expensive than a total CSPV system of the same capacity. The evidence, however, is mixed as to whether the established PV technology and newer thin film product technology are perceived by producers and customers to compete with each other.

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[57] Canadian Solar, "Form 20-F," May 17, 2011, pp. 31-32; Jessica Lillian, "Further Automation, Improved Encapsulants Reshape Module Assembly," *Solar Industry*, April 2011, 40, 42; Trina Solar Ltd., "Form 20-F," April 18, 2011, 40; Conference transcript, pp. 230–231 (Efird) and 231 (King).

[58] Conference transcript, p. 231 (King).

[59] Petition, exh. I-11; ***.

[60] Conference transcript, p. 42–43 (Brinser).

[61] Petition, exh. I-11; Yingli, "Form 20-F," May 5, 2011, 54; Suntech, "Form 20-F, May 9, 2011, 38.

[62] Conference transcript, p. 40–41, 73 (Brinser).

[63] Petition, p. 12 and exh I-11; Conference transcript, p. 41 (Brinser).

[64] Petition, exh. I-11.

[65] Petition, p. 16; Petitioner's postconference brief, "Answers to Questions from Staff," exh. 7; Petitioner's prehearing brief, pp. 10-14 and exh. 8.

[66] Respondent CCCME's postconference brief, pp. 7-17; Respondent Sun Edison's postconference brief, pp. 5-17; Respondent CCCME's prehearing brief, pp. 4-16.

Based on the evidence in the record, we do not expand the definition of domestic like product beyond the scope to include thin film products. We will, however, revisit this issue in any final phase investigations. [67]

Thin Film Photovoltaic (PV) Cells and Modules–Definition and Background

Thin film cells and modules use a several micron thick layer of either amorphous silicon (a-Si), cadmium telluride (CdTe), copper indium (gallium) (di)selenide (CIS or CIGS), or a combination of a-Si and micro-crystalline silicon (µc-Si) to convert sunlight to electricity (figure I-9).[68] CdTe modules are typically on glass while a-Si and CIGS can be on glass or a flexible substrate such as stainless steel or plastic (figure I-9).[69] A typical CdTe module is about 47 inches long, 24 inches wide, and 0.27 to 0.32 inches thick and weighs between 26.5 and 28.7 pounds. CdTe modules generally have an output ranging from about 65 to 88 watts.[70] Sharp's multijunction a-Si and µc-Si on glass is about 56 inches long, 40 inches wide, and 1.8 inches thick and weighs about 42 pounds, though its frameless module is about 0.29 inches thick. The output for these Sharp modules ranges from 121 watts to 142 watts.[71] However, many thin film modules, particularly amorphous silicon and CIGS modules, have a broader range of sizes given the different substrates that can be used and the flexibility those substrates allow in module size selection. For example, one of United Solar's products was available in lengths of 109.1 inches or 213.1 inches and with a power output of 68 watts (for the shorter module) or more than 130 watts (136 or 144 watts). The modules had the same width (14.7 inches) and thicknesses (0.12 inches), and weighed either 8.5 pounds or 16.2 pounds.[72] Thin film module outputs generally range from 60 watts to 350 watts.[73] Thin film products can also be used in building integrated products such as solar shingles.[74]

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[67] *Crystalline Silicon Photovoltaic Cells and Modules from China*, Inv. Nos. 701-TA-481 and 731-TA-1190 (Preliminary), USITC Pub. 4295, December 2011, pp. 9-10.

[68] Other PV technologies that have been produced commercially on a small scale (i.e., 30 MW or less of global production in 2009) "include fully organic PV (OPV) and hybrid dye-sensitized solar cells (DSSC)." OPV and DSSC cells in commercial production or on large surfaces have efficiencies of less than 4 percent. EPIA, *Solar Generation 6*, 2011, 25.

[69] Solarbuzz Web site, "Technologies," http://www.solarbuzz.com/going-solar/understanding/technologies (accessed November 14, 2011); EPIA, *Solar Generation 6*, 2011, 22–23; CCCME postconference brief, exh. 1, p. 25.

[70] First Solar, First Solar FS Series 2 PV Module brochure; First Solar, First Solar FS Series 3 PV Module brochure; Abound Solar, AB1 Series Thin-Film Photovoltaic Module brochure; GE Web site, http://www.ge-energy.com/products_and_services/products/solar_power/cdte_thin_film_solar_module78.jsp (accessed November 17, 2011).

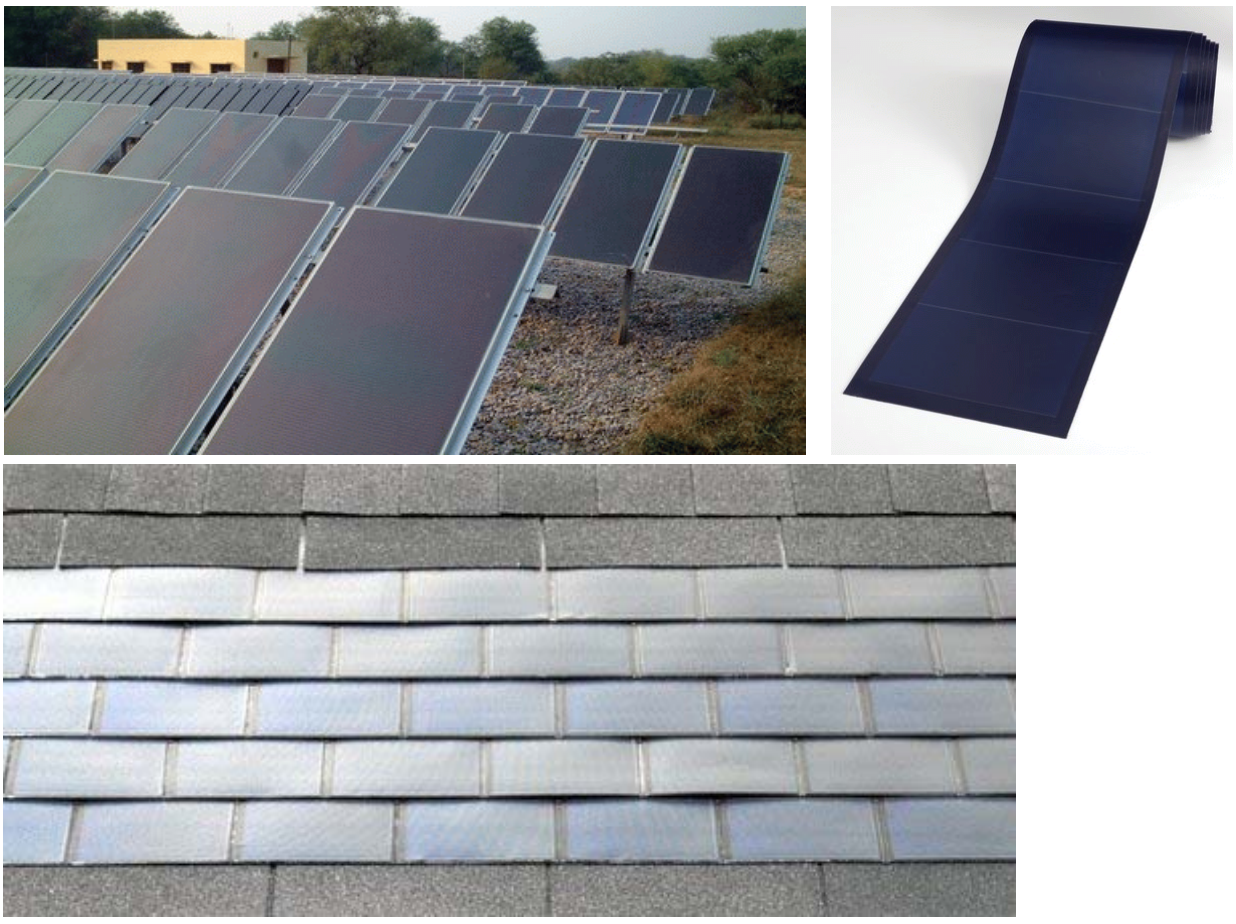
[71] Sharp, 135 Watt Thin Film Module brochure; Sharp, 135 Watt Frameless, Glass-on-Glass Thin Film Module brochure; Sharp Web site, http://www.sharpusa.com/SolarElectricity/SolarProducts/UtilityScaleProducts.aspx (accessed November 17, 2011).

[72] EPIA, *Solar Generation 6*, 2011, p. 23; United Solar, PowerBond ePVL brochure.

[73] EPIA, *Solar Generation 6*, 2011, p. 23.

[74] EPIA, *Solar Generation 6*, 2011, p. 22; United Solar Web site, http://www.uni-solar.com/products/residential-products/powershingle-2 (accessed November 17, 2011).

Figure I-9
Ground mounted thin film installation (left), flexible a-Si module (right), and thin film solar shingles (bottom)



Source: Photos courtesy of DOE NREL, credit Peter McNutt (left) and United Solar Ovonic (right and bottom).

Domestic thin film module shipments in 2011 had an average conversion efficiency of 11 percent.[75] Conversion efficiencies vary by technology type and there is some overlap in the efficiencies of the various technologies (table I-2).[76] Thin film modules are capable of generating power in low light conditions, such as early in the morning or late in the day.[77]

[75] Petitioner's posthearing brief, exh. 22, U.S. Energy Information Administration (EIA), *Solar Photovoltaic Cell/Module Shipments Report 2011*, September 2012, p. 7.

[76] EPIA, *Solar Generation 6*, 2011, p. 25.

[77] Conference transcript, p. 125 (Efird); CCCME postconference brief, p. 11.

Table I-2
Thin film commercial module efficiencies, 2010

Module type	Module efficiency *(percent)*
Amorphous silicon	4 to 8
Cadmium telluride	10 to 11
Copper indium (gallium) (di)selenide	7 to 12
Multijunction amorphous silicon and microcrystalline silicon	7 to 9
Note: For modules currently in commercial production. Source: EPIA, *Solar Generation 6*, 2011, p. 25.	

Thin film PV systems convert sunlight into electricity for use on-site or for distribution through the electric grid. Thin film systems can be ground-mounted or roof-mounted and also generally require an inverter and other balance of system components, though flexible thin films may not require the same racking as modules on glass.[78]

Thin film modules can be used in all three of the major grid-connected market segments—residential, nonresidential, and utility—and in the off-grid market. Shipments of thin film modules to the residential sector in 2011 totaled 35 MW, shipments to the nonresidential (commercial and industrial) sector totaled 50 MW, and shipments to the electric power sector totaled 86 MW.[79] However, depending on the technology and substrate, the number of market segments in which thin film modules produced by particular companies are used may vary.[80] For example, the primary applications of flexible a-Si and CIGS modules are generally the residential and nonresidential markets, particularly the building integrated market and on rooftops that are not able to hold a significant amount of weight (due to the modules' flexibility and light weight).[81] In contrast, CdTe modules on glass are primarily sold in the

[78] A diagram of a residential installation would be the same as in figure I-3.

[79] Thin film accounted for 4.7 percent of total shipments to the residential sector in 2011, 3.5 percent of shipments to the nonresidential (commercial and industrial) sector, and 11.3 percent of shipments to the electric power sector. Total shipments in EIA data include thin film, CSPV, and non-subject concentrating photovoltaic modules, and include off-grid applications within each sector. Petitioner's posthearing brief, exh. 22, EIA, *Solar Photovoltaic Cell/Module Shipments Report 2011*, September 2012, p. 16.

[80] First Solar, "Form 10-K," February 28, 2011, pp. 1, 4; Energy Conversion Devices, "Form 10-K," August 25, 2011, pp. 1–2; Ascent Solar Technologies, "Form 10-K," February 28, 2011, p. 2–3; Dow, "Industry First: DOW POWERHOUSE Solar Shingle Protects and Powers the Home," News release, January 19, 2010; Abound Web site, http://www.abound.com/solar-modules/manufacturing (accessed November 17, 2011); Stion Web site, http://www.stion.com/applications.html (accessed November 17, 2011); Solar Frontier Web site, http://www.solar-frontier.com/Projects/Gunkul+Megasolar/70 and http://www.solar-frontier.com/Projects/Gunkul+Megasolar/70&page=2&ct= (accessed November 17, 2011).

[81] Energy Conversion Devices, "Form 10-K," August 25, 2011, pp. 1–2; Ascent Solar Technologies, "Form 10-K," February 28, 2011, pp. 2–3; Dow, "Industry First: DOW POWERHOUSE Solar Shingle Protects and Powers the Home," News release, January 19, 2010.

nonresidential and utility market segments.[82] CIGS modules on glass are used in all three of the major grid-connected market segments and in the off-grid market.[83]

Production Process

The thin film production process often varies by company and technology, with companies often employing proprietary production processes.[84] In general, a thin layer of the photosensitive material (a-Si, CdTe, CIGS, etc.) is deposited directly onto a glass, stainless steel, or plastic substrate via physical vapor deposition, chemical vapor deposition, electrochemical deposition, or a combination of methods. For CdTe modules on glass, the process is continuous and automated, with a piece of glass entering the production line every ten seconds and emerging on the other end as a complete module in about two hours, according to Abound Solar's production rate. First Solar notes that there are three main stages in the CdTe production process: (1) in the deposition stage, a layer of cadmium sulfide is applied and then a layer of cadmium telluride; (2) in the cell definition stage, lasers are used to create interconnected cells; and (3) in the third stage, busbars, an inter-laminate material, and a rear piece of glass are added, the module is laminated, and a junction box and wires are added. For modules on a flexible substrate, a roll to roll manufacturing process is used, whereby a long roll of the plastic or stainless steel substrate is unrolled as it moves through production equipment that deposits the photosensitive material, such as through vacuum deposition (figure I-10). In some cases this results in a more manual module assembly process as the roll is cut into individual cells that are interconnected and then laminated to form the module.[85]

[82] First Solar, "Form 10-K," February 28, 2011, p. 4; Abound Web site, http://www.abound.com/solar-modules (accessed November 17, 2011).

[83] Stion Web site, http://www.stion.com/applications.html (accessed November 17, 2011); Solar Frontier Web site, http://www.solar-frontier.com/Projects/Gunkul+Megasolar/70 and http://www.solar-frontier.com/Projects/Gunkul+Megasolar/70&page=2&ct= (accessed November 17, 2011).

[84] This section provides a general overview of thin film production techniques and includes some specific examples, but does not cover all possible production methods.

[85] EPIA, *Solar Generation 6*, 2011, p. 22–24; DOE, EERE Web site, http://www.eere.energy.gov/basics/renewable_energy/polycrystalline_thin_film.html (accessed November 17, 2011); Record of Categorical Exclusion for SoloPower, Inc.; SoloPower Web site, http://www.solopower.com/solopower-launches-breakthrough-flexible-cigs-module-product-line.html (accessed November 17, 2011); Ascent Solar Technologies, "Form 10-K," February 28, 2011, p. 2, 4, 8–9; Energy Conversion Devices, "Form 10-K," August 25, 2011, p. 2; First Solar, "Form 10-K," February 28, 2011, p. 3; Abound Web site, http://www.abound.com/solar-modules/manufacturing (accessed November 17, 2011).

Figure I-10
Roll to roll CIGS production equipment (left) and CIGS on a flexible substrate (right)

Source: Photos courtesy of DOE/NREL, credit Global Solar Energy.

U.S. Producers of Thin Film Solar Products

The Commission received U.S. producer questionnaires from seven firms that reported that they produced thin film solar products in the United States during the period of investigation. Table I-3 presents the list of reporting U.S. producers of thin film solar products with each company's U.S. production location(s), 2011 reported production, share of total 2011 production, and whether that firm also produced CSPV cells or modules.

Table I-3
Thin film solar products: U.S. producers of thin film solar products, U.S. production locations, and shares of U.S. production in 2011

Firm	Production location	Reported 2011 U.S. production *(kilowatts)*	Share of reported 2011 U.S. production (*percent*)	Also a producer of CSPV cells or modules? (Yes/No)
Ascent[1]	Thornton, CO	***	***	***
First Solar	Tempe, AZ Perrysburg, OH	***	***	***
GE[2]	Arvada, CO	***	***	***
Global Solar[3]	Tucson, AZ	***	***	***
HelioVolt	Austin, TX	(4)	(4)	***
PowerFilm	Ames, IA	(4)	(4)	***
Stion	San Jose, CA Hattiesburg, MS	***	***	***
Total		***	100.0	

[1] Ascent Solar Technologies, Inc. ("Ascent").
[2] GE Energy (USA), LLC ("GE") is a wholly owned subsidiary of General Electric Corp. of Fairfield, CT. PrimeStar Solar, Inc. of Arvada, CO is the GE affiliate engaged in the development of thin film solar products. PrimeStar has not yet begun commercial production. Effective January 4, 2010, GE sold its CSPV business to Motech, and therefore no longer produces both CSPV and thin film solar products.
[3] Global Solar Energy, Inc. ("Global Solar") is 65 percent owned by Mithril GmbH of Frankfurt, Germany, 19 percent owned by Solon SE of Berlin, Germany, and 16 percent owned by I-Sol Ventures GmbH of Berlin, Germany.
[4] HelioVolt and PowerFilm did not provide the Commission with usable data and are not included in Appendix C, table C-5.

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

Appendix C, table C-5 compiles the U.S. industry data reported by thin film solar producers. Appendix C, table C-6 combines the U.S. industry data for both U.S. producers of CSPV modules and U.S. producers of thin film solar products.[86]

During the period of investigation, a number of U.S. producers of thin film solar products have either entered or exited the market. Table I-4 shows a time line of when U.S. producers of thin film solar products either entered or exited the U.S. market during the period of investigation.

[86] In 2011, First Solar accounted for approximately ***. *PV News*, Volume 31, Number 5, May 2012, pp. 8-10.

Table I-4
Thin film solar products: Listing of U.S. firms with thin film production facilities opening and/or closing, 2009-August 2012

Company	2009		2010		2011		2012	
	January to June	July to December	January to June	July to December	January to June	July to December	January to June	July to August
Abound	Opened plant in CO						Ceased production in CO and filed for bankruptcy	
AQT Solar				Opened plant in CA				Reportedly seeking to sell IP and assets
Ascent	Started production in CO		Started production at larger plant in CO					
EPV Solar			Filed for bankruptcy[1]					
First Solar							Indicated opening of new plant in AZ indefinitely delayed	
GE								Suspended construction of plant in CO[2]
Global Solar	No known plant openings or closings							
Heliovolt	No known plant openings or closings							
International Solar Electric Technology (ISET)		Stated pilot production in CA						
Konarka							Filed for bankruptcy	
MiaSole		Started commercial shipments from plant in CA					Announced reorganization and reduction in manufacturing operations	
Nanosolar				Started mass production of cells in CA				

Table continued on next page

Table I-4--*Continued*
Thin film solar products: Listing of U.S. firms with thin film production facilities opening and/or closing, 2009-August 2012

Company	2009		2010		2011		2012	
	January to June	July to December	January to June	July to December	January to June	July to December	January to June	July to August
Powerfilm	No known plant openings or closings							
Sencera		Opened commercial scale production lines in NC[3]						
Solopower							Started test runs at plant in OR and indicated plant expected to open later in the year	
Solyndra				Opened new plant in CA and closed older CA plant		Suspended manufacturing in CA and filed for bankruptcy		
Stion						Opened plant in MS		
United Solar				Closed module assembly lines in MI (continued cell production in MI)		Suspended manufacturing operations in MI	Filed for bankruptcy	
Xunlight	Completed installation of first production line in OH							

[1]EPV closed its manufacturing plant in NJ in 2009
[2]GE acquired Primestar solar, which has a 30 MW production plant in Colorado.
[3]Exact dates that increased production capacity to 50 MW not available.

Note:–Does not include increases in production capacity at existing plants. In addition to the plants listed above, Dow had pilot production of solar shingles at a plant in Michigan as of 2011 and was building a larger plant to produce solar shingles. Since most plants produce both cells and modules, this table does not refer separately to cell and module plants unless the change in production is specifically related to either cells or modules.

Source:–Compiled from public research material.

Shipments of U.S.-manufactured thin film modules decreased from 426 MW in 2010 to 367 MW in 2011.[87] According to a trade industry publication, the leading U.S. producers of thin film cells in 2011 were First Solar (240 MW), MiaSole (60 MW), United Solar (50 MW), Abound Solar (40 MW), and Solyndra (40 MW).[88] As noted in table I-4, United Solar, Abound Solar, and Solyndra have filed for bankruptcy protection.

Commission's Six-factor Domestic Like Product Analysis

The Commission's decision regarding the appropriate domestic products that are "like" the subject imported products is based on a number of factors including: (1) physical characteristics and uses; (2) common manufacturing facilities, production processes, and production employees; (3) interchangeability; (4) customer and producer perceptions; (5) channels of distribution; and (6) price. The following sections provide information regarding these factors provided by the parties. In these final phase investigations, the Commission collected data regarding thin film solar products in its questionnaires.[89]

Physical Characteristics and Uses

In the preliminary and final phases of these investigations, petitioner argued that CSPV cells and thin film solar products use completely different raw material inputs and production technologies. It also stated that the two products have different efficiency and energy output rates with thin film solar products being less efficient and producing a lower wattage rate than CSPV cells.[90] Respondents argued that both products share the same physical characteristics and end uses stating that both products are laminated products that capture sunlight and convert it to electricity by a photovoltaic effect. They also stated that although thin film solar products may be generally less efficient by generating less electricity per square meter they are able to generate electricity with lower levels of sunlight.[91] Respondents argued that although the basic raw material input for CSPV cells, crystalline silicon, may not be used in thin film solar products, the material used for sunlight absorption only accounts for approximately 23 percent of the total cost of a CSPV module and less than 8 percent of the cost of a thin film module.[92]

Of the nineteen U.S. producers of CSPV and/or thin film solar products, ten reported that thin film solar products did have the same or similar physical characteristics as CSPV cells and modules.[93] Of the forty-nine responding U.S. importers, twenty-eight reported that thin film solar products did have the same or similar physical characteristics as CSPV cells and modules.[94]

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[87] Petitioner's posthearing brief, exh. 22, EIA, *Solar Photovoltaic Cell/Module Shipments Report 2011*, September 2012, p. 9; EIA, *Solar Photovoltaic Cell/Module Shipments Report 2010*, January 2012, p. 9.

[88] Petitioners' prehearing brief, exh. 6C, Hering, Garrett, "Enter the Dragon," *Photon International*, March 2012, pp. 150–151.

[89] U.S. producers and U.S. importers were asked in the Commission's questionnaire about the Commission's six domestic like product factors. Their narrative responses are presented in Appendix E.

[90] Petition, pp. 17-18; Petitioner's postconference brief, exh. 1, pp. 11-13 and exh. 28 (product specifications comparisons, by company); Petitioner's prehearing brief, pp. 10-14 and exh. 8.

[91] Respondent CCCME's postconference brief, pp. 8-11; Respondent CCCME's prehearing brief, pp. 8-11.

[92] Respondent Sun Edison's postconference brief, p. 7.

[93] Responses to U.S. producer questionnaire, question II-19.

[94] Responses to U.S. importer questionnaire, question II-9.

Common Manufacturing Facilities, Production Processes, and Production Employees

In the preliminary and final phases of these investigations, petitioner stated that the production processes and manufacturing facilities for CSPV cells and thin film products are completely different. It stated that the thin film production process uses entirely different inputs and bypasses an essential step in CSPV cell production process, namely the production of the silicon crystal and wafer. Thin film solar products, by contrast, are produced by directly placing thin layers of photovoltaic material onto a substrate. These photovoltaic materials most commonly consist of amorphous silicon, cadmium telleride, and copper indium gallium selenide, materials not used in the production of CSPV cells.[95] Respondents agreed that the two product types do not share common manufacturing facilities, production process, and production employees.[96]

Of the nineteen U.S. producers of CSPV and/or thin film solar products, eighteen reported that the production process of thin film solar products differed from that of CSPV cells and modules.[97] Of the forty-nine responding U.S. importers, thirty-seven reported that the production processes between the two product types differed substantially.[98] Only *** reported producing both CSPV and thin film solar products during the period of investigation. ***.

Interchangeability

In the preliminary and final phases of these investigations, petitioner stated that because of the different physical characteristics of the two products, especially efficiency and output rates, the interchangeability of CSPV cells and thin film solar products is limited. Therefore, thin film solar products need more surface area to generate the same amount of electricity that can be generated by CSPV cells, and thus, are less suitable for roof-top residential and commercial applications. Because of the larger geographic areas needed for thin film solar products, petitioner alleged that they are typically used in the utility market segment, which is a relatively small segment for solar applications accounting for approximately *** percent of total U.S. installations in the second quarter of 2011.[99] Respondents claimed that the two product types are interchangeable in the marketplace and compete in utility sector as well as the residential and commercial roof-top sectors.[100] Respondent Sun Edison stated that it purchases both CSPV cells and thin film solar products for its solar power systems and determines which product to use in a given project based on a number of factors including ***.[101]

Of the nineteen U.S. producers of CSPV and/or thin film solar products, eleven reported that they believed thin film solar products not to be interchangeable with CSPV cells and modules.[102] Of the forty-nine responding U.S. importers, twenty-seven reported that they believed that the two product categories are not interchangeable.[103]

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[95] Petition, pp. 20-21; Petitioner's postconference brief, exh. 1, pp. 8-10; Petitioner's prehearing brief, pp. 10-11 and exh. 8.

[96] Respondent CCCME's postconference brief, p. 15; Respondent CCCME's prehearing brief, p. 16.

[97] Responses to U.S. producer questionnaire, question II-19.

[98] Responses to U.S. importer questionnaire, question II-9.

[99] Petition, pp. 18-19; Petitioner's postconference brief, exh. 1, pp. 14-15; Petitioner's prehearing brief, p. 12 and exh. 8.

[100] Respondent CCCME's postconference brief, pp. 11-12; Respondent CCCME's prehearing brief, pp. 12-13.

[101] Respondent Sun Edison's postconference brief, pp. 9-10. Respondent Sun Edison agreed that thin film solar products are not used as prevalently in the residential and commercial rooftop sectors, but cited a number of examples of thin film solar products being used in those sectors. Ibid., at pp. 7-8.

[102] Responses to U.S. producer questionnaire, question II-19.

[103] Responses to U.S. importer questionnaire, question II-9.

Customer and Producer Perceptions

In the preliminary and final phases of these investigations, petitioner stated that customers and producers generally perceive CSPV cells to be the established PV technology with higher efficiency and thin film solar products to be a newer, less established and less efficient technology.[104] Respondents claimed that customers and producers perceive both products to be similar and in direct competition with one another. Respondents cited the largest producer of thin film solar product, First Solar's 2010 annual report in which it states that manufacturers of CSPV cells are among its main competitors. Respondents also claimed that customers, especially large solar project developers, will consider bids for both types of technology.[105]

Of the nineteen U.S. producers of CSPV and/or thin film solar products, eleven reported that their customers perceive thin film solar products not to be similar to CSPV cells and modules.[106] Of the forty-nine responding U.S. importers, twenty-six reported that their customers perceived the products similarly.[107]

Channels of Distribution

In the preliminary and final phases of these investigations, petitioner stated that there are three primary market segments: (1) utilities; (2) commercial; and (3) residential. According to petitioner, CSPV products compete in all markets whereas thin film solar products are highly concentrated in the utility sector. The utility market segment is a relatively small segment for solar applications accounting for approximately *** percent of U.S. installations in the second quarter of 2011. Petitioner argued that the utility sector generally purchases its solar panels in direct negotiations between the solar producer and the utility or developer whereas residential and commercial applications are generally sold from solar producer to distributor or installer and then to end user.[108] Respondents claimed that the channels of distribution for both products are identical whereby both products are sold directly to utilities and sold to wholesalers and distributors to be sold in the residential and commercial roof-top sector.[109]

Of the nineteen U.S. producers of CSPV and/or thin film solar products, twelve reported that thin film solar products did share the same channels of distribution as CSPV cells and modules.[110] Of the forty-nine responding U.S. importers, thirty-four reported that the two product categories did share the same channels of distribution.[111]

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[104] Petition, p. 20; Petitioner's postconference brief, exh. 1, p. 19; Petitioner's prehearing brief, pp. 13-14 and exh. 8.

[105] Respondent CCCME's postconference brief, pp. 12-14; Respondent CCCME's prehearing brief, pp. 14-15.

[106] Responses to U.S. producer questionnaire, question II-19.

[107] Responses to U.S. importer questionnaire, question II-9.

[108] Petition, pp. 19-20; Petitioner's postconference brief, exh. 1, pp. 16-18; Petitioner's prehearing brief, p. 13 and exh. 8.

[109] Respondent CCCME's postconference brief, p. 12; Respondent Sun Edison's postconference brief, p. 13; Respondent CCCME's prehearing brief, pp. 13-14.

[110] Responses to U.S. producer questionnaire, question II-19.

[111] Responses to U.S. importer questionnaire, question II-9.

Price

In the preliminary and final phases of these investigations, petitioner maintained that because CSPV cells and thin film solar products use different production technology and raw material inputs, the two products' respective cost structures and therefore their respective prices are different. According to petitioners, thin-film solar products are generally less costly to produce and are priced lower than CSPV cells.[112] Respondents argued that although thin film solar products may be priced less on per-watt basis, they are priced comparably to CSPV cells on a system-wide basis due to the additional costs necessary to accommodate the less efficient thin-film solar products such as more land, more labor, more structure, and more wiring.[113] Respondent Sun Edison stated that it believes thin film solar products to be the price leaders in the solar module market and that the lower production costs of thin film solar products push down the prices of CSPV cells.[114]

Of the nineteen U.S. producers of CSPV and/or thin film solar products, twelve reported that generally CSPV cells and modules are priced higher than thin film solar products.[115] Of the forty-nine responding U.S. importers, thirty-five reported that CSPV cells and modules are priced higher than thin film solar products.[116]

[112] Petition, p. 21; Petitioner's postconference brief, exh. 1, p. 11; Petitioner's prehearing brief, p. 12 and exh. 8.
[113] Respondent CCCME's postconference brief, pp. 16-17; Respondent CCCME's prehearing brief, pp. 16-17.
[114] Respondent Sun Edison's postconference brief, p. 16.
[115] Responses to U.S. producer questionnaire, question II-19.
[116] Responses to U.S. importer questionnaire, question II-9.

PART II: CONDITIONS OF COMPETITION IN THE U.S. MARKET

U.S. MARKET CHARACTERISTICS

CSPV modules are made of CSPV cells that convert sunlight into electricity and can be used in both on-grid and off-grid installations. Modules vary in sizes, nominal power output, and efficiencies. Typical on-grid modules have 60 to 72 cells and a power output of between 120 watts and 300 watts.[1] As discussed in Part I, the three on-grid market segments are residential, commercial, and utility. The residential market segment consists primarily of installations by home or building owners in order to generate electricity for use on site. Some residential installations may be owned by a third-party lessor who sells the electricity to a residential client.[2] The commercial market segment consists primarily of building owners seeking to generate electricity for use on site, and may also be provided by third-party lessors. The utility market segment is primarily installations owned by utility companies or third parties where the electricity is generated for a power grid.[3] [4] According to a historical report summarizing the U.S. PV industry, the U.S. PV market has been largely driven by national, state, and local government incentives.[5] In addition, industry association sources note the role Federal and state incentives have had on business cycles and demand.[6]

Channels of Distribution

CSPV modules are sold primarily through four channels of distribution (distributors, residential installers, commercial installers, and utility co/developers).[7] [8] As shown in table II-1, the majority of U.S.-produced modules were sold to commercial installers in 2009 through June 2011, after which a

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[1] Petitioner asserts that the 60 cell module is the industry standard and is widely used in all market segments: commercial, residential, and utility and that the "72 cell module is a recent entry into the utility scale." Hearing transcript, p. 27 and p. 88 (Brinser). Of the respondents, Suntech stated that it sells both the 60 cell and 72 cell modules, and it asserts that the 72 cell module is preferred for utility scale projects because it is more cost efficient per watt and has a lower overall balance of system costs than a 60 cell module because fewer panels need to be installed when using the larger module. Hearing transcript, p. 299 (Beebe); and Respondent's posthearing brief, exhibit 5, p. 18.

[2] According to Solar Energy Industries Association (SEIA), third-party ownership in the residential solar sector has increased, particularly over the last one to two years. SEIA, "Executive Summary," U.S. Solar Market Insight, Q2 2012, 6. See *Financing* in Part II for further discussion.

[3] Interstate Renewable Energy Council (IREC), "U.S. Solar Market Trends 2010," June 2011, p. 5.

[4] Utility scale projects often involve a bidding process. Respondents assert that, with utility projects, there are two contracts being negotiated at the same time: "one for the Engineering, Procurement, and Construstion ("EPC") firm for the construction of the project and one for the Power Purchase Agreement ("PPA") for the sale of electricity to the utility company." Respondent's posthearing brief, exhibit 2, p. 15.

[5] Barbose, Galen et al., "Tracking the Sun IV," September 2011, p. 5.

[6] The SEIA reports that as a result of the expected expiration of the Section 1603 Treasury Cash Grant program in December 31, 2010, during the summer of 2010 many project developers initiated projects to meet the start-construction deadline at the end of 2010. The program was ultimately extended through December 31, 20ll. As a result, SEIA identified an "application boom" in Q2-2010, and an "installation boom" in Q1-2011 in the nonresidential market segment. Petition, SEIA, "U.S. Solar Market Insight: 1st Quarter 2011—Executive Summary," Exhibit I-23, pp. 6-10 and Figure 2-2. SEIA also adds that as a result of the "2010 Overhang," 2010 module shipments greatly exceeded 2010 module installations.

[7] Only one importer identified the channels of distribution of its commercial shipments of CSPV cells. *** reported that 100 percent of its U.S. shipments from China were shipped to commercial installers for 2011.

[8] In its posthearing brief, the petitioner notes "that there is a distinction between channels of distribution and market segments." It views solar modules "as being sold in two channels of distribution, either to distributors or directly to end users, which are either installers or utilities." Petitioner's posthearing brief, exhibit 3, p. 5.

majority of shipments were made to distributors.[9] [10] Shares of shipments of imports from China were sold primarily to commercial installers with some shipments to distributors and utility co/developers.[11] [12] Shares of shipments from nonsubject sources varied throughout the period.

Table II-1
CSPV modules: Channels of distribution for commercial shipments of domestic product and subject imports sold in the U.S. market, by year and by source, 2009-11, January-June 2011, and January-June 2012

Item	2009	2010	2011	January-June 2011	January-June 2012
	Shares of reported U.S. commercial shipments (percent)				
Domestic producers' U.S. shipments:					
To distributors	41.9	37.2	32.3	33.5	40.1
To residential installers	12.0	15.5	18.0	16.3	18.5
To commercial installers	46.1	44.1	39.4	46.8	35.6
To utility co/developers	0.0	3.2	10.3	3.4	5.7
U.S. importers' U.S. shipments from China:					
To distributors	26.2	18.2	6.9	10.0	7.4
To residential installers	5.1	16.0	14.8	15.4	7.6
To commercial installers	54.1	46.1	41.3	49.2	25.8
To utility co/developers	14.6	19.7	37.0	25.5	59.2
U.S. importers' U.S. shipments from nonsubject countries:					
To distributors	36.0	38.5	21.1	28.3	15.9
To residential installers	27.3	23.7	28.7	37.2	23.4
To commercial installers	34.5	30.2	20.7	17.2	39.6
To utility co/developers	2.2	7.5	29.5	17.3	21.1
U.S. shipments from all sources:					
To distributors	35.3	27.8	14.6	19.6	15.3
To residential installers	14.2	17.1	17.2	18.5	12.4
To commercial installers	45.3	42.9	38.4	44.3	30.0
To utility co/developers	5.2	12.3	29.8	17.6	42.3

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

Market Segments

According to industry experts, all three of the market segments (residential, commercial, and utility) have experienced growth during the period of investigation. However, the relative share of installed capacity has been shifting from the commercial segment to the utility segment, driven in large part by state renewable portfolio standard requirements (figure II-1). There has been substantial growth

[9] Petitioner asserts that U.S. producers sell into the utility market by selling to utilities or by selling indirectly through distributors or installers that work in the utility segment. It stated that sales to utilities represent 19 percent of SolarWorld's U.S. sales in 2012. Petitioner's posthearing brief, exhibit 3, pp. 6-7.

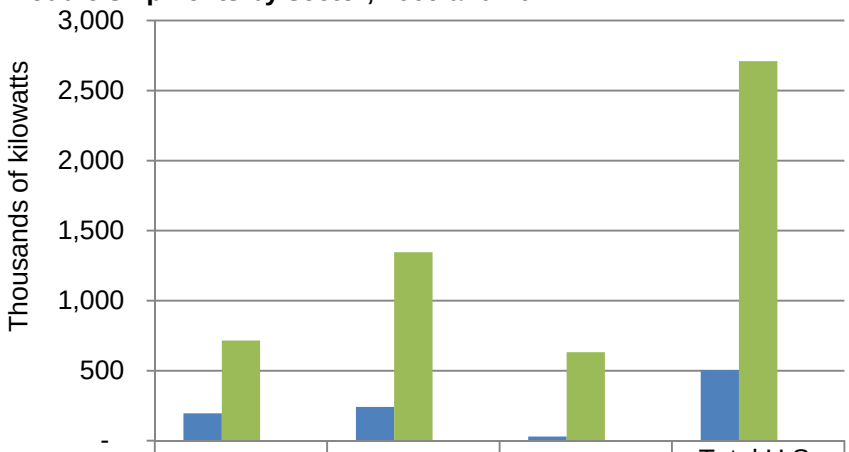
[10] The shift in channels of distribution of U.S. shipments of CSPV modules from commercial installers to distributors in interim 2012 is primarily due to a decrease in *** reported shipments to commercial installers in 2012. In the interim period of 2011, *** reported commercial shipment of *** to commercial installers; in the interim period of 2012, it reported shipments of *** to commercial installers.

[11] The large increase in U.S. shipments of CSPV modules imported from China to utility co/developers is a reflection of large increases in reported shipments from *** in the interim period of 2012.

[12] *** reported that all of its domestically produced CSPV modules were shipped to distributors, however, its shipments of CSPV modules imported from China were predominantly shipped to commercial installers and utility co/developers.

in the U.S. market, with U.S. shipments of CSPV modules, by kilowatts, increasing by 437.9 percent from 2009 to 2011.[13] As shown in table II-1, while the commercial sector was the largest market in 2011, the largest growth occurred in the utility sector which increased 1,977.4 percent from 2009 to 2011. It is anticipated that the utility sector will account for 54 percent of total installations by the end of 2012, up from 40 percent in 2011.[14]

Figure II-1
U.S. CSPV module shipments by sector, 2009 and 2011



	Residential	Commercial	Utility	Total U.S. shipments
2009	195,391	241,520	30,407	503,738
2011	715,150	1,346,055	631,662	2,709,503
Percent change	266.0	457.3	1977.4	437.9

Source: *Solar Photovoltaic Cell/Module Shipments Report 2011*, U.S. Energy Information Administration, September 2012, http://www.eia.gov/renewable/annual/solar_photo/pdf/pv_report.pdf.

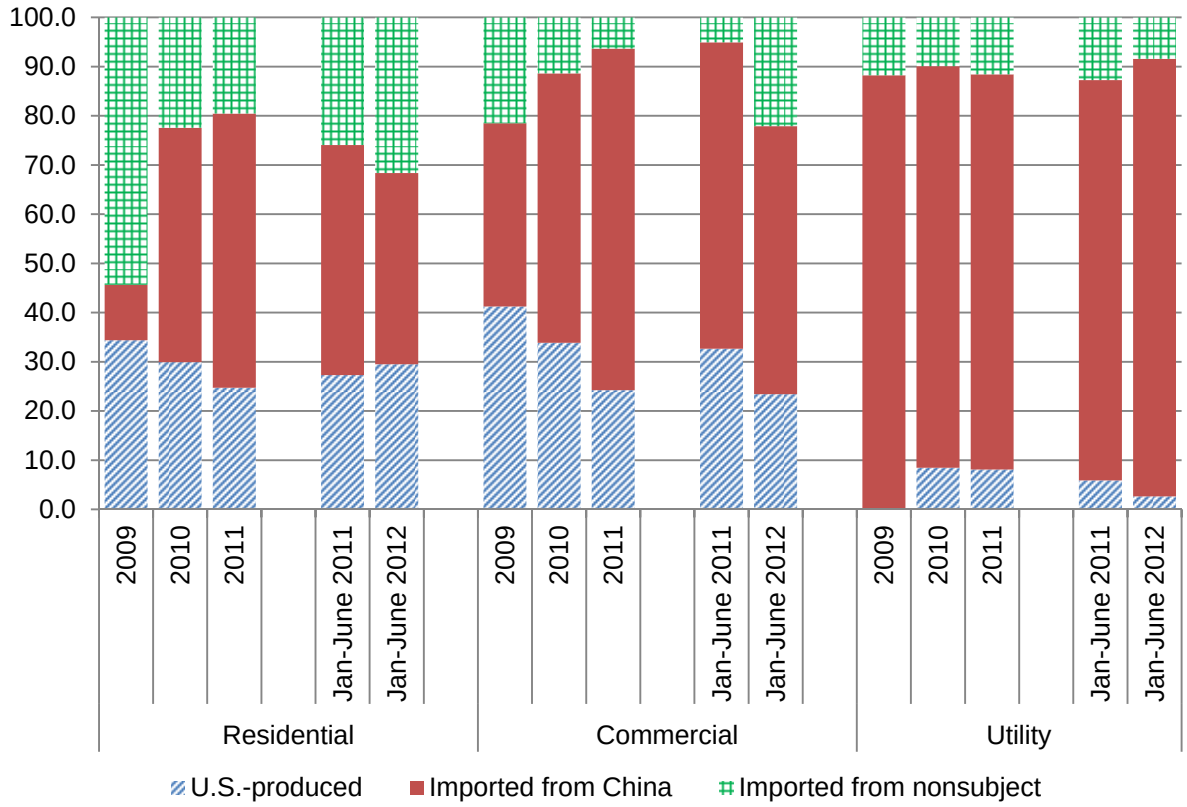
According to questionnaire data, during the period of investigation, domestic U.S. market share of CSPV modules declined by 17.2 percentage points and subject imports increased U.S. market share by approximately 29.7 percentage points. U.S.-produced CSPV modules accounted for 21.9 percent of the U.S. market in terms of volume in 2011, down from 39.1 in 2009.[15] In 2011, subject imports from China accounted for 64.5 percent of the U.S. market compared to 34.8 percent in 2009.[16]

The U.S. market share, by market segment (residential, commercial, and utilities), is presented in figure II-2. The domestic market share in the residential sector decreased during the period of investigation, falling from 34.4 percent in 2009 to 24.7 percent in 2011, and was 23.5 percent in interim 2012 compared to 32.7 percent in interim 2011. The domestic market share in the commercial sector declined from 41.3 percent in 2009 to 24.3 percent in 2011 and was 23.5 percent in the interim 2012 compared to 32.7 percent in the interim 2011. The domestic market share in the utility sector fluctuated from 0.0 percent in 2009 to 8.1 percent in 2011, and was 2.7 percent in interim 2012 compared to 5.9 percent in interim 2011.[17] U.S shipments of CSPV modules from China increased U.S. market share in the residential and commercial sectors from 2009-11, and were the predominant source of CSPV modules

[13] *Solar Photovoltaic Cell/Module Shipments Report 2011*, U.S. Energy Information Administration, September 2012, http://www.eia.gov/renewable/annual/solar_photo/pdf/pv_report.pdf.
[14] *U.S. Solar Market Insight Report Q2 2012 Executive Summary*, SEIA, p. 10.
[15] U.S. producers' share was 27.3 percent in interim 2011 and 19.1 percent in interim 2012.
[16] Chinese importers' share was 58.2 in interim 2011 and 60.5 in interim 2012.
[17] Figure II-2 may understate the domestic share in the utility sector. In petitioner's posthearing brief, ***. Petitioner's posthearing brief, exhibit 3A; and petitioner's answers to staff questions, October 17, 2012, II-14.

in the utility sector, accounting for 82.4 percent of total U.S. market in 2011 and 89.0 percent in the interim 2012.

Figure II-2
CSPV modules: U.S. market share of U.S. commercial shipments in kilowatts, by market sector[1] and by source, 2009-2011, January-June 2011, and January-June 2012



[1] These data are based on direct U.S. commercial shipments of CSPV modules to end users in these three market sectors, and do not reflect the end uses for U.S. commercial shipments that were first sold to distributors.

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

Modules of varying watt ranges are sold in all three market segments. Producers and importers reported their firm's sales, by pricing product, to each channel of distribution for 2011.[18] As seen in table II-2, all 5 price products, which encompassed CSPV modules with peak power wattage ranging from 200 watts to above 280 watts, were sold by U.S. producers and Chinese importers to all three market segments. The utilities segment purchased CSPV modules from both the lower and higher watt ranges. Approximately 51.8 percent of all U.S. sales of product 1 and approximately 63.2 percent of product 5 was sold to utilities.

[18] Only one producer for product 4 and one producer for product 5 reported both its price data and identified its sales to each channel of distribution which is reflected in the shares in table II-2. *** identified its sales by pricing product to each channel of distribution, but only reported price data for 2010; therefore, its shares were not included in table II-2. It reported that 100 percent of its sales of product 1 was sold to utilities; products 2-3 and 5 were sold to all 4 channels of distribution; and product 4 was sold to utilities and distributors. *** reported 2011 price data for products 2-5 but did not identify its sales by pricing product to each channel distribution. Producer questionnaire responses, section IV-2 and section IV-3. Twenty-one of the 22 importers of CSPV modules from China that reported price data also identified their sales by pricing product to each channel of distribution.

Table II-2
CSPV modules: Sales of domestic product and subject imports sold in the U.S. market to each channel of distribution, by pricing product, 2011

Item	Product 1 (200 to 219 watts)	Product 2 (220 to 239 watts)	Product 3 (240 to 259 watts)	Product 4 (260 to 279 watts)	Product 5 (280 watts and above)
	Shares of reported U.S. sales (percent)				
Sales of U.S.-produced CSPV modules:					
Residential installers	52.4	17.1	47.1	0.0	0.0
Commercial installers	25.7	35.9	35.7	100.0	100.0
Utility/Developers	0.0	33.1	10.2	0.0	0.0
Distributors	21.8	9.3	4.3	0.0	0.0
Other	0.1	4.6	2.8	0.0	0.0
Total	100	100	100	100	100
Sales of CSPV modules imported from China:					
Residential installers	7.3	24.2	25.3	4.4	0.5
Commercial installers	22.1	35.4	51.6	38.9	35.3
Utility/Developers	62.1	24.6	4.5	53.7	63.2
Distributors	8.5	15.8	18.5	3.0	1.0
Total	100	100	100	100	100
Total sales of domestic and subject CSPV modules:					
Residential installers	14.8	23.3	36.5	4.4	0.5
Commercial installers	22.7	35.4	43.4	38.9	35.3
Utility/Developers	51.8	25.7	7.4	53.7	63.2
Distributors	10.7	15.0	11.2	3.0	1.0
Other	0.0	0.6	1.4	0.0	0.0
Total	100	100	100	100	100

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

U.S. Purchasers

The Commission received 53 purchaser questionnaire responses from firms that purchased CSPV cells and modules during January 2009-June 2012. Forty-eight firms provided useable purchase data, and these firms reported cell purchases totaling $31.4 million (29,103 kilowatts) and module purchases totaling $623.0 million (524,413 kilowatts) for 2011.[19] [20] Four purchasers reported cell purchases. The largest cell purchaser was *** of 2011 cell purchases by quantity.[21] The other three cell purchasers were *** of 2011 cell purchases by quantity, *** of 2011 cell purchases by quantity, and *** of 2011 cell

[19] Purchasers were asked if they knew the origin of the cells (whether individual cells or cells incorporated into modules) that they purchased; 34 of 53 purchasers responded "yes."

[20] *** reported module purchases from the United States of *** kilowatts for 2011 and *** kilowatts for January-June 2012; and module purchases from Korea of *** kilowatts for January-June 2012, but did not provide value data for these purchases. Its purchases have been included in the total volume of module purchases for 2011 but are not reflected in the total value.

[21] *** reported purchases of U.S.-produced cells of *** for 2010 and *** for 2011 on its purchaser questionnaire response.

purchases by quantity. The largest module purchaser was *** of 2011 module purchases by quantity.[22] The second largest module purchaser was ***. Other notable module purchasers were ***, each accounting for approximately *** of 2011 module purchases by quantity, respectively. Twenty-seven purchasers reported that they were commercial installers; 17 residential installers; 14 utility company/developers; 14 distributors of modules; 4 module manufacturers; 3 end users; 1 engineering, procurement, and construction (EPC) contractor; 1 reseller; and two purchasers reported manufacturing off-grid products.[23]

GEOGRAPHIC DISTRIBUTION

Table II-3 presents information provided by U.S. producers and importers on the specific markets served by their firm based on their reported 2011 U.S. commercial shipments. Both U.S. producers and importers reported nationwide sales; however, their sales (based on f.o.b. sales values) are primarily concentrated in the Northeast and the Pacific Coast. GTM Research highlighted California, New Jersey, Massachusetts, and Hawaii as states with high installation rates, noting that Hawaii was particularly "strong in 2011 and looks to be stronger in 2012."[24]

Table II-3
CSPV cells and modules: Share of U.S. commercial shipment values by geographical market areas in the United States served by domestic producers and importers, 2011

Region	U.S. producers	Importers from China	Importers from nonsubject countries
Northeast[1]	32.9	36.5	27.9
Midwest[2]	3.9	1.3	2.1
Southeast[3]	12.3	3.9	2.1
Central Southwest[4]	1.7	3.0	1.9
Mountains[5]	8.2	15.6	9.3
Pacific Coast[6]	37.2	37.6	51.8
Other[7]	3.8	2.1	4.9
Total	100.0	100.0	100.0

[1] Includes CT, ME, MA, NH, NJ, NY, PA, RI, and VT.
[2] Includes IL, IN, IA, KS, MI, MN, MO, NE, ND, OH, SD, and WI.
[3] Includes AL, DE, DC, FL, GA, KY, MD, MS, NC, SC, TN, VA, and WV.
[4] Includes AR, LA, OK, and TX.
[5] Includes AZ, CO, ID, MT, NV, NM, UT, and WY.
[6] Includes CA, OR, and WA.
[7] Includes all other markets in the United States not previously listed, such as AK, HI, PR, and VI.

Note.--Because of rounding, figures may not add to the totals shown.

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

[22] On its importer questionnaire response, *** reported importing product from ***.
[23] Some purchasers specified multiple roles.
[24] "GTM Research Slideshow: U.S. Solar PV Market Inside the Numbers," *Greentechsolar*, March 9, 2012, http://www.greentechmedia.com/articles/read/GTM-Research-U.S.-PV-Market-Inside-the-Numbers.

SUPPLY AND DEMAND CONSIDERATIONS

U.S. Supply

Domestic Production

Based on available information, U.S. CSPV cells and modules producers have the ability to respond to changes in demand with moderately large to large changes in the quantity of shipments of U.S. produced CSPV cells and modules to the U.S. market. The main contributing factors to the high degree of responsiveness of supply are unused capacity, alternative markets, and moderate inventories; supply responsiveness is somewhat constrained due to an inability to switch from production of alternate products to CSPV products.

Industry Capacity

U.S. producers' capacity utilization, by kilowatts, for CSPV cells and modules increased from approximately *** percent in 2009 to approximately *** percent in 2010 before decreasing to *** percent in 2011 (figure II-3).[25] U.S. production of CSPV cells and modules increased by more than *** percent from *** kilowatts in 2009 to *** kilowatts in 2011. U.S. producers' capacity increased from approximately *** kilowatts in 2009 to *** kilowatts in 2011.

Figure II-3
CSPV cells and modules: U.S. production and capacity utilization, 2009—2011, Jan.-June 2011, and Jan.-June 2012

* * * * * * *

Alternative Markets

U.S. producers have a moderate-to-large ability for CSPV cells and limited ability for CSPV modules to divert shipments to or from alternative markets in response to price changes in the price of CSPV cells and modules. Exports by U.S. producers as a share of total shipments of CSPV cells, by kilowatts, decreased overall from *** percent in 2009 to *** percent in 2011; the share of exports of CSPV cells increased from *** percent to *** percent between interim 2011 and interim 2012. Exports by U.S. producers as a share of total shipments of CSPV modules, by kilowatts, decreased overall from 44.2 percent in 2009 to 17.7 percent in 2011; the share of exports of CSPV modules decreased from 22.1 percent to 17.4 percent between interim 2011 and interim 2012.

Inventory Levels

U.S. producers have the ability to use inventories as a means of increasing shipments of CSPV cells and modules. The ratio of end-of-period inventories to total shipments for U.S. producers increased from *** percent in 2009 to *** percent in 2011; the ratio of end-of-period inventories to total shipments was *** percent in interim 2011 and was *** percent in interim 2012.

[25] Capacity utilization was *** percent and *** percent in interim 2011 and interim 2012, respectively. Capacity utilization for CSPV cells decreased from *** percent in 2009 to *** percent in 2011 while capacity utilization for CSPV modules fluctuated, increasing from *** percent in 2009 to *** percent in 2010, and then falling to *** percent in 2011.

Production Alternatives

Twelve of 13 responding U.S. producers reported that no other products could be produced using the same machinery and equipment used in the production of CSPV cells and modules.[26]

Supply Constraints

Eight of 13 responding U.S. producers indicated that their firm had not refused, declined, or been unable to supply CSPV cells and modules since January 2009. Five producers (***) reported supply shortages.[27] *** specifically attributed the supply constraint directly to the increased demand driven by the expected expiration of the 1603 Treasury cash grant program.[28]

Supply of Subject Imports

Based on available information, Chinese CSPV cells and modules producers have the ability to respond to changes in demand with large changes in the quantity of shipments of Chinese produced CSPV cells and modules to the U.S. market. The main contributing factor to the high degree of responsiveness of supply are increasing capacity and the existence of large export markets; supply responsiveness is somewhat constrained due to limited inventories and an inability to shift from production of alternate products.

Industry Capacity

Responding foreign producers' capacity utilization, by kilowatts, for CSPV cells and modules increased from approximately 61 percent in 2009 to approximately 75 percent in 2011, and is projected to decrease to 67 in 2012 and increase to 78 percent in 2013 (figure II-4).[29] The increase in capacity utilization was driven by increases in production that exceeded total capacity increases.

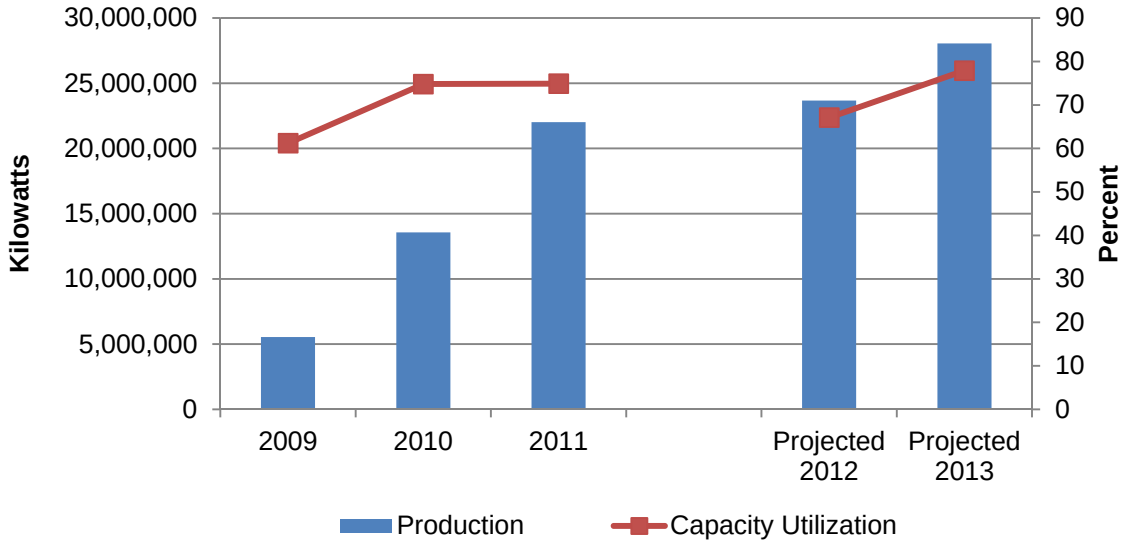
[26] *** reported that they have produced or anticipated producing other products on the same equipment and machinery, but did not provide further detail on these products.

[27] Both *** reported supply shortages during 2010 due to increased demand.

[28] See Table II-4 for additional information on the investment tax credit and the 1603 Treasury cash grant program.

[29] Capacity utilization for CSPV cells and modules was approximately 77 percent and 69 percent in interim 2011 and interim 2012, respectively. Capacity utilization for CSPV cells increased from approximately 69 percent in 2009 to approximately 77 percent in 2011. Capacity utilization for CSPV modules increased from approximately 54 percent in 2009 to approximately 73 percent in 2011.

Figure II-4
CSPV cells and modules: Chinese production and capacity utilization, 2009—11, and projected 2012-13



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

Alternative Markets

Responding Chinese producers have the ability to divert shipments of CSPV cells and modules to or from alternative markets in response to changes in the price of CSPV cells and modules. Approximately three-fourths of Chinese producers' CSPV cells were internally consumed during the period of investigation. Exports of CSPV cells fluctuated from 5.5 percent in 2009, to 10.3 percent in 2010, then to 8.8 percent in 2011. Home market shipments of CSPV cells decreased from approximately 20 percent in 2009 to 15 percent in 2011. Home market shipments of CSPV modules fluctuated, but increased overall from 7.0 percent in 2009 to 14.9 percent in 2011 and are projected to represent 18.2 percent and 19.5 percent in 2012 and 2013, respectively. Shipments of CSPV modules to the United States increased from 5.3 percent in 2009 to 14.7 percent in 2011 and are projected to represent 6.9 percent and 6.5 percent in 2012 and 2013, respectively. Shipments of CSPV modules to external markets other than the United States decreased from 86.4 percent in 2009 to 67.7 percent in 2011 and are projected to represent 71.7 percent and 70.2 percent in 2012 and 2013, respectively.

Inventory Levels

Responding Chinese producers have a limited ability to use inventories as a means of increasing shipments of CSPV cells and modules. The ratio of end-of-period inventories to total shipments for Chinese producers decreased from 5.5 percent, by kilowatts, in 2009 to 3.7 percent in 2011.

Production Alternatives

All responding Chinese producers responded that no other products could be produced using the same machinery and equipment used in the production of CSPV cells and modules.

Supply Constraints

Fifteen of 47 responding importers indicated that their firm had refused, declined, or been unable to supply CSPV cells and modules since January 2009. Most importers reported supply shortages in 2010, and (***) specifically attributed the supply constraint directly to the increased demand driven by the expected expiration of the 1603 Treasury cash grant program.

Supply of Nonsubject Imports of CSPV Cells and Modules to the U.S. Market

Based on importer questionnaire data (presented in Part IV), CSPV cells and modules are typically imported from a few nonsubject countries and in limited quantities. The specific nonsubject sources for cells identified in questionnaire responses were Taiwan, Korea, Japan, and Germany, and the specific nonsubject sources for modules were identified as Taiwan, Korea, Mexico, Canada, Singapore, and Japan.[30]

New Suppliers

Thirty-two of 53 purchasers indicated that new suppliers have entered the U.S. market since 2009. Eleven purchasers indicated that there were "too many to list" when asked to provide the names of new suppliers in the market. Other purchasers cited LG (8 firms), Hyundai (5), Yingli (5), Hanwha (5), Trina (4), Samsung (4), SolarOne (3), GE (2), Suniva (2), and AUO Optronics (2). The following suppliers were each listed by one purchaser: Helios Solar, JA Solar, Jinko, LDK, Solartech, Del Solar, Astronergy, Q-Cells, Solarland, BYD from China, Siliken, Miasole, Motech, Bosch, and Calisolar.[31]

U.S. Demand

Based on available information, it is likely that changes in the price level of CSPV cells and modules would result in a moderate to large change in the quantity of CSPV cells and modules demanded. The main contributing factor is the availability of substitute products and the high cost share of CSPV cells and modules in their end uses.

The demand for CSPV cells and modules is derived from the demand for solar electricity. The demand for solar electricity is attributed to increasing power rates and energy consumption, environmental concerns and the general movement toward "green energy" alternatives, and cost competitiveness with traditional energy sources. Federal, state, and local incentives for renewable energy have also bolstered demand for CSPV cells and modules. Competition with traditional energy sources and government incentives are linked to grid parity. Grid parity is the price at which the levelized cost of electricity generated from renewable sources is competitive with the cost of conventional energy from the grid.[32]

As discussed later in Part II, the ability to obtain financing was indicated as one of the leading factors that drives demand of CSPV cells and modules. As seen in figure II-5, after negative U.S. GDP

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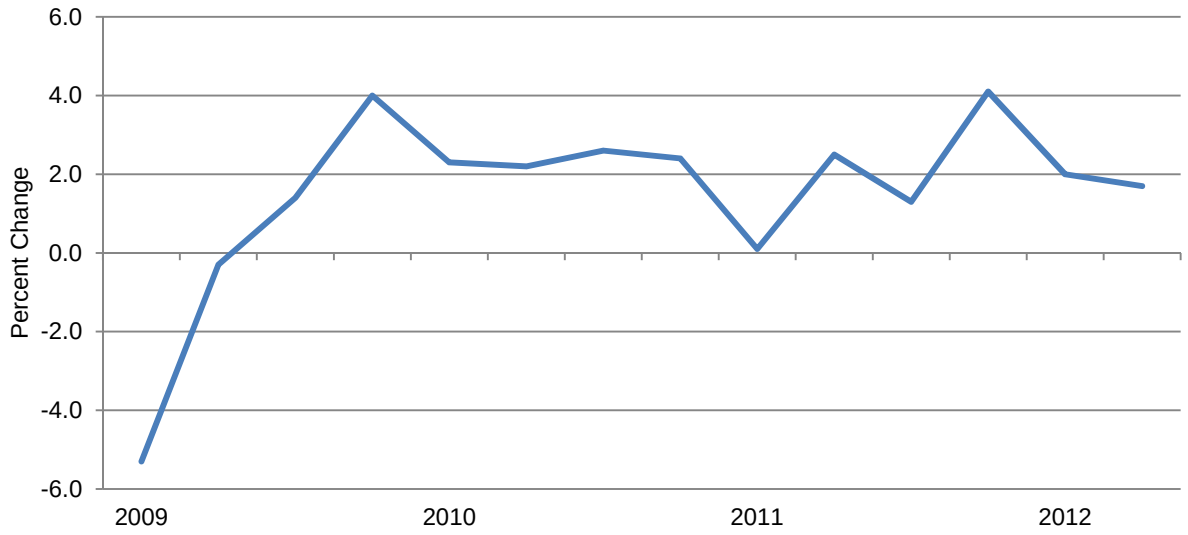
[30] Modules imported from nonsubject sources were reported to be produced with cells from Taiwan and Japan. Some importers indicated importing modules from China that were manufactured with cells produced in Taiwan.

[31] ***.

[32] Respondents noted that wholesale energy prices have fallen during the POI due to a drop in natural gas prices and thus the price of natural gas has had a direct effect on the price for solar electricity. Respondents also assert that incentives were designed as "infant industry" support to bridge the gap between the price of distributed solar electricity and the retail "grid parity," and that these incentives have declined during the POI. Before government incentives, the non-subsidized price of solar electricity was too high and, therefore, not competitive with the "grid parity" price, and accordingly there was very little demand for solar electricity. By bridging the price gap, the incentives built a demand base for solar electricity. Respondent's posthearing brief, pp. 8-9, 11; exhibit 2, p. 6; and exhibit 3, p. 8.

growth in the first and second quarters of 2009, which hindered financing opportunities, quarterly GDP growth rates were positive beginning in the third quarter of 2009 through June 2012 increasing access to capital and financing.[33]

Figure II-5
Real U.S. GDP growth: Percentage change, quarterly, January 2009-June 2012



Source: National Income and Product Accounts- Table 1.1.1, Percent Change from Preceding Period in Real Gross Domestic Product, Bureau of Economic Analysis, http://www.bea.gov/iTable/index_nipa.cfm, retrieved August 30, 2012.

Apparent Consumption

Apparent U.S. consumption of CSPV modules, by value, increased by 343.6 percent from 2009 to 2011 increasing from $679.4 million in 2009 to $3.0 billion in 2011. Apparent consumption was $1.9 billion in interim 2011 and $1.6 billion in interim 2012.

Business Cycles and Incentives

Almost all responding U.S. producers, two-thirds of responding importers, and just over one-half of responding purchasers indicated that the CSPV cells and modules market is subject to business cycles or conditions of competition distinctive to the CSPV cells and modules market.[34] The two most frequently identified factors were incentives and the weather. Most responding firms indicated that demand generally declines during winter months, as it can be more difficult to install solar systems on rooftops in snow or ice conditions, although this business cycle is more relevant for northern states than for Sunbelt/southern states. Many responding firms also identified Federal incentives (e.g., Federal tax credits and 1603 Treasury cash grant program sunset) and state incentives and policies (e.g., Renewable

[33] It was argued in the preliminary investigations that the economic crisis, which began in 2008, limited access to capital, thereby limiting growth of the solar industry. Petition, p. 41.

[34] One producer selected "no."

Portfolio Standards (RPS)),[35] as well as associated uncertainties, as contributing to swings in market conditions. A few responding firms noted the role of European incentives as affecting conditions in U.S. market by increasing the amount of competition in the U.S. market. Several responding firms indicated that demand generally increased in the latter part of the calendar year, particularly in the fourth quarter, as customers raced to meet end-of-year tax incentive deadlines.[36]

Ten firms identified fluctuating availability of raw materials and raw materials cost as conditions of competition that are distinctive to CSPV cells and modules. Purchaser *** noted that silicon is a significant input for CSPV and silicon prices have fluctuated.[37] In addition, three firms indicated access to financing and warranty strength as important conditions of competition.

All responding U.S. producers, and almost all responding importers and purchasers indicated that there had been changes in the business cycles or conditions of competition for CSPV cells and modules since January 2009.[38] The two most frequently identified factors were government incentives and increased supply in the U.S. market. Seven firms noted the expiration of the 1603 Treasury cash grant and depleted Federal incentive funding, and four firms identified the presence (or lack of) incentives as reasons for changes in business cycles and conditions of competition. Two importers noted that the 1066 Safe-Harbor grant increased sales in 2011. Eighteen firms indicated an increase in supply in the U.S. market. Seven firms attributed this increase in supply to an increased presence of Chinese product in the United States, and three firms noted a decrease in European demand as a driver for increased U.S. supply. Several responding firms also identified an increase in U.S. production as driving down prices in the U.S. market resulting in changes in conditions of competition.

Various types of supply and purchase incentives are provided in the United States by Federal, state, and local entities.[39] Programs include different types of tax credits as wells as Renewable Portfolio Standards (RPS).[40] While not comprehensive, table II-4 provides a summary of several types of programs.[41]

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[35] RPS is a regulation that requires a specific total renewable energy production level as a percentage of the total energy usage. RPS places an obligation on utility companies to produce a specified percentage of their electricity from renewable energy sources.

[36] One producer-importer also noted an increase in demand during fourth quarter as firms worked to complete installations before the first frost.

[37] Importer and purchaser *** reported that increasing raw material costs have had a significant impact on their ability to capture sales.

[38] Three importers and two purchasers selected "no."

[39] Petitioner noted that incentives are provided to purchasers and installers and apply to purchases of both domestic and Chinese solar modules. The incentives are not based on the manufacturer of the solar panels and, therefore, are available to any producer anywhere in the world. Petitioner's posthearing brief, exhibit 4, pp. 2-3; hearing transcript, p. 121 (Brinser).

[40] Currently, 35 states and the District of Columbia have enacted RPSs with target renewable energy production percentage levels ranging from 10 to 40 percent. Among the states with current policies, the target year by which they are aiming to reach their stated renewable energy target ranges from 2015 to 2030. United States Department of Energy, Database of State Incentives for Renewables & Efficiency (DSIRE), petitioner's posthearing brief, attachment 4D.

[41] Additional information is available from the Database of State Incentives for Renewables and Efficiency (DSIRE)'s website: http://www.dsireusa.org/. "DSIRE is a comprehensive source of information on state, local, utility and federal incentives and policies that promote renewable energy and energy efficiency. Established in 1995 and funded by the U.S. Department of Energy, DSIRE is an ongoing project of the N.C. Solar Center and the Interstate Renewable Energy Council."

Table II-4
Description of various selected types of solar PV incentives

Incentive Typed	Description
Capital subsidies for equipment or total cost	Federal (incl. 1603 Treasury cash grant program): 30% Investment Tax Credit (ITC), which can be taken as a grant in lieu of the credit if the system meets certain requirements. The Energy Policy Act of 2005 created tax incentives for solar energy–a new 30% ITC for commercial and residential solar energy systems that applied from January 1, 2006 through December 31, 2007. These credits were extended for one additional year in December 2006 by the Tax Relief and Health Care Act of 2006. In 2008, Congress enacted the Emergency Economic Stabilization Act of 2008, which, among other things, included an eight-year extension of the commercial and residential solar ITC, elimination of the monetary cap for residential solar electric installations, and permitted utilities and alternative minimum tax (AMT) filers to utilize the credits. Approximately $426 million was distributed to solar projects under the Recovery Act's Section 1603 in 2010; however, not all these projects were c-Si PV projects. State: 20 states, the District of Columbia, and Puerto Rico offer capital subsidies
Renewable portfolio standards (RPS)	36 states plus the District of Columbia, Guam, Puerto Rico, and Virgin Islands have an RPS. 22 states and the District of Columbia have solar or distributed generation provisions in RPS.
Renewable Energy Credit (REC) purchase programs	There are seven REC regional tracking systems or registries and at least 30 REC products available.
Enhanced feed-in tariffs (gross/net)	The legality of feed-in tariffs was challenged before the Federal Energy Regulatory Commission (FERC) in proceedings involving the California Public Utilities Commission and three California utilities. A FERC order issued in October resolved the uncertainty by providing clarifying validation, within strict parameters, for a state-level feed-in tariff.
Green electricity schemes	Green pricing programs are offered by utilities in 41 states. More than 20 states have environmental disclosure policies in place, requiring electricity suppliers to provide information on fuel sources used and, in some cases, emissions associated with electricity generation.
Investment funds for PV	U.S. private sector capital investment reached $6.8 billion in 2010.
Income tax credits	Federal: federal investment tax credit of 30 % for residential, commercial, and utility systems. About $1.1 billion in income tax credits were awarded to solar manufacturers under the Advanced Energy Manufacturing Tax Credit program. State: 21 states offer tax credits for solar projects.
Commercial bank activities	Federal: DOE Loan Program Office administers two loan programs that are applicable to solar energy: 1) Title XVII Section 1703 of the Energy Policy Act of 2005 – Provides loan guarantees to innovative clean technologies, where obtaining conventional private financing is difficult due to high technology risk and capital-intensive nature of investment. 2) Title XVII Section 1705 of the Energy Policy Act of 2005 – Provides loan guarantees to commercial-scale renewable energy projects, including those employing more mature technologies that begin construction prior to 30 September 2011. Although 25 states plus the District of Columbia authorize Property Assessed Clean Energy (PACE), the Federal Housing Financing Agency (FHFA) issued a statement in July 2010 concerning the senior lien status associated with most PACE programs. In response to the FHFA statement, most local PACE programs have been suspended until further clarification is provided. Commercial banks are engaged in all aspects of PV financing. Through their project finance arms, they provide project-level debt, construction and term, equity, and tax equity for solar projects. Commercial banks also invest in solar companies engaged in project development and manufacturing along the supply chain.
Sustainable building requirements	Federal: No federal codes exist, but DOE produces best-practices guides for sustainable building for both residential and commercial builders. State and Local: Some states and local jurisdictions have sustainable building requirements.

Source: Bolcar, Katie (U.S. Department of Energy) and Kristen Ardani (National Renewable Energy Laboratory), International Energy Agency, National Survey Report of PV Power Applications in the United States 2010, May 2011, p. 22 (Table 11); SEIA, "Backgrounder: Success of the Section 1603 Treasury Program," Respondent CCCME's postconference brief, exh. 25.

Demand Characteristics

Demand trends

Most U.S. producers (11 of 12), importers (44 of 48), and purchasers (42 of 50) indicated that demand within the United States had increased since January 2009 (table II-5).[42] Producers, importers, and purchasers attributed the increased demand to lower prices due to an increase U.S. production and an increase in imports from China; Federal, state, and local government incentives (e.g., Federal tax credits and state RPS); increasing power rates and energy consumption; environmental concerns and the general movement toward "green energy" alternatives; cost competitiveness with traditional energy sources; increase in large-scale solar utility farms; improved technology; lower costs and higher efficiency; and increased availability of financing.

Half of U.S. producers (5 of 10), and most importers (26 of 40) and purchasers (19 of 29), indicated that demand outside the United States had increased, and a number indicated that it had fluctuated (4 of 10 producers, 8 of 40 importers, and 4 of 29 purchasers). Producers, importers, and purchasers attributed the increased demand outside the United States to lower prices and government incentives (including the feed-in-tariff in Europe); technology improvements and higher efficiencies; and increased demand for "clean energy."[43] Producer and importer *** indicated that Italy, Germany, China, and Japan have introduced new legislation aimed at stimulating demand for solar energy, which led to the increase in global demand. Those that reported demand had fluctuated outside of the United States attributed it to the availability of financing, fluctuations and elimination of incentives, and the "economic crisis" in Europe.

Table II-5
CSPV cells and modules: U.S. producer, importer, and purchaser responses regarding the demand for CSPV cells and modules since 2009

	Number of firms reporting			
Item	**Increase**	**No Change**	**Decrease**	**Fluctuate**
Demand within the United States				
U.S. producers	11	0	0	1
Importers	44	0	2	2
Purchasers	42	1	6	1
Demand outside the United States				
U.S. producers	5	0	1	4
Importers	26	2	4	8
Purchasers	19	3	3	4

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

Federal, state, and local government incentives have impacted demand of CSPV cells and modules. Most U.S. producers (11 of 14), importers (36 of 46), and purchasers (27 of 44) reported that state and local government incentives increased demand since January 2009 (table II-6).[44] Responding

[42] One importer-purchaser (***) and three purchasers (***) indicated that demand in the United States had decreased. They attributed the decline to a "down economy" and price competition.

[43] The feed-in-tariff is designed to increase investment in renewable energy by having utility companies pay above-market rates for green energy as part of a long term contract, shifting the burden of subsidizing efforts from taxpayers to electricity ratepayers. Gailbraith, Kate. "Europe's Way of Encouraging Solar Power Arrives in the U.S.," *New York Times*, March 12, 2009, http://www.nytimes.com/2009/03/13/business/energy-environment/13solar.html?_r=1.

[44] Producer and importer *** and producer *** indicated that state and local government incentives had both "increased" and "decreased" demand citing variations in incentives offered between states. *** specifically

(continued…)

firms most often identified the California Solar Initiative, Solar Renewable Energy Credit (SREC) program offered in New Jersey and Connecticut, the Renewable Portfolio Standards (RPS), and various tax credits and rebates offered by state and local governments.

Most producers (11 of 15), importers (37 of 49), and purchasers (34 of 45) reported that Federal government incentives increased demand (at least temporarily) since January 2009. Three producers, ***, indicated that Federal government incentives temporarily increased demand.[45] All three firms cited the 1603 Treasury cash grant as a reason for the fluctuation. *** noted that the ARRA stimulus package and the 1603 Treasury cash grant increased demand in 2009 through 2011, but as funding for both programs "dried up" in 2011, demand slowed through 2012. *** also mentioned the ending of the 1603 Treasury cash grant in 2011 and stated that "failure to reinstate the case grant program will likely have a negative impact on demand." Most importers and purchasers attributed the increased demand to the 1603 Treasury cash grant program, and a few purchasers also mentioned the Department of Energy loan program and the Federal investment tax credit.

Table II-6
CSPV cells and modules: U.S. producer, importer, and purchaser responses regarding the effect of Federal, state, and local government incentives on demand for CSPV cells and modules since 2009

	Number of firms reporting		
Item	**Increase**	**No Change**	**Decrease**
State and local government incentives			
U.S. producers	11	1	2
Importers	36	5	5
Purchasers	27	10	7
Federal government incentives			
U.S. producers	11	1	3
Importers	37	7	5
Purchasers	34	7	4

Note: Some firms chose more than one response, i.e., indicated that demand both "increased" and 'decreased."

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

Eight of 12 U.S. producers and 27 of 48 importers indicated that there have been significant changes in the product range, mix, or marketing of CSPV cells and modules since January 2009. Most firms identified changes related to various performance aspects of CSPV cells and modules, including increased power output, increased wattage per panel, and improved efficiency. These performance changes were attributed to different panel sizes and/or improved technology. Other product changes included various product aspects such as stronger frames, additional or improved racking components, increased variety, more colors, and sleeker designs. *** noted the introduction of their ***. *** mentioned entering the utility sector/power plant market segment and the advent of solar farms. U.S. producers *** indicated that marketing their product has become more difficult with increasing Chinese presence in the market and Chinese producers' ability to offer the same products at lower prices.

Other factors affecting demand

On a broad level, purchasers can demand energy and electricity from a wide variety of sources, ranging from traditional fossil fuels to various forms of renewable energy (including wind, solar, geothermal, and biomass). As shown in table II-7, the majority of U.S. producers reported that the prices

(…continued)
mentioned an increase in demand in New Jersey with the introduction of the Solar Renewable Energy Credits (SREC), but noted that growth slowed when pricing dropped due to oversupply.

[45] *** also indicated the same response on their importer questionnaires.

of conventional energy sources such as natural gas and coal either did not affect demand or caused demand to decrease in the residential and commercial sectors since January 2009. About one-third of responding importers reported that the prices of conventional energy sources such as natural gas and coal caused demand to increase in the residential and commercial sectors. *** indicated that the residential market is less sensitive to price changes for conventional energy sources than commercial or utility markets because residential electricity rates are often "fixed by regulators for a period of time," but the commercial market is highly sensitive to price differences and will be less likely to install solar power as conventional energy prices decline. *** noted that due to reduction of natural gas prices, the CSPV solar industry had to cut costs in order to price products competitively as natural gas electricity generation competes directly against solar electricity generation.[46] Regarding the utility sector, responses were more scattered with firms noting that the utility market is extremely sensitive to price (decreasing costs of natural gas, increasing costs of other conventional fuel sources) and demand is driven by incentives. One firm also noted that in some states, utilities are required to source a certain percentage of their electricity from renewable sources.

Table II-7
CSPV cells and modules: U.S. producer, importer, and purchaser responses regarding the effect of conventional energy prices on demand for CSPV cells and modules since 2009, by sector

	Number of firms reporting			
Item	**Increase**	**No Change**	**Decrease**	**Fluctuate**
Residential				
U.S. producers	2	6	4	1
Importers	18	12	6	8
Purchasers	10	11	7	7
Commercial				
U.S. producers	1	4	6	1
Importers	18	9	8	8
Purchasers	8	11	10	7
Utility				
U.S. producers	1	2	2	3
Importers	14	9	7	9
Purchasers	5	10	10	5
Source: Compiled from data submitted in response to Commission questionnaires.				

Substitute products

Five of 12 responding U.S. producers, 19 of 44 responding importers, and 21 of 51 responding purchasers indicated that there were substitute products for CSPV cells and modules. The most often identified substitute product for CSPV cells and modules by U.S. producers, importers, and purchasers was thin film.[47] Most responding U.S. producers and the majority of responding importers and purchasers indicated that thin film did not affect the price of CSPV cells and modules, citing the lower price of thin film products. One purchaser stated that the drop in price of CSPV has caused thin film not to be as popular indicating that the once cheaper price of thin film offset the lesser efficiency, but with decreasing CSPV prices, thin film is a less viable option.

[46] *** indicated that this was the case with residential and commercial markets. However in the utility sector, if the utility's cost to generate the electricity declines, they charge lower rates to customers purchasing that electricity from the grid, which makes residential solar installations less attractive to potential residential and commercial customers and decreases the demand for CSPV cells and modules.

[47] Other identified substitutes include concentrated solar PV/thermal; other solar technologies, such as cadmium telluride and ASi; and gas, wind, and coal power generation.

Twenty-nine of 52 purchasers reported evaluating both CSPV modules and thin film for the same end use or project. Seven purchasers reported considering both technologies for 100 percent of their purchases since 2009; with four firms (***) specifically noting that they considered both for utility scale projects. Other end uses where firms considered both technologies included ground mount projects, rooftops, and commercial systems. *** indicated that has considered both CSPV modules and thin film for a ground mount project, but is not accepting thin film for the project due to low efficiency (wattage capacity per square foot). Several firms indicated that in the eastern portion of the United States, where land is more expensive and less available, CSPV is a better choice for most projects. *** noted that even though thin film is less expensive, it does not produce enough power for residential applications. *** reported that thin film was cost competitive in 2009 but is now more expensive than CSPV modules even when the cost of racking used in CSPV modules is included.

End uses, cost share and installed costs

The primary end use for CSPV cells are modules, and for modules, some form of solar power generation installation or system (see *Part I* for more information).[48] Eight U.S. producers, 16 importers, and seven purchasers provided cost-share information for modules.[49] Six U.S. producers, 21 importers, and 28 purchasers provided cost share information for residential systems. Eight U.S. producers, 21 importers, and 33 purchasers provided cost share information for commercial systems. Four U.S. producers, 12 importers, and 16 purchasers provided cost share information for utility systems. Cost share information is summarized in table II-8.

Table II-8
CSPV cells and modules: U.S. producer, importer, and purchaser responses reporting the share of CSPV cells and modules as a percentage of total cost, by system

	Number of firms reporting								
	Residential system			Commercial system			Utility system		
Share of total cost (percent)	<30	30-60	60>	<30	30-60	60>	<30	30-60	60>
U.S. producers	2	1	3	3	2	3	0	4	0
Importers	5	12	4	6	12	3	1	9	2
Purchasers	5	19	4	5	26	2	2	14	0

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

Various industry sources have tracked the cost share of PV modules in solar installations. The cost share of modules in PV systems or installations varies depending on the market segment, geographic market, and other components in the system. As shown in figure II-6, since 2008, module prices have declined by approximately 54 percent from $3.65 per watt to $1.67 per watt. During 2008-11, average system prices declined by almost 38 percent from $7.60 per watt to $4.75 per watt. As shown in figure II-7, since the first quarter of 2010, all three market segments have experienced declines in the installed PV cost, although the average cost for the utility segment was substantially lower than for the residential and nonresidential market segments.[50] Respondents stated that increased demand in the utility segment which

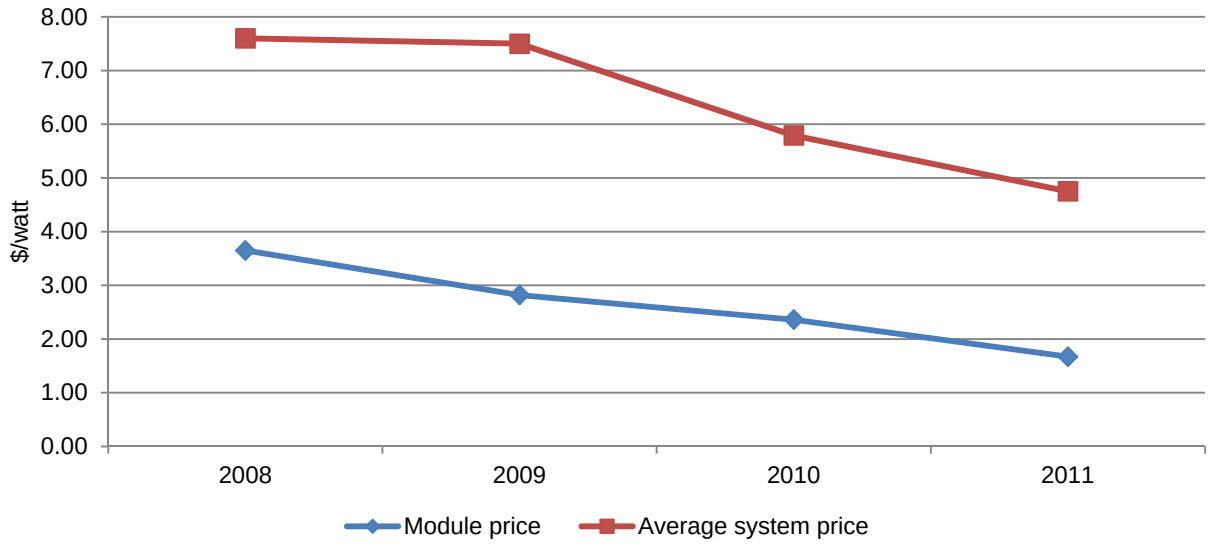
[48] Other end uses identified by questionnaire respondents included off-grid and ground mount projects.

[49] Of those firms, three U.S. producers, eight importers, and three purchasers indicated that CSPV cells and modules account for 100 percent of the total cost of the module.

[50] Both petitioners and respondents note that there is substantial price sensitivity in the utility market. Respondents also stated that because utility-scale projects involve sales of more than five megawatts, utilities "tend to pay slightly lower prices for their panel purchasers," in part due to "lower transaction costs." Conference transcript, p. 135 (Petrina). Petitioner's posthearing brief, exhibit 3, p. 17.

has a larger volume) intensified the observed decline in overall prices.[51] In addition, a 2011 report for the U.S. Department of Energy reports that in 2010, much of the decline in national weighted average system prices is attributable to an increased share of large-scale, utility PV installations.[52]

Figure II-6
Module and system prices, 2008-2011

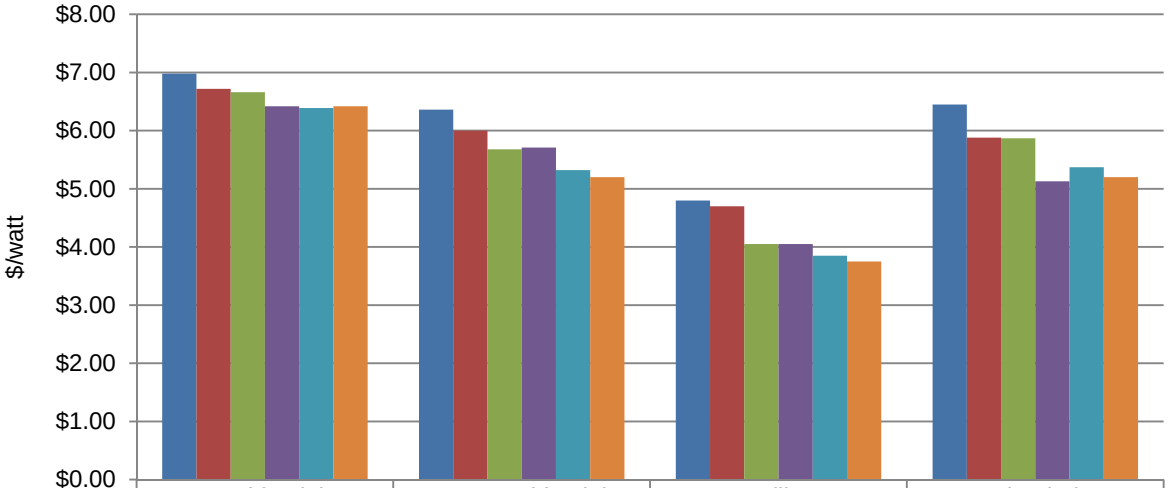


Source: Bolcar, Katie (U.S. DOE) and Kristen Ardani (National Renewables Energy Laboratory), International Energy Agency, "National Survey Report of PV Power Applications in the United States--2011," June 2012.

[51] Respondent CCCME's postconference brief, p. 24.

[52] Bolcar, Katie (U.S. Department of Energy) and Kristen Ardani (National Renewable Energy Laboratory), International Energy Agency, National Survey Report of PV Power Applications in the United States 2010, May 2011, p. 2. The report adds that "four broad categories of utility solar business models have emerged in the United States: utility ownership of assets, utility financing of assets, development of customer programs, and utility purchase of solar output." (p. 24)

Figure II-7
Installed PV cost, by market segment, by quarter, 1Q2010 to 2Q2011



	Residential	Non-Residential	Utility	Blended
Q1 2010	$6.98	$6.36	$4.80	$6.45
Q2 2010	$6.72	$6.00	$4.70	$5.88
Q3 2010	$6.66	$5.68	$4.05	$5.87
Q4 2010	$6.42	$5.71	$4.05	$5.13
Q1 2011	$6.39	$5.32	$3.85	$5.37
Q2 2011	$6.42	$5.20	$3.75	$5.20

Source: Petition, Exh. I-16, SEIA, "U.S. Solar Market Insight" 2nd Quarter 2011, p. 11.

SUBSTITUTABILITY ISSUES[53]

The degree of substitution between domestic and imported CSPV cells and modules depends on such factors as relative prices, quality (e.g., wattage output, efficiency, certification) and conditions of sale (e.g., price discounts/rebates, financing, lead times between order and delivery, payment terms, customer service). Based on available data, staff believes that there is a high degree of substitutability between domestically produced CSPV cells and modules and CSPV cells and modules imported from China.

Factors Affecting Purchasing Decisions

Purchasers were asked a variety of questions to determine what factors influence their decisions when buying CSPV cells and modules. Information obtained from their responses indicates that quality, availability, price, bankability, credit extension, and product consistency are relatively important factors.

Knowledge of Country Sources

Thirty-nine of 53 purchasers indicated they had marketing/pricing knowledge of domestically produced CSPV cells and modules, 43 of CSPV cells and modules from China, 27 from Japan, 17 from

[53] According to an article in California Management Review, "Standard crystalline silicon cells have become highly commoditized with little perceived differentiation across suppliers." Supplement to the Petition, California Management Review, "Government Policy and Firm Strategy in the Solar Photovoltaic Industry," Exh. Supp-2, p. 24.

Taiwan, 8 from Mexico, 10 from Korea, 7 from Germany, 3 from Malaysia, 2 from India, 2 from Philippines, 1 from Norway, 1 from Canada, and 1 from Sweden. As shown in table II-9, most purchasers "always" make purchasing decisions based on the producer and "sometimes" or "never" make purchasing decisions based on country of origin. Most purchasers reported that their customers "sometimes" make purchasing decisions based on the producer and country of origin.

Table II-9
CSPV cells and modules: Purchaser responses to questions regarding the origin of their purchases

Purchaser/customer decision	Always	Usually	Sometimes	Never
Purchaser makes decision based on producer	28	8	9	8
Purchaser's customer makes decision based on producer	5	13	17	13
Purchaser makes decision based on country	6	8	21	18
Purchaser's customer makes decision based country	1	5	28	11

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

Major Factors in Purchasing

Available information indicates that purchasers consider a variety of factors when purchasing CSPV cells and modules. While quality and price were cited most frequently as being important factors in their purchase decisions, other factors such as bankability and availability are also important considerations. Price was most frequently cited as the first-most important factor (21 firms), and quality was most frequently reported as the second-most important factor (19 firms) (table II-10).

Table II-10
CSPV cells and modules: Ranking factors used in purchasing decisions, as reported by U.S. purchasers

Factor	Number of firms reporting			
	First	Second	Third	Total
Price	21	11	15	47
Quality	11	19	7	37
Availability	5	12	11	28
Bankability	8	5	3	16
Other[1]	7	6	18	31

[1] Other factors include payment terms, organizational capability, relationship with supplier, approved by state regulatory certification, domestically produced, and levelized cost of energy for the first factor; extension of credit, payment terms, warranty, and sales support for the second factor; and extension of credit, payment terms, delivery costs, lead times, warranty, and brand recognition for the third factor.

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

Purchasers were split when asked how often they purchase CSPV cells and modules offered at the lowest price, with 26 of 52 purchasers reporting "always" or "usually," 17 reporting "sometimes," and 9 reporting "never." Thirty-four purchasers also reported that they purchased higher-priced CSPV cells and modules from one source although a comparable product was available at a lower price from another source. Purchasers most often identified bankability, warranty, product availability, quality, and failure to certify as reasons for choosing higher-priced CPSV cells and modules. Other reasons included reliability

of supply, delivery times, product specifications, payment terms, brand recognition, incentives to purchase U.S.-produced product, diversification of suppliers, and availability of financing.[54]

Thirteen of 52 responding purchasers reported that certain watts/types/sizes of CSPV cells and modules were available from only one source (either domestic or foreign). Purchaser *** reported purchasing custom made modules from Chinese manufacturers over the last 20 years, and indicated no domestic producer was willing to produce modules with *** specific size and rating requirements. *** stated that China seemed to be one of the only producers of the larger watt *** modules, which they use to reduce installation and racking costs per watt installed. *** reported that the *** modules that they purchase are only available through ***. *** reported that their ***[55] modules are only available from sources in China, as other producers have declined to produce that type of module. *** reported that high efficiency *** panels using *** cells were only available through ***. *** also indicated that wattage efficiency was a concern when sourcing modules, and reported that *** was their supplier for high wattage modules that are used in rooftop applications when space is limited. *** reported purchasing *** prior to the import duties. According to *** was a leading monocrystalline product with high efficiency and reasonable prices when compared to polysilicon modules.

Importance of Specified Purchase Factors

Purchasers were asked to rate the importance of 20 factors when making their purchasing decisions (table II-11). The factors listed as "very important" by at least two-thirds of the responding 53 purchasers were price (51 firms); quality meets industry standards (48); availability (45); reliability of supply (42); product consistency (41); warranty (38); bankability (35), and delivery time (34).

[54] ***

[55] ***.

Table II-11
CSPV cells and modules: Importance of purchase factors, reported by U.S. purchasers

Factor	Very important	Somewhat important	Not important
	Number of firms responding		
Availability	45	7	1
Bankability	35	8	9
Conversion efficiency	21	27	3
Delivery terms	29	23	1
Delivery time	34	19	1
Discounts offered	23	26	3
Extension of credit	33	9	11
Federal government incentives	27	12	12
State/ local government incentives	23	15	14
Minimum quantity requirements	14	25	14
Packaging	9	30	14
Price	51	1	1
Product consistency	41	10	2
Product range	13	27	12
Quality meets industry standards	48	4	1
Quality exceeds industry standards	28	23	2
Reliability of supply	42	9	2
Technical support/service	25	23	5
U.S. transportation costs	14	30	9
Warranty	38	13	2

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

Factors determining quality

U.S. purchasers identified various principal factors they considered in determining the quality of CSPV cells and modules. Reported factors included output efficiency, warranty, reliability, durability, appearance (matching of cell colors and solid frame structure), flash testing or third party testing, power tolerance ratings, UL certification, and availability.

Bankability

Thirty-two of 49 purchasers reported bankability was a "very important" factor in their purchasing decisions. When describing the role of bankability in their customers' purchasing decisions, many purchasers reported that bankability was especially important for large scale or commercial projects because these types of projects typically require financing, and bankability is often an indicator of financial stability. Several purchasers referred to product warranties when discussing the role of bankability in purchasing decisions. *** all noted the importance of looking for suppliers that are bankable enough to honor the 25 year product warranty. Other purchasers noted the importance of bankability due to power purchase agreements.

Financing

Forty-nine of 53 purchasers indicated that they did not purchase CSPV cells and modules from a producer or importer that offered to finance the purchase. Four purchasers (***) reported purchasing from a supplier that offered to finance their purchase and indicated that these purchases accounted for 60

to 100 percent of their 2011 purchases. Most purchasers stated that they were offered 30 to 90 day payment terms.

Sixteen of 45 purchasers reported that their firm's access to financing has changed since 2009. Reported factors for increasing financing opportunities included: adding new financing partners, increasing market capitalization, decreasing interest rates, increasing interest in renewable energy, and increasing size and growth of firms. Other firms listed poor economic conditions, volatility of incentive programs, and increased Chinese presence in the U.S. market as factors that have reduced credit availability.

The use of third-party ownership, through power purchase agreements (PPAs) or leasing agreements, is used in residential, commercial, and utility market segments. According to SEIA, third-party ownership in the residential solar sector has increased, particularly over the last one to two years.[56] Even as costs of solar residential systems decline,[57] purchasing a solar system is not always a viable option for many customers.[58] Under a third-party lease agreement, customers have little or no upfront costs to install a solar system. According to SEIA, "the success of third-party residential solar providers has attracted more than $600 million in new investments in recent months…It is expected that third-party installations will quickly claim even more market share in the coming quarters."[59] According to an article from the *Wall Street Journal*, under a typical lease agreement, which is usually a 15 to 20 year term, the leasing company covers the installation costs of the solar system, and customers pay a fixed monthly price to the leasing company to rent the system. Power purchase agreements work in a similar manner. The solar company will install and maintain the panels at a residential or commercial site, and the customer agrees to pay the company a predetermined price for the electricity generated by the system.[60] U.S. purchaser, ***, reported using PPAs in its large-scale utility operations for investor-owned public utilities, municipalities, or cooperative associations that serve residential and commercial customers. The steady income generated by these lease agreements over the 20 year term makes them attractive to investors. Banks will often fund the purchase of the systems through solar companies, and as a return on the investment, receive the tax credits and a negotiated share of the monthly payments.[61]

Supplier certification

Thirty-four of the 52 responding purchasers reported that they require suppliers of CSPV cells and modules to become certified or pre-qualified for all of their purchases.[62] Four purchasers reported conducting on-site audits or interviews of potential suppliers to examine engineering and manufacturing capabilities, verify product specifications, review reliability testing and certification, and determine the supplier's ability to meet delivery capabilities, technical support, and pricing and payment term requirements. Purchasers reported considering the following qualities when qualifying a new supplier: financial strength and bankability of supplier (12 firms), product meeting industry standards (9), quality of product (10), product reliability and warranty (6), suppliers' ability to offer competitive pricing (6), product technology of supplier (4), customer service (4), and domestically produced (1). Qualification

[56] At least 22 states and the District of Columbia authorize or allow third-party solar PV purchase power agreements. United States Department of Energy, Database of State Incentives for Renewables & Efficiency (DSIRE), August 2012, http://www.dsireusa.org/documents/summarymaps/3rd_Party_PPA_map.pdf.

[57] The average price of a residential system was $32,453 in the second quarter of 2012, down from $37,144 a year ago. SEIA, "Executive Summary," *U.S. Solar Market Insight*, Q2 2012, 6.

[58] SEIA, "Executive Summary," *U.S. Solar Market Insight*, Q2 2012, 6.

[59] Ibid.

[60] *Wall Street Journal*, "Rays for Rent," September 12, 2010; and *The New York Times*, "The Secret to Solar Power," August 9, 2012..

[61] *The New York Times*, "The Secret to Solar Power," August 9, 2012.

[62] One purchaser reported that they require suppliers of CSPV cells and modules to become certified or pre-qualified for 90 percent of their purchases.

times ranged from one day to 180 days, with 15 of 35 purchasers reporting qualification times of 90 to 180 days.[63]

When asked if any domestic or foreign suppliers had failed to obtain certification, 16 of 50 purchasers reported "yes." Reasons reported for failure to qualify included not meeting certain quality, price competitiveness, and financial strength and bankability standards; and inability or unwillingness to produce product designed to meet customers' product specifications. Firms that reported suppliers losing certification cited bankruptcy (***) or exiting the market (***) as reasons for those suppliers no longer being qualified.

Lead times

Of the ten responding producers, 89.3 percent of sales of U.S.-produced CSPV cells and modules (based on 2011 U.S. commercial shipment values) came from inventories, with lead times ranging from 1 to 30 days. The remaining 10.7 percent of producers' sales were produced-to-order in 2011, with lead times typically ranging from 30 to 120 days.[64] Of the 24 responding importers, 48.6 percent of sales of CSPV cells and modules from China were produced-to-order; 43.6 percent of sales came from U.S. inventories; and 7.8 percent of sales came from their foreign manufacturers' inventories. Twenty-one importers reported lead times that ranged from 7 days to 86 days for sales from U.S. inventories; for produced-to-order sales, seven importers reported lead times ranging from 25 days to 90 days; and seven importers reported lead times ranging from 2 days to 60 days for sales from foreign inventories.

Changes in purchasing patterns

Since January 2009, purchasers of CSPV cells and modules have changed their purchasing patterns in different ways with respect to the country of origin of the CSPV cells and modules (table II-12). Purchasers of domestic CSPV cells and modules indicated that their purchases generally fluctuated or decreased. Reasons reported for fluctuations or decreases in domestic purchases included supply issues, increasing demand for U.S.-produced product, decrease in government incentives, and price. Some purchasers also reported increases in purchases of domestic CSPV cells and modules citing projects that required U.S.-produced product, quality, and delivery schedules. The majority of purchasers who had purchased from China reported an increase in purchases. Competitive lower pricing, high quality, and improved delivery were noted as reasons for an increase in purchases of CSPV cells and modules from China.

Table II-12
CSPV cells and modules: Changes in purchase patterns from U.S., subject countries, and nonsubject countries

Source	Decreased	Increased	Constant	Fluctuated	Did not purchase
United States	8	7	1	7	16
China	7	20	2	4	8
Nonsubject countries:					
Mexico	4	1	1	1	30
Japan	13	3	2	2	18
Other nonsubject	13	22	3	2	33

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

[63] Seven purchasers reported qualification times of 30 to 60 days; and six purchasers reported qualification times of approximately two weeks or less.

[64] One producer reported a lead time of two days for produced-to-order sales.

Forty-three of 53 purchasers reported that they had changed suppliers since 2009. *** reported dropping SunPower due to cost and performance concerns and also dropping Sharp due to performance concerns. *** reported adding suppliers Suntech and Schott because of good performance and prices and adding SolarWorld because they offered a cost effective monocrystalline product. Several purchasers reported dropping SolarWorld (dropped by ***) and Sharp (dropped by ***) due to supply reliability issues. *** reported adding Suntech as a supplier because of their warranty and module variety. *** reported switching purchases from Schuco to Trina due to price and availability. *** reported adding Samsung and AUO due to their competitive pricing and high quality product. Purchasers also reported adding Motech, Canadian Solar, and Suntech due to competitive pricing. Several purchasers also reported adding suppliers Canadian Solar, SolarWorld, Yingli, Schott, Motech, Sharp, MX Solar, and Kyocera to increase diversification of products available to them.

Of the 53 responding purchasers, 20 purchased monthly, 18 purchased on an as-needed project-by-project basis, 9 purchased CSPV cells and modules weekly, 4 purchased quarterly, and 2 purchased annually. When asked if purchasers made significant changes to their purchasing pattern since 2009, 30 of 53 purchasers responded "yes." Purchasers (10 firms) most often cited increasing demand or increasing customer base as the reason for increasing their purchasing frequency. Four purchasers adjusted their purchasing patterns to decrease the amount of product held in inventory and switch to purchasing product as required by specific projects. *** and *** reported that due to rapidly changing module efficiencies and market pricing, they discontinued holding modules in inventory and began purchasing on a per project basis in early 2010. Two purchasers reported entering or exiting the business as explanation for changing their purchasing patterns,[65] and two purchasers reported changing purchasing patterns when switching suppliers. One firm indicated making smaller, more frequent purchases due to price decline risks.

The majority of purchasers (44 of 53) contact at least two or three suppliers before making a purchase. Forty-five of 52 purchasers reported negotiating with the supplier when purchasing CSPV cells and modules. Twenty-seven purchasers reported that negotiations are based on price. Of those 25 purchasers, 14 reported that negotiations are also based on payment terms, delivery terms, and availability. The majority of purchasers (37 of 52) reported that they do not vary their purchases from a given supplier within a specified time period based on the price offered for that period.

Importance of purchasing domestic product

Twenty-seven purchasers reported that buying U.S. product was not an important factor in their firms' purchases. Twenty purchasers reported that buying domestic product was required by law (10 to 30 percent of purchases),[66] and 16 purchasers reported that buying domestic product was required by their customers (5 to 90 percent of purchases).[67] One firm reported that in order to qualify for the Department of Energy loan program, a portion of the modules purchased were required to have been assembled in the United States. One firm noted that their decision to buy domestic product was dependent upon whether the project was part of the "Buy American" program, and other firms indicated that source of product purchased depended on whether the customer requested a U.S.-produced product. *** reported that unless a customer specifically requests U.S.-produced modules, they will procure modules that meet the project specifications at the most efficient price, and typically these modules are sourced from overseas. *** reported that with the exception of their CSPV cells (which they do not purchase domestically due to cost, availability, and quality issues), they source all other module components (glass, plastics, aluminum, etc.) from U.S. companies.

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[65] *** indicated that they entered the solar business in 2010 with two engineering, procurement, and construction contracts with ***, and *** reported purchasing cells weekly when they were ***

[66] Two purchasers, *** reported that buying domestic product was required by law for 60 and 90 percent of their purchases, respectively.

[67] *** indicated that buying domestic product was required by their customers for 90 percent of their purchases.

Comparison of U.S.-Produced and Imported Products

When comparing U.S. product to subject products, most responding purchasers reported that U.S. product was comparable to product from China for all characteristics except for price, for which the product from China was rated as superior (table II-13).

Table II-13
CSPV cells and modules: Comparisons of product by source country, as reported by U.S. purchasers

Factor	U.S. vs. China			U.S. vs. Mexico			U.S. vs. Japan		
	S	C	I	S	C	I	S	C	I
Availability	4	32	10	2	11	1	8	23	2
Bankability	8	32	2	2	11	0	2	26	4
Conversion efficiency	3	40	2	1	13	0	1	29	3
Delivery terms	6	31	7	2	11	1	5	25	2
Delivery time	9	29	7	2	11	1	5	25	3
Discounts offered	3	22	18	1	9	3	4	21	6
Extension of credit	4	25	14	1	11	1	3	23	3
Federal government incentives	13	27	2	3	10	0	5	23	1
State/ local government incentives	14	26	2	3	10	0	5	23	1
Minimum quantity requirements	5	36	4	3	11	0	4	28	1
Packaging	1	40	2	1	13	0	2	29	1
Price[1]	2	9	36	2	6	6	4	21	8
Product consistency	7	36	1	2	12	0	3	27	3
Product range	4	30	11	1	13	0	3	26	3
Quality meets industry standards	10	33	1	2	12	0	1	26	5
Quality exceeds industry standards	7	36	1	1	13	0	1	29	2
Reliability of supply	6	28	10	1	12	1	3	24	4
Technical support/service	13	29	3	3	11	0	7	23	2
U.S. transportation costs[1]	10	32	3	2	12	0	6	24	1
Warranty	6	35	4	2	12	0	4	28	1

Table continued on the following page.

Table II-13--*Continued*
CSPV cells and modules: Comparisons of product by source country, as reported by U.S. purchasers

Factor	U.S. vs. other nonsubject countries			China vs. Mexico			China vs. Japan		
	S	C	I	S	C	I	S	C	I
Availability	4	24	7	4	9	0	11	18	1
Bankability	4	28	1	1	10	1	2	20	7
Conversion efficiency	2	31	2	2	11	0	2	23	4
Delivery terms	4	26	5	4	9	0	6	21	1
Delivery time	8	22	5	2	10	1	3	26	1
Discounts offered	4	19	10	2	10	0	10	18	1
Extension of credit	5	21	6	4	8	0	7	19	2
Federal government incentives	5	24	2	1	11	0	1	25	2
State/ local government incentives	5	23	2	1	11	0	1	25	2
Minimum quantity requirements	4	26	4	2	11	0	3	25	1
Packaging	3	31	1	1	12	0	1	28	1
Price[1]	2	14	19	9	4	0	22	7	1
Product consistency	5	27	3	1	12	0	1	22	6
Product range	2	27	6	5	7	1	8	21	1
Quality meets industry standards	5	27	2	1	12	0	2	23	5
Quality exceeds industry standards	3	30	2	1	12	0	1	27	2
Reliability of supply	5	25	5	3	10	0	5	24	1
Technical support/service	8	25	2	2	10	1	4	21	4
U.S. transportation costs[1]	8	25	1	1	12	0	1	27	1
Warranty	5	27	2	2	11	0	2	24	4

Table continued on the following page.

Table II-13--*Continued*
CSPV cells and modules: Comparisons of product by source country, as reported by U.S. purchasers

Factor	China vs. other nonsubject countries			Mexico vs. Japan			Mexico vs. other nonsubject countries		
	S	C	I	S	C	I	S	C	I
Availability	9	23	1	1	11	0	0	11	0
Bankability	2	22	6	0	9	1	0	9	0
Conversion efficiency	2	29	1	0	10	1	0	10	0
Delivery terms	7	24	1	2	9	0	0	10	0
Delivery time	3	28	1	1	10	0	0	10	0
Discounts offered	10	19	2	1	9	0	0	9	0
Extension of credit	7	21	2	1	7	2	1	8	0
Federal government incentives	2	24	2	0	10	0	0	9	0
State/ local government incentives	2	24	2	0	10	0	0	9	0
Minimum quantity requirements	3	26	1	0	11	0	0	10	0
Packaging	2	28	1	0	11	0	0	10	0
Price[1]	18	11	3	5	5	1	0	8	2
Product consistency	2	26	4	0	10	1	0	9	1
Product range	7	24	1	0	11	0	0	10	0
Quality meets industry standards	2	22	7	0	10	1	0	9	1
Quality exceeds industry standards	2	28	2	0	11	0	0	10	0
Reliability of supply	4	26	2	0	11	0	0	10	0
Technical support/service	4	24	4	0	11	0	0	10	0
U.S. transportation costs[1]	2	27	2	0	11	0	0	10	0
Warranty	3	28	1	0	11	0	0	10	0

[1] A rating of superior means that price/U.S. transportation cost is generally lower. For example, if a firm reported "U.S. superior", it meant that the price of the U.S. product was generally lower than the price of the imported product.

Note.--S=first listed country's product is superior; C=both countries' products are comparable; I=first listed country's product is inferior.

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

Twelve of 13 responding producers, 37 of 45 responding importers, and 37 of 42 responding purchasers reported that domestic and Chinese products are "always" or "frequently" interchangeable (table II-14). Several responding U.S. producers, importers, and purchasers noted that the interchangeability assessment assumed compliance with UL and EST safety standards, and one firm noted that certification standards and power tolerance differ between the United States and the rest of the world/Europe.

Table II-14
CSPV cells and modules: Perceived interchangeability of products produced in the United States and in other countries, by country pairs

Country pair	U.S. producers				U.S. importers				U.S. purchasers			
	A	F	S	N	A	F	S	N	A	F	S	N
U.S. vs. subject countries												
U.S. vs. China	6	6	1	0	16	21	8	0	17	20	5	1
U.S. vs. nonsubject countries												
U.S. vs. Mexico	4	5	0	0	8	13	1	0	8	7	0	1
U.S. vs. Japan	5	6	0	0	14	15	6	0	13	13	5	1
U.S. vs. other nonsubject	4	4	1	0	9	14	6	0	9	14	3	0
China vs. other countries												
China vs. Mexico	5	3	0	0	11	11	1	0	7	5	0	1
China vs. Japan	6	3	0	0	13	14	6	0	13	10	4	1
China vs. other nonsubject	5	2	1	0	11	13	5	0	9	12	2	0
Nonsubject countries												
Mexico vs. Japan	4	2	0	0	9	10	2	0	9	4	0	1
Mexico vs. other nonsubject	3	2	0	0	7	7	2	0	6	4	0	0
Japan vs. other nonsubject	4	2	0	0	10	9	3	0	9	8	2	0

Note.--A = Always, F = Frequently, S = Sometimes, N = Never.

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

The majority of producers (7 of 11) reported that differences other than price were "always" or "frequently" important in comparing U.S. and Chinese product. However, most importers (25 of 42) and purchasers (26 of 45) reported that differences other than prices were "sometimes" important in comparing U.S. and Chinese product (table II-15). The most commonly identified factor other than price was "bankability." One U.S. producer (***) reported that Chinese companies were seen as more "bankable" because of ease of access to credit from "state-owned" banks, low risk of bankruptcy, and ability to fulfill warranties; and another producer (***) reported that U.S. purchasers pay attention to the likelihood of a manufacturer remaining a "going concern" for the life of the 25-year warranty. In addition to "bankability," other identified factors other than price include quality, reliability, technical support, and warranty.

Table II-15
CSPV cells and modules: Perceived significance of differences other than price between products produced in the United States and in other countries, by country pairs

Country pair	U.S. producers				U.S. importers				U.S. purchasers			
	A	F	S	N	A	F	S	N	A	F	S	N
U.S. vs. subject countries												
U.S. vs. China	2	5	4	0	7	8	25	2	9	5	26	5
U.S. vs. nonsubject countries												
U.S. vs. Mexico	1	3	2	0	3	2	12	4	5	4	7	2
U.S. vs. Japan	1	2	4	0	5	5	20	3	8	5	17	5
U.S. vs. other nonsubject	0	4	4	0	3	5	16	3	6	7	15	3
China vs. other countries												
China vs. Mexico	1	1	2	1	3	1	12	2	6	2	5	1
China vs. Japan	1	0	3	0	5	3	19	2	6	3	12	5
China vs. other nonsubject	0	1	2	1	3	3	15	2	4	3	11	3
Nonsubject countries												
Mexico vs. Japan	1	0	3	0	3	0	11	4	5	2	4	3
Mexico vs. other nonsubject	0	1	1	1	2	1	10	3	3	2	4	1
Japan vs. other nonsubject	0	0	2	0	2	0	14	3	4	3	8	3

Note.--A = Always, F = Frequently, S = Sometimes, N = Never.

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

As seen in table II-16, almost all responding purchasers indicate that U.S.-produced product and product imported from China at least "usually" meet minimum quality specifications.

Table II-16
CSPV cells and modules: Ability to meet minimum quality specifications, by source

Country	Number of firms reporting				
	Always	Usually	Sometimes	Rarely or never	Don't know
United States	19	21	0	0	7
Subject countries:					
China	16	23	6	0	6
Nonsubject countries:					
Mexico	2	8	4	0	24
Japan	12	19	0	0	15
Other nonsubject	11	15	1	0	9

Source: Compiled from responses to Commission questionnaires.

ELASTICITY ESTIMATES

This section discusses suggested elasticity estimates based on the conditions of competition; party comments are noted below.

U.S. Supply Elasticity

The domestic supply elasticity for CSPV cells and modules measures the sensitivity of the quantity supplied by U.S. producers to a change in the U.S. market price of CSPV cells and modules. The elasticity of domestic supply depends on several factors, including the level of excess capacity, the ease with which producers can alter capacity, producers' ability to shift to the production of other products, the existence of inventories, and the availability of alternative markets for U.S.-produced CSPV cells and modules. Analysis of these factors indicates that the U.S. industry has the ability to respond to changes in demand with moderately large to large changes in shipments of CSPV cells and modules to the U.S. market. Staff estimates the supply elasticity for CSPV cells and modules is between 5 and 7.

U.S. Demand Elasticity

The U.S. demand elasticity for CSPV cells and modules measures the sensitivity of the overall quantity demanded to a change in the U.S. market price of CSPV cells and modules. This estimate depends on factors discussed earlier such as the availability substitute products, as well as the component share of CSPV cells and modules in the production of downstream products. As discussed earlier, it is likely that any change in the price level of CSPV cells and modules will result in a moderate to large change in the quantity of CSPV cells and modules demanded. Based on available information, the demand elasticity for CSPV cells and modules is likely to be in the range of -0.75 to -1.0. Respondents reported that the demand elasticity for CSPV cells and modules is likely to be at the high end of that range.[68]

Substitution Elasticity

The substitution elasticity measures how easily purchasers switch from the U.S. product to the subject product (or vice versa) when prices change. This elasticity depends upon the extent of product differentiation between the domestic and imported products and therefore such factors as quality and conditions of sale (e.g., service, availability, delivery). Based on this and other available information, the substitution elasticity between U.S.-produced CSPV cells and modules and subject imported CSPV cells and modules is likely to be in the range of 3 to 5.

[68] CCCME's prehearing brief, pp. 31-32.

PART III: U.S. PRODUCERS' PRODUCTION, SHIPMENTS, AND EMPLOYMENT

Information presented in this section of the report is based on (except as noted) the questionnaire responses of two U.S. producers of CSPV cells, which accounted for approximately *** percent of total 2011 U.S. CSPV cell production, and fourteen U.S. producers that produce CSPV modules, which account for approximately *** percent of total 2011 U.S. production of CSPV modules.[1]

U.S. PRODUCERS

The Commission sent producers' questionnaires to 82 firms identified by the Commission as possible U.S. producers or U.S. importers of CSPV cells and/or modules.[2] The Commission received responses from 14 firms. Of the reporting firms, two U.S. producers, the petitioner SolarWorld, and Suniva, reported that they produced CSPV cells in the United States and twelve firms reported that they produced only CSPV modules in the United States. Both U.S. CSPV cell producers, SolarWorld and Suniva, also reported manufacturing CSPV modules. In the preliminary and final phases of these investigations, petitioner maintained that the domestic industry properly includes both U.S. producers of CSPV cells and CSPV modules.[3] Respondents did not raise any arguments regarding the domestic industry definition. In its preliminary views, the Commission found that U.S. module assemblers engaged in sufficient production-related activities to include them as part of the domestic industry (and their finished modules as shipments of the domestic like product).[4] The Commission defined the domestic industry as all domestic producers of CSPV cells and modules.

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[1] Based on a comparison of U.S. producers' reported production of CSPV cells and modules in 2011 with total 2011 U.S. production of cells (*** mw) as reported in *PV News*, Volume 31, Number 5, May 2012, pp. 8-9, and modules (*** mw) as reported in *U.S. Solar Market Insight, 2011 Year-in-Review*, Solar Energy Industries Association, p. 13.

[2] The 82 U.S. firms also included a number of firms believed to produce thin film solar products. The Commission received responses from seven firms that reported that they produce thin film solar products in the United States during the period of investigation (*see* Table I-3). Appendix C, table C-5 presents data gathered by the Commission regarding U.S. producers of thin film solar products and table C-6 combines the U.S. industry data for both U.S. producers of CSPV modules and U.S. producers of thin film solar products.

[3] Petitioner's postconference brief, pp. 4-7; Petitioner's prehearing brief, pp. 14-18. Petitioner argued that sufficient production related activity is done in the United States for the U.S. producers of CSPV modules to be properly included into the domestic industry. It cited extensive capital investment and research and development necessary to engage in module production. For example, it cited total reported total assets and capital expenditures of $*** and $***, respectively for U.S. module producers compared to $*** and $*** for U.S. producers of cells. Petitioner also stated that although the module production process may be more labor intensive, it is still a highly automated and technically sophisticated process which adds approximately *** percent of the value to the final product. Ibid.

The petitioner argued, however, that a number of U.S. producers should be excluded from the domestic industry as related parties. *See, infra*.

[4] Specifically, the Commission stated: "Module operations have substantial capital investments and other costs, and require significant technical expertise and a large number of employees for the production of the finished module. Additionally, assembly of cells into modules adds significant value to the finished module. Accordingly, we find that U.S. module assemblers engage in sufficient production-related activities to include them as part of the domestic industry (and their finished products as shipments of the domestic like product)." *Crystalline Silicon Photovoltaic Cells and Modules from China*, Inv. Nos. 701-TA-481 and 731-TA-1190 (Preliminary), USITC Pub. 4295, December 2011, p. 13.

Table III-1 presents the list of reporting U.S. producers of CSPV cells and modules with each company's U.S. production location, share of reported U.S. CSPV cell or module production in 2011, and position on the petition.

Table III-1
CSPV cells and modules: Reporting U.S. producers of cells and modules, U.S. production locations, shares of U.S. production in 2011, and positions on the petition

Firm	Production location	Share of reported 2011 U.S. production (*percent*)	Position on the petition
U.S. producers of CSPV cells			
SolarWorld[1]	Camarillo, CA Hillsboro, OR	***	Petitioner
Suniva	Norcross, GA	***	***
U.S. producers of CSPV modules			
ASP[2]	Lake Mary, FL	***	***
GE[3]	Schenectady, NY	***	***
Helios	Milwaukee, WI	***	***
Kyocera[4]	San Diego, CA Scottsdate, AZ	***	***
Mage[5]	Dublin, GA	***	***
Motech[6]	Newark, DE	***	***
MX Solar[7]	Somerset, NJ	***	***
Schott[8]	Albuquerque, NM Santa Clara, CA Billerica, MA	***	***
Sharp[9]	Memphis, TN Camas, WA	***	***
Silicon Energy[10]	Marysville, WA Mt. Iron, MN	***	***
SolarWorld	Camarillo, CA Hillsboro, OR	***	Petitioner
Solon[11]	Tucson, AZ	***	***
Suniva	Norcross, GA	***	***
Suntech[12]	Goodyear, AZ	***	***

* * * * * * *

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

U.S. Producers of CSPV Cells

Of the fourteen responding U.S. producers, two firms, the petitioner SolarWorld and Suniva, reported that they manufactured CSPV cells in the United States during the period of investigation.[5] SolarWorld and Suniva reported that they internally consume the majority of their CSPV cells in their U.S. production of CSPV modules.[6]

U.S. Producers of CSPV Modules

Of the fourteen responding U.S. producers, twelve firms reported that they did not produce CSPV cells in the United States, but rather assembled CSPV modules using CSPV cells either transferred, purchased, or imported from another related or unrelated firm. Table III-2 lists the responding U.S. producers of CSPV modules, affiliated CSPV cell producers, and the source of their CSPV cells, by firm and country of origin.

Table III-2
CSPV cells and modules: U.S. producers of modules, affiliated firms, sources of CSPV cells, by firm and country of origin

* * * * * * *

U.S. CAPACITY, PRODUCTION, AND CAPACITY UTILIZATION

Numerous U.S. producers of CSPV cells and modules reported events that affected total U.S. capacity and production. Table III-3 lists these events that occurred during the period of investigation. Table III-4 shows a time line of when U.S. producers of CSPV cell or modules either entered or exited the U.S. market during the period of investigation.[7]

Table III-3
CSPV cells and modules: U.S. producers of CSPV cells and modules, activities affecting U.S. capacity, by date

* * * * * * *

[5] A number of U.S. CSPV cell producers that provided the Commission with a questionnaire response in its preliminary phase of these investigations have since exited the market. For example, Evergreen declared bankruptcy and no longer produces CSPV cells in the United States. Calisolar, after a reorganization, is now Silicor Materials, a producer of polysilicon used in the solar industry.

[6] In 2011, SolarWorld reported that *** percent of its total shipments were commercial sales of CSPV cells with *** percent being internally consumed to produce modules, and *** percent exported. In 2011, Suniva reported that *** percent of its total shipments were commercial sales of CSPV cells with approximately *** percent being ***. In 2011, Suniva reported ***.

[7] See also, petition, pp. 35-37 (list of U.S. firms either reducing production or declaring bankruptcy); Petitioner's postconference brief, pp. 25-28 and exh. 1, pp. 49-53; Respondent CCCME's postconference brief, p. 29 (list of firms commencing production in the United States during the period of investigation); Petitioner's prehearing brief, pp. 65-69.

Table III-4
CSPV cells and modules: Listing of U.S. firms with CSPV production facilities opening and/or closing, 2009-August 2012

Company	2009		2010		2011		2012	
	January to June	July to December	January to June	July to December	January to June	July to December	January to June	July to August
1Soltech		Started module production in TX				Moved to larger module plant in TX		
Advanced Solar Photonics	Started module production in FL							
Alternative Energies Kentucky				Started module production in KY				
BP Solar	Announced plan to end module assembly in MD by Nov., but keep cell production		Announced plan to close manufacturing plant in MD					
Calisolar			Cell plant opened in CA			Announced plan to downsize cell production, shift focus to polysilicon		
Evergreen					Closed cell and module plant in MA			
Helios					Opened module plant in WI			
Isofoton								Indicated module plant in OH will open in Nov. 2012
Itek Energy						Opened module plant in WA[1]		
Jetion Solar					Announced plan to open module plant in NC			
Kyocera			Opened module plant in CA					
Mage Solar					Opened module plant in GA			
Motech			Bought GE module plant in DE					
MX Solar				Opened module plant in NJ			Closed module plant in NJ	
NuSun							Indicated plans to start module production in fall 2012 in IN	
Schott	Started module production in NM	Closed module plant in MA					Closed all CSPV module production in U.S. and Europe	

Table continued on next page.

Table III-4--*Continued*
CSPV cells and modules: Listing of U.S. firms with CSPV production facilities opening and/or closing, 2009-August 2012

Company	2009		2010		2011		2012	
	January to June	July to December	January to June	July to December	January to June	July to December	January to June	July to August
Sharp	No known plant openings or closings							
Solartech			Opened module plant in NY					
Silicon Energy			Moved to larger module plant in WA			Opened module plant in MN		
Siliken					Closed module plant in CA			
Solar Power Industries								Closed PA cell and module plant[2]
Solaria Corp.			Started module shipments from plant in CA					
SolarWorld						Closed module plant in CA		
Solon Corp				Opened module plant in AZ		Closed module plant in AZ		
Spectrawatt			Opened cell plant in NY	Closed cell plant in NY				
Suniva						Added (or expanded) module production in GA (also produce cells in GA)		
SunPower					Module plant opened in CA (with Flextronics)			
Suntech				Opened module plant in AZ				
tenKsolar				Start of module sales from plant in MN				
Transform Solar							Announced will close cell plant in ID[3]	
Twin Creeks Technologies					Opened cell plant in MS[4]			
Wanxiang			Opened module plant in IL					

[1]Exact date of plant opening not available. Produced 100 modules as of November 2011.
[2]Exact date of plant closing not available. As of August 2012, assets for cell and module production lines were being auctioned.
[3]Date of plant opening not available. Transform Solar was a joint venture started in 2010.
[4]It is not clear if this plant only produces cells or also produces modules.

Source:–Compiled from public research material.

Data on U.S. producers of CSPV cells and modules capacity, production, and capacity utilization are presented in table III-5. Total U.S. capacity of CSPV cells increased from 2009 to 2011 by *** percent and was *** between January-June 2011 and January-June 2012. Total U.S. capacity of CSPV modules increased from 2009 to 2011 by 280.7 percent and was higher by 8.3 percent between January-June 2011 and January-June 2012. Total U.S. production of CSPV cells increased from 2009 to 2011 by *** percent, but was lower by *** percent between January-June 2011 and January-June 2012. Total U.S. production of CSPV modules increased from 2009 to 2011 by 254.6 percent, but was lower by 21.4 percent between January-June 2011 and January-June 2012. Annual capacity utilization rates for CSPV cell production ranged from *** percent in 2011 to *** percent in 2009. Annual capacity utilization rates for CSPV module production ranged from 65.6 percent in 2011 to 76.4 percent in 2010.

Table III-5
CSPV cells and modules: U.S. producers' capacity, production, and capacity utilization, 2009-11, January-June 2011, and January-June 2012

Item	Calendar year			January-June	
	2009	2010	2011	2011	2012
			Capacity *(kilowatts)*		
Cells	***	***	***	***	***
Modules	266,777	596,950	1,015,708	528,796	572,804
Total	***	***	***	***	***
			Production *(kilowatts)*		
Cells	***	***	***	***	***
Modules: produced using–					
U.S. produced cells produced by your firm	***	***	***	***	***
U.S. produced cells produced by another U.S. firm	***	***	***	***	***
Chinese produced cells	***	***	***	***	***
Other foreign produced cells	***	***	***	***	***
Total modules	187,976	456,026	666,533	366,884	288,513
Total cells and modules	***	***	***	***	***
			Capacity utilization (*percent*)		
Cells	***	***	***	***	***
Modules	70.5	76.4	65.6	69.4	50.4
Average	***	***	***	***	***

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

U.S. PRODUCERS' U.S. SHIPMENTS AND EXPORT SHIPMENTS

As detailed in table III-6, the volume of U.S. shipments of CSPV cells increased by *** percent from 2009 to 2011, but was lower by *** percent from January-June 2011 to January-June 2012. The value of U.S. shipments also increased by *** percent from 2009 to 2011, but was lower by *** percent from January-June 2011 to January-June 2012. During the period of investigation, the vast majority of U.S. produced CSPV cells were internally consumed by their producers to manufacture CSPV modules. In 2011, U.S. producers of CSPV cells, SolarWorld and Suniva, reported that *** percent and *** percent, respectively, of their total U.S. shipments were internally consumed to produce CSPV modules.[8]

As shown in table III-7, the volume of U.S. shipments of CSPV modules increased by 318.7 percent from 2009 to 2011, and was higher by 6.0 percent from January-June 2011 to January-June 2012. The value of U.S. shipments also increased by 209.0 percent from 2009 to 2011, but was lower by 31.3 percent from January-June 2011 to January-June 2012.

Table III-6
CSPV cells: U.S. producers' shipments OF CELLS, by types, 2009-11, January-June 2011, and January-June 2012

* * * * * * *

[8] Suniva reported that ***.

Table III-7
CSPV modules: U.S. producers' shipments OF MODULES, by types, 2009-11, January-June 2011, and January-June 2012

Item	Calendar year			January-June	
	2009	2010	2011	2011	2012
			Quantity (*kilowatts*)		
U.S. commercial shipments	***	***	***	***	***
Internal consumption	***	***	***	***	***
Transfers to related firms	***	***	***	***	***
U.S. shipments	108,276	331,167	453,378	243,279	257,992
Exports to related firms	80,763	108,523	55,776	29,991	47,927
Exports to unrelated firms	4,975	23,663	41,924	39,152	6,369
Total exports	85,738	132,186	97,700	69,143	54,296
Total shipments	194,014	463,353	551,078	312,422	312,288
			Value (*$1,000*)		
U.S. commercial shipments	***	***	***	***	***
Internal consumption	***	***	***	***	***
Transfers to related firms	***	***	***	***	***
U.S. shipments	255,778	568,029	790,466	422,650	290,219
Exports to related firms	203,871	235,516	104,000	56,837	58,675
Exports to unrelated firms	13,337	45,752	73,111	69,012	7,361
Total exports	217,208	281,268	177,111	125,849	66,036
Total shipments	472,986	849,297	967,577	548,499	356,255
			Unit value (*per kilowatt*)		
U.S. commercial shipments	***	***	***	***	***
Internal consumption	***	***	***	***	***
Transfers to related firms	***	***	***	***	***
U.S. shipments	2,362	1,715	1,744	1,737	1,125
Exports to related firms	2,524	2,170	1,865	1,895	1,224
Exports to unrelated firms	2,681	1,933	1,744	1,763	1,156
Total exports	2,533	2,128	1,813	1,820	1,216
Total shipments	2,438	1,833	1,756	1,756	1,141

Table continued on next page.

Table III-7--*Continued*
CSPV modules: U.S. producers' shipments OF MODULES, by types, 2009-11, January-June 2011, and January-June 2012

Item	Calendar year			January-June	
	2009	2010	2011	2011	2012
	Share of shipment quantity (*percent*)				
U.S. commercial shipments	***	***	***	***	***
Internal consumption	***	***	***	***	***
Transfers to related firms	***	***	***	***	***
U.S. shipments	55.8	71.5	82.3	77.9	82.6
Exports to related firms	41.6	23.4	10.1	9.6	15.3
Exports to unrelated firms	2.6	5.1	7.6	12.5	2.0
Total exports	44.2	28.5	17.7	22.1	17.4
Total shipments	100.0	100.0	100.0	100.0	100.0

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

U.S. PRODUCERS' IMPORTS AND PURCHASES OF IMPORTS

*** of the fourteen reporting U.S. producers reported U.S. imports or purchases of imports from China.[9] *** U.S. producers reported purchasing or importing CSPV modules and *** of the firms reported importing CSPV cells to be assembled into modules in the United States. Table III-8 presents those firms who purchased and/or imported CSPV cells and modules from China, the quantity of purchases and/or imports and their U.S. production.

Table III-8
CSPV cells and modules: U.S. producers' subject imports and purchases of subject imports, 2009-11, January-June 2011, and January-June 2012

* * * * * * *

[9] In the petition, petitioners claimed that *** firms should be excluded from the domestic industry as related parties. These firms include: ***. Petitioner argued that ***. Petition, pp. 22-25.

In the final phase of these investigations, petitioner argued that Suntech and Motech should be removed from the U.S. industry as their major interests are the importation of cells and modules from their affiliates in China rather than U.S. production of modules. Petitioner's prehearing brief, pp. 18-22. Respondent Suntech argued that it should be included in the U.S. industry and that its primary interest is the production of modules in the United States. It stated that it has invested approximately $10 million in its Goodyear, AZ manufacturing facility and that it not only relies on cells and modules from its affiliate in China, but also cells from non-affiliated firms to assemble into modules. Respondents' prehearing brief, pp. 18-21.

Appendix C, table C-4 presents the U.S. industry summary data excluding the trade data of *** and the financial data of ***. *** did not submit U.S. producers questionnaires in these final phase investigations.

U.S. PRODUCERS' INVENTORIES

Data on end-of-period inventories of CSPV cells and modules for the period of investigation are presented in table III-9.

Table III-9
CSPV cells and modules: U.S. producers' end-of-period inventories, 2009-11, January-June 2011, and January-June 2012

Item	Calendar year			January-June	
	2009	2010	2011	2011	2012
U.S. producers of cells					
Inventories *(kilowatts)*	***	***	***	***	***
Ratio to production (*percent*)	***	***	***	***	***
Ratio to U.S. shipments (*percent*)	***	***	***	***	***
Ratio to total shipments (*percent*)	***	***	***	***	***
U.S. producers of modules					
Inventories *(kilowatts)*	19,450	17,170	113,244	85,353	80,381
Ratio to production (*percent*)	10.3	3.8	17.0	11.6	13.9
Ratio to U.S. shipments (*percent*)	18.0	5.2	25.0	17.5	15.6
Ratio to total shipments (*percent*)	10.0	3.7	20.5	13.7	12.9
U.S. producers of cells and modules					
Inventories *(kilowatts)*	***	***	***	***	***
Ratio to production (*percent*)	***	***	***	***	***
Ratio to U.S. shipments (*percent*)	***	***	***	***	***
Ratio to total shipments (*percent*)	***	***	***	***	***

Note.--January-June ratios are calculated using annualized production and shipment data.
Source: Compiled from data submitted in response to Commission questionnaires.

U.S. EMPLOYMENT, WAGES, AND PRODUCTIVITY

Data provided by U.S. producers on the number of production and related workers ("PRWs") engaged in the production of CSPV cells and modules, the total hours worked by such workers, wages paid to such PRWs,[10] productivity, and unit labor costs during the period of investigation are presented in table III-10.

Table III-10
CSPV cells and modules: Average number of production and related workers producing CSPV cells and modules, hours worked, wages paid to such employees, and hourly wages, productivity, and unit labor costs, 2009-11, January-June 2011, and January-June 2012

Item	Calendar year			January-June	
	2009	2010	2011	2011	2012
U.S. producers of cells					
PRWs (*number*)	***	***	***	***	***
Hours worked (*1,000*)	***	***	***	***	***
Wages paid (*$1,000*)	***	***	***	***	***
Hourly wages	***	***	***	***	***
Productivity *(kilowatts per hour)*	***	***	***	***	***
Unit labor costs (*per kilowatt*)	***	***	***	***	***
U.S. producers of modules					
PRWs (*number*)	1,180	1,866	1,856	1,999	1,516
Hours worked (*1,000*)	2,719	4,101	4,098	2,492	1,591
Wages paid (*$1,000*)	47,660	77,049	82,840	47,201	32,815
Hourly wages	$17.53	$18.79	$20.22	$18.94	$20.63
Productivity *(kilowatts per hour)*	0.1	0.1	0.2	0.1	0.2
Unit labor costs (*per kilowatt*)	$253.54	$168.96	$124.37	$128.67	$113.80
U.S. producers of cells and modules					
PRWs (*number*)	***	***	***	***	***
Hours worked (*1,000*)	***	***	***	***	***
Wages paid (*$1,000*)	***	***	***	***	***
Hourly wages	***	***	***	***	***
Productivity *(kilowatts per hour)*	***	***	***	***	***
Unit labor costs (*per kilowatt*)	***	***	***	***	***

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

[10] The U.S. Department of Labor certified that the SolarWorld employees of the closed Camarillo, CA manufacturing facility are eligible to apply for trade adjustment assistance. Attachment to U.S. producer's questionnaire of SolarWorld.

PART IV: U.S. IMPORTS, APPARENT CONSUMPTION, AND MARKET SHARES

U.S. IMPORTERS

The Commission sent U.S. importers' questionnaires to 82 firms identified by the Commission as possible U.S. producers or U.S. importers of CSPV cells and/or modules. Questionnaire responses containing usable data were received from 49 firms[1] and accounted for approximately 67.1 percent of U.S. imports of CSPV cells and modules from China in 2011 and 37.3 percent of U.S. imports from nonsubject countries.[2]

Table IV-1 lists all responding U.S. importers of CSPV cells and modules, their U.S. locations, and their quantities of imports, by source, for 2011.

[1] Spire, Solarland, and Renewable Energy Alternatives submitted U.S. importer questionnaire responses to the Commission with incomplete and/or unusable data.

[2] Based on a comparison of the value of 2011 U.S. imports of CSPV cells and modules from China reported in the responses to the Commission's U.S. importer questionnaire with total landed-duty paid value of 2011 U.S. imports from China of cells and modules as reported by official Commerce import statistics (HTS 8541.40.60.30 and 8541.40.60.20). The percentage of U.S. imports from nonsubject countries were computed in the same manner. Questionnaire data coverage percentages may be understated because the official Commerce statistics may include other products not within the scope of these investigations such as thin film solar products.

Table IV-1
CSPV cells and modules: Reported U.S. imports, by importers and by sources of imports, 2011

Importer	U.S. location(s)	Quantity *(kilowatts)*				
		China		Nonsubject countries		
		Cells	Modules	Cells	Modules	Country
ASP[1]	Lake Mary, FL	***	***	***	***	*** ***
Adema[2]	Santa Clara, CA Mountain View, CA	***	***	***	***	***
AES[3]	Arlington, VA	***	***	***	***	
Ameresco[4]	Framingham, MA Tomball, TX Temecula, CA Tempe, AZ	***	***	***	***	
Boss Buck	Seagoville, TX	***	***	***	***	
BP Solar[5]	Houston, TX Frederick, MD	***	***	***	***	***
Canadian Solar[6]	San Ramon, CA	***	***	***	***	***
CBC[7]	Commack, NY	***	***	***	***	***
Eoplly[8]	San Bruno, CA	***	***	***	***	
Essco[9]	Chandler, AZ	***	***	***	***	
ET Solar[10]	Pleasanton, CA	***	***	***	***	***
GE[11]	Schenectady, NY Newark, DE	***	***	***	***	***
Greenleaf[12]	Redwood City, CA	***	***	***	***	
groSolar[13]	White River Junction, VT	***	***	***	***	
Helios	Milwaukee, WI	***	***	***	***	*** ***
JA Solar[14]	Shanghai, China	***	***	***	***	
Jinko[15]	San Francisco, CA	***	***	***	***	
Kyocera[16]	San Diego, CA Scottsdale, AZ	***	***	***	***	***
Lumos[17]	Boulder, CO	***	***	***	***	
Mage[18]	Dublin, GA	***	***	***	***	
MEMC[19]	St. Peters, MO Belmont, CA Beltsville, MD	***	***	***	***	*** ***
Mitsubishi	Cypress, CA	***	***	***	***	***

Table continued on next page

Table IV-1--*Continued*
CSPV cells and modules: Reported U.S. imports, by importers and by sources of imports, 2011

Importer	U.S. location(s)	Quantity *(kilowatts)*				
		China		Nonsubject countries		
		Cells	Modules	Cells	Modules	Country
Morgan Stanley[20]	Purchase, NY	***	***	***	***	
Motech[21]	Newark, DE	***	***	***	***	***
MX Solar[22]	Somerset, NJ	***	***	***	***	***
Nexamp	North Andover, MA	***	***	***	***	
NextEra	Juno Beach, FL	***	***	***	***	
OneSource	Oceanside, CA	***	***	***	***	
ProVision	Hilo, HI	***	***	***	***	
Renogy	Baton Rouge, LA	***	***	***	***	***
Sanyo[23]	San Diego, CA Cupertino, CA Frisco, TX	***	***	***	***	***
Schott	Albuquerque, NM Santa Clara, CA Billerica, MA	***	***	***	***	***
Schuco[24]	Newington, CT	***	***	***	***	***
Sharp[25]	Memphis, TN Camas, WA	***	***	***	***	*** ***
Silicon[26]	Marysville, WA	***	***	***	***	***
SolarWorld[27]	Hillsboro, OR	***	***	***	***	***
Solatube	Vista, CA	***	***	***	***	
Solon	Tucson, AZ	***	***	***	***	***
SUMEC[28]	The Woodlands, TX	***	***	***	***	
Suniva	Norcross, GA	***	***	***	***	
Sunperfect[29]	San Jose, CA	***	***	***	***	
Suntech[30]	San Francisco, CA Goodyear, AZ	***	***	***	***	
SunWize[31]	San Jose, CA	***	***	***	***	*** ***
Tri Valley	Newark, CA	***	***	***	***	

Table continued on next page.

Table IV-1--*Continued*
CSPV cells and modules: Reported U.S. imports, by importers and by sources of imports, 2011

Importer	U.S. location(s)	Quantity *(kilowatts)*				
		China		Nonsubject countries		
		Cells	Modules	Cells	Modules	Country
Trina[32]	San Jose, CA	***	***	***	***	
Upsolar[33]	San Francisco, CA	***	***	***	***	
United Renewable[34]	Alpharetta, GA	***	***	***	***	
Wanxiang	Rockford, IL	***	***	***	***	***
Yingli[35]	New York, NY San Francisco, CA	***	***	***	***	
Total		103,943	1,346,732	280,787	317,200	1,874,728

* * * * * * *

Source: Compiled from data submitted in response to Commission questionnaires

U.S. IMPORTS

Table IV-2 presents data for U.S. imports of CSPV cells and modules from China[3] and nonsubject countries. The data that follow are compiled using responses to the Commission's U.S. importer questionnaire.[4] As shown, U.S. imports of cells from China increased from zero in 2009 to 103,943 kilowatts in 2011. U.S. imports of modules from China increased by 1,016.5 percent from 2009 to 2011 and were higher by 35.0 percent from January-June 2011 to January-June 2012. The volume of U.S. imports of CSPV cells from nonsubject countries increased by 109.0 percent from 2009 to 2011, but were lower by 13.5 percent from January-June 2011 and January-June 2012. The volume of U.S. imports of CSPV modules from nonsubject countries increased by 168.1 percent from 2009 to 2011, and were higher by 131.3 percent from January-June 2011 to January-June 2012. The largest sources of U.S. imports from nonsubject countries in 2011 were: (1) Taiwan, (2) Malaysia, (3) Germany, (4) Japan, and (5) Mexico.

[3] According to Commerce's scope determination, the country of origin of a CSPV module is the country of origin of its component CSPV cells. Commerce found that the assembly of a CSPV panel did not constitute "substantial transformation" of the CSPV cell and thereby, confer country of origin onto the assembled CSPV module. *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From the People's Republic of China: Preliminary Determination of Sales at Less Than Fair Value, Postponement of Final Determination and Affirmative Preliminary Determination of Critical Circumstances;* 77 FR 31309, May 25, 2012; *See also Scope Clarification: Antidumping and Countervailing Duty Investigations of Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, from the People's Republic of China*, Memorandum to Gary Taverman, Acting Deputy Assistant Secretary for Antidumping and Countervailing Duty Operations, March 19, 2012

[4] In the preliminary phase of these investigations, petitioner and respondents observed that the volumes reported in the official Commerce statistics under HTS 8541.40.6020 (modules) most likely report the number of modules and not the number of cells imported into the United States. This may result in quantities that when summed do not accurately reflect the total volume of imported cells. Petition, p. 15, fn. 28. In the preliminary phase, respondents urged the Commission not to rely on official Commerce statistics as a measure of U.S. imports because of the inconsistency and unreliability of the volumes reported in "units" and because official Commerce statistics, although most likely overwhelmingly reporting imports of CSPV products, may include some thin-film solar products. Respondent CCCME's postconference brief, p. 30. The Commission recognized the data issue in its preliminary views. *Crystalline Silicon Photovoltaic Cells and Modules from China*, Inv. Nos. 701-TA-481 and 731-TA-1190 (Preliminary), USITC Pub. 4295, December 2011, p. 21. Therefore, throughout this report, U.S. import volume data are compiled using "kilowatts" compiled from U.S. importer questionnaire responses.

Table IV-2
CSPV cells and modules: U.S. imports of cells and modules, by sources, 2009-11, January-June 2011, and January-June 2012

Source	Calendar year			January-June	
	2009	2010	2011	2011	2012
Quantity (*kilowatts*)					
China					
Cells	0	16,802	103,943	41,814	0
Modules	120,621	635,973	1,346,732	532,289	718,723
Total	120,621	652,775	1,450,675	574,103	718,723
All others					
Cells	134,369	244,709	280,787	190,035	164,336
Modules	118,335	245,673	317,200	153,170	354,262
Total	252,704	490,382	597,987	343,204	518,598
Total	373,325	1,143,157	2,048,662	917,307	1,237,321
Value (*$1,000*)[1]					
China					
Cells	0	21,657	105,620	47,027	0
Modules	236,096	1,049,617	1,799,600	851,001	686,489
Total	236,096	1,071,274	1,905,220	898,028	686,489
All others					
Cells	229,486	322,188	284,751	190,653	86,622
Modules	293,536	480,313	539,838	284,474	351,942
Total	523,022	802,501	824,588	475,127	438,564
Total	759,118	1,873,775	2,729,809	1,373,156	1,125,053
Unit value (*per kilowatt*)					
China					
Cells	0	1,289	1,016	1,125	0
Modules	1,957	1,650	1,336	1,599	955
Total	1,957	1,641	1,313	1,564	955
All others					
Cells	1,708	1,317	1,014	1,003	527
Modules	2,483	1,955	1,702	1,861	993
Total	2,071	1,636	1,379	1,386	846
Total	2,034	1,639	1,332	1,497	909

Table continued on next page.

Table IV-2--*Continued*
CSPV cells and modules: U.S. imports of cells and modules, by sources, 2009-11, January-June 2011, and January-June 2012

Source	Calendar year			January-June	
	2009	2010	2011	2011	2012
			Share of quantity (*percent*)		
China					
Cells	0.0	1.5	5.1	4.6	0.0
Modules	32.3	55.6	65.7	58.0	58.1
Total	32.3	57.1	70.8	62.6	58.1
All others					
Cells	36.0	21.4	13.7	20.7	13.3
Modules	31.7	21.5	15.5	16.7	28.6
Total	67.7	42.9	29.2	37.4	41.9
Total	100.0	100.0	100.0	100.0	100.0
			Share of value (*percent*)		
China					
Cells	0.0	1.2	3.9	3.4	0.0
Modules	31.1	56.0	65.9	62.0	61.0
Total	31.1	57.2	69.8	65.4	61.0
All others					
Cells	30.2	17.2	10.4	13.9	7.7
Modules	38.7	25.6	19.8	20.7	31.3
Total	68.9	42.8	30.2	34.6	39.0
Total	100.0	100.0	100.0	100.0	100.0

[1] Landed, duty-paid.

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

NEGLIGIBILITY

The Tariff Act of 1930 provides for the termination of an investigation if imports of the subject product from a country are less than 3 percent of total imports, or, if there is more than one such country, their combined share is less than or equal to 7 percent of total imports, during the most recent 12 months for which data are available preceding the filing of the petition.[5] Section 771(24)(B) of the Act further provides that in those countervailing duty investigations under section 701 involving imports from developing countries, imports of subject merchandise from a developing country are negligible if such imports account for less than 4 percent of the volume of all such merchandise imported into the United States in the specified 12-month period. U.S. imports of CSPV cells and modules from China accounted for 57.1 percent of total U.S. imports of CSPV cells and modules in 2010. In the preliminary and final phases of these investigations, no party disputed that the share of the total quantity of U.S. imports from China surpassed the requisite negligibility threshold during the period.

CRITICAL CIRCUMSTANCES

In its preliminary affirmative determination in its countervailing duty investigation of the subject product from China, Commerce found that critical circumstances exist for Wuxi Suntech, Trina Solar, and the PRC-wide entity. Commerce stated that it found that there had been "massive imports of the subject product over a relatively short period of time by these entities."[6] In its final affirmative CVD determination, Commerce again found that critical circumstances exist for Wuxi Suntech, Trina Solar, and the PRC-wide entity. Commerce stated:[7]

> Our analysis of the comments submitted by interested parties has not led us to change our findings from the Preliminary Critical Circumstances Determination. Therefore, in accordance with section 705(a)(2) of the Act, we continue to find that critical circumstances exist with respect to imports from Wuxi Suntech, Trina Solar and all other producers or exporters of solar cells from the PRC, and we will continue to maintain the suspension of liquidation of imports that entered the United States 90 days before the date of publication of the Preliminary Determination, unless the U.S. International Trade Commission (ITC) determines that critical circumstances do not exist.

In its preliminary affirmative determination of LTFV sales of the subject product from China, Commerce found that critical circumstances exist for Wuxi Suntech, Trina Solar, the separate rate respondents, and the PRC-wide entity. In particular, Commerce stated:

> The dumping margins calculated for Wuxi Suntech and Trina Solar exceed the threshold sufficient to impute knowledge of dumping (i.e., 15 percent for CEP sales). Therefore, we determine that there is sufficient basis to find that importers should have known that the exporters were selling the merchandise under consideration at less than its fair value.
> . . .

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[5] 19 U.S.C. § 1677(24)(A)(ii).

[6] *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From the People's Republic of China: Preliminary Affirmative Countervailing Duty Determination*, 77 FR 17439, March 26, 2012; *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From the People's Republic of China: Preliminary Determination of Critical Circumstances*, 77 FR 5487, February 3, 2012.

[7] *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, from the People's Republic of China: Final Affirmative Countervailing Duty Determination and Final Affirmative Critical Circumstances Determination*, 77 FR 63788, October 17, 2012.

> the Department has preliminarily determined a rate for the PRC-wide entity of 249.96 percent. This PRC-wide rate exceeds both the 25 percent threshold for EP sales and the 15 percent threshold for CEP sales. Therefore, the Department is preliminary imputing importer knowledge of sales at LTFV with respect to the PRC-wide entity. Furthermore, since the ITC preliminarily found a reasonable indication that an industry in the United States is materially injured by imports from the PRC of solar cells, the Department has determined that there is a reasonable basis to believe or suspect that the importers knew or should have known that there was likely to be material injury by reason of sales at LTFV of solar cells from Wuxi Suntech, Trina Solar, the separate rate companies, and the PRC-wide entity.
>
> . . .
>
> ***e find that the imports of Wuxi Suntech's and Trina Solar's merchandise have been massive over a relatively short period of time. . . we find that imports by all other producers or exporters also increased by more than 15 percent. The PRC-wide entity did not act to the best of its ability in responding to the Department's request for information. Therefore, the Department finds that the application of AFA is warranted. Consequently, we also preliminarily determine that imports have been massive over a relatively short period of time with respect to the PRC-wide entity."[8]

In its final affirmative antidumping determination, Commerce again found that critical circumstances exist for Trina Solar and the PRC-wide entity, but not for Wuxi Suntech. Commerce stated:[9]

> In the Preliminary Determination, we determined that critical circumstances exist for Wuxi Suntech, Trina, the separate rate respondents, and the PRC-wide entity, based on two comparisons. We examined two comparison periods starting either September 2011 or October 2011 based on imputing knowledge that a proceeding was likely in either early or late September 2011. Due to data availability in the Preliminary Determination we ended both comparison periods in March 2012. Specifically, we compared imports during a base period of February 2011 through August 2011 to imports from September 2011 through March 2012, and imports during a base period of April 2011 through September 2011 to imports from October 2011 through March 2012. For the final determination we have shipment data for both Wuxi Suntech and Trina for April 2012 and May 2012. Based on our practice, we have included data in our comparison period through the month of the Preliminary Determination, May 2012. For the final determination, we have determined that critical circumstances do not exist for Wuxi Suntech. However, critical circumstances continue to exist for Trina, the separate rate respondents, and the PRC-wide entity.

If the Commission determines that an industry in the United States is materially injured by reason of LTFV imports of CSPV cells and modules from China, it must further determine "whether the imports subject to the affirmative {Commerce critical circumstances} determination . . . are likely to undermine seriously the remedial effect of the antidumping duty order to be issued."[10] The statute further provides that in making this determination, the Commission shall consider:

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[8] *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From the People's Republic of China: Preliminary Determination of Sales at Less Than Fair Value, Postponement of Final Determination and Affirmative Preliminary Determination of Critical Circumstances;* 77 FR 31309, May 25, 2012.

[9] *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules, from the People's Republic of China: Final Determination of Sales at Less Than Fair Value, and Affirmative Final Determination of Critical Circumstances, in Part,* 77 FR 63791, October 17, 2012.

[10] Section 735(b)(4)(A)(i) of the Act (19 U.S.C. § 1673d(b)(4)(A)(i)).

(I) the timing and the volume of the imports,
(II) a rapid increase in inventories of the imports, and
(III) any other circumstances indicating that the remedial effect of the antidumping order will be seriously undermined.[11]

Monthly import data and end-of-period inventories of imports of CSPV cells and modules by U.S. importers (Suntech, Trina, and all other U.S. importers) from China, for the period before and after the filing of the petition (April 2011 through April 2012), are presented in table IV-3.

Table IV-3
CSPV cells and modules: U.S. imports and end-of-period inventories of CSPV cells and modules from China, by month and firm, April 2011-April 2012

Quantity (*kilowatts*)									
Month	Suntech			Trina			All other importers		
	U.S. imports		End of period inventories	U.S. imports		End of period inventories	U.S. imports		End of period inventories
	China	All other		China	All other		China	All other	
April 2011	***	***	***	***	***	***	62,883	42,148	62,762
May 2011	***	***	***	***	***	***	52,327	33,245	71,703
June 2011	***	***	***	***	***	***	78,838	30,658	64,002
July 2011	***	***	***	***	***	***	41,803	28,733	55,491
August 2011	***	***	***	***	***	***	59,098	27,191	71,821
September 2011	***	***	***	***	***	***	72,236	23,478	88,028
October 2011	***	***	***	***	***	***	46,974	33,504	88,337
November 2011	***	***	***	***	***	***	67,199	41,656	109,357
December 2011	***	***	***	***	***	***	121,869	58,802	70,891
January 2012	***	***	***	***	***	***	140,109	46,961	86,408
February 2012	***	***	***	***	***	***	136,569	45,787	115,549
March 2012	***	***	***	***	***	***	41,255	72,698	119,383
April 2012	***	***	***	***	***	***	48,426	64,642	78,800
Total	***	***	***	***	***	***	969,586	549,503	

Note:–End of period inventories are monthly volumes of inventory of U.S. imports from China.

Source: Data compiled from responses to Commission questionnaires.

[11] Section 735(b)(4)(A)(ii) of the Act (19 U.S.C. § 1673d(b)(4)(A)(ii)).

APPARENT U.S. CONSUMPTION AND MARKET SHARES

Data on apparent U.S. consumption of CSPV modules[12] are presented in table IV-4. From 2009 to 2011, the quantity of apparent U.S. consumption of CSPV modules increased by 595.6 percent and was higher by 51.1 percent from January-June 2011 to January-June 2012. From 2009 to 2011, the value of apparent U.S. consumption increased by 343.6 percent, but was lower by 2.9 percent between the interim periods.

Data on U.S. market shares for CSPV modules are presented in table IV-5. From 2009 to 2011, U.S. producers' market share based on volume decreased by 15.3 percentage points and by 11.4 percentage points based on value. Between January-June 2011 and January-June 2012, U.S. producers' market share based on volume and value was 8.5 percentage points lower. U.S. imports from China increased U.S. market share by 29.3 percentage points during 2009-11 based on volume and 27.5 percentage points based on value. Between the interim periods, U.S. imports from China held 3.1 percentage points higher U.S. market share based on volume and 4.9 percentage points based on value. The U.S. market share of U.S. imports from nonsubject countries declined 14.0 percentage points from 2009 to 2011 based on volume and 16.0 percentage points based on value. Between the interim periods, U.S. imports from nonsubject countries had a 5.4 percentage point higher U.S. market share based on volume and 3.5 percentage points based on value.

[12] Throughout the main body of this report, the apparent consumption of the U.S. market and U.S. market shares are measured using the data compiled for CSPV modules. The use of solely CSPV module data addresses two potential issues of double counting. First, the vast majority of U.S. shipments of CSPV cells manufactured in the United States are internally consumed to produce CSPV modules. For example, in 2011, SolarWorld reported that *** percent of its total shipments were commercial sales of CSPV cells with *** percent being internally consumed to produce modules, and *** percent exported. Second, because U.S. shipments of imports of CSPV cells are used to produce CSPV modules in the United States, there may be double counting as the cell is counted and the module to which it is assembled. Additionally, in its determinations in the preliminary phase of these investigations, the Commission found that U.S. module assemblers engaged in sufficient production related activities to include them as part of the domestic industry and their finished products as shipments of the domestic like product even though the assemblers sometimes used imported CSPV cells to manufacture the CSPV modules.

Table IV-4
CSPV modules: U.S. shipments of domestic product, U.S. imports by sources, and apparent U.S. consumption, 2009-11, January-June 2011, and January-June 2012

Item	Calendar year			January-June	
	2009	2010	2011	2011	2012
	Quantity (*kilowatts*)				
Modules					
U.S. producers' U.S. shipments	108,276	331,167	453,378	243,279	257,992
U.S. shipments of imports from China	92,953	527,845	1,221,395	485,272	772,614
U.S. shipments of imports from all other countries	80,860	176,375	287,548	124,086	257,587
Total imports	173,813	704,220	1,508,943	609,359	1,030,201
Apparent U.S. consumption	282,089	1,035,387	1,962,321	852,638	1,288,193
	Value (*$1,000*)				
U.S. producers' U.S. shipments	255,778	568,029	790,466	422,650	290,219
U.S. shipments of imports from China	203,291	932,845	1,729,560	805,828	852,362
U.S. shipments of imports from all other countries	220,318	347,351	493,674	234,963	278,259
Total imports	423,609	1,280,196	2,223,234	1,040,791	1,130,621
Apparent U.S. consumption	679,387	1,848,225	3,013,700	1,463,441	1,420,839

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

Table IV-5
CSPV modules: Apparent U.S. consumption and market shares, 2009-11, January-June 2011, and January-June 2012

Item	Calendar year			January-June	
	2009	2010	2011	2011	2012
Quantity (*kilowatts*)					
Apparent U.S. consumption	282,089	1,035,387	1,962,321	852,638	1,288,193
Value (*$1,000*)					
Apparent U.S. consumption	679,387	1,848,225	3,013,700	1,463,441	1,420,839
Share of quantity (*percent*)					
U.S. producers' U.S. shipments	38.4	32.0	23.1	28.5	20.0
U.S. shipments of imports from China	33.0	51.0	62.2	56.9	60.0
U.S. shipments of imports from all other countries	28.7	17.0	14.7	14.6	20.0
Total imports	61.6	68.0	76.9	71.5	80.0
Share of value (*percent*)					
U.S. producers' U.S. shipments	37.6	30.7	26.2	28.9	20.4
U.S. shipments of imports from China	29.9	50.5	57.4	55.1	60.0
U.S. shipments of imports from all other countries	32.4	18.8	16.4	16.1	19.6
Total imports	62.4	69.3	73.8	71.1	79.6

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

RATIO OF IMPORTS TO U.S. PRODUCTION

Data on the ratio of imports to U.S. production of CSPV cells and modules are presented in table IV-6.

Table IV-6
CSPV cells and modules: U.S. production, U.S. imports, and ratios of imports to production, 2009-11, January-June 2011, and January-June 2012

Item	Calendar year			January-June	
	2009	2010	2011	2011	2012
Cells					
			Quantity (*kilowatts*)		
U.S. production of cells	***	***	***	***	***
U.S. imports of cells from–					
China	0	16,802	103,943	41,814	0
All others	134,369	244,709	280,787	190,035	164,336
Total imports of cells	134,369	261,511	384,730	231,849	164,336
			Ratio of imports to U.S. production (*percent*)		
U.S. imports of cells from--					
China	***	***	***	***	***
All others	***	***	***	***	***
Total imports of cells	***	***	***	***	***
Modules					
			Quantity (*kilowatts*)		
U.S. production of modules	187,976	456,026	666,533	366,884	288,513
U.S. imports of modules from–					
China	120,621	635,973	1,346,732	532,289	718,723
All others	118,335	245,673	317,200	153,170	354,262
Total imports of modules	238,956	881,646	1,663,932	685,459	1,072,985
			Ratio of imports to U.S. production (*percent*)		
U.S. imports of modules from--					
China	64.2	139.5	202.1	145.1	249.1
All others	63.0	53.9	47.6	41.7	122.8
Total imports of modules	127.1	193.3	249.6	186.8	371.9

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

PART V: PRICING AND RELATED INFORMATION

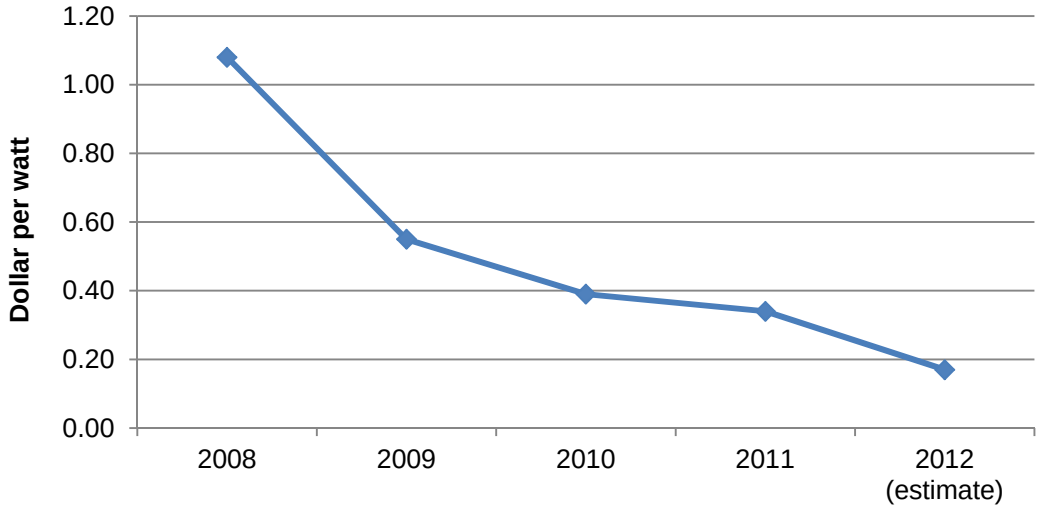
FACTORS AFFECTING PRICES

Raw Material Costs

Raw material costs for the production of solar modules (much of which are the cost of the cells) accounted for 81.5 percent of U.S. producers' total cost of goods sold during 2011, up from 65.6 percent in 2009.[1] Raw material costs for the production of solar cells accounted for *** percent of U.S. producers' total cost of goods sold during 2011, up from *** percent in 2009.[2] The main raw material input for CSPV cells is polysilicon (see *Part I* for additional information on the production process).[3] The cost of polysilicon, ingots, and wafers accounted for *** percent of U.S. producers' total cost of goods sold in 2011, down from *** percent in 2009 (see *Part VI* for additional information on raw material costs). According to petitioner, the cost of silver paste, used in cell production, and aluminum frames, used in module production, ***. The price of silver paste and alumunim frames are dependent on the silver and aluminum commodity markets and these commodity prices have increased during the POI. Between 2009 and the second quarter of 2012, the per unit price of silver paste and aluminum frames increased by *** percent and *** percent, respectively.[4]

The two main industries using polysilicon are the semiconductor and solar panel industries. As the global CSPV industry has expanded, relative global demand for polysilicon has been shifting from semiconductors to CSPV cells.[5] According to industry experts, ***.[6] Data on polysilicon prices and the increasing global supply are provided in figures V-1 and V-2.

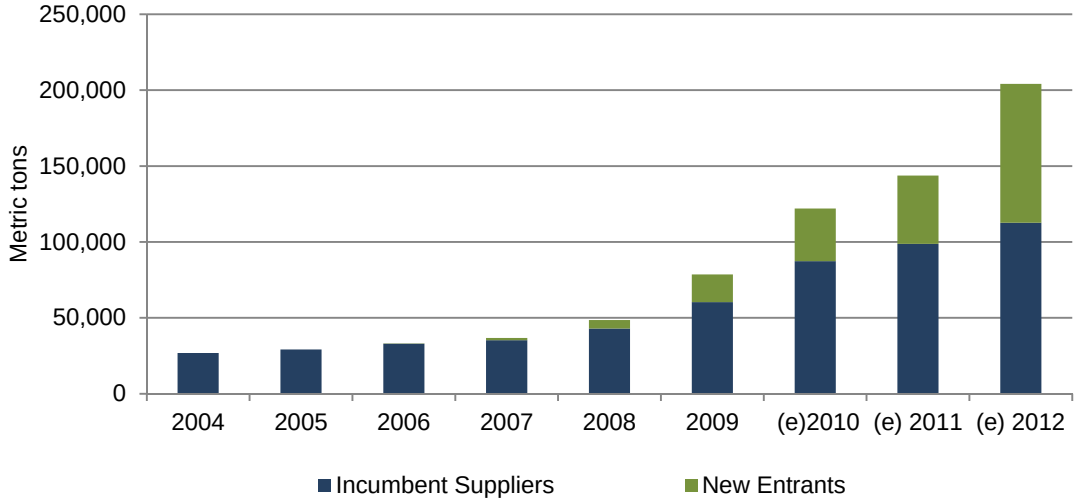
Figure V-1
Price trends for polysilicon



Source: Petitioner's posthearing brief, exhibit 4, p. 2; and respondent CCCME's posthearing brief, exhibit 9, p. 9.

[1] This value was approximately 81.5 percent in interim 2011 and approximately 80.3 percent in interim 2012.
[2] This value was approximately *** percent in interim 2011 and approximately *** percent in interim 2012.
[3] According to Green Rhino Energy, "Around a quarter of the cost of a crystalline module is just for polysilicon." Petition, Green Rhino Energy, "Polysilicon, Solar Value Chain," Exh. AD-Supp-1, p. 1.
[4] Peitioner's posthearing brief, exhibit 14, p. 4.
[5] ***.
[6] ***.

Figure V-2
Global polysilicon supply



Source: Respondent CCCME's postconference brief, exhibit 52.

*** responding producers and the majority of importers (28 of 30) reported that the price of polysilicon has fallen significantly over the period. The majority of these firms indicated that the drop in polysilicon prices has resulted in a decrease in the sale price of CSPV cells and modules.[7] *** noted that "CSPV cells and modules are significantly affected by the price of silicon, the most expensive and major raw material used in CSPV modules. Polysilicon in mid-2008 was quoted at over $450/kg. In 2009, that price collapsed to under $100/kg and then $40/kg by 2011. In 2012, analysts project the price to fall to approximately $20/kg by year-end. This remarkable 95 percent reduction from $450/kg to $20/kg allowed the cost of solar panels to drop rapidly between 2008 and 2012 and for customers to enjoy significantly lower prices." The majority of producers (5 of 8) reported that they anticipate raw material prices, and in particular polysilicon prices, to stabilize going forward. *** reported that while it expects the pricing for some if its inputs to stabilize, it projects the price of silver paste and aluminum to continue to increase. *** stated that "prices will continue to decline marginally due to increases in scale and changes in technology."

Producers were asked to report the proportion of their polysilicon purchases that were covered by long-term contracts longer than 3 years since 2009. Three of 13 producers, ***, reported purchasing polysilicon through long-term contracts. *** reported that in 2009, 100 percent of its polysilicon purchases were through two long-term contracts. It stated that both contracts were subject to take-or-pay provisions, but also contained termination provisions. *** reported that for each year during the period of investigation, 100 percent of its polysilicon purchases were via long-term contracts which all contained a take-or-pay provision. ***."[8] *** reported that in 2011, 100 percent of its polysilicon purchases were through a long-term contract which contained a take-or-pay provision. Three producers, ***, reported that they did not purchase polysilicon through long-term contracts during the period of investigation. *** reported that its parent company negotiates its polysilicon contracts. *** reported that it does not directly

[7] ***, ***, and *** reported that the decline in Chinese subject import prices of CSPV cells and modules exceeds any changes in input costs during the period of investigation.

[8] During the preliminary investigation, the parties discussed the role of the price of polysilicon in explaining the price of CSPV cells and modules. As Green Rhino Energy noted, "Due to the supply shortage {in} 2006 – 2008, 90% of the market is governed by fixed supply agreements lasting 6–10 years." Petition, Green Rhino Energy, "Polysilicon, Solar Value Chain," Exh. AD-Supp-1, p. 4. The Petitioner reported that given the need for uninterrupted supply, U.S. producers often have a series of overlapping long-term contracts, no different from Chinese producers. The Petitioner added that ***. Petitioner's postconference brief, p. 22-25. According to Respondents, ***. Respondent CCCME's postconference brief, Exh. 9, p. 2.

purchase polysilicon. The remaining five producers did not report any purchases of polysilicon via long-term contracts and left the question blank.

U.S. Inland Transportation

Transportation costs for U.S. inland shipments for CSPV cells and modules generally account for a small share of the delivered price of these products. The majority of responding producers and importers reported that costs ranged from less than 1 percent to 3 percent.[9] The Commission asked U.S. producers and importers of CSPV cells and modules from China to report the percentage of their sales shipped to various distances. Ten U.S. producers and 21 importers of product from China reported their share of sales by specified distance categories. The weighted-average data they reported on distances shipped from their U.S. shipping locations during 2011 are shown in the tabulation below.

	Shares of U.S. commercial shipment values (*percent*)	
Distances shipped	**U.S.-produced**	**Importers from China**
Within 100 miles	11.4	42.9
101 to 1,000 miles	29.9	43.6
Over 1,000 miles	58.8	13.4
Total	100.0	100.0
Source: Compiled from data submitted in response to Commission questionnaires.		

PRICING PRACTICES

Pricing Methods

The most commonly reported pricing method for both U.S. producers (9 of 12) and importers (26 of 36) is transaction-by-transaction negotiations. Seven producers and 23 importers reported selling CSPV cells and modules through contracts and 4 producers and 12 importers reported using set price lists.[10]

Most responding producers reported selling CSPV cells and modules through spot sales, whereas responding importers of product from China split their sales between short-term contracts and spot sales. Eight U.S. producers and 19 importers reported their 2011 U.S. commercial shipments of CSPV cells and modules by type of sale; their shipment shares, based on f.o.b. sales values, are shown in table V-1.[11]

[9] One producer reported a range of 10 percent; four importers reported 4, 5, 7, and 10 percent, respectively.

[10] Additionally, one producer reported using a third party consulting firm to determine intercompany transfer price and one importer indicated that it conducts market analysis on a monthly basis to determine its pricing method.

[11] Spot sales are usually for a one-time delivery, within 30 days of the purchase agreement; short-term sales are for multiple deliveries for up to 12 months after the purchase agreement; and long-term sales are for multiple deliveries for more than 12 months after the purchase agreement. Short-term and long-term sales may be arranged by contracts or oral agreements.

Table V-1
CSPV cells and modules: U.S. producers' and importers' U.S. commercial shipments by type of sale, 2011

Type of sale	Shares of 2011 U.S. commercial shipments (*percent*)	
	U.S. producers	Importers from China
Long-term contracts	0.0	7.6
Short-term contracts	9.8	52.9
Spot sales	90.2	39.4
Total	100.0	100.0

Note.–Because of rounding, figures may not add to the totals shown.

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

Of the seven responding producers reporting use of short-term contracts, five indicated that price could not be renegotiated during the contract period; all short-term contracts fixed price and quantity, and five did not have a meet-or-release clause.[12] Five producers reported that the duration of their short-term contracts ranged from 30 days to 90 days and two reported one year. Of the 18 responding importers reporting use of short-term contracts, ten indicated that price could be renegotiated during the contract period and eight reported that it could not; most short-term contracts fixed price and quantity, and most did not have a meet-or-release clause. The majority of importers reported that the duration of their short-term contracts ranged from two to four months and three importers reported one year. Four importers identified using long-term contracts and all four indicated that prices could be renegotiated during the contract period; most long term contracts fixed both price and quantity and all four did not have a meet-or-release clause.[13]

Sales Terms and Discounts

Most responding producers (8 of 11) reported selling on an f.o.b. basis, whereas responding importers were closely split with 19 importers selling on an f.o.b. basis and 13 reported selling on a delivered basis. Most producers (8 of 12) and half of the responding importers (18 of 36) do not offer any type of discount. However, a plurality of producers and importers reported offering favorable pricing for higher volume distributors and integrators and annual volume discounts. Four of 12 responding producers and 17 of 36 importers reported offering quantity based discounts; 2 producers and 9 importers reported offering volume discounts;[14] and one importer reported offering discounts for early payments. The typical sales term for most responding producers and importers is net 30 days.

Price leaders

Twenty-four of 32 responding purchasers identified the following Chinese firms as price leaders: Canadian Solar (7); Jinko (2); Trina (14); Suntech (12); Suniva (1); and Yingli (12). Several purchasers

[12] Four producers identified contract provisions as "not applicable," and no U.S. producer provided information on long-term contract provisions.

[13] Twenty-eight of 36 responding importers identified long-term contract provisions as "not applicable."

[14] One producer (***) noted that discounts are offered from its wholesale list price to installers and distributors who typically sell its products into the residential and commercial segments. Customers are also rewarded with higher discounts as their volumes increase. For project pricing of individual and specific projects, *** reported that it provides project specific pricing which is below its wholesale list price. "The module pricing for these projects are discounted typically based on volume, but other factors such as strategic alignment, use of *** racking and inverters are also considered. The project business is typically very competitive as the Chinese manufacturers price aggressively for larger volume projects."

noted that price leaders differ depending if they are a Tier 1 or a Tier 2 supplier.[15] *** reported that Yingli does not offer the lowest price, but it is among the lowest priced bankable module suppliers. Purchasers *** also noted that Suntech, Yingli, and Trina offered the lowest pries among Tier 1 vendors. Purchasers also identified several non-Chinese suppliers as price leaders which included: Hanwha Solarone (2), LG Solar (2); Sharp (5); Solarworld (2); and Schott (1).

PRICE DATA

The Commission requested U.S. producers and importers of CSPV cells and modules to provide quarterly data for the total quantity and f.o.b. value of CSPV modules that were shipped to unrelated customers in the U.S. market that were either produced in the United States or imported from China or nonsubject countries Mexico and Japan. Data were requested for the period January 2009 to June 2012. The products for which pricing data were requested are as follows:

Product 1.–Crystalline silicon module, with a peak power wattage of between 200 to 219, inclusive, P-max or Wp

Product 2.–Crystalline silicon module, with a peak power wattage of between 220 to 239, inclusive, P-max or Wp

Product 3.–Crystalline silicon module, with a peak power wattage of between 240 to 259, inclusive, P-max or Wp

Product 4.–Crystalline silicon module, with a peak power wattage of between 260 to 279, inclusive, P-max or Wp

Product 5.–Crystalline silicon module, with a peak power wattage of 280 and above, P-max or Wp

Eight U.S. producers and 23 importers provided usable price data for sales of the requested products, though not all firms reported price for all products for all quarters.[16] Price data reported by these firms accounted for approximately 44.0 percent of reported U.S. producers' shipments of CSPV modules, 93.7 percent of reported U.S. shipments of subject imports from China, and 86.7 percent of reported U.S. shipments of subject imports from all other sources during the period. Nonsubject country price data are presented in Appendix D.

In general, price data were concentrated in the last six quarters of the period. By quantity, 74 percent of the reported price data were in 2011 and the first two quarters of 2012. Approximately 97 percent of the price data (by quantity) reported by U.S. producers was for products 1-3.[17] However, price data reported by importers from China were more evenly distributed among the five products with 52 percent of the price data (by quantity) falling in products 1-3 and the remaining 48 percent for products 4-5.

Price data are shown in tables V-2 to V-6, and figure V-3. Price trend summary data are presented in table V-7. During 2009-12, domestic and imported subject products 1 and 5 experienced steady price declines.

The sale prices of U.S.-produced CSPV module products decreased substantially from their 2009 levels. Overall, f.o.b. prices of all U.S.-produced CSPV modules fell by *** percent between the first

[15] Purchasers noted that while Tier 2 suppliers often offer modules at the lowest cost, purchasers follow the price leaders in the Tier 1 category. *** stated that "The top tier players, like Yingli and Suntech are not price leaders as they try to resist and keep their pricing above the "floor" established by others…We also believe firms like Yingli and Suntech can still make a profit at their pricing, so are building sustainable companies that will be around to stand behind their warranties."

[16] Over the last few years, a number of firms have entered and exited the industry. See tables III-3 and III-4 of this report for further discussion.

[17] By quantity, approximately *** percent of the price data reported by U.S. producers was for product 3.

quarter of 2009 and the second quarter of 2012. Overall, f.o.b. prices of all CSPV modules imported from China fell by *** percent between the first quarter of 2009 and the second quarter of 2012.

Margins of underselling and overselling for the period are presented in table V-8. Based on these data, prices for CSPV modules imported from China were below those for U.S.-produced CSPV modules in 35 of 46 instances; margins of underselling ranged from *** percent to *** percent, with an average margin of *** percent. In the remaining 11 instances CSPV modules from China were above prices for the domestic product margins; margins of overselling ranged from *** percent to *** percent with an average margin of *** percent.

Table V-2
CSPV modules: Weighted average f.o.b. prices and quantities of domestic and imported product 1,[1] and margins of underselling/(overselling), by quarters, January 2009-June 2012

Period	United States		China		
	Price *(per kilowatt)*	**Quantity (kilowatts)**	**Price *(per kilowatt)***	**Quantity (kilowatts)**	**Margin (*percent*)**
2009:					
Jan.-Mar.	$***	***	$***	***	***
Apr.-June	***	***	***	***	***
July-Sept.	***	***	***	***	***
Oct.-Dec.	***	***	***	***	***
2010:					
Jan.-Mar.	***	***	***	***	***
Apr.-June	***	***	***	***	***
July-Sept.	***	***	***	***	***
Oct.-Dec.	***	***	1,833	21,489	***
2011:					
Jan.-Mar.	***	***	1,906	25,196	***
Apr.-June	***	***	***	***	***
July-Sept.	***	***	1,485	602	***
Oct.-Dec.	***	***	***	***	***
2012:					
Jan.-Mar.	***	***	1,287	442	***
Apr.-June	***	***	***[2]	***	***

[1] Product 1.--Crystalline silicon modules, with a peak power wattage of between 200 to 219, inclusive, P-max or Wp.
[2] ***.

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

Table V-3
CSPV modules: Weighted average f.o.b. prices and quantities of domestic and imported product 2,[1] and margins of underselling/(overselling), by quarters, January 2009-June 2012

Period	United States		China		
	Price *(per kilowatt)*	Quantity (kilowatts)	Price *(per kilowatt)*	Quantity (kilowatts)	Margin (*percent*)
2009:					
Jan.-Mar.	--	0	$***	***	--
Apr.-June	--	0	***	***	--
July-Sept.	$***	***	***	***	***
Oct.-Dec.	***	***	1,938	9,712	***
2010:					
Jan.-Mar.	***	***	1,751	18,122	***
Apr.-June	***	***	1,689	48,240	***
July-Sept.	1,922	6,728	1,662	117,962	***
Oct.-Dec.	1,905	15,755	1,639	138,906	14.0
2011:					
Jan.-Mar.	1,869	18,954	1,665	102,700	10.9
Apr.-June	***	***	1,587	109,280	***
July-Sept.	1,501	9,073	1,366	64,026	9.0
Oct.-Dec.	1,221	21,455	1,031	138,945	***
2012:					
Jan.-Mar.	***	***	993	70,064	***
Apr.-June	***	***	962	22,518	***

[1] Product 2.--Crystalline silicon modules, with a peak power wattage of between 220 to 239, inclusive, P-max or Wp.

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

Table V-4
CSPV modules: Weighted average f.o.b. prices and quantities of domestic and imported product 3,[1] and margins of underselling/(overselling), by quarters, January 2009-June 2012

Period	United States		China		
	Price *(per kilowatt)*	Quantity (kilowatts)	Price *(per kilowatt)*	Quantity (kilowatts)	Margin (*percent*)
2009:					
Jan.-Mar.	--	0	$***	***	--
Apr.-June	--	0	***	***	--
July-Sept.	--	0	***	***	--
Oct.-Dec.	$***	***	***	***	***
2010:					
Jan.-Mar.	--	0	***	***	--
Apr.-June	***	***	1,919	3,678	***
July-Sept.	***	***	1,775	3,560	***
Oct.-Dec.	***	***	1,650	5,388	***
2011:					
Jan.-Mar.	***	***	1,578	8,383	***
Apr.-June	***	***	1,567	9,590	***
July-Sept.	***	***	1,392	16,617	***
Oct.-Dec.	***	***	1,022	106,152	***
2012:					
Jan.-Mar.	***	***	989	85,186	***
Apr.-June	***	***	912	42,198	***

[1] Product 3.--Crystalline silicon modules, with a peak power wattage of between 240 to 259, inclusive, P-max or Wp.

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

Table V-5
CSPV modules: Weighted average f.o.b. prices and quantities of domestic and imported product 4,[1] and margins of underselling/(overselling), by quarters, January 2009-June 2012

Period	United States		China		
	Price *(per kilowatt)*	Quantity (kilowatts)	Price *(per kilowatt)*	Quantity (kilowatts)	Margin (*percent*)
2009:					
Jan.-Mar.	--	0	$***	***	--
Apr.-June	--	0	***	***	--
July-Sept.	--	0	***	***	--
Oct.-Dec.	--	0	***	***	--
2010:					
Jan.-Mar.	--	0	***	***	--
Apr.-June	--	0	***	***	--
July-Sept.	--	0	***	***	--
Oct.-Dec.	--	0	***	***	--
2011:					
Jan.-Mar.	--	0	***	***	--
Apr.-June	--	0	1,656	9,336	--
July-Sept.	$***	***	1,226	43,055	***
Oct.-Dec.	--	0	1,290	34,502	--
2012:					
Jan.-Mar.	***	***	1,200	27,051	***
Apr.-June	--	0	***	***	--

[1] Product 4.--Crystalline silicon modules, with a peak power wattage of between 260 to 279, inclusive, P-max or Wp.

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

Table V-6
CSPV modules: Weighted average f.o.b. prices and quantities of domestic and imported product 5,[1] and margins of underselling/(overselling), by quarters, January 2009-June 2012

Period	United States		China		
	Price *(per kilowatt)*	Quantity (kilowatts)	Price *(per kilowatt)*	Quantity (kilowatts)	Margin (*percent*)
2009:					
Jan.-Mar.	--	0	--	0	--
Apr.-June	--	0	$***	***	--
July-Sept.	--	0	***	***	--
Oct.-Dec.	--	0	***	***	--
2010:					
Jan.-Mar.	--	0	***	***	--
Apr.-June	--	0	***	***	--
July-Sept.	$***	***	***	***	***
Oct.-Dec.	***	***	***	***	***
2011:					
Jan.-Mar.	***	***	***	***	***
Apr.-June	***	***	***	***	***
July-Sept.	***	***	1,364	84,490	***
Oct.-Dec.	***	***	1,188	221,107	***
2012:					
Jan.-Mar.	***	***	1,024	437,928	***
Apr.-June	1,331	7,849	1,204	110,495	9.6

[1] Product 5.--Crystalline silicon modules, with a peak power wattage of 280 and above, P-max or Wp.

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

Figure V-3
CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product, by quarters, January 2009-June 2012

* * * * * * *

Table V-7
CSPV modules: Summary of weighted-average f.o.b. prices for products 1-5, from the United States and China

Item	Number of quarters	Low price (*per unit*)	High price (*per unit*)	Change in price[1] (percent)
Product 1				
United States	14	$***	$***	***
China	14	***	***	***
Product 2				
United States	12	***	***	***
China	14	***	***	***
Product 3				
United States	10	***	***	***
China	14	***	***	***
Product 4				
United States	2	***	***	***
China	14	***	***	***
Product 5				
United States	8	***	***	***
China	13	***	***	***

[1] Percentage change (based on unrounded data) from first observed quarter to the last observed quarter of data. Thus, the percentage change is not necessarily calculated from the high and low prices shown in this table.

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

Table V-8
CSPV modules: Instances of underselling/overselling and the range and average of margins, January 2009-June 2012

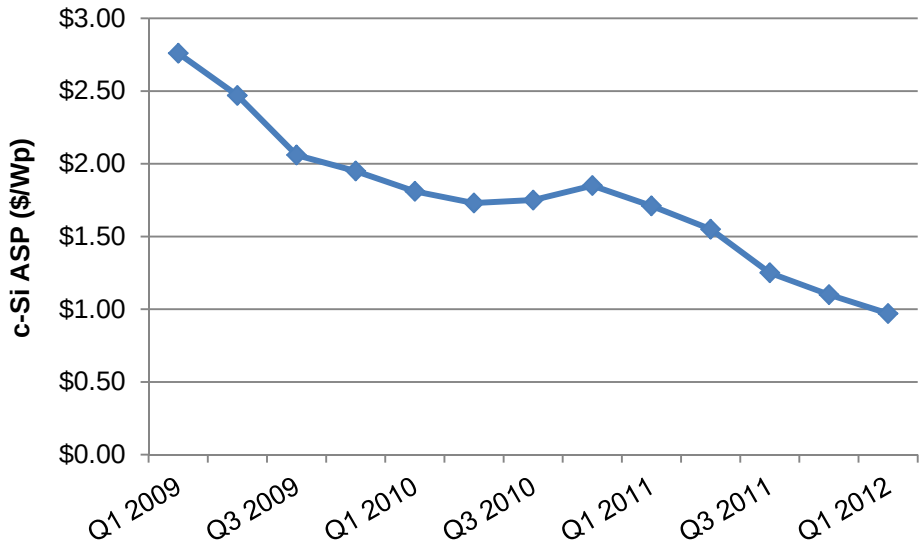
Source	Underselling			Overselling		
	Number of instances	Range (*percent*)	Average margin (*percent*)	Number of instances	Range (*percent*)	Average margin (*percent*)
Product 1	9	***	***	5	***	***
Product 2	11	***	***	1	***	***
Product 3	8	***	***	2	***	***
Product 4	1	***	***	1	***	***
Product 5	6	***	***	2	***	***
Total	35	***	***	11	***	***

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

PUBLISHED PRICE DATA

In general, PV product prices have been trending downward since the 1990s, despite a period of increasing prices between 2003 and 2008; in addition, prices for small-quantity buyers, on average, have been higher than for mid-range and large quantity buyers, although the gap between these three groups has been larger in the last decade.[18] Although modules are generally priced on a per-watt basis, the quoted price per watt varies with the volume purchased.[19] As seen in figure V-4, the price of modules in the United States declined by 50 pecent during 2011.

Figure V-4
Average c-SI Module Prices in the U.S., January 2009- March 2012



Source: "GTM Research Slideshow: U.S. Solar PV Market Inside the Numbers," *Greentechsolar*, March 9, 2012, http://www.greentechmedia.com/articles/read/GTM-Research-U.S.-PV-Market-Inside-the-Numbers.

LOST SALES AND LOST REVENUES

In the preliminary and final phases of these investigations, the Commission requested U.S. producers of CSPV cells and modules to report any instances of lost sales or revenues they experienced due to competition from imports from China. During the preliminary phase of these investigations, six of the 16 responding producers reported both reducing prices and rolling back announced price increases to avoid losing sales to competitors selling CSPV cells and modules from China and eight reported only reducing prices. Two producers (***) reported that they did not reduce their prices or roll back price increases to avoid losing sales. During the final phase of these investigtions, U.S. producers reported an additional 22 lost sales allegations and 15 lost revenue allegations.

The total value of the 205 lost sales allegations for CSPV cells and modules was $499.1 million and involved 401,632 kilowatts. The total value of the 25 lost revenue allegations for CSPV cells and modules was $34.1 million and involved 86,445 kilowatts of CSPV cells and modules. Staff attempted to contact all of these purchasers and a summary of the information obtained follows (tables V-9 and V-10).[20] Staff received responses for 77 lost sales allegations. Five responding purchasers reported that

[18] Petition, Navigant Consulting, "PV Market Analysis: Mid-2011 Pause for Reflection—Just Don't Pause for Long," Exh. I-24, p. 1 (Figure 1).

[19] According to Petitioner, price is driven by volume. Conference transcript, p. 100 (Kilkelly)

[20] Additional lost sale allegations provided in the preliminiary phase of these investigations, which totaled *** and involved approximately *** kilowatts of CSPV cells and modules and lost revenue allegations, which totaled *** and involved approximately *** kilowatts of CSPV cells and modules, were received without valid fax numbers

they agreed with seven of the lost sales allegations totaling $*** and involving 4,989 kilowatts. Staff received responses for 7 lost revenue allegations. Three responding purchasers reported that they agreed with three lost revenue allegation totaling $*** and involving 8,900 kilowatts.

Table V-9
CSPV cells and modules: U.S. producers' lost sales allegations

* * * * * * *

Table V-10
CSPV cells and modules: U.S. producers' lost revenue allegations

* * * * * * *

*****:**

*** of *** agreed with both lost sale allegations involving his firm. Regarding the *** allegation, he indicated that in a few instances *** sourced Chinese modules because of lower prices and stated that projects with ARRA funding, which carry the requirement of U.S. produced modules, cost more to install than if Chinese modules were an option. Regarding the *** allegation involving *** modules, he indicated that the date was nearer *** and the product was *** modules.

*****:**

***'s representative, ***, disagreed with the two lost sale allegations involving his company. He reported that the project did not come to fruition and he could not say that if prices were substantially lower the customer would have proceeded with the project.

*****:**

*** of *** disagreed with the lost sale allegation involving his firm, but did not provide any further information or explanation.

*****:**

*** of *** disagreed with three of the five lost sale allegations involving his firm.[21] He reported that the modules were purchased from ***. *** reported that *** only purchases American made modules. He also stated that U.S. producers of CSPV cells and modules reduced their prices to compete with prices of CSPV cells and modules imported from China, but also attributed the decline in prices to the expiration of Federal and State incentives.

*****:**

*** of *** disagree with the lost sale allegation involving his firm. He reported that his firm only does *** of business in a year (the allegation was for ***), and this year *** expected to only do *** of business.

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from questionnaire respondents. These allegations account for 6.7 percent of the total quantity involved in the total lost sales allegations and 2.1 percent of the total quantity involved in the total lost revenue allegations received in the preliminary and final phases of these investigations. In the preliminiary phase of these investigations, staff made repeated attempts to contact the producers who provided these allegations to obtain valid fax numbers and also conducted phone and internet research to try to reach the purchasers at issue without success. These allegations are not reported here.

***, which accounted for 41.4 percent of the total quantity of the unconfirmed allegations, submitted only lists of quotes they provided to various purchasers without any indication whether they had or had not obtained the sale and/or whether they had or had not reduced their price in order to get the sale.

[21] *** did not respond to the remaining two allegations.

*****:**

*** of *** disagreed with the lost sale allegation involving his firm. He stated that *** prefers diversity in its manufacturers and while it does purchase some of its panels from *** it has no intention to purchase 100% of its panels from one manufacturer. Price is one of many considerations *** evaluates when purchasing panels. He indicated that *** is constantly seeking quotes for product at any given time and only has the demand to buy from 2-3 suppliers.

*****:**

*** of *** indicated that his firm does not and has never purchased any panels. He stated that his firm ***.

*****:**

*** of *** agreed with the lost sale allegation involving his firm but indicated that the product was *** instead of the alleged ***, and the quantity was *** instead of the alleged ***.

*****:**

*** of *** indicated that he could not identify the purchase based on the information provided in the allegation.

*****:**

*** disagreed with the lost sale allegation involving ***. While indicating that his firm often purchases from both domestic and Chinese producers, the specific project named in the allegation was installed using modules from U.S. producer, ***.

*****:**

*** of *** disagreed with the lost sale allegation involving his firm. He stated "*** did not win a sales order 'against' ***, the product named in the allegation, especially of such size." *** also indicated that his firm stopped purchasing *** due to quality issues.

*****:**

*** of *** disagreed with both lost sale allegations involving his company stating that no product was purchased. *** also indicated that the firm has not switched purchases from U.S.-produced CSPV cells and modules to CSPV cells and modules imported from Chinese suppliers in the last three years.

*****:**

*** of *** disagreed with the lost sale allegation involving his firm. He reported that they were unable to complete the order due to a lack of funds.

*****:**

*** disagreed with the lost sale allegation involving ***. He stated that his company "did not get the sale," and he did not know the reason.

*****:**

*** of *** disagreed with all *** lost sale allegations involving his firm. He reported that *** purchases American made products 99.9% of the time since their projects require it.

*****:**

*** of *** indicated that he could not identify the information provided in the allegation, but did state that his firm has purchased both U.S.-produced and Chinese modules. He also indicated that his firm prefers ***, which they purchased from Chinese firms because no U.S. company manufactures ***.

*****:**

*** neither agreed nor disagreed with the lost sales allegation involving ***. He stated that the information provided in the allegation was "a little confusing," and he suspected that the "panels" referred to in the allegation might actually be "solar cells" instead, but in either case, *** had not made a purchase in that amount. *** reported that *** has not purchased many cells from China, and in fact, most of their business over the last three years has been ***. He stated that now that the solar cell shortage is over, the company is not exporting cells to China anymore and has an existing inventory of U.S. manufactured cells. He indicated that a much smaller portion of their business is ***. He indicated that most of their cells are purchased from ***.

*****:**

*** disagreed with the two lost sale allegations involving ***. He stated the project did not go forward due to complications with the power purchase agreement between his customer and the host of the project. He also indicated that the prices he received from a U.S. supplier were not higher than the offer received from a Taiwanese firm. *** indicated that since 2007, prices for panels have fallen due to economies of scale, improved manufacturing equipment, and increased cell efficiency, and that all three factors were driven by global competition and risky investments.

*****:**

*** of *** agreed with the lost sale allegation involving his firm. He indicated that after revising the price two to three times in effort to win the sale, the Chinese were able to offer an even lower price and thus won the sale.

*****:**

***'s representative, ***, disagreed with the lost sale allegation involving his firm. He indicated that *** did not purchase any *** product in the alleged volume at the alleged time. *** reported that his company switched from U.S. produced CSPV cells and modules to Chinese CSPV cells and modules seeking higher wattage, higher efficiency, and higher quality product.

*****:**

*** of *** disagreed with the lost sale allegation involving her company. She stated that they accepted a quote from a different U.S. manufacturer. *** noted that since *** began operations in ***, they have sourced Chinese made modules. However, since then, they have begun to switch some of their purchases to U.S.-produced modules, which include the project named in the allegation.

*****:**

*** responded to the lost sale allegation involving ***. *** indicated that his company only purchases products manufactured in the United States, and that they have never attempted to purchase any Chinese-made solar modules or other products. He stated, "I believe pricing is very competitive and the products are equally as good that are made here or there."

*****:**

*** of *** disagreed with the lost sale allegation involving his firm. He reported that the price from both vendors on this project was the same, ***. He reported that his firm placed an order with *** and cancelled the order following *** change in their frame design, which did not give *** the structural strength that was needed in their application.

*****:**

*** of *** agreed with the lost revenue allegation involving *** kilowatts. However, he stated that "we are not recognizing the information above as a discrete single order. We do acknowledge that as a stocking distributor of the products listed we did receive decreasing cost from *** consistent with the timeline and prices listed above, due to market pricing pressures."

*****:**

*** of *** disagreed with two of the three lost sale allegations involving his firm indicating that his firm did not get the job that was bid. For the third allegation, involving a *** product, he reported purchasing product from U.S. producer *** for the job.

*****:**

*** responded to the lost sale allegation involving ***. She indicated that *** is not a purchaser or producer of CSPV cells and modules. Instead, her company is involved in research and development of CSPV cells and modules. *** indicated that the offer mentioned in the allegation was an occurrence of her firm passing along information to one of their research and development clients, but she is not aware of what took place after providing the information.

*****:**

*** disagreed with both lost sale allegations involving ***. She reported that *** is a solar PV integrator and was soliciting quotes only from American solar panel manufacturers at the time of the allegations for an ARRA funded project. She stated that her firm would have been a subcontractor on the project, for which they did not win the bid, and therefore, did not purchase the products detailed in the allegations. ***

*****:**

*** of *** agreed with both lost sale allegations involving his firm. He stated, "Chinese supplied product is driving the U.S. module manufacturers out of business." *** reported that most of ***'s projects have been ARRA funded jobs requiring U.S. produced modules. He stated that if they were not required to use U.S. product for these jobs, that they would have used imported modules to complete the projects.

*****:**

*** of *** disagreed with the *** lost sale allegations involving his firm. He stated that during the alleged period ***, *** purchased *** panels for its solar projects. ***.

*****:**

*** of *** disagreed with the lost sale allegation involving his firm. He indicated that he believed the alleged quote was for a New Jersey project that has not gone beyond basic concept and reported that no sale was lost since no project was built. *** also indicated that *** has used local modules on past projects.

*****:**

*** of *** disagreed with the lost sale allegation involving his firm. He indicated that the sale was lost due to lower electrical labor.

*****:**

*** disagreed with the lost sale allegation involving ***. He indicated that the project never went forward due to unacceptable finance terms offered by ***. He stated that *** requested 100 percent of the payment in advance, and *** could not accept the terms of the contract as proposed.

*****:**

*** disagreed with the two lost sale allegations involving his company ***. He reported that one product listed in the allegation, the ***, was purchased from U.S. producer *** for ***.

*****:**

***'s representative *** disagreed with all three lost sale allegations involving his firm indicating that no sale was actually made. He also reported that, "Chinese modules are far less expensive than U.S. modules."

*****:**

*** of *** did not respond to the specific allegation involving his company. He indicated that he was not familiar with the specific transaction named in the allegation, but that *** has mostly purchased product from overseas suppliers since they have been in business.

*****:**

*** of *** agreed with the lost revenue allegation involving his firm. He reported that ***'s initial quote for the product named in the allegation was above the market for similar product, however, the revised quote was in line with market pricing and *** accepted the price for the project. *** reported that *** still purchases product from ***, but also indicated that his company had switched a portion of purchases of CSPV cells and modules from U.S. producers to suppliers of CSPV cells and modules, reporting price as the primary reason for the switch. He also indicated quality was a factor in ***'s decision to switch purchases to Chinese-produced CSPV cells and modules. In his response, *** noted, "The Chinese have achieved the most significant increases in volume and scale globally allowing the downward movement in price. Chinese manufacturers leading the market to lower prices does not imply illegal or anticompetitive activities were used to achieve those lower prices."

*****:**

*** disagreed with the lost sale and lost revenue allegations involving his firm ***. He stated that, given the general nature of the data provided in the allegation, *** was not able to provide specific details of why another product was purchased over the product named in the allegations as his company uses a number of factors to determine which products they purchase. Those factors include price, payment terms, cost of installation and electrical hardware, efficiency, reliability, warranty, bankability, and the supplier's ability to meet delivery requirements among other things. He also indicated that *** has switched purchases from U.S. made CSPV cells and modules to suppliers of product from China, but that price was only one of the myriad of reasons for the switch.

*****:**

*** of *** agreed with the lost sale allegation involving his company. He also indicated that *** has switched purchases of CSPV cells and modules from U.S. producers to suppliers of CSPV cells and modules from China.

*****:**

*** of *** stated that his firm has not purchased panels from China at the alleged size of ***. He reported that his firm purchases *** product from U.S. firm ***.

*****:**

*** of *** disagreed with the lost sale allegation involving the company. He stated that the specific quote named in the allegation was part of a "Master Procurement Agreement" and the alleged modules were never procured.

*****:**

*** stated that "To the best of my knowledge, there is no project for which we purchased the referenced quantity of 6,700,000 watts." However, he noted that without the identity of the suppliers involved in the allegation or the name of the subject project, he cannot offer any further comment. "We request quotes from suppliers all the time and without know the parties I will be unable to track down the specific quote and characterize the circumstances surrounding it."

*****:**

*** neither agreed nor disagreed with the allegation involving his company ***. He indicated that the project specified in the allegation had been postponed indefinitely due to the collapse of the New Jersey "spec market" and no product was ever purchased. *** also reported that *** has not purchased any modules since January 2008.

*****:**

*** of *** did not agree or disagree with the lost revenue allegation involving his firm. He stated that he did not recall the transaction detailed in the allegation.

*****:**

*** disagreed with all three lost sale allegations involving ***. For the allegation involving a *** product she indicated that the company did not make any purchase of the alleged product and volume during the specified time frame. Another allegation involved one ***. ***. Her comments also indicated that since the supplier was not indicated in the information provided in the allegation, she was unable to provide additional details on the allegations.

*****:**

There were four lost sale allegations involving ***. Regarding the *** allegation dated ***, *** of *** disagreed with this allegation and stated that his firm has not quoted or purchased the alleged product in over a year. *** of *** indicated that without more specific information involving the projects named in the allegations dated ***, it would be difficult for him to determine if the sales were lost to modules imported from China.

*****:**

*** was named in one lost sale allegation. *** of *** disagreed with the allegation indicating that the alleged quote was for modules in an ARRA project requiring U.S. made modules. He stated that the project was lost to another supplier of U.S. made modules, ***. He also noted that his firm has not switched purchases from U.S. made CSPV cells and modules to suppliers of CSPV cells and modules from China and stated that *** has never imported product from China.

PART VI: FINANCIAL EXPERIENCE OF THE U.S. PRODUCERS

BACKGROUND

CSPV cell and module financial results, as presented in this section of the report, are divided into the following categories: cell operations (commercial sales and transfers) and module operations.[1] [2] Financial results on thin-film operations, which for the most part reflect a separate set of U.S. producers, are presented in table C-5 (Appendix C).[3]

As indicated in footnote 1, domestic cell operations represent the operations of two companies: Suniva and SolarWorld. While the operations of thirteen U.S. producers are included in the module financial results presented in this section of the report, *** accounted for the majority of period's total sales volume: ***.[4]

As described in a previous section of this report, a number of U.S. producers began their operations during the period examined. Entry into the market in general involved initial investments in capacity and in some cases subsequent expansion, as well as closure or restructuring of existing capacity.[5] As also described previously, several U.S. producers effectively exited the market during the period

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[1] ***. As discussed in Part III of this report, SPI, or a portion of it, appears to have been liquidated since the preliminary phase. In contrast, Calisolar switched its focus primarily to the commercial development of a silicon purification process and has ceased commercial cell operations. Calisolar also reportedly changed its name to Silicor Materials and has reportedly entered an agreement to become a key silicon supplier of Suntech with silicon to be supplied from its prospective polysilicon plant in Lowndes County, MS. *Calisolar changes name as Suntech becomes key customer of its purified silicon metal*, PV News, retrieved at http://www.pv-tech.org/news on June 13, 2012. *Solar for the Masses*, Mechanical Engineering, December 2007, p. 8. As a share of total interim 2011 cell revenue reported in the preliminary phase, ***. In the absence of updated financial results from these companies, only Suniva and SolarWorld's stand-alone cell financial results are presented in this section of the report. ***. October 3, 2012 e-mail with attachments from Suniva to USITC auditor. October 9, 2012 e-mail with attachments from Suniva to USITC auditor. ***.

The following U.S. producers reported module financial results for the preliminary phase of these investigations but did not submit financial results for the final phase: ***. USITC auditor notes. ***.

[2] The majority of U.S. producers reported their annual financial results based on calendar-year periods. Kyocera and Sharp (reporting on the basis of March-ending fiscal years) were the exceptions. Similarly, the majority of U.S. producers reported their financial results on the basis of U.S. generally accepted accounting principles (GAAP). SolarWorld and Solon were the exceptions and reported their financial results on the basis of International Financial Reporting Standards (IFRS).

[3] ***. USITC auditor notes. It should also be noted that several companies reporting thin film financial results ***. Ascent 2011 10-K, p. 2. August 15, 2012 e-mail with attachments from Ascent Solar to USITC auditor. GE Energy U.S. producer questionnaire, note to table II-20. August 20, 2012 e-mail with attachment from HelioVolt to USITC auditor.

[4] While *** were the only U.S. producers to report operations throughout the period examined, the module operations reported by ***, represent the same underlying Newark, DE facilities.

[5] As noted below, SolarWorld recognized closure costs related to the facilities (Camarillo, CA and Vancouver, WA) which it purchased from Shell Solar in 2006. Subsequent to the closure of the Camarillo, CA facility, SolarWorld's 2011 annual report stated that ". . . we can now meet demand in the American market completely with the solar modules from our integrated plant in Hillsboro. Module production in the U.S. is thus directly embedded in wafer and cell production; this means shorter transport routes, more efficiency and lower costs. Compared to last year {2010}, we have 150 MW fewer module production capacities available in the U.S. as a result of this charge. The machines {in Camarillo, CA} will be maintained and can be deployed again once the market is more stable." SolarWorld 2011 Annual Report, p. 44.

***. August 16, 2012 e-mail with attachments from Motech to USITC auditor.

examined with Evergreen being the largest in terms of the financial results reported to the Commission.[6] Three U.S. producers that began operations prior to the period (Evergreen, SolarWorld, and Suniva), and whose financial results are reflected in this section of the staff report, are/were integrated with respect to U.S. cell production, while U.S. producers who started module operations during the period examined generally were not.[7] In addition to differences in the level of manufacturing integration, the extent to which U.S. producers engage directly or indirectly in downstream activity related to solar project design, installation, and maintenance also varies.[8]

OPERATIONS ON CSPV CELLS AND MODULES

Income-and-loss data for operations on cells (commercial sales and transfers) and modules are presented in table VI-1 and table VI-2, respectively.[9] Selected company-specific financial results for cells (commercial sales and transfers) and modules are presented in table VI-3 and table VI-4, respectively. A variance analysis of the financial results of cells (commercial sales and transfers) and modules is presented in table VI-5 and table VI-6.[10]

[6] The 2008 closure of Evergreen's pilot manufacturing plant in Marlboro, MA and the 2011 closure of its Devens, MA plant resulted in non-recurring charges which, as noted below, are reflected in the U.S. industry's module financial results. Schott, ***, ceased CSPV operations at its Albuquerque, NM plant in July 2012. The Albuquerque, NM plant, which began operations in 2009, succeeded Schott's module plant in Billerica, MA which was closed in 2009. Sharp's Memphis, TN plant, which opened in 2003 and was the company's first solar panel manufacturing facility outside of Japan, is unintegrated (with respect to U.S. operations) and appears to reflect the facility with the longest period of continuous operations in the United States. Environmental Design & Construction, p. 13, January/February 2004.

[7] As indicated in a previous section of this report, the underlying wafer production used by Evergreen ("thin-ribbon") and SolarWorld (conventional silicon-based) are/were different. Evergreen's wafer production process used less polysilicon which reportedly provided the company with a distinct cost advantage when polysilicon prices, prior to the period examined, were substantially higher. Evergreen 2009 10-K, p. 8.

[8] One avenue used by some larger U.S. and non-U.S. solar panel producers to promote the use of their products has reportedly been to acquire or expand project development capabilities. For example, in late 2010, Sharp acquired Recurrent Energy, a solar project developer with "distributed-scale" projects in North America and Europe. According to an article describing the acquisition, "{t}he purchase of privately owned Recurrent for the first time gives Sharp the ability to bid for utility-scale solar projects, which is considered increasingly crucial for solar panel makers to secure demand for their output in the currently glutted photovoltaic (PV) market. Sharp's major competitors--including First Solar Inc., SunPower and Suntech Power Holdings --all have recently acquired or expanded project development capabilities so they can win projects that will use their panels." *Sharp Buys "Distributed-Scale" Solar Developer*, Energy Daily, September 24, 2010, p. 4.

[9] ***. August 22, 2012 response by SolarWorld to USITC auditor request regarding table III-10.

[10] The Commission's variance analysis is calculated in three parts: sales variance, cost of goods sold (COGS) variance, and sales, general and administrative (SG&A) expenses variance. Each part consists of a price variance (in the case of the sales variance) or a cost variance (in the case of the COGS and SG&A variances) and a volume (quantity) variance. The sales or cost variance is calculated as the change in unit price/cost times the new volume, while the volume variance is calculated as the change in volume times the old unit price/cost. In this case, units are calculated on a per kilowatt basis. Summarized at the bottom of the variance analysis table, the price variance is from sales, the net cost/expense variance is the sum of those items from COGS and SG&A, respectively, and the net volume variance is the sum of the sales, COGS, and SG&A volume variances. All things being equal, a stable overall product mix generally enhances the utility of the Commission's variance analysis.

Revenue

As shown in table VI-1 and table VI-2, while cell and module sales volumes followed somewhat different patterns, both reached their highest absolute levels in 2011.[11] The higher level of module sales in 2010 primarily reflects increases in sales volume reported by ***, as well as the entry of several new producers and their corresponding sales (see table VI-4). The small increase in the 2011 sales volume of cell operations reflects a relatively large increase in ***.[12]

Table VI-1
CSPV Cells (commercial sales and transfers): Results of operations, 2009-11, January-June 2011, and January-June 2012

* * * * * * *

Narrative information accompanying public financial statements generally indicates that declines in module sales value were widespread and began prior to the period examined.[13] As shown in table VI-4, company-specific average sales values for modules reflect the same basic pattern of decline.[14]

Similarly, table VI-1 shows that average sales value for cells also declined throughout the period. ***.

With regard to the persistence of negative price variances for both cells and modules (see revenue section of table VI-5 (cell variance analysis) and table VI-6 (module variance analysis)), declines in average sales value directionally correspond to declines in average raw material costs. With regard to this pattern in general, SolarWorld indicated that the magnitude of decline in average sales value was due largely ***.[15] In contrast, Suntech specifically attributed the ***.[16] As shown in table VI-1 and table VI-2, the ratio of total raw material costs to sales value for both cells and modules increased during the full-year period and then was somewhat lower in interim 2012 compared to the preceding full-year periods.

Notwithstanding consecutive negative price variances, the positive impact of higher sales volumes served to increase total cell and module revenue in 2010 (see revenue section of table VI-5 and table VI-6). For the rest of the period, total cell and module revenue declined because sales volume variances were either negative, in which case they amplified the impact of the negative price variance, or were still positive but not large enough to offset the corresponding negative price variance.

Cost of Goods Sold and Gross Profit or (Loss)

As shown in table VI-1, average costs associated specifically with polysilicon, ingots, and wafers declined throughout the period, while all other raw material costs fluctuated and reached their lowest level in interim 2011.[17] In conjunction with declines in the other components of COGS (i.e., direct labor and

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[11] With regard to the cell revenue reported in table VI-1, ***.
While the majority of module revenue reported in table VI-2 reflects U.S. commercial shipments, ***. August 20, 2012 e-mail with attachment from Suntech to USITC auditor. ***. September 4, 2012 response from SolarWorld to USITC auditor follow-up questions.

[12] ***. August 20, 2012 response from SolarWorld to staff follow-up questions.

[13] Evergreen 2009 10-K , p. 4. SolarWorld 2011 Annual Report, p. 21. Suntech 2011 20-F, pp. 61-62. Schott 2011 Annual Report, p. 38.

[14] ***. August 28, 2012 e-mail with attachment from Helios to USITC auditor.
***.

[15] August 20, 2012 response from SolarWorld to staff follow-up questions.

[16] As described by Suntech, ***. August 20, 2012 e-mail with attachment from Suntech to USITC auditor.

[17] The pattern of declining costs associated with polysilicon, ingots, and wafers appears to be consistent with public information indicating that silicon prices in general declined from their peak prior to the period examined as additional supply was added. Suntech 2009 10-K, pp. 6-7. ***. SolarWorld U.S. producer questionnaire (final), question III-7. ***. October 18, 2012 e-mail from Suniva to USITC auditor. See footnote 29 regarding ***.

Table VI-2
CSPV Modules: Results of operations, 2009-11, January-June 2011, and January-June 2012

Item	Fiscal year			January-June	
	2009	2010	2011	2011	2012
	Quantity (*kilowatts*)				
Total net sales quantity	276,691	560,331	560,742	314,603	320,333
	Value (*$1,000*)				
Total net sales value	712,853	1,075,977	954,997	575,114	359,589
Cost of goods sold:					
Raw materials	478,984	788,789	857,472	466,281	302,754
Direct labor	69,620	92,093	65,703	39,588	31,560
Other factory costs	181,545	186,402	128,875	66,143	42,554
Total cost of goods sold	730,149	1,067,284	1,052,050	572,012	376,869
Gross profit or (loss)	(17,296)	8,693	(97,053)	3,102	(17,279)
Total SG&A expenses[1]	63,079	88,967	141,663	55,585	41,362
Operating income or (loss)	(80,375)	(80,274)	(238,716)	(52,483)	(58,642)
Interest expense	34,117	58,278	37,279	25,985	7,830
Other expenses	241,457	433,507	208,186	34,986	209
Other income items	12,014	26,599	30,358	25,091	9,004
Net income or (loss)	(343,935)	(545,461)	(453,824)	(88,363)	(57,677)
Depreciation/amortization	284,765	479,809	248,939	37,475	19,979
Estimated cash flow from operations	(59,170)	(65,652)	(204,884)	(50,888)	(37,697)
	Ratio to net sales (*percent*)				
Raw materials	67.2	73.3	89.8	81.1	84.2
Direct labor	9.8	8.6	6.9	6.9	8.8
Other factory costs	25.5	17.3	13.5	11.5	11.8
Cost of goods sold	102.4	99.2	110.2	99.5	104.8
Gross profit or (loss)	(2.4)	0.8	(10.2)	0.5	(4.8)
SG&A expenses[1]	8.8	8.3	14.8	9.7	11.5
Operating income or (loss)	(11.3)	(7.5)	(25.0)	(9.1)	(16.3)
Net income or (loss)	(48.2)	(50.7)	(47.5)	(15.4)	(16.0)

Table continued on next page.

Table VI-2--*Continued*
CSPV Modules: Results of operations, 2009-11, January-June 2011, and January-June 2012

Item	Fiscal year			January-June	
	2009	2010	2011	2011	2012
	Ratio to cost of goods sold (*percent*)				
Raw materials	65.6	73.9	81.5	81.5	80.3
Direct labor (module production)[2]	9.5	8.6	6.2	6.9	8.4
Other factory (module production)[2]	24.9	17.5	12.2	11.6	11.3
	Unit value (*dollars per kilowatt)*				
Total net sales	2,576	1,920	1,703	1,828	1,123
Cost of goods sold:					
Raw materials	1,731	1,408	1,529	1,482	945
Direct labor	252	164	117	126	99
Other factory costs	656	333	230	210	133
Total cost of goods sold	2,639	1,905	1,876	1,818	1,176
Gross profit or (loss)	(63)	16	(173)	10	(54)
SG&A expenses[1]	228	159	253	177	129
Operating income or (loss)	(290)	(143)	(426)	(167)	(183)
	Number of producers reporting				
Operating losses	4	8	9	9	7
Data	5	9	13	12	11

[1] ***.

[2] Based on the information on module operations presented in this table, conversion costs (direct labor and other factory costs), which the Commission has used in other cases to measure value added, ranged from 18.4 percent (full-year 2011) to 34.4 percent (2009). For the period as a whole, value added was 24.7 percent on a weighted averaged basis.

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

Table VI-3
CSPV Cells (commercial sales and transfers): Results of operations, by firm, 2009-11, January-June 2011, and January-June 2012

* * * * * * *

Table VI-4
CSPV Modules: Results of operations, by firm, 2009-11, January-June 2011, and January-June 2012

* * * * * * *

Table VI-5
CSPV Cells (commercial sales and transfers): Variance analysis of financial results, 2009-11, January-June 2011, and January-June 2012

* * * * * * *

Table VI-6
CSPV Modules: Variance analysis of financial results, 2009-11, January-June 2011, and January-June 2012

Item	Fiscal year			Jan.-June
	2009-11	2009-10	2010-11	2011-12
	Value (*$1,000*)			
Total net sales:				
Price variance	(489,672)	(367,633)	(121,769)	(225,999)
Volume variance	731,816	730,757	789	10,474
Total net sales variance	242,144	363,124	(120,980)	(215,525)
Cost of sales:				
Raw material costs				
Cost variance	113,237	181,209	(68,105)	172,019
Volume variance	(491,726)	(491,014)	(578)	(8,492)
Net raw material variance	(378,488)	(309,805)	(68,683)	163,527
Direct labor				
Cost variance	75,389	48,895	26,458	8,748
Volume variance	(71,472)	(71,369)	(68)	(721)
Net direct labor variance	3,917	(22,473)	26,390	8,027
Other factory costs				
Cost variance	239,044	181,248	57,663	24,793
Volume variance	(186,374)	(186,105)	(137)	(1,205)
Net other factory cost variance	52,670	(4,857)	57,527	23,589
Net cost of sales:				
Cost variance	427,671	411,352	16,017	205,561
Volume variance	(749,572)	(748,488)	(783)	(10,417)
Total net cost of sales variance	(321,901)	(337,135)	15,234	195,143
Gross profit variance	(79,757)	25,989	(105,746)	(20,382)
SG&A expenses:				
Expense variance	(13,827)	38,775	(52,630)	15,235
Volume variance	(64,757)	(64,663)	(65)	(1,012)
Total SG&A variance	(78,584)	(25,888)	(52,695)	14,223
Operating income variance	(158,341)	101	(158,442)	(6,159)
Summarized as:				
Price variance	(489,672)	(367,633)	(121,769)	(225,999)
Net cost/expense variance	413,844	450,127	(36,614)	220,796
Net volume variance	(82,513)	(82,394)	(59)	(956)

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

other factory costs), total cell raw material costs as a share of total COGS increased to its highest level in 2010 and then declined to its lowest level in interim 2012 (see table VI-1).[18]

For module operations raw material costs also increased as a share of total COGS but at a somewhat sharper rate (see table VI-2) as compared to cell operations. As a result of differences in company-specific module operations, the raw material costs presented in table VI-2 effectively represent a composite of costs associated with integrated production of cells, the purchase of cells from related and unrelated parties, as well as the purchase of partially manufactured modules. Supplemental information indicates that on an overall basis, the majority of the total module raw material costs reported in table VI-2 represents the cost of purchased cells (approximately *** percent), followed by the cost of manufactured cells (approximately *** percent) and finally all other raw material costs (approximately *** percent).[19] Consistent with the general pattern of average cell costs reported in table VI-1, average raw material costs for modules declined throughout much of the period. However, and in conjunction with larger relative declines in average direct labor and other factory costs throughout much of the period, the overall share of raw material costs to total COGS increased for modules during the period, reached its highest level in 2011 (full-year and interim period), and then declined marginally in interim 2012.

*** reported by U.S. producers with financial results in 2009 (Evergreen, GE Energy, Sharp, and SolarWorld), appears to be generally consistent with the character of their operations in that year: ***.[20] [21] As the period progressed, the mix of companies changed somewhat with company-specific levels of average other factory costs (see table VI-4) reflecting, at least in part, differences in underlying module operations, as well as subsequent changes in the character of those operations during the period. For example, in the second half of 2011, ***.[22] The sharp increase in ***.[23] Non-recurring charges which directly impacted COGS were largely, although not exclusively, identified as related to inventory revaluations.[24] Pursuant to GAAP and IFRS, U.S. producers are generally required to recognize losses immediately when balance sheet costs assigned to inventory exceed market or net realizable values, respectively.[25]

As shown in table VI-2, U.S. module operations collectively generated a gross profit in 2010, i.e., the year when module sales volume reached its second highest absolute level, and in interim 2011. ***. For cell and module operations, and notwithstanding some fluctuations in direct labor and other factory costs as a share of sales, the most consistent factor explaining the pattern of gross losses is the progressive

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[18] ***. September 4, 2012 response from SolarWorld to USITC auditor follow-up questions.

[19] USITC auditor notes.

[20] ***. September 4, 2012 response from SolarWorld to USITC auditor follow-up questions.

[21] With regard to Evergreen, the first phase of the company's Devens, MA facility was reportedly opened in mid-2008 with a second expansion phase starting in early 2008 and reaching completion in the fourth quarter of 2009. While the company initially envisioned an entirely integrated production facility, Evergreen determined in late 2009 that, in order to be cost competitive in the face of significant declines in solar panel prices, it would move panel assembly to China. Evergreen estimated that it would incur $40 million (ratably beginning in the third quarter of 2009 through mid-2011) for accelerated depreciation associated with panel assembly equipment. Evergreen 2010 10-K, p. 4. Staff notes that Evergreen ***. However, the subsequent decision to abandon the entire Devens, MA facility resulted in the company directly recognizing only a portion of the above-referenced amount as accelerated depreciation (approximately $11.9 million in 2009 and $18.3 million in 2010). Evergreen 2010 10-K, p. 45.

[22] August 16, 2012 e-mail with attachments from Motech to USITC Auditor

[23] USITC auditor notes.

[24] ***. August 22, 2012 response by SolarWorld to USITC auditor request regarding table III-10. ***. October 3, 2012 e-mail with attachments from Suniva to USITC auditor. ***.

[25] While the most substantial inventory valuation adjustments were reportedly recognized in 2011, it is likely that at least some U.S. producers did not report and/or separately identify relevant inventory valuation adjustments. For example, ***. USITC auditor notes.

In 2011 and with respect to its module operations, ***.

increase in the ratio of raw material costs to sales value.[26] Table VI-4 shows that the majority of U.S. module producers reported gross losses throughout all or most of the period. ***.[27]

SG&A Expenses and Operating Income or (Loss)

Consistent with the U.S. industry's negative to weak gross profitability during the period examined, table VI-1 and table VI-2 show that operations on cells and modules, respectively, generated consecutive operating losses. While following the same directional pattern, operating loss ratios (i.e., operating losses as a share of revenue) reported for cell operations were generally somewhat higher compared to module operations.

With respect to module operations (see table VI-2), SG&A expense ratios (i.e., SG&A expenses as a share of revenue) varied from company to company with differences reflecting features such as production and sales volumes achieved during the period, as well as the underlying level of trade that the reported SG&A expenses supported. For example, ***.[28] ***.[29]

***.[30] ***.[31]

As indicated previously, non-recurring charges related primarily to inventory revaluation adjustments are included in COGS and therefore directly impacted the industry's reported operating results in table VI-1 and table VI-2. ***. Other non-recurring charges, including *** are reflected in "other expenses" and therefore do not directly impact reported operating results.[32]

CAPITAL EXPENDITURES AND RESEARCH AND DEVELOPMENT EXPENSES

Data on capital expenditures and research and development (R&D) expenses related to cells and modules, respectively, are presented in table VI-7.

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[26] Narrative information accompanying SolarWorld's 2011 Annual Reports acknowledged the impact of start-up activity on the profitability of its U.S. operations (SolarWorld 2011 Annual Report, p. 90), while the company's interim 2012 report indicated that, with respect to its operations in general, continued improvement in the group-wide purchase process and material use in production only partially offset the negative impact of declining product prices. SolarWorld First Quarter 2012 consolidated interim report, p. 16.

[27] ***. August 27, 2012 e-mail with attachment from Silicon Energy to USITC auditor.

[28] MX Solar U.S. producer questionnaire, III-3. USITC auditor notes. ***. August 28, 2012 e-mail with attachment from Helios to USITC auditor. ***. August 7, 2012 e-mail with attachment from Global Solar to USITC auditor. ***. That being said, since SG&A expenses reflect an important part of the overall structure of a company's operations, it is also reasonable to expect corresponding SG&A ratios to be higher when production/sales volumes are substantially below the levels that a company was structured to achieve.

[29] ***. October 9, 2012 e-mail with attachments from Suniva to USITC auditor. ***.

[30] ***. September 4, 2012 response from SolarWorld to USITC auditor follow-up questions.

[31] August 20, 2012 e-mail with attachment from Suntech to USITC Auditor. ***.

[32] ***.

***. August 20, 2012 SolarWorld response to staff questions. To the extent that SolarWorld reported its financial results on the basis of IFRS, as opposed to GAAP, it should be noted that IFRS and GAAP differ on some points regarding accounting for impairments; e.g., under IFRS, impairment charges for assets not held for sale can be reversed while reversal is not allowed under GAAP. However, the underlying concept of impairment is basically the same: "{t}he condition that exists when a long-lived asset's carrying amount is not expected to be recoverable over the remainder of its expected life." Wiley GAAP 2012, p. 434. ***. August 20, 2012 SolarWorld response to staff questions.

Table VI-7
CSPV Cell and Modules: Capital expenditures and R&D expenses, 2009-11, January-June 2011, January-June 2012

* * * * * * *

Most U.S. producers that began operations during the period examined reported capital expenditures which appear to correspond to the initial establishment of their production facilities. ***.[33]

As shown in table VI-7, ***.[34]

***.[35]

***.[36] ***.[37]

CAPITAL AND INVESTMENT

The Commission requested U.S. producers to describe any actual or anticipated negative effects of imports of CSPV cells and/or modules from China on their firms' growth, investment, ability to raise capital, existing development and production efforts (including efforts to develop a derivative or more advanced version of the product), or the scale of capital investments. The U.S. producers' responses are presented below.

Actual Negative Effects

ASP	***.
Evergreen	***.[38]
GE Energy	***.
Helios	***.
Kyocera	***.
Mage	***.
Motech	***.
MX Solar	***.[39]
Sharp	***.
Silicon Energy	***.
SolarWorld	***.
Solon	***.
Suniva	***.
Suntech	***.

[33] August 17, 2012 e-mail with attachments from Solon to USITC auditor.

[34] With regard to its Hillsboro, OR facility specifically, SolarWorld stated that ***. August 20, 2012 response from SolarWorld to staff follow-up questions.

[35] September 7, 2012 e-mail from SolarWorld to USITC auditor.

[36] *** are consistent with the R&D expenses reported in the company's public financial statements. Evergreen 2010 10-K, p. 34. As described by Evergreen in its 2010 10-K, "{r}esearch and development expenses consist primarily of salaries and related personnel costs, including stock based compensation costs, consulting expenses and prototype costs related to the design, engineering, development, testing and enhancement of our products, manufacturing equipment and manufacturing technology." Evergreen 2010 10-K, p. 41. To the extent that the company also referenced its expansion of R&D initiatives in China (Evergreen 2010 10-K, p. 10), it appears reasonable to conclude that the R&D expenses reported by Evergreen were not limited to just those directly supporting its U.S. operations.

[37] August 20, 2012 SolarWorld response to staff questions.

[38] Part VI of Commission's preliminary-phase staff report, p. VI-29.

[39] Ibid.

Anticipated Negative Effects

ASP	***.
Evergreen	***.[40]
GE Energy	***.
Helios	***.
Kyocera	***.
Mage	***.
Motech	***.
MX Solar	***.[41]
Sharp	***.
Silicon Energy	***.
SolarWorld	***.
Solon	***.
Suniva	***.
Suntech	***.

[40] Part VI of Commission's preliminary-phase staff report, p. VI-32.

[41] Ibid.

PART VII: THREAT CONSIDERATIONS

Section 771(7)(F)(i) of the Act (19 U.S.C. § 1677(7)(F)(i)) provides that–

In determining whether an industry in the United States is threatened with material injury by reason of imports (or sales for importation) of the subject merchandise, the Commission shall consider, among other relevant economic factors[1]--

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

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

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

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

(V) inventories of the subject merchandise,

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

(VII) in any investigation under this title which involves imports of both a raw agricultural product (within the meaning of paragraph (4)(E)(iv)) and any product processed from such raw agricultural product, the likelihood that there will be increased imports, by reason of product shifting, if there is an affirmative determination by the Commission under section 705(b)(1) or 735(b)(1) with respect to either the raw agricultural product or the processed agricultural product (but not both),

[1] Section 771(7)(F)(ii) of the Act (19 U.S.C. § 1677(7)(F)(ii)) provides that "The Commission shall consider {these factors} . . . as a whole in making a determination of whether further dumped or subsidized imports are imminent and whether material injury by reason of imports would occur unless an order is issued or a suspension agreement is accepted under this title. The presence or absence of any factor which the Commission is required to consider . . . shall not necessarily give decisive guidance with respect to the determination. Such a determination may not be made on the basis of mere conjecture or supposition."

> (VIII) the actual and potential negative effects on the existing development and production efforts of the domestic industry, including efforts to develop a derivative or more advanced version of the domestic like product, and
>
> (IX) any other demonstrable adverse trends that indicate the probability that there is likely to be material injury by reason of imports (or sale for importation) of the subject merchandise (whether or not it is actually being imported at the time).[2]

Information on the nature of the alleged subsidies was presented earlier in this report; information on the volume and pricing of imports of the subject merchandise is presented in Parts IV and V; and information on the effects of imports of the subject merchandise on U.S. producers' existing development and production efforts is presented in Part VI. Information on inventories of the subject merchandise; foreign producers' operations, including the potential for "product-shifting;" any other threat indicators, if applicable; and any dumping in third-country markets, follows.

THE INDUSTRY IN CHINA

The Commission received responses from 18 firms accounting for approximately *** percent of 2011 production of CSPV cells in China and accounting for approximately *** percent of 2011 production of CSPV modules in China.[3] Thirteen of the 18 responding Chinese producers reported that they produced CSPV cells in China. These firms are identified in table VII-1 along with each firms' cell capacity, production, and export shipment data. All eighteen of the responding Chinese producers reported that they produced CSPV modules in China. These firms are identified in table VII-2 along with each firms' cell capacity, production, and export shipment data.

[2] Section 771(7)(F)(iii) of the Act (19 U.S.C. § 1677(7)(F)(iii)) further provides that, in antidumping investigations, ". . . the Commission shall consider whether dumping in the markets of foreign countries (as evidenced by dumping findings or antidumping remedies in other WTO member markets against the same class or kind of merchandise manufactured or exported by the same party as under investigation) suggests a threat of material injury to the domestic industry."

[3] Based on a comparison of foreign producers reported production of CSPV cells and modules in 2011 with total Chinese production of cells (*** mw) and modules (*** mw) as reported in *PV News*, Volume 31, Number 5, May 2012, pp. 8-9.

Table VII-1
CSPV cells: China's reported CELL production capacity, production, and export shipments, 2011

Producer	Share of reported 2011 production *(percent)*	Capacity *(kilowatts)*	Production *(kilowatts)*	Capacity utilization *(percent)*	Exports to the U.S. *(kw)*	Share of firm's total shipments exported to the U.S. *(percent)*
Aide[1]	***	***	***	***	***	***
Canadian Solar China	***	***	***	***	***	***
CNPV	***	***	***	***	***	***
Eoplly	***	***	***	***	***	***
ET Solar[2]	***	***	***	***	***	***
Hanwha[3]	***	***	***	***	***	***
Hareon	***	***	***	***	***	***
JA Solar	***	***	***	***	***	***
Jinko	***	***	***	***	***	***
PV-Tech	***	***	***	***	***	***
Suntech	***	***	***	***	***	***
Trina China	***	***	***	***	***	***
Yingli China	***	***	***	***	***	***
Total	100.0	14,015,238	10,781,179	76.9	66,494	

[1] Aide Solar Energy Technology Co., Ltd. ("Aide") commenced production in 2010.
[2] ET Solar Industry, Ltd. ("ET Solar") commenced production of CSPV cells in October 2010.
[3] In 2010, Hanwha Chemical Corp. purchased Solarfun Power Holdings Co., Ltd and renamed the company Hanwha Solar One.

Source: Compiled from data submitted in Commission questionnaire responses.

Table VII-2
CSPV modules: China's reported MODULE production capacity, production, and export shipments, 2011

Producer	Share of reported 2011 production *(percent)*	Capacity *(kilowatts)*	Production *(kilowatts)*	Capacity utilization *(percent)*	Exports to the U.S. *(kw)*	Share of firm's total shipments exported to the U.S. *(percent)*
Aide	***	***	***	***	***	***
Canadian Solar China	***	***	***	***	***	***
Chaori	***	***	***	***	***	***
CNPV	***	***	***	***	***	***
Eoplly	***	***	***	***	***	***
ET Solar	***	***	***	***	***	***
Hanwha	***	***	***	***	***	***
Hareon	***	***	***	***	***	***
JA Solar	***	***	***	***	***	***
Jinko	***	***	***	***	***	***
Konca[1]	***	***	***	***	***	***
LDK	***	***	***	***	***	***
PV-Tech	***	***	***	***	***	***
SUMEC	***	***	***	***	***	***
Suntech	***	***	***	***	***	***
Trina China	***	***	***	***	***	***
Wuxi Taichang	***	***	***	***	***	***
Yingli China	***	***	***	***	***	***
Total	100.0	15,368,820	11,239,874	73.1	1,664,084	

[1] Konca Solar Cell Co., Ltd. ("Konca") commenced production of CSPV modules in 2010 and ceased production at the end of 2011.

Source: Compiled from data submitted in Commission questionnaire responses.

Reporting Producers of CSPV Cells and Modules in China

Tables VII-3 to VII-5 present combined data for reported capacity, production, and shipments of CSPV cells and modules for all reporting producers in China.

Collectively, in 2011, reporting foreign producers in China reported that 76.0 percent of their total shipments of CSPV cells were internally consumed to produce CSPV modules in China, 15.1 percent of CSPV cell shipments were to their home market, 0.6 percent of their CSPV cell shipments were exported to the United States, and 8.2 percent were exported to other markets.

In 2011, 14.7 percent of total shipments of modules by Chinese producers were exported to the United States, 14.9 percent to their home market, and 67.7 percent of their shipments were to other export markets. Their exports of CSPV modules to the United States increased from 134,954 kilowatts in 2009 to 1.7 million kilowatts in 2011. Their shipments to other export markets increased throughout the period of investigation from 2.2 million kilowatts in 2009 to 7.7 million kilowatts in 2011.[4]

Collectively, Chinese foreign producers reported that CSPV cell capacity increased by 237.0 percent from 2009 to 2011,[5] and is projected to increase by an additional 22.5 percent from 2011 to 2013. They reported CSPV module capacity increased by 219.3 percent from 2009 to 2011, and is projected to increase an additional 22.5 percent from 2011 to 2013. They reported CSPV cell production increased by 270.0 percent from 2009 to 2011, and is projected to increase an additional 19.9 percent from 2011 to 2013. They reported CSPV module production increased by 327.9 percent from 2009 to 2011, and is projected to increase an additional 34.6 percent from 2011 to 2013.

Five Largest Reporting Producers of CSPV Modules in China[6]

Suntech

Suntech reported that *** percent of its total sales in the most recent fiscal year were sales of CSPV cells and modules. In 2011, *** percent of Suntech's total shipments of CSPV cells were internally consumed to produce CSPV modules and *** percent of total shipments of modules were exported to the United States, *** percent of its shipments were to its home market, and *** percent of its shipments were to other export markets. Suntech's exports of CSPV modules to the United States increased from 2009 to 2011, by *** percent, but are projected to ***. From 2009 to 2011, its shipments to other export markets increased by *** percent and are projected to ***.[7]

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[4] JA Solar reported that it ***.

Suntech, Trina, and Canadian Solar also submitted breakouts of their export shipments to the EU. *See fns. 7, 10, and 12.* Respondent CCCME's posthearing brief, exh. 62.

[5] Various publications have reported that total capacity and production in China has greatly increased during the period of investigation and is projected to continue to expand in 2012 and beyond. One source reported that in 2008 total cell capacity in China was *** megawatts and by 2011 it had expanded to *** megawatts, an increase of *** percent. It reported capacity of modules in China as *** megawatts and by 2011 it had expanded to *** megawatts, an increase of *** percent. With regard to production, it reported that in 2008 total cell production in China was *** megawatts and by 2011 it had expanded to *** megawatts, an increase of *** percent. It reported production of modules in China as *** megawatts and by 2011 it had expanded to *** megawatts, an increase of *** percent. *Goldman Sachs Global Investment Research, Global Clean Energy, Solar*, July 7, 2011. Attached as exh. 3 of Petitioner's postconference brief; see also, petition, pp. 47-48 (list of reported capacity expansions by Chinese producers).

[6] Based on reported 2011 capacity to produce CSPV modules.

[7] Suntech reported that it ***. Respondent CCCME's posthearing brief, exh. 62.

Suntech's reported CSPV cell capacity increased by *** percent from 2009 to 2011[8], and is projected to *** percent from 2011 to 2013.[9] Its reported CSPV module capacity increased by *** percent from 2009 to 2011, and is projected to *** in 2012 and 2013. Suntech reported CSPV cell production increased by *** percent from 2009 to 2011, and is projected to *** percent in 2013. Its reported CSPV module production increased by *** percent from 2009 to 2011, but is projected to *** percent in 2013. Suntech reported that its largest U.S. importer of CSPV cells and modules during the period of investigation was ***.

Trina China

Trina China reported that *** percent of its total sales in the most recent fiscal year were sales of CSPV cells and modules. In 2011, *** percent of Trina China's total shipments of CSPV cells were internally consumed to produce CSPV modules and *** percent of total shipments of modules were exported to the United States, *** percent of its shipments were to its home market, and *** percent of its shipments were to other export markets. Trina China's exports of CSPV modules to the United States increased from *** kilowatts in 2009 to *** kilowatts in 2011 and are projected to ***. Its shipments to other export markets increased throughout the period of investigation and are projected to ***.[10]

Trina China's reported CSPV cell capacity increased by *** percent from 2009 to 2011, and is projected to *** percent from 2011 to 2013. Its reported CSPV module capacity increased by *** percent from 2009 to 2011, and is projected to *** percent from 2011 to 2013. Trina China's reported CSPV cell production increased by *** percent from 2009 to 2011, and is projected to *** percent from 2011 to 2013. Its reported CSPV module production increased by *** percent from 2009 to 2011, and is projected to *** percent from 2012 to 2013. Trina China reported that its largest U.S. importer of CSPV modules during the period of investigation was ***.

Yingli China

Yingli China reported that *** percent of its total sales in the most recent fiscal year were sales of CSPV cells and modules. In 2011, *** percent of Yingli China's total shipments of CSPV cells were internally consumed to produce CSPV modules and *** percent of total shipments of modules were exported to the United States, *** percent of its shipments were to its home market, and *** percent of its shipments were to other export markets. Yingli China's exports of CSPV modules to the United States increased from *** units in 2009 to *** units in 2011 and are projected to ***. Its shipments to other export markets increased throughout the period of investigation and are projected to ***.

Yingli China's reported CSPV cell capacity increased by *** percent from 2009 to 2011, and is projected to *** percent from 2011 to 2013.[11] Its reported CSPV module capacity increased by *** percent from 2009 to 2011, and is projected to *** percent from 2011 to 2013. Yingli China's reported CSPV cell production increased by *** percent from 2009 to 2011, and is projected to *** percent from 2011 to 2013. Its reported CSPV module production increased by *** percent from 2009 to 2011, and is projected to *** percent from 2011 to 2013. Yingli China reported that its largest U.S. importer of CSPV modules during the period of investigation was ***.

[8] Suntech reported that ***.

[9] Suntech reported ***.

[10] Trina China reported that it ***. Respondent CCCME's posthearing brief, exh. 62.

[11] Yingli China reported that ***.

Canadian Solar China

Canadian Solar China reported that *** percent of its total sales in the most recent fiscal year were sales of CSPV cells and modules. In 2011, *** percent of Canadian Solar China's total shipments of CSPV cells were internally consumed to produce CSPV modules and *** percent of total shipments of modules were exported to the United States, *** percent of its shipments were to its home market, and *** percent of its shipments were to other export markets such as ***. Canadian Solar China's exports of CSPV modules to the United States increased from 2009 to 2011 by *** percent, and are projected to ***. Its shipments to other export markets increased by *** percent from 2009 to 2011, and are projected to ***.[12] Canadian Solar China's reported CSPV cell capacity increased by *** percent from 2009 to 2011, and is projected to *** percent from 2011 to 2013.[13] Its reported CSPV module capacity increased by *** percent from 2009 to 2011, and is projected to *** percent from 2011 to 2013.[14] Canadian Solar China's reported CSPV cell production increased by *** percent from 2009 to 2011, and is projected to *** percent from 2011 to 2013. Its reported CSPV module production increased by *** percent from 2009 to 2011, and is projected to *** percent from 2011 to 2013. Canadian Solar China reported that its largest U.S. importer of CSPV modules during the period of investigation was ***.

LDK

LDK reported that *** percent of its total sales in the most recent fiscal year were sales of CSPV cells and modules. LDK commenced production of CSPV modules in 2010. It does not produce its own CSPV cells, but rather purchases cells from other producers in China. In 2011, *** percent of total shipments of modules were exported to the United States, *** percent of its shipments were to its home market, and *** percent of its shipments were to other export markets. LDK's exports of CSPV modules to the United States began in 2011 with *** kilowatts. Its shipments to other export markets also began in 2011 with *** kilowatts.

LDK's reported CSPV module capacity increased by *** percent from 2010, the year in which it commenced production, to 2011, and is projected to *** percent from 2011 to 2013. Its reported CSPV module production increased by *** percent from 2010 to 2011, and is projected to *** percent from 2011 to 2013. LDK reported that its largest U.S. importer of CSPV modules during the period of investigation was ***.

[12] Canadian Solar reported that ***. Respondent CCCME's posthearing brief, exh. 62.

[13] Canadian Solar China reported that ***. Canadian Solar China's foreign producer questionnaire, question II-2.

[14] Canadian Solar China reported that ***. Canadian Solar China's foreign producer questionnaire, question II-2.

Table VII-3
CSPV cells: China's reported production capacity, production, shipments, and inventories OF CELLS, 2009-11, January-June 2011, January-June 2012, and projections for 2012 and 2013

Item	Actual experience					Projections	
				January-June			
	2009	2010	2011	2011	2012	2012	2013
	Quantity (*kilowatts*)						
Capacity	4,159,000	8,277,510	14,015,238	6,550,445	8,331,000	17,041,000	17,171,000
Production	2,913,693	6,826,446	10,781,179	5,121,136	6,094,629	11,613,583	12,928,315
End-of-period inventories	123,789	175,675	251,097	205,295	631,648	220,634	262,086
Shipments:							
Internal consumption	2,191,032	5,115,394	8,495,606	3,845,906	4,757,325	8,925,652	10,163,593
Home market	569,221	1,020,349	1,689,525	860,728	1,194,433	2,297,543	2,310,264
Exports to--							
The United States	4,621	33,487	66,494	21,338	2,259	22,269	82,008
All other markets	156,763	668,672	921,240	451,215	529,224	756,546	931,841
Total exports	161,384	702,159	987,734	472,554	531,483	778,815	1,013,849
Total shipments	2,921,638	6,837,903	11,172,864	5,179,188	6,483,241	12,002,010	13,487,707
	Ratios and shares (*percent*)						
Capacity utilization	69.4	82.5	76.9	78.2	73.2	68.2	75.3
Inventories to production	4.2	2.6	2.3	2.0	5.2	1.9	2.0
Inventories to total shipments	4.2	2.6	2.2	2.0	4.9	1.8	1.9
Shares of total quantity of shipments:							
Internal consumption	75.0	74.8	76.0	74.3	73.4	74.4	75.4
Home market	19.5	14.9	15.1	16.6	18.4	19.1	17.1
Exports to--							
The United States	0.2	0.5	0.6	0.4	0.0	0.2	0.6
All other markets	5.4	9.8	8.2	8.7	8.2	6.3	6.9
Total exports	5.5	10.3	8.8	9.1	8.2	6.5	7.5

Note.–January-June inventory ratios are calculated using annualized production and shipments data.

Source: Compiled from data submitted in Commission questionnaire responses.

Table VII-4
CSPV modules: China's reported production capacity, production, shipments, and inventories OF MODULES, 2009-11, January-June 2011, January-June 2012, and projections for 2012 and 2013

Item	Actual experience					Projections	
				January-June			
	2009	2010	2011	2011	2012	2012	2013
	Quantity (*kilowatts*)						
Capacity	4,814,000	9,843,770	15,368,820	6,969,810	9,072,730	18,220,050	18,834,350
Production	2,627,017	6,734,154	11,239,874	5,256,104	5,973,661	12,064,059	15,123,394
End-of-period inventories	174,140	369,948	582,705	508,522	808,396	772,905	1,016,242
Shipments:							
Internal consumption	31,752	114,201	299,324	43,861	355,879	377,745	574,090
Home market	177,672	393,797	1,692,617	416,267	644,935	2,178,917	2,939,851
Exports to–							
The United States	134,954	751,336	1,664,084	551,330	659,550	826,271	975,785
All other markets	2,184,771	5,282,121	7,668,270	4,095,989	4,252,034	8,562,689	10,596,281
Total exports	2,319,725	6,033,457	9,332,354	4,647,320	4,911,584	9,388,959	11,572,066
Total shipments	2,529,149	6,541,455	11,324,294	5,107,447	5,912,398	11,945,621	15,086,007
	Ratios and shares (*percent*)						
Capacity utilization	54.1	68.4	73.1	75.4	65.8	66.2	80.3
Inventories to production	6.6	5.5	5.2	4.8	6.8	6.4	6.7
Inventories to total shipments	6.9	5.7	5.1	5.0	6.8	6.5	6.7
Shares of total quantity of shipments:							
Internal consumption	1.3	1.7	2.6	0.9	6.0	3.2	3.8
Home market	7.0	6.0	14.9	8.2	10.9	18.2	19.5
Exports to–							
The United States	5.3	11.5	14.7	10.8	11.2	6.9	6.5
All other markets	86.4	80.7	67.7	80.2	71.9	71.7	70.2
Total exports	91.7	92.2	82.4	91.0	83.1	78.6	76.7

Note.–January-June inventory ratios are calculated using annualized production and shipments data.

Source: Compiled from data submitted in Commission questionnaire responses.

Table VII-5
CSPV cells and modules: China's reported production capacity, production, shipments, and inventories OF CELLS AND MODULES, 2009-11, January-June 2011, January-June 2012, and projections for 2012 and 2013

Item	Actual experience					Projections	
				January-June			
	2009	2010	2011	2011	2012	2012	2013
	Quantity (*kilowatts*)						
Capacity	8,973,000	18,121,280	29,384,058	13,520,255	17,403,730	35,261,050	36,005,350
Production	5,540,710	13,560,600	22,021,053	10,377,240	12,068,291	23,677,643	28,051,710
End-of-period inventories	297,930	545,623	833,802	713,818	1,440,044	993,539	1,278,328
Shipments:							
Internal consumption	2,222,784	5,229,595	8,794,929	3,889,767	5,113,204	9,303,397	10,737,684
Home market	746,893	1,414,146	3,382,142	1,276,995	1,839,368	4,476,459	5,250,115
Exports to–							
The United States	139,575	784,823	1,730,577	572,668	661,809	848,540	1,057,793
All other markets	2,341,534	5,950,794	8,589,510	4,547,205	4,781,258	9,319,234	11,528,122
Total exports	2,481,109	6,735,616	10,320,088	5,119,873	5,443,067	10,167,775	12,585,915
Total shipments	5,450,786	13,379,358	22,497,158	10,286,636	12,395,640	23,947,631	28,573,714
	Ratios and shares (*percent*)						
Capacity utilization	61.2	74.8	74.9	76.8	69.3	67.1	77.9
Inventories to production	5.4	4.0	3.8	3.4	6.0	4.2	4.6
Inventories to total shipments	5.5	4.1	3.7	3.5	5.8	4.1	4.5
Shares of total quantity of shipments:							
Internal consumption	40.8	39.1	39.1	37.8	41.3	38.8	37.6
Home market	13.7	10.6	15.0	12.4	14.8	18.7	18.4
Exports to–							
The United States	2.6	5.9	7.7	5.6	5.3	3.5	3.7
All other markets	43.0	44.5	38.2	44.2	38.6	38.9	40.3
Total exports	45.5	50.3	45.9	49.8	43.9	42.5	44.0

Note.–January-June inventory ratios are calculated using annualized production and shipments data.

Source: Compiled from data submitted in Commission questionnaire responses.

U.S. IMPORTERS' INVENTORIES

Reported inventories held by U.S. importers of subject merchandise from China and nonsubject countries are shown in table VII-6.

Table VII-6
CSPV cells and modules: U.S. importers' end-of-period inventories of subject and nonsubject imports, by sources, 2009-2011, January-June 2011, and January-June 2012

Source	Calendar year			January-June	
	2009	2010	2011	2011	2012
Cells					
Imports from China:					
Inventories (*kilowatts*)	0	2,102	10,417	5,313	71
Ratio to imports (*percent*)	0	12.5	10.0	6.4	(1)
Ratio to U.S. shipments of imports (*percent*)	0	60.1	18.1	11.4	0.3
Imports from nonsubject countries:					
Inventories (*kilowatts)*	6,227	11,642	7,797	9,519	11,484
Ratio to imports (*percent*)	4.6	4.8	2.8	2.5	3.5
Ratio to U.S. shipments of imports (*percent*)	5.6	5.8	4.1	3.5	5.4
Imports from all sources:					
Inventories (*kilowatts*)	6,227	13,744	18,214	14,832	11,555
Ratio to imports (*percent*)	4.6	5.3	4.7	3.2	3.5
Ratio to U.S. shipments of imports (*percent*)	5.6	6.7	7.4	4.7	5.0
Modules					
Imports from China:					
Inventories (*kilowatts*)	35,645	81,245	211,048	114,045	164,739
Ratio to imports (*percent*)	29.6	12.8	15.7	10.7	11.5
Ratio to U.S. shipments of imports (*percent*)	38.3	15.4	17.3	11.8	10.7
Imports from nonsubject countries:					
Inventories (*kilowatts)*	21,949	17,764	16,309	33,863	125,411
Ratio to imports (*percent*)	18.5	7.2	5.1	11.1	17.7
Ratio to U.S. shipments of imports (*percent*)	27.1	10.1	5.7	13.6	24.3
Imports from all sources:					
Inventories (*kilowatts*)	57,594	99,009	227,357	147,908	290,150
Ratio to imports (*percent*)	24.1	11.2	13.7	10.8	13.5
Ratio to U.S. shipments of imports (*percent*)	33.1	14.1	15.1	12.1	14.1

Table continued on next page

Table VII-6--*Continued*
CSPV cells and modules: U.S. importers' end-of-period inventories of subject and nonsubject imports, by sources, 2009-20101, January-June 2011, and January-June 2012

Source	Calendar year			January-June	
	2009	2010	2011	2011	2012
Total cells and modules					
Imports from China:					
Inventories (*kilowatts*)	35,645	83,347	221,465	119,358	164,810
Ratio to imports (*percent*)	29.6	12.8	15.3	10.4	11.5
Ratio to U.S. shipments of imports (*percent*)	38.3	15.7	17.3	11.7	10.5
Imports from nonsubject countries:					
Inventories (*kilowatts)*	28,176	29,406	24,106	43,382	136,895
Ratio to imports (*percent*)	11.1	6.0	4.0	6.3	13.2
Ratio to U.S. shipments of imports (*percent*)	14.7	7.8	5.1	8.4	18.8
Imports from all sources:					
Inventories (*kilowatts*)	63,821	112,753	245,571	162,740	301,705
Ratio to imports (*percent*)	17.1	9.9	12.0	8.9	12.2
Ratio to U.S. shipments of imports (*percent*)	22.4	12.4	14.0	10.6	13.2

Note.–January-June ratios are calculated using annualized import data.

[1]Not available.

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

U.S. IMPORTERS' CURRENT ORDERS

The Commission requested U.S. importers to indicate whether they imported or arranged for the importation of CSPV cells or modules after June 30, 2012. *** of the 24 reporting U.S. importers stated that they had imported or arranged for importation since June 30, 2012. Table VII-7 presents the U.S. importers which indicated that they had imported or arranged for the importation of the subject product from China and the quantity of those U.S. imports.

Table VII-7
CSPV cells and modules: U.S. importers' orders of subject imports from China subsequent to June 30, 2012, by firm

* * * * * * *

ANTIDUMPING AND COUNTERVAILING DUTY ORDERS IN THIRD-COUNTRY MARKETS

In July 2012, SolarWorld filed an antidumping petition with the European Commission alleging that producers of CSPV solar cells and modules in China were selling CSPV cells and modules at less than fair value.[15] On September 6, 2012, the European Commission announced its initiation of an antidumping duty investigation on CSPV cells and modules from China.[16] On September 25, 2012, SolarWorld filed a countervailing duty complaint with the European Commission.[17] The investigations are ongoing.

In October 2012, solar manufacturers in India filed an antidumping and countervailing duty complaint alleging that solar cells and modules from China, Taiwan, Malaysia, and the United States are being sold at LTFV and unfairly subsidized by the respective governments.[18] The investigation has yet to be initiated.

On July 20, 2012, the Government of China announced the commencement of an antidumping and countervailing duty investigation into "solar-grade polysilicon" from the United States and Korea.[19] The investigation in ongoing.

INFORMATION ON NONSUBJECT SOURCES

In assessing whether the domestic industry is materially injured or threatened with material injury "by reason of subject imports," the legislative history states "that the Commission must examine all relevant evidence, including any known factors, other than the dumped or subsidized imports, that may be injuring the domestic industry, and that the Commission must examine those other factors (including nonsubject imports) 'to ensure that it is not attributing injury from other sources to the subject imports.'"[20]

Global Market

Global PV installations (including nonsubject products such as thin film) increased from 7.4 gigawatts (GW) in 2009 to 29.7 GW in 2011, with Europe accounting for 73 percent of the increase in installations (figure VII-1). In 2011, the largest markets were Italy (9,284 MW, 31.3 percent of global installations), Germany (7,485 MW, 25.2 percent), China (2,200 MW, 7.4 percent), the United States (1,855 MW, 6.3 percent), France (1,671 MW, 5.6 percent), and Japan (1,296 MW, 4.4 percent).[21] Substantial market growth is expected in Asia and North America over the next two years, and the

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[15] "Europe Solar-Panel Companies File Dumping Complaint vs. Chinese," *Wall Street Journal*, July 24, 2012.

[16] *Notice of initiation of an antidumping proceeding concerning imports of crystalline silicon photovoltaic modules and key components (i.e. cells and wafers) originating in the People's Republic of China*, Official Journal of the European Union, C/269/5, September 6, 2012.

[17] *"European Solar Group Seeks Wider Trade Inquiry,"* The New York Times, September 25, 2012.

[18] *"Indian Solar Manufacturers Ask for Anti-Dumping Duties of Up to 200%,"* PV Magazine, October 10, 2012.

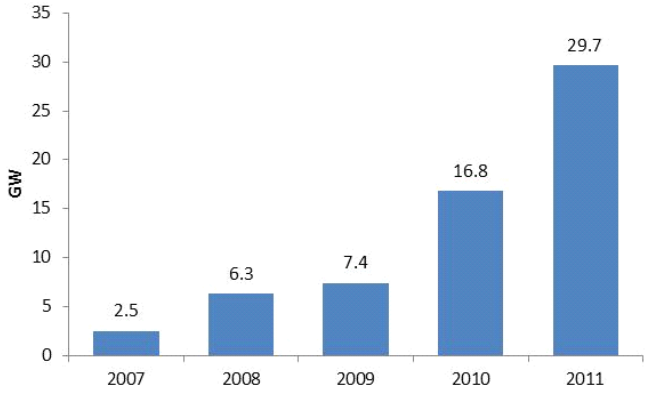
[19] See Ministry of Commerce, People's Republic of China website: http://english.mofcom.gov.cn/aarticle/newsrelease/significantnews/201207/20120708245225.html accessed August 30, 2012.

[20] Mittal Steel Point Lisas Ltd. v. United States, Slip Op. 2007-1552 at 17 (Fed. Cir., Sept. 18, 2008), quoting from Statement of Administrative Action on Uruguay Round Agreements Act, H.R. Rep. 103-316, Vol. I at 851-52; see also Bratsk Aluminum Smelter v. United States, 444 F.3d 1369 (Fed. Cir. 2006).

[21] In Europe, residential installations account for a larger portion of installations than in the United States. The EPIA counts a project as being installed when it is connected to the grid. In Italy, about 3.5 GW of projects were completed in 2010, but not grid-connected until 2011. EPIA, *Global Market Outlook for Photovoltaics until 2016*, May 2012, pp. 19, 30, 66–67; conference transcript, p. 135 (Petrina).

European Photovoltaic Industry Association (EPIA) projects that the United States and China will be the largest markets in 2013.[22] Installations in Asia are projected to increase from 16 percent of annual global installations in 2011 to more than one-third of global installation in 2013.[23] Globally, CSPV accounted for 79 percent of PV installations in 2009 and 89 percent in 2010.[24]

Figure VII-1
Global PV installations, 2007–11



Source: EPIA, *Global Market Outlook for Photovoltaics until 2016*, May 2012, pp. 66–67.

Global CSPV Cell and Module Production

Global CSPV cell production also increased during 2009–11, rising from 10.3 GW in 2009 to 32.7 GW in 2011 (218 percent).[25] China was the largest global producer of CSPV cells, while the leading nonsubject producers of CSPV cells in 2011 were Taiwan (11.6 percent of global production), Japan (5.4 percent), and Germany (4.9 percent) (table VII-11).[26] All of the major nonsubject countries increased CSPV cell output from 2009 to 2010. In 2011, output rose in Taiwan, South Korea, Malaysia, and the Philippines, but was flat in Japan and declined in Germany. However, the share of global CSPV cell production accounted for by all of the major nonsubject countries, except Malaysia, fell in 2011.[27] The top ten companies, in terms of global production of cells in 2011, were Suntech (6.0 percent of global production), JA Solar (4.6 percent), Yingli (4.3 percent), Trina (3.6 percent), Motech (3.0 percent),

[22] Based on the EPIA's "moderate" scenario. EPIA, *Global Market Outlook for Photovoltaics until 2016*, pp. 66–67.
[23] EPIA, *Global Market Outlook for Photovoltaics until 2016*, May 2012, p. 67.
[24] Sun Edison postconference brief, p. 11.
[25] Global CSPV cell production was calculated based on total cell production and share of production accounted for by monocrystalline, multicrystalline, and string ribbon CSPV cells. Petition, Exhibit I-10, "Year of the Tiger," *Photon International*, March 2011, p. 188, 208; Petitioner's prehearing brief, exh. 6C, Hering, Garrett, "Enter the Dragon," *Photon International*, March 2012, pp. 134, 142.
[26] Petitioner's prehearing brief, exh. 6C, Hering, Garrett, "Enter the Dragon," *Photon International*, March 2012, pp. 134–159; tables VII-11 to VII-15.
[27] Petition, Exhibit I-10, "Year of the Tiger," *Photon International*, March 2011, 194–214; Petitioner's prehearing brief, exh. 6C, Hering, Garrett, "Enter the Dragon," *Photon International*, March 2012, pp. 134–159; tables VII-11 to VII-15.

Canadian Solar (2.7 percent), Hareon Solar (2.5 percent), SunPower (2.5 percent), Gintech (2.3 percent), and Hanwha SolarOne (2.2 percent).[28]

Table VII-11
Global CSPV cell production, 2009–2011

Country	2009	2010	2011	2009	2010	2011
	(megawatts)			*(percent)*		
China[1]	4,746.8	13,018.4	21,312.3	45.1	53.4	64.0
United States	189.4	642.0	501.0	1.8	2.6	1.5
Nonsubject						
Taiwan	1,440.4	3,308.0	3,869.3	13.7	13.6	11.6
Japan	1,291.0	1,880.0	1,810.0	12.3	7.7	5.4
Germany	1,427.8	1,931.0	1,634.1	13.6	7.9	4.9
South Korea[1]	229.0	865.0	1,095.0	2.2	3.5	3.3
Malaysia	20.0	474.0	740.0	0.2	1.9	2.2
Philippines	397.0	558.0	622.0	3.8	2.3	1.9
Other[1]	790.1	1,707.4	1,708.9	7.5	7.0	5.1
Total nonsubject[1]	5,595.3	10,723.4	11,479.3	53.1	44.0	34.5
Total[1]	10,531.5	24,383.8	33,292.6	100.0	100.0	100.0

[1] May include nonsubject thin film cells. Total differs from that in the text since it includes some nonsubject products.

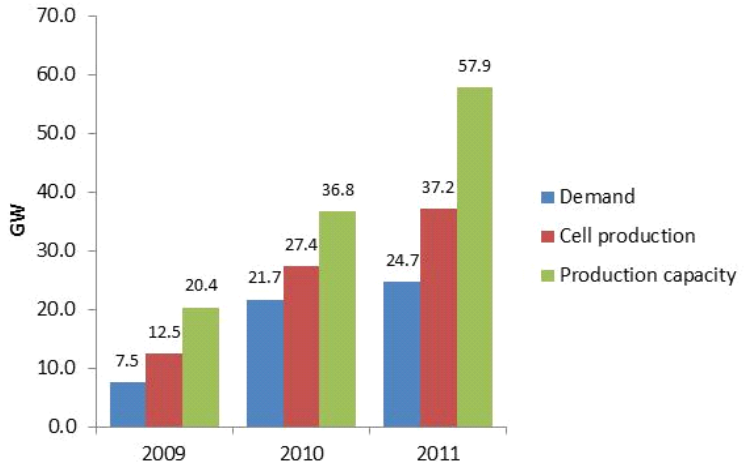
Source: Petition, Exhibit I-10, "Year of the Tiger," *Photon International*, March 2011, 194–214; Petitioner's prehearing brief, exh. 6C, Hering, Garrett, "Enter the Dragon," *Photon International*, March 2012, pp. 134–159; tables VII-12 to VII-15.

Estimated global PV cell production (including nonsubject thin film products) consistently exceeded installations during 2009–11 (figure VII-2). In 2009, production exceeded demand by 4.9 GW (65 percent higher), in 2010 the gap was 5.7 GW (26 percent), and in 2011 production exceeded installations by 12.5 GW (51 percent). Global capacity utilization in 2011 was an estimated 64 percent.[29]

[28] Companies may produce cells in more than one country. Percentage is of global production of CSPV and thin film cells. Petitioner's prehearing brief, exh. 6C, Hering, Garrett, "Enter the Dragon," *Photon International*, March 2012, pp. 136, 138.

[29] Petitioner's prehearing brief, exh. 6C, Hering, Garrett, "Enter the Dragon," *Photon International*, March 2012, pp. 134, 160; EPIA, *Global Market Outlook for Photovoltaics until 2016*, May 2012, pp. 19, 66–67.

Figure VII-2
Global PV cell supply and demand, 2009–2011



Source: Hering, Garrett, "Enter the Dragon," *Photon International*, March 2012, pp. 134, 160; EPIA, *Global Market Outlook for Photovoltaics until 2016*, May 2012, pp. 19, 66–67.

Note: Demand total listed here differs from installation data in the global market section. In this figure, the demand is based on when European projects are completed rather than when they are grid-connected in order to present more comparable data on supply and demand. In Europe, 18.3 GW of projects were completed in 2010, but only 13.4 GW were grid-connected. Many of the projects completed in 2010 were grid-connected in 2011, resulting in 21.9 GW of grid-connected projects, but only 16.9 GW of completed projects.

***.[30]

Figure VII-3
PV module assembly, by country, 2011

* * * * * * *

While global production of cells and modules has significantly expanded, *Photon International* indicates that, as of its May 2012 issue, more than 20 cell and/or module producers (including thin film producers) closed or declared bankruptcy since the start of 2011.[31] However, "despite the surge of insolvencies and factory closures among cell manufacturers since 2011, only about 3 GW of capacity have been taken out of service—compared to more than 20 GW of nominal capacity added in 2011."[32]

Mexico

Mexico was the leading nonsubject PV cell and module supplier to the U.S. market during 2009–11 (including nonsubject thin film products), though 2011 imports from Malaysia surpassed those

[30] ***.

[31] Petitioner's prehearing brief, exh. 6B, Hering, Garrett, "The Solar Cemetery," *Photon International*, May 2012, p. 84.

[32] Petitioner's prehearing brief, exh. 6B, Hering, Garrett, "The Solar Cemetery," *Photon International*, May 2012, p. 85.

from Mexico. U.S. PV imports from Mexico increased from $349.4 million in 2009 to $514.7 million in 2011.[33]

The Mexican CSPV industry is comprised solely of companies that assemble modules and most PV production is exported, primarily to the United States.[34] The CSPV industry in Mexico includes two Japan-based companies (Kyocera and Sanyo/Panasonic), two U.S.-based companies (Sunpower and contract manufacturer Jabil Circuit), one Europe-based company (Siliken), and two Mexico-based companies (ERDM and Solartec) (table VII-12).[35] Panasonic, however, indicated that it intends to end module production at its plant in Mexico and transfer this production to a new plant in Malaysia in 2012.[36]

Table VII-12
Companies assembling CSPV modules in Mexico, 2011

Company	Module production capacity	Headquarters
	(megawatts)	
ERDM	>30	Mexico
Jabil Circuit	Not available	United States
Kyocera	120	Japan
Sanyo/Panasonic	50	Japan
Siliken	75	Spain
Solartec	Not available	Mexico
SunPower	500	United States

Notes: Only includes CSPV manufacturers. Jabil Circuit is a contract manufacturer for multiple companies, including JA Solar and SunPower. Production capacity for the SunPower plant in Mexico is based on total capacity once all production lines are operational. As of February 2012, two production lines at the plant were operational. Panasonic plans to shift module production to Malaysia in 2012.

Sources: Baja California Solar Industry brochure; SunPower, "SunPower Announces New Solar Panel Manufacturing Facility," News release, August 5, 2011; ERDM Web site, http://erdmsolar.com/English/who-we-are/technology.html (accessed November 14, 2011); Solartec Web site, http://www.solartecmexico.com (accessed November 14, 2011); SANYO, "Sanyo Celebrates Grand Opening of New Monterrey Solar Module Assembly Manufacturing Plant with Ceremony," News release, November 4, 2009; SunPower, "SunPower Announces Multi-Year Manufacturing Agreement With Jabil Circuit, Inc.," News release, June 8, 2009; Andrew Herndon, "JA Solar to Supply Jabil with 400 Megawatts of Solar Power Cells," *Bloomberg*, April 4, 2011; *Japan Times*, "Panasonic Shifting Panels to Malaysia," July 29, 2012; SunPower Corp., "Form 10-K," annual report for Securities and Exchange Commission, February 29, 2012, p. 11.

[33] A portion of U.S. imports from Mexico are likely thin film modules. United Solar, which filed for bankruptcy protection in February 2012, has a plant in Mexico with an annual module production capacity of 130 MW. USITC DataWeb/USDOC (accessed August 10, 2012); Baja California Solar Industry brochure; United Solar Web site, http://www.uni-solar.com/chapter-11-restructuring/ (accessed August 10, 2012).

[34] The PV market in Mexico totaled only 10 MW in 2011. Mexico does not have a specific subheading for PV products, but exports in the broader HS 6-digit subheading, HS 8541.40, totaled $931.9 million in 2011, of which 97 percent were exported to the United States. Global Trade Information Service, Inc. (GTIS), Global Trade Atlas database (accessed August 10, 2012); EPIA, *Global Market Outlook for Photovoltaics until 2016*, May 2012, p. 67.

[35] Baja California Solar Industry brochure; SunPower, "SunPower Announces New Solar Panel Manufacturing Facility," News release, August 5, 2011; ERDM Web site, http://erdmsolar.com/English/who-we-are/technology.html (accessed November 14, 2011); Solartec Web site, http://www.solartecmexico.com (accessed November 14, 2011); SANYO, "Sanyo Celebrates Grand Opening of New Monterrey Solar Module Assembly Manufacturing Plant with Ceremony," News release, November 4, 2009; SunPower, "SunPower Announces Multi-Year Manufacturing Agreement With Jabil Circuit, Inc.," News release, June 8, 2009; Andrew Herndon, "JA Solar to Supply Jabil with 400 Megawatts of Solar Power Cells," *Bloomberg*, April 4, 2011; SunPower Corp., "Form 10-K,"February 29, 2012, p. 11.

[36] *Japan Times*, "Panasonic Shifting Panels to Malaysia," July 29, 2012.

Japan

Japan was the second largest nonsubject supplier to the U.S. market during 2009–11. U.S. PV imports from Japan increased from $241.1 million in 2009 to $404.6 million in 2011.[37] Japanese CSPV cell production, however, leveled off in 2011 and its share of global production significantly decreased during 2009–11.[38]

Japanese CSPV cell production is led by four companies, Kyocera, Mitsubishi Electric, Sanyo, and Sharp.[39] Japanese companies typically produce CSPV cells in Japan and assemble modules either in Japan or close to major markets (table VII-13), though this may be changing as the Sanyo/Panasonic plant under construction in Malaysia will produce wafers, cells, and modules and in the last few years Sharp has increasingly sourced cells from Taiwanese firms.[40] In addition to the four largest firms, a number of companies have smaller scale manufacturing, primarily of modules, in Japan.[41]

Table VII-13
Japanese production of CSPV cells by company, 2009–2011, and cell and module production locations

Company	CSPV cell production				CSPV module production locations
	2009	2010	2011	Production locations	
	megawatts				
Kyocera	400.0	650.0	660.0	Japan	China, Czech Republic, Japan, Mexico, United States
Mitsubishi Electric	120.0	210.0	190.0	Japan	Japan
Sanyo/Panasonic	260.0	300.0	350.0	Japan	Hungary, Japan, Mexico
Sharp	501.0	710.0	600.0	Japan	Japan, United Kingdom, United States
Clean Venture 21	10.0	10.0	10.0	Japan	Not available
Total	1,291.0	1,880.0	1,810.0		

Sources: Petition, Exhibit I-10, "Year of the Tiger," *Photon International*, March 2011, pp. 199, 211; Petitioner's prehearing brief, exh. 6C, Hering, Garrett, "Enter the Dragon," *Photon International*, March 2012, pp. 145, 155; "Sharp Reviews Llay Factory Plan Over Solar Subsidy Cuts," *BBC News*, November 16, 2011; Sharp, "Sharp Solar Modules Qualify for 'Buy American'"; SANYO Electric Co., Ltd., "Sanyo Celebrates Grand Opening of New Monterrey Solar Module Assembly Manufacturing Plant with Ceremony," News release, November 4, 2009; Kyocera Corp., Form 20-F", June 30, 2010, p. 17; Mitsubishi Electric Web site, http://www.mitsubishielectric.com/bu/solar/overview/pvplant.html (accessed November 14, 2011); Clean Venture 21 Web site, http://www.cv21.co.jp/en/profile/outline.php (accessed November 17, 2011); Osborne, Mark, "Panasonic Breaks Ground on First Fully Integrated PV Plant in Malaysia," *PV-Tech*, March 5, 2012.

Note: Sanyo/Panasonic is building a plant in Malaysia that will make cells, wafers, and modules.

[37] Import data may include nonsubject products. USITC DataWeb/USDOC (accessed August 10, 2012).
[38] See table VII-13.
[39] Petition, Exhibit I-10, "Year of the Tiger," *Photon International*, March 2011, p. 199, 211.
[40] Petitioner's prehearing brief, exh. 6C, Hering, Garrett, "Enter the Dragon," *Photon International*, March 2012, p. 143; Osborne, Mark, "Panasonic Breaks Ground on First Fully Integrated PV Plant in Malaysia," *PV-Tech*, March 5, 2012.
[41] Masamichi Yamamoto and Osamu Ikki, "National Survey Report of PV Power Applications in Japan 2010," June 17, 2011, p. 27.

Malaysia

Malaysia was the third largest nonsubject source of U.S. imports during 2009–11, but imports from Malaysia surpassed those of Mexico and Japan in 2011 to make it the largest source of nonsubject imports. U.S. imports from Malaysia increased from $55.9 million in 2009 to $576.4 million in 2011.[42] More than half of cell production in Malaysia is thin film production by First Solar, but Malaysia's production of CSPV cells increased from 20 MW in 2009 to 740 MW in 2012—though 440 MW of this production was by Q-Cells, which filed for bankruptcy in 2012.[43] Flextronics, a contract manufacturer, also has 1 GW of CSPV module assembly capacity in Malaysia.[44] Malaysia's domestic market was 1 MW in 2011, so most production was exported.[45]

Taiwan

Taiwan was the largest nonsubject CSPV producer in 2011 and the fourth largest nonsubject supplier to the U.S. market during 2009–11. U.S. PV imports from Taiwan increased from $113.1 million in 2009 to $161.1 million in 2011.[46]

Taiwan's overall CSPV cell production increased from 1,473 MW in 2009 to 3,869 MW in 2011, but its share of global CSPV cell production fell from 13.7 percent to 11.6 percent. Two Taiwan-based companies, Motech (which also has production outside of Taiwan) and Gintech, were among the top ten global suppliers of CSPV cells in 2011 (table VII-14).[47] Taiwan's CSPV industry is concentrated in cell production, though some companies have vertically integrated into module production. *** Taiwan companies were among the *** global producers of CSPV modules in 2011.[48] Taiwan's domestic market was only 70 MW in 2011, so most of Taiwan's cell production is exported. In 2011, Taiwan's PV exports totaled $4.1 billion, up substantially from $2.2 billion in 2009, but down from $4.7 billion in 2010.[49]

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[42] Import data includes nonsubject products. USITC DataWeb/USDOC (accessed August 10, 2012).

[43] *BBC*, "Solar Panel Maker Q-Cells to File for Bankruptcy," April 2, 2012; Petition, Exhibit I-10, "Year of the Tiger," *Photon International*, March 2011, p. 199; Petitioner's prehearing brief, exh. 6C, Hering, Garrett, "Enter the Dragon," *Photon International*, March 2012, p. 155.

[44] Flextronics, "Flextronics and MEMC Expand Partnership to Produce Solar Panels for SunEdison," News release, May 11, 2011.

[45] International Energy Agency, Photovoltaic Power Systems Programme, "Trends Preview," July 11, 2012, p. 1.

[46] Import data may include nonsubject products. See table VII-11 for production by country in 2011. USITC DataWeb/USDOC (accessed August 10, 2012); Petitioner's prehearing brief, exh. 6C, Hering, Garrett, "Enter the Dragon," *Photon International*, March 2012, pp. 156–157.

[47] Petition, Exhibit I-10, "Year of the Tiger," *Photon International*, March 2011, pp. 200–201; Petitioner's prehearing brief, exh. 6C, Hering, Garrett, "Enter the Dragon," *Photon International*, March 2012, pp. 138, 156–157.

[48] Jonathan Gifford and Shamsiah Ali-Oettinger, "Global Ambitions," *PV Magazine* no. 9 (2011); ***.

[49] Trade in products in 8541.40.3000, "solar cells," and 8541.40.4000, "photovoltaic cells whether or not assembled into modules," in Taiwan's tariff schedule. Export data may include nonsubject products. GTIS, Global Trade Atlas database (accessed August 10, 2012); EPIA, *Global Market Outlook for Photovoltaics until 2016*, May 2012, pp. 19, 30, 66–67.

Table VII-14
CSPV cell production in Taiwan, 2009–2011

Company	2009	2010	2011
		(megawatts)	
Big Sun	32.6	75.0	105.0
DelSolar	88.8	125.0	136.0
E-Ton Solar	220.0	420.0	200.3
Gintech	368.0	827.0	873.0
Motech	296.0	710.0	800.0
Neo Solar Power	201.0	545.0	800.0
Solartech Energy	132.0	260.0	440.0
Sunrise Global Solar Energy	17.0	120.0	120.0
Tainergy Tech	45.0	100.0	150.0
Other	72.6	126.0	245.0
Total	1,473	3,308	3,869

Note: Does not include production by Auria Solar, GET, Kenmos Photovoltaic, NexPower Technology, Sinonar, Sun Well Solar, Sunner Solar, and Sunshine PV. For Big Sun, low end of estimated production range.

Source: Petition, Exhibit I-10, "Year of the Tiger," *Photon International*, March 2011, pp. 200–201; Petitioner's prehearing brief, exh. 6C, Hering, Garrett, "Enter the Dragon," *Photon International*, March 2012, pp. 156–157.

Philippines

The Philippines is the fifth largest nonsubject supplier to the U.S. market, primarily due to the manufacturing presence of SunPower. SunPower has 700 MW of cell production capacity in the Philippines and 600 MW of module assembly capacity.[50] In 2011, SunPower accounted for all 622 MW of CSPV cell production in the Philippines.[51] U.S. PV imports from the Philippines increased from $174.1 million in 2009 to $244.0 million in 2011.[52]

Germany

Germany was the third largest nonsubject CSPV cell producer during 2011, but only the sixth largest nonsubject PV supplier to the U.S. market. German CSPV cell production increased from 1,428 MW in 2009 to 1,931 MW in 2010, then declined to 1,634 MW in 2011 (table VII-15). Since September 2011, a number of German producers (e.g., Conergy, Q-Cells, and Schott Solar) have declared

[50] SunPower Corp., "Form 10-K," February 29, 2012, pp. 10–11.
[51] Petitioner's prehearing brief, exh. 6C, Hering, Garrett, "Enter the Dragon," *Photon International*, March 2012, pp. 145, 155.
[52] Import data may include nonsubject products. USITC Dataweb/USDOC (accessed August 10, 2012).

bankruptcy or announced that they will stop cell production. U.S. PV imports from Germany increased from $70.0 million in 2009 to $118.4 million in 2011.[53]

Table VII-15
CSPV cell production in Germany, 2009–2011

	Cells		
	2009	**2010**	**2011**
	(megawatts)		
Arise Technologies	15.8	85.0	17.0
Bosch	200.0	385.0	450.0
Centrosolar	0.0	0.0	0.1
Conergy	100.0	210.0	100.0
Q-Cells	551.0	470.0	280.0
Schott Solar	229.0	320.0	295.0
SolarWorld	200.0	200.0	250.0
Sovello	65.0	145.0	180.0
Sunways	67.0	116.0	62.0
Total	1,427.8	1,931.0	1,634.1

Source: Petitioner's prehearing brief, exh. 6C, Hering, Garrett, "Enter the Dragon," *Photon International*, March 2012, pp. 157–158; Petition, Exhibit I-10, “Year of the Tiger,” *Photon International*, March 2011, pp. 201–202.

[53] Import data may include nonsubject products. USITC DataWeb/USDOC (accessed August 10, 2012); Petitioner’s prehearing brief, exh. 6C, Hering, Garrett, "Enter the Dragon," *Photon International*, March 2012, pp. 157–158; Petition, Exhibit I-10, "Year of the Tiger," *Photon International*, March 2011, p. 201–202; *BBC*, "Solar Panel Maker Q-Cells to File for Bankruptcy," April 2, 2012; *Renewable Energy World*, “Schott Solar To Halt Crystalline PV Production in Germany, Close US Plant,” June 28, 2012; Stuart, Becky, “Conergy Discontinues Wafer and Cell Manufacturing at Frankfurt (Oder),” *PV Magazine*, September 9, 2011.

APPENDIX A

FEDERAL REGISTER NOTICES

Notices in the Federal Register

Crystalline Silicon Photovoltaic Cells and Modules from China: Commission's scheduling of its final phase investigations, 77 FR 35425, June 13, 2012

http://www.gpo.gov/fdsys/pkg/FR-2012-06-13/pdf/2012-14323.pdf

Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, from the People's Republic of China: Final Affirmative Countervailing Duty Determination and Final Affirmative Critical Circumstances Determination, 77 FR 63788, October 17, 2012.

http://www.gpo.gov/fdsys/pkg/FR-2012-10-17/pdf/2012-25564.pdf

Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules, from the People's Republic of China: Final Determination of Sales at Less Than Fair Value, and Affirmative Final Determination of Critical Circumstances, in Part, 77 FR 63791, October 17, 2012.

http://www.gpo.gov/fdsys/pkg/FR-2012-10-17/pdf/2012-25580.pdf

APPENDIX B

LIST OF HEARING WITNESSES

CALENDAR OF PUBLIC HEARING

Those listed below appeared as witnesses at the United States International Trade Commission's hearing:

Subject:	Crystalline Silicon Photovoltaic Cells and Modules from China
Inv. Nos.:	701-TA-481 and 731-TA-1190 (Final)
Date and Time:	October 3, 2012 - 9:30 a.m.

Sessions were held in connection with these investigations in the Main Hearing Room (room 101), 500 E Street, SW, Washington, D.C.

STATE GOVERNMENT WITNESS:

The Honorable Georgia Lord, Mayor , City of Goodyear, Arizona

OPENING REMARKS:

Petitioners (**Timothy C. Brightbill**, Wiley Rein LLP)
Respondents (**Richard L.A. Weiner**, Sidley Austin LLP)

In Support of the Imposition of the Antidumping and Countervailing Duty Orders:

Wiley Rein LLP
Washington, D.C.
on behalf of

SolarWorld Industries America, Inc. ("SolarWorld")

Brigadier General Mike Caldwell, Deputy Director, Oregon Military Department

Gordon Brinser, President, SolarWorld

Kevin Kilkelly, President and Sales Manager, SolarWorld

Steven Ostrenga, Chief Executive Officer, Helios Solar Works

Mike McKechnie, President, Mountain View Solar

Mark Ferda, Renewable Energy Account Manager, McNaughton-McKay Electronic Company

Joe Morinville, President, Energy Independent Solutions

Dr. Seth T. Kaplan, Principal, Capital Trade, Inc.

Timothy C. Brightbill)
Adam H. Gordon) – OF COUNSEL
Robert E. DeFrancesco)

In Opposition to the Imposition of
the Antidumping and Countervailing Duty Orders:

Sidley Austin LLP
Washington, D.C.
on behalf of

Chinese Chamber of Commerce for Import and Export of Machinery and Electronic Products ("CCCME")

Polly Shaw, Senior Director of External Relations, Suntech Power

Andrew Beebe, Chief Commercial Officer, Suntech America

Matthew McConkey, Counsel to Suntech, Mayer Brown LLP

Alan King, General Manager, Canadian Solar (USA), Inc.

Thomas Young, Senior Director of Investor Relations, Trina Solar Limited

Victor Contract, U.S. Legal Director, Trina Solar Limited

Robert Petrina, Managing Director, Yingli Green Energy Americas, Inc.

Kevin Lapidus, Senior Vice President, Legal and Government Affairs, SunEdison LLC

David Christy, Counsel to SunEdison, LLC, Thompson Hine

Jigar Shah, Partner, Inerjys

Dr. Kenneth R. Button, Senior Vice President, Economic Consulting Services, LLC

Jennifer Lutz, Senior Economist, Economic Consulting Services, LLC

Neil R. Ellis)
Richard L.A. Weiner)
Brenda A. Jacobs)
) – OF COUNSEL
Rajib Pal)
Jill Caiazzo)
Raphaelle Monty)

Dorsey & Whitney LLP
Washington, D.C.
on behalf of

Upsolar Group Co., Ltd.
Upsolar America Inc.

Troy Dalbey, Managing Director, Upsolar America Inc.

William Perry) – OF COUNSEL

DeKieffer & Horgan, PLLC
Washington, D.C.
on behalf of

LDK Solar Hi-Tech (Nanchang) Co., Ltd.
LDK Solar Hi-Tech (Suzhou) Co., Ltd.
LDK Solar Tech USA, Inc.

Mike Lasky, General Manager, LDK Solar Tech USA, Inc.

Kathy Heilmann, Director of Marketing, LDK Solar Tech USA, Inc.

Gregory S. Menegaz) – OF COUNSEL

Arent Fox LLP
Washington, D.C.
on behalf of

Changzhou Trina Solar Energy Co., Ltd.
Trina Solar (US) Inc.

John M. Gurley)
) – OF COUNSEL
Diana Dimitriuc Quaia)

Interested Party Witness:

ProVision Solar, Inc.
Hilo, HI

Marco Mangelsdorf, President

REBUTTAL/CLOSING REMARKS:

Petitioners (**Timothy C. Brightbill**, Wiley Rein LLP)
Respondents (**Neil R. Ellis**, Sidley Austin LLP)

APPENDIX C

SUMMARY DATA

Table C-1:
CSPV cells: Summary data concerning the U.S. market, 2009-11, January-June 2011, and January-June 2012

* * * * * * *

Table C-2
CSPV modules: Summary data concerning the U.S. market, 2009-11, January-June 2011, and January-June 2012

(Quantity=kilowatts, value=1,000 dollars, unit values, unit labor costs, and unit expenses are per kilowatt; period changes=percent, except where noted)

	Reported data					Period changes			
				January-June					Jan.-June
Item	2009	2010	2011	2011	2012	2009-11	2009-10	2010-11	2011-12
U.S. consumption quantity:									
Amount	282,089	1,035,387	1,962,321	852,638	1,288,193	595.6	267.0	89.5	51.1
Producers' share (1)	38.4	32.0	23.1	28.5	20.0	-15.3	-6.4	-8.9	-8.5
Importers' share (1):									
China	33.0	51.0	62.2	56.9	60.0	29.3	18.0	11.3	3.1
All other sources	28.7	17.0	14.7	14.6	20.0	-14.0	-11.6	-2.4	5.4
Total imports	61.6	68.0	76.9	71.5	80.0	15.3	6.4	8.9	8.5
U.S. consumption value:									
Amount	679,387	1,848,225	3,013,700	1,463,441	1,420,839	343.6	172.0	63.1	-2.9
Producers' share (1)	37.6	30.7	26.2	28.9	20.4	-11.4	-6.9	-4.5	-8.5
Importers' share (1):									
China	29.9	50.5	57.4	55.1	60.0	27.5	20.5	6.9	4.9
All other sources	32.4	18.8	16.4	16.1	19.6	-16.0	-13.6	-2.4	3.5
Total imports	62.4	69.3	73.8	71.1	79.6	11.4	6.9	4.5	8.5
U.S. shipments of imports from:									
China:									
Quantity	92,953	527,845	1,221,395	485,273	772,614	1214.0	467.9	131.4	59.2
Value	203,291	932,845	1,729,560	805,828	852,362	750.8	358.9	85.4	5.8
Unit value	$2,187	$1,767	$1,416	$1,661	$1,103	-35.3	-19.2	-19.9	-33.6
All other sources:									
Quantity	80,860	176,375	287,548	124,087	257,587	255.6	118.1	63.0	107.6
Value	220,318	347,351	493,674	234,963	278,259	124.1	57.7	42.1	18.4
Unit value	$2,725	$1,969	$1,717	$1,894	$1,080	-37.0	-27.7	-12.8	-43.0
All sources:									
Quantity	173,813	704,220	1,508,943	609,359	1,030,201	768.1	305.2	114.3	69.1
Value	423,609	1,280,196	2,223,234	1,040,791	1,130,621	424.8	202.2	73.7	8.6
Unit value	$2,437	$1,818	$1,473	$1,708	$1,097	-39.5	-25.4	-19.0	-35.7
U.S. producers':									
Average capacity quantity	266,777	596,950	1,015,708	528,796	572,804	280.7	123.8	70.1	8.3
Production quantity	187,976	456,026	666,533	366,884	288,513	254.6	142.6	46.2	-21.4
Capacity utilization (1)	70.5	76.4	65.6	69.4	50.4	-4.8	5.9	-10.8	-19.0
U.S. shipments:									
Quantity	108,276	331,167	453,378	243,279	257,992	318.7	205.9	36.9	6.0
Value	255,778	568,029	790,466	422,650	290,219	209.0	122.1	39.2	-31.3
Unit value	$2,362	$1,715	$1,744	$1,737	$1,125	-26.2	-27.4	1.6	-35.2
Export shipments:									
Quantity	85,738	132,186	97,700	69,143	54,296	14.0	54.2	-26.1	-21.5
Value	217,208	281,268	177,111	125,849	66,036	-18.5	29.5	-37.0	-47.5
Unit value	$2,533	$2,128	$1,813	$1,820	$1,216	-28.4	-16.0	-14.8	-33.2
Ending inventory quantity	19,450	17,170	113,244	85,353	80,381	482.2	-11.7	559.5	-5.8
Inventories/total shipments (1)	10.0	3.7	20.5	13.7	12.9	10.5	-6.3	16.8	-0.8
Production workers	1,180	1,866	1,856	1,999	1,516	57.3	58.1	-0.5	-24.1
Hours worked (1,000s)	2,719	4,101	4,098	2,492	1,591	50.7	50.8	-0.1	-36.2
Wages paid ($1,000s)	47,660	77,049	82,840	47,201	32,815	73.8	61.7	7.5	-30.5
Hourly wages	$17.53	$18.79	$20.22	$18.94	$20.63	15.3	7.2	7.6	8.9
Productivity (kilowatts per hour)	0.1	0.1	0.2	0.1	0.2	135.1	60.9	46.2	23.2
Unit labor costs	$253.54	$168.96	$124.37	$128.67	$113.80	-50.9	-33.4	-26.4	-11.6
Net sales:									
Quantity	276,691	560,331	560,742	314,603	320,333	102.7	102.5	0.1	1.8
Value	712,853	1,075,977	954,997	575,114	359,589	34.0	50.9	-11.2	-37.5
Unit value	$2,576	$1,920	$1,703	$1,828	$1,123	-33.9	-25.5	-11.3	-38.6
Cost of goods sold (COGS)	730,149	1,067,284	1,052,050	572,012	376,869	44.1	46.2	-1.4	-34.1
Gross profit or (loss)	(17,296)	8,693	(97,053)	3,102	(17,279)	-461.1	(2)	(2)	(2)
SG&A expenses	63,079	88,967	141,663	55,585	41,362	124.6	41.0	59.2	-25.6
Operating income or (loss)	(80,375)	(80,274)	(238,716)	(52,483)	(58,642)	-197.0	0.1	-197.4	-11.7
Capital expenditures	33,768	77,802	33,544	25,858	3,937	-0.7	130.4	-56.9	-84.8
Unit COGS	$2,639	$1,905	$1,876	$1,818	$1,176	-28.9	-27.8	-1.5	-35.3
Unit SG&A expenses	$228	$159	$253	$177	$129	10.8	-30.4	59.1	-26.9
Unit operating income or (loss)	($290)	($143)	($426)	($167)	($183)	-46.6	50.7	-197.2	-9.7
COGS/sales (1)	102.4	99.2	110.2	99.5	104.8	7.7	-3.2	11.0	5.3
Operating income or (loss)/ sales (1)	(11.3)	(7.5)	(25.0)	(9.1)	(16.3)	-13.7	3.8	-17.5	-7.2

(1) "Reported data" are in percent and "period changes" are in percentage points.
(2) Not applicable.

Note.--Financial data are reported on a fiscal year basis and may not necessarily be comparable to data reported on a calendar year basis. Because of rounding figures may not add to the totals shown. Unit values and shares are calculated from the unrounded figures.

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

Table C-3:
CSPV cells and modules: Summary data concerning the U.S. market, 2009-11, January-June 2011, and January-June 2012

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Table C-4:
CSPV modules (with 3 firms excluded from U.S. producer data): Summary data concerning the U.S. market, 2009-11, January-June 2011, and January-June 2012

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Table C-5:
Thin film solar modules: Summary data concerning the U.S. market, 2009-11, January-June 2011, and January-June 2012

* * * * * * *

Table C-6:
CSPV modules and thin film solar modules: Summary data concerning the U.S. market, 2009-11, January-June 2011, and January-June 2012

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Table C-7:
CSPV modules (with Suntech excluded from U.S. producer data): Summary data concerning the U.S. market, 2009-11, January-June 2011, and January-June 2012

* * * * * * *

Table C-8:
CSPV cells and modules (with Suntech excluded): Summary financial data concerning the U.S. market, 2009-11, January-June 2011, and January-June 2012

* * * * * * *

APPENDIX D

QUARTERLY DOMESTIC, CHINESE AND NONSUBJECT-COUNTRY PRICE DATA

Presented graphically below in figures D-1 through D-5 are quarterly pricing and quantity data for CSPV modules from the United States, China, and nonsubject countries. Nonsubject pricing data were received from Germany, Japan, Korea, Malaysia, Mexico, and Taiwan, but not for all periods or all products. Price data reported by these firms accounted for approximately 86.7 percent of reported U.S. shipments of CSPV modules from nonsubject countries during the period.

When comparing domestic pricing data to pricing data from all nonsubject sources, there were *** possible pricing comparisons, in which domestic CSPV modules were priced *** in ***. Generally, domestically produced modules with lower wattage ranges (products 1-3) were priced *** than nonsubject imports but domestically produced modules with higher wattage ranges (products 4-5) were typically priced *** than nonsubject imports.

When comparing Chinese pricing data to pricing data from all nonsubject sources, there were *** possible pricing comparisons, in which Chinese CSPV modules were priced *** in ***. Instances of Chinese *** occurred evenly through all five price products. A summary of margins of underselling and overselling is presented in table D-1.

Figure D-1
CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product, by quarters, January 2009-June 2012

* * * * * * *

Figure D-2
CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product, by quarters, January 2009-June 2012

* * * * * * *

Figure D-3
CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product, by quarters, January 2009-June 2012

* * * * * * *

Figure D-4
CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product, by quarters, January 2009-June 2012

* * * * * * *

Figure D-5
CSPV modules: Weighted-average f.o.b. prices and quantities of domestic and imported product, by quarters, January 2009-June 2012

* * * * * * *

Table D-1
CSPV modules: Summary of underselling/(overselling) by product from nonsubject countries, January 2009-June 2012

* * * * * * *

APPENDIX E

U.S. PRODUCERS' & U.S. IMPORTERS' NARRATIVE RESPONSES TO DOMESTIC LIKE PRODUCT QUESTIONS

* * * * * * *