EXHIBIT LIST

Exhibit No.	Description
1	Crystalline Silicon Photovoltaic Cells and Modules from China, Investigation Nos. 701-TA-481 and 731-TA-1190 (Review), USITC Pub. 4874 at I-43–I-49 (March 2019) ("USITC Publication 4874")
2	Notice of Scope Rulings, 86 Fed. Reg. 47,476 (Dep't Commerce Aug. 25, 2021)
3	Memorandum from Lauren Caserta to James Maeder, Final Scope Ruling on the Antidumping and Countervailing Duty Orders on Crystalline Silicon Photovoltaic Cells from the People's Republic of China: ET Solar Inc., Case Nos. A-570-979, C-570-980 (Scope Inquiry: ET Solar) (June 15, 2021) ("ET Solar Final Scope Ruling")
4	Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules From the People's Republic of China: Amended Final Determination of Sales at Less Than Fair Value, and Antidumping Duty Order, 77 Fed. Reg. 73018 (December 7, 2012)
5	Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From the People's Republic of China: Countervailing Duty Order, 77 Fed. Reg. 73017 (December 7, 2012)
6	Memorandum from Daniel Alexander to James Maeder, Antidumping and Countervailing Duty Orders on Crystalline Silicon Photovoltaic Cells from the People's Republic of China: Sunspark Technology Inc. Scope Ruling, Case Nos. A-570-979, C-570-980 (Oct. 23, 2020) ("SunSpark Technology Final Scope Ruling")
7	U.S. Customs and Border Protection, Ruling H301813 (May 24, 2019)
8	U.S. Customs and Border Protection, Ruling H301201 (Oct. 18, 2019)
9	Crystalline Silicon Photovoltaic Cells and Modules From China, Inv. Nos. 701-TA-481 and 731-TA-1190, USITC Pub. 4360 (Nov. 2012) (Final)
10	Crystalline Silicon Photovoltaic Cells, Whether or Not Partially or Fully Assembled Into Other Products, Inv. No. TA-201-75, USITC Pub. 5266 (Dec. 2021) (Extension)
11	Memorandum to J. Maeder from P. Shaw re: Antidumping and Countervailing Duty Orders on Crystalline Silicon Photovoltaic Cells from the People's Republic of China, and Certain Crystalline Silicon Photovoltaic Products from Taiwan: The Solaria Corporation Scope Ruling at 14 (Dept. Commerce Apr. 8, 2021)
12	Memorandum from Jeff Pedersen to Gary Taverman, 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, Dep't Commerce Case Nos. A-570-979 & C-570-980 (March 19, 2012) ("AD/CVD Scope Clarification Memo")
13	Issues and Decision Mem. for the Final Determination in the AD Investigation of Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules, from China–9 (Oct. 9, 2012) (COMMENT 32)
14	U.S. Customs and Border Protection, Ruling H261693 (Sept. 16, 2015).
15	U.S. Customs and Border Protection, Ruling H095409 (September 29, 2010)
16	U.S. Customs and Border Protection, Ruling H298653 (November 19, 2018)

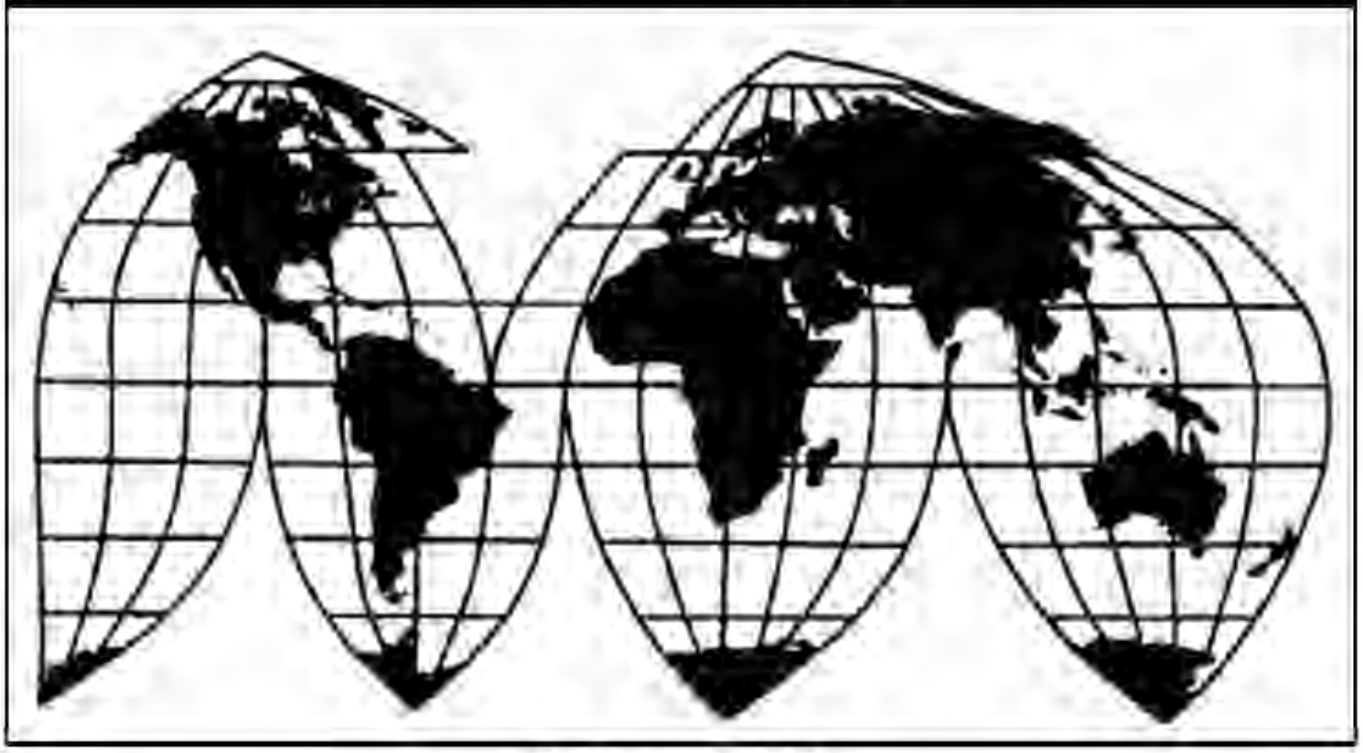
EXHIBIT 1

Crystalline Silicon Photovoltaic Cells and Modules from China

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

Publication 4874 **March 2019**

U.S. International Trade Commission



Washington, DC 20436

U.S. International Trade Commission

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Crystalline Silicon Photovoltaic Cells and Modules from China

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

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

Applications[83]

There are four primary market segments for CSPV products. There are three grid-connected market segments–residential, nonresidential, and utility–and an off-grid market. In the grid-connected market, installations are usually either ground-mounted or roof-mounted. In addition to the module, there are a number of other components of the installation called the balance of system ("BOS"). The BOS includes components such as the inverter and the racking on which the modules are installed.[84]

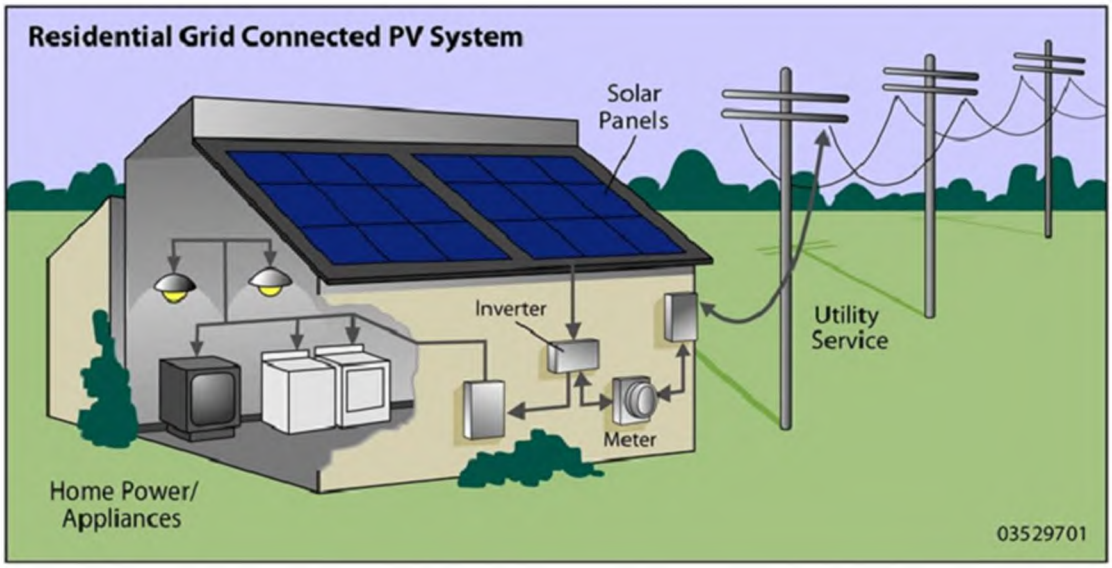
Residential grid-connected systems are installed at individual homes. CSPV modules are typically installed on the roof, though they can also be ground-mounted, and connected to an inverter. The system can use a central inverter, which converts the power from multiple modules, or each module can have its own microinverter attached. In residential installations, the electricity generated by the system is used for power in the individual home (figure I-10). Homeowners use grid energy when solar electricity generation is not sufficient to meet demand, and often feed energy back into the grid when solar electricity generation exceeds home use. In the United States, the median size of a residential PV installation was 6.3 kW in 2017.[85]

[83] This section is primarily derived from *Crystalline Silicon Photovoltaic Cells (Whether or not Partially or Fully Assembled into Other Products), Inv. No. TA-201-75,* USITC Publication 4739, November 2017, pp. I-24–I-28. Citations to direct quotes, pictures, and data were retained.

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

[85] Barbose, Galen and Naïm Darghouth, *Tracking the Sun XI: Installed Price Trends for Distributed Photovoltaic Systems in the United States*, Lawrence Berkeley National Laboratory, September 2018, p. 12, https://emp.lbl.gov/tracking-the-sun, retrieved December 18, 2018.

Figure I-10
Residential grid-connected CSPV system



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

Nonresidential systems are installed at commercial, industrial, government, and similar buildings and sites (figure I-11). Nonresidential installations are typically larger than residential installations—for nonresidential systems 500 kW or less, the median size in 2017 was 36 kW, though systems can be substantially larger.[86] However, they function similarly to residential installations, providing electricity to meet onsite needs, pulling additional electricity from the grid when needed, and feeding excess electricity back into the grid when it is not needed.

[86] Nonresidential systems can be substantially larger than residential systems. The *Tracking the Sun* report also includes the median size of systems 500 kW or larger, which was 1,069 kW in 2016. However, their definition of system size likely includes systems that would be classified as utility projects in other definitions. Barbose, Galen and Naïm Darghouth, *Tracking the Sun XI: Installed Price Trends for Distributed Photovoltaic Systems in the United States*, Lawrence Berkeley National Laboratory, September 2018, pp. 7, 12, https://emp.lbl.gov/tracking-the-sun, retrieved December 18, 2018.

Figure I-11
Installation of a nonresidential CSPV system

Source: Photos courtesy of DOE/NREL, credit Dennis Schroeder, https://www.nrel.gov/.

Utility systems are generally the largest systems, and provide electricity directly to the electric grid for sale to customers rather than for on-site use (figure I-12). The median size of utility projects was 4.9 MW and the mean size was 17.15 MW during 2012-16.[87] These systems are generally ground-mounted and currently tend to use central inverters rather than microinverters. CSPV utility systems may involve fixed-tilt, single-axis tracking (panels rotate to follow the east-west movement of the sun), or dual-axis tracking (panels also move to follow the north-south movement of the sun during the year). During 2012-17, 79 percent of installed systems larger than 5 MW used tracking, with most systems using single-axis tracking.[88] While prior to 2012 most utility systems installed in the United States were 600 volts, higher 1,000-volt utility systems became increasingly common during 2012-16 and toward the end of this time period 1,500-volt systems were introduced in the U.S. market. These higher voltage systems use fewer BOS components, require less installation time, reduce electricity losses, and lead to higher inverter efficiencies. This results in lower energy costs.[89]

[87] This is based on data from GTM Research and the August 2017 Utility PV tracker for 1,850 projects. The definition of utility systems, however, can vary by source of information.

[88] In their utility-scale report, LBNL uses alternating current for capacity rather than direct current. Bolinger, Mark and Joachim Seel, *Utility-Scale Solar: Empirical Trends in Project Technology, Cost, Performance, and PPA Pricing in the United States - 2018 Edition,* Data file, Lawrence Berkeley National Laboratory, September 2018, https://emp.lbl.gov/utility-scale-solar, retrieved December 18, 2018.

[89] One thousand volt systems are also used in some commercial installations.

Figure I-12
La Ola PV plant, a utility CSPV system on Lanai, Hawaii

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

As noted above, there are a broad range of off-grid applications, such as power generation in remote locations, mobile power solutions, telecommunications power and lighting systems, and portable consumer goods (such as systems for recharging consumer electronics like tablets and phones). These systems often have additional BOS components, such as a battery and charge controller, though inverters are not needed for all off-grid applications.

Manufacturing processes[90]

There are five principal stages involved in the manufacture of CSPV products. First, polysilicon is refined, then it is formed into ingots, which are sliced into wafers, converted to CSPV cells, and assembled into the finished product, modules (figure I-13). These are discrete production steps that may be done in different plants or locations. Companies may source products at each stage of the value chain or produce the products in-house. CSPV cells and modules are tested and inspected during the production process.[91] The ingot and wafer production process differs for monocrystalline and multicrystalline cells, as discussed below.

[90] This section is derived from *Crystalline Silicon Photovoltaic Cells (Whether or not Partially or Fully Assembled into Other Products), Inv. No. TA-201-75,* USITC Publication 4739, November 2017, pp. I-18–24. Citations to direct quotes, pictures, and data were retained.

[91] SolarWorld, "Real Value," 2016, https://www.solarworld-usa.com/why-choose-solarworld/the-solarworld-standard#Product_certifications, retrieved December 18, 2018.

Figure I-13
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: SolarWorld, "Energy for You and Me" brochure, pp. 6–7, 9; ingot photo courtesy of DOE/NREL, credit John Wohlgemuth, Solarex, https://www.nrel.gov/.

Silicon refining

The first step in the CSPV value chain is refining polysilicon. There are multiple approaches to polysilicon refining. This discussion will focus on the Siemens method, which accounted for more than 85 percent of global production in 2017, and fluidized bed reactor ("FBR") technology, which accounts for most of the remaining market.[92]

In the first step in the Siemens process, quartz (silicon dioxide) and carbon are heated to around 1,800 degrees Celsius. The carbon reacts with the oxygen, resulting in carbon dioxide and silicon with a purity of around 98 to 99 percent. The silicon is then combined with hydrogen chloride gas at 300 to 350 degrees Celsius, with the reaction resulting in the liquid trichlorosilane. Next, heated silicon rods are inserted into a Siemens reactor, where they are further heated to 1,000 degrees Celsius or more. Hydrogen and trichlorosilane gas are fed into the reactor. The silicon from the trichlorosilane is deposited onto the rods, which steadily increase in size until they are removed from the reactor about a week later. The resulting products are high purity polysilicon chunks or rocks.

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

[92] ITRPV, Results 2017 Including Maturity Report, Ninth Edition, September 2018, p. 8.

when they are sufficiently large. As they do so, new seed granules and gas are introduced into the chamber and the process continues."[93] The FBR process, which is newer than the Siemens process, uses 80 to 90 percent less energy, requires a smaller footprint, is a continuous process, takes up less space in shipping, and can increase downstream production efficiency. However, the process is difficult to scale and achieve high purity production at low cost.

Ingots and wafers for monocrystalline cells

In the Czochralski process[94] 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-14). The crucible is then loaded into a Czochralski furnace and heated to about 2,500 degrees Fahrenheit. Once the polysilicon is melted, a seed crystal is lowered into the material and rotated, with the crucible rotated in the opposite direction. The melt starts to solidify on the seed and the seed is slowly raised out of the melt—creating a single long crystal. The crystal is then cooled before it is moved onto the next step. The process of growing the crystal takes about 2.5 days.

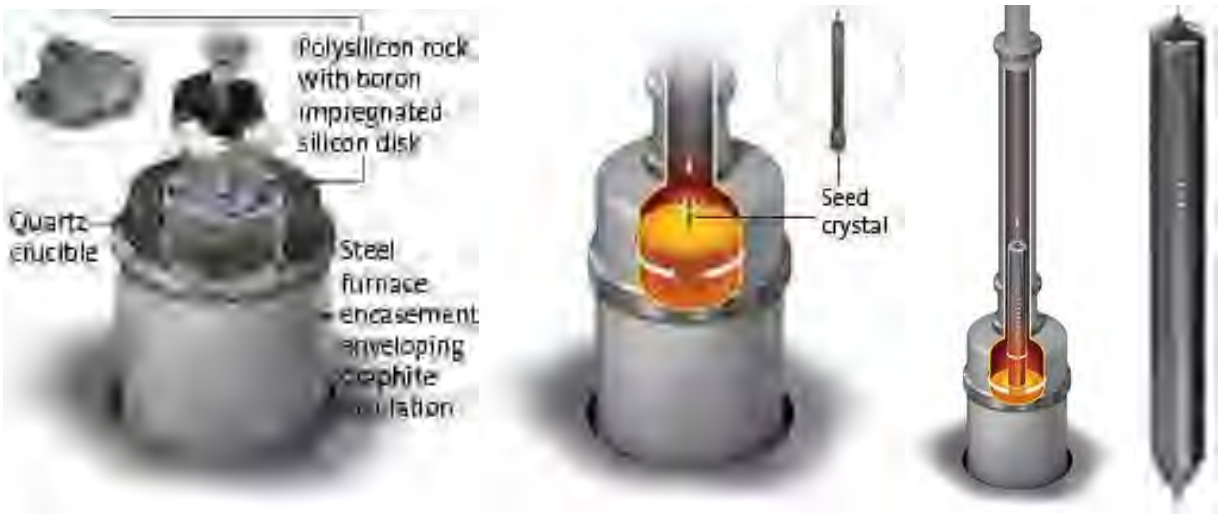
Once the crystal has cooled, it is processed into wafers. The top and tail (each end of the cylindrical crystal) are cut off (figure I-15). The remaining portion of the crystal (or ingot) is cut into equal length pieces and then it is squared. In squaring, the rounded sides of the ingot are cut into four flat sides, leaving only rounded corners. A wire saw then slices the ingots into wafers. A majority of global manufacturers have switched to diamond wire saws for monocrystalline wafer slicing, which has several benefits including increasing the speed of the production process. The wafers are then cleaned, dried, and inspected.

[93] REC Silicon website, http://www.recsilicon.com/technology/rec-silicons-fluidized-bed-reactor-process, retrieved June 12, 2017.

[94] This discussion will focus on the Czochralski process, which accounted for more than 95 percent of production in 2016. ITRPV, 2016 Results, March 2017, p. 19, http://www.itrpv.net/.cm4all/iproc.php/ITRPV%20Eighth%20Edition%202017.pdf?cdp=a, retrieved December 18, 2018.

Figure I-14

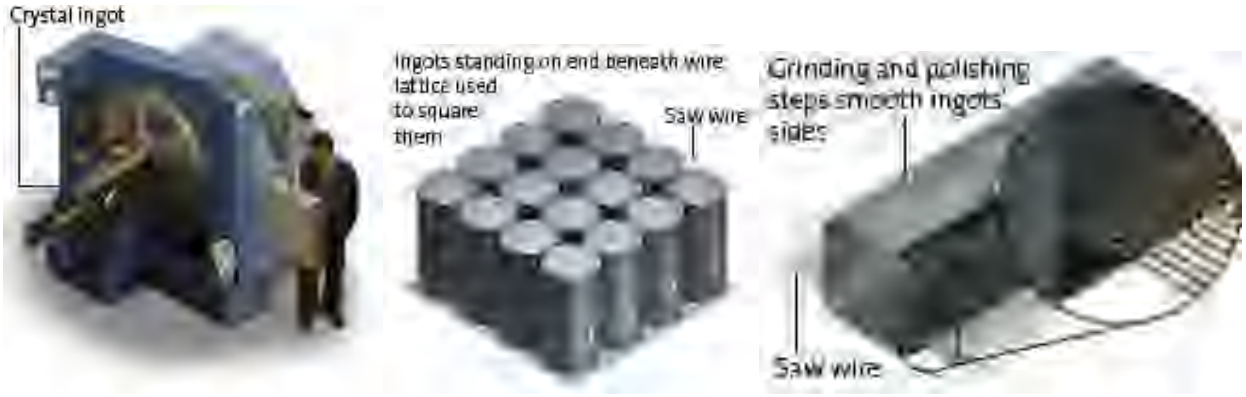
Czochralski process, crucible loading/charging (left), seed crystal (second from left), crystal growing (second from right), and finished crystal (right)



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

Figure I-15

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



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

Ingots and wafers for multicrystalline cells

For multicrystalline ingots, the first step is also loading polysilicon into a crucible. This crucible is then loaded into a directional solidification systems ("DSS") furnace, where it is cast into ingots. The ingot is then cut into blocks. These blocks are tested and any parts of the block that do not pass these tests are cropped off. The blocks are sliced into wafers using a wire saw.

Finally, the wafers are cleaned, dried, and inspected. This process results in square wafers, while the monocrystalline process results in wafers with rounded corners.

CSPV cells[95]

The monocrystalline and multicrystalline wafers, which are 180 to 200 micrometers thick, are next processed into CSPV cells. CSPV cell production is capital intensive and requires a skilled workforce. Some firms use a highly automated manufacturing process, while others mix automation and manual labor in their production processes. The main steps in CSPV cell production are as follows: [96]

- **Cleaning and texturing:** First, the wafers are cleaned, then the surface of the wafer undergoes a chemical treatment that reduces the reflection of sunlight and increases light absorption (figure I-16).
- **Diffusion:** In the next step, "phosphorus is diffused into a thin layer of the wafer surface. The molecular-level impregnation occurs as the wafer surface is exposed to phosphorus gas at a high heat, a step that gives the surface a negative potential electrical orientation. The combination of that layer and the boron-doped layer below creates a positive-negative, or p/n, junction–a critical partition in the functioning of a PV cell."[97]
- **Edge isolation:** A thin layer of silicon is then removed from the edge of the CSPV cell to separate the positive and negative layers.
- **Coating:** Next, a silicon nitride antireflective coating is added to the PV cells to increase the absorption of sunlight.
- **Printing:** Metals are then printed on the solar CSPV cell to collect the electricity. On the front of the CSPV cell, these metals are printed in thin metal strips called fingers, which are connected to the rest of the module via busbars. A metal layer, typically aluminum, is also printed on the back of the CSPV cell.
- **Co-firing:** The CSPV cells then enter a furnace, where the "high temperature causes the silver paste to become imbedded in the surface of the silicon layer, forming a reliable electrical contact."[98]
- **Testing and sorting:** The final step in the process is the testing and sorting of the CSPV cells based on their characteristics and efficiency.

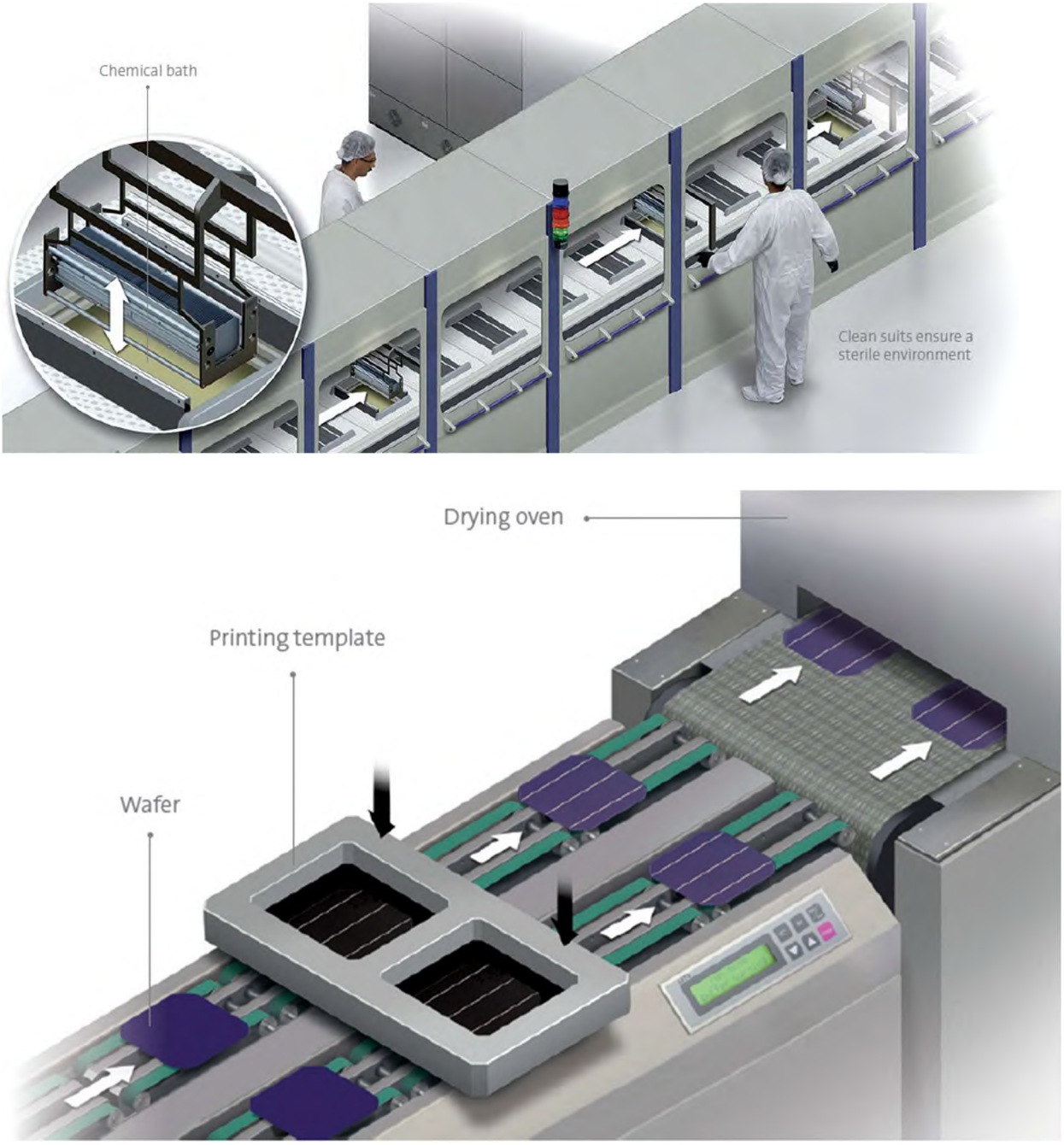
[95] The cell manufacturing process varies by company and technology.

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

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

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

Figure I-16
CSPV cell production: Texturing (top) and screen printing (bottom)

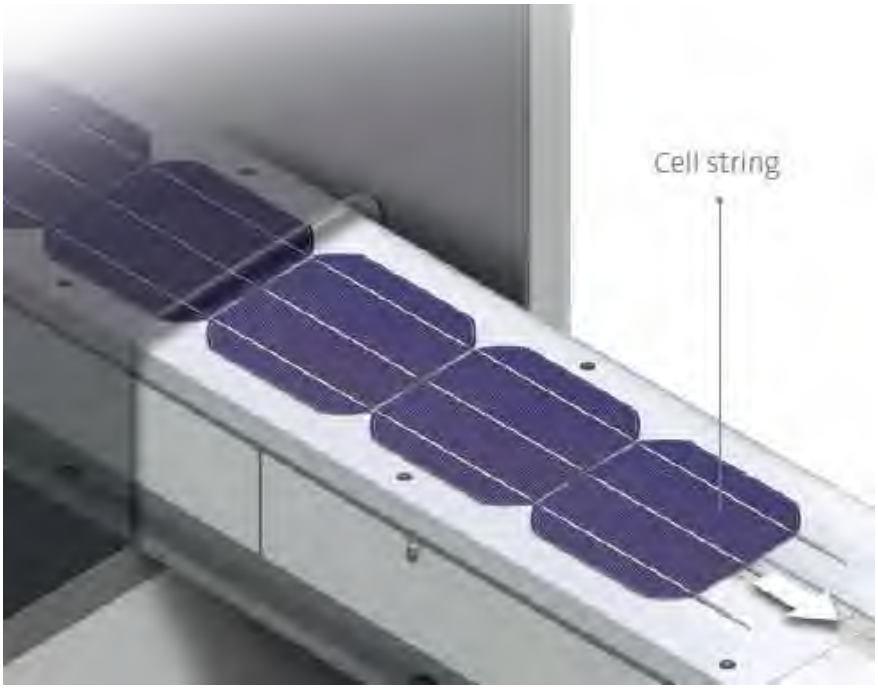


Source: SolarWorld, “Energy for You and Me” brochure, pp. 12–13.

Modules

The CSPV cells are next assembled into modules. The extent of automation and manual labor involved in module assembly varies depending on the company, though it is generally the most labor-intensive part of the manufacturing process. First, a string of CSPV cells is soldered together (figure I-17). A piece of glass is placed on the production line, on top of which is added a piece of ethyl vinyl acetate ("EVA"). The CSPV cells are laid out in a rectangular matrix that will provide the appropriate wattage and power requirements. Typically, a sealant is added, often EVA, and a back sheet is added. The CSPV cells are then laminated in a vacuum and are cured. At this stage, the CSPV cells are referred to as a "laminate." Frames are then usually attached to the laminate, and a junction box is attached to the back. In the final step, modules are cleaned and inspected.

Figure I-17
Soldering CSPV cells together into strings



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

DOMESTIC LIKE PRODUCT ISSUES

The domestic like product is defined as the domestically produced product or products which are like, or in the absence of like, most similar in characteristics and uses with, the subject merchandise. In the previous *CSPV 1* and *CSPV 2* antidumping and countervailing duty determinations, the Commission found one domestic like product consisting of CSPV cells and

CSPV modules, but not including thin film products.[99] In its *CSPV 1* final investigations, the Commission determined not to define CSPV cells and CSPV modules as separate domestic like products, and no party argued otherwise. In the *CSPV 2* investigations, the Taiwan respondents argued that the Commission should define CSPV cells and CSPV modules as separate domestic like products based on a "semi-finished" domestic like product analysis. In its analysis under the "semi-finished products" factors in *CSPV 2*, the Commission found that (1) the upstream article (i.e., CSPV cells) is dedicated for use in the production of the downstream article (i.e., CSPV modules), (2) there are no separate markets for CSPV cells and CSPV modules, (3) CSPV cells and CSPV modules share the same primary physical characteristics and functions, (4) CSPV cells undergo only one major manufacturing step (assembly) to become CSPV modules and that process does not change the essential characteristics of the CSPV cells, and (5) CSPV cells represent a substantial portion of the total cost of finished CSPV modules.[100]

In its *CSPV 3* safeguard determination, the Commission found a single domestic product consisting of all forms of CSPV cells, whether or not partially or fully assembled into other products, corresponding to the imported articles within the scope of the investigation. This was the definition advocated by petitioners. No party requested that the Commission collect data concerning other possible alternative products in their comments on the Commission's draft questionnaires and no party requested a different definition at the injury hearing or in their prehearing or posthearing injury briefs.[101]

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[99] The Commission found that due to differences in their underlying raw materials, manufacturing facilities, manufacturing processes, and production employees, CSPV and thin film products differ significantly in physical characteristics, conversion efficiency, output, and other capabilities. The Commission noted that these physical limitations affect their relative prices, limit their interchangeability, and limit any overlap in channels of distribution, particularly for non-utility sales.

[100] The Commission concluded that CSPV cells are dedicated for use in CSPV modules, and the vast majority of the CSPV cells manufactured in the United States are consumed by the CSPV cell manufacturer in its own production of CSPV modules. It found further that the fraction of CSPV cells manufactured in the United States that are sold in the commercial market are used to manufacture CSPV modules, thereby indicating a lack of separate markets for the upstream and downstream products. The Commission noted that the processes used to manufacture CSPV modules from CSPV cells are technologically sophisticated, more labor intensive than manufacturing CSPV cells, and add value to the product, but they enhance rather than change the basic function of the CSPV cells, which is to convert sunlight into electricity. *Certain Crystalline Silicon Photovoltaic Products from China and Taiwan, Inv. Nos. 701-TA-511 and 731-TA-1246-1247 (Final)*, USITC Publication 4519, February 2015, pp. 8-15 (Commissioner Broadbent dissenting and finding that CSPV cells and CSPV modules were separate domestic like products). *Crystalline Silicon Photovoltaic Cells (Whether or not Partially or Fully Assembled into Other Products), Inv. No. TA-201-75,* USITC Publication 4739, November 2017, pp. I-9—I-10.

[101] *Crystalline Silicon Photovoltaic Cells (Whether or not Partially or Fully Assembled into Other Products), Inv. No. TA-201-75,* USITC Publication 4739, November 2017, pp. 13-16 and I-10.

No party requested that the Commission collect data concerning other possible domestic like products in their comments on the Commission's draft questionnaires.[102] In these full five-year reviews, the domestic interested party, SolarWorld, argues that the Commission should again determine that there is one domestic like product that includes both CSPV cells and modules. It adds that, "under the Commission's semi-finished product analysis, cells are dedicated to the production of modules; both cells and modules are sold in similar markets and share the same primary physical characteristics; cells represent a substantial portion of the cost and value of a module; and cells undergo only one major production step before transformation into modules."[103] The respondent interested parties do not disagree with the Commission's prior determinations concerning the domestic like product.[104]

U.S. MARKET PARTICIPANTS

U.S. producers

During the original investigations, two U.S. producers of CSPV cells, which accounted for approximately *** percent of total 2011 U.S. CSPV cell production, and 14 U.S. producers that produced CSPV modules, which accounted for approximately *** percent of total 2011 U.S. production of CSPV modules submitted usable questionnaire responses.[105] [106] In these current proceedings, the Commission issued U.S. producers' questionnaires to 62 firms, 11 of which provided the Commission with usable information on their production operations, 4 of which produce cells and 11 of which produce modules. The four responding U.S. producers of CSPV cells are believed to have accounted for *** percent of domestic capacity of CSPV cells in

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[102] Canadian Solar's Comments on Draft Questionnaires, July 30, 2018; and SolarWorld's Comments on Draft Questionnaires, July 30, 2018.

[103] SolarWorld's prehearing brief, p. 5.

[104] Hearing transcript, p. 223 (Stoel) ("To be candid, we reviewed your earlier decisions and found that it was very difficult to make the argument they should be considered separate domestic like products.").

[105] Based on a comparison of U.S. producers' reported production of CSPV cells and modules in 2011 with total U.S. production of cells (***) as reported in *PV News*, Volume 31, Number 5, May 2012, pp. 8-9, and modules (***) as reported in *U.S. Solar Market Insight, 2011 Year-in-Review*, Solar Energy Industries Association, p. 13.

[106] The two U.S. producers of CSPV cells that supplied the Commission with usable questionnaire information during the original investigations were SolarWorld (petitioner) and Suniva. The 14 U.S. producers of CSPV modules that supplied the Commission with usable questionnaire information during the original investigations were cell producers SolarWorld and Suniva, as well as module assemblers Advanced Solar Photonics ("ASP"); GE Energy (USA), LLC (acquired by Motech) ("GE"); Kyocera Solar, Inc. ("Kyocera"); Mage Solar Products, Inc. ("Mage"); Motech Americas LLC ("Motech"); MX Solar USA LLC ("MX"); Schott Solar PV, Inc. ("Schott"); Sharp Manufacturing Co. of America ("Sharp"); Silicon Energy, LLC ("Silicon Energy"); Solon Corp. ("Solon"); and Suntech Arizona, Inc. ("Suntech").

EXHIBIT 2

86 FR 47476-01, 2021 WL 3737794(F.R.)

NOTICES

DEPARTMENT OF COMMERCE

International Trade Administration

Notice of Scope Rulings

Wednesday, August 25, 2021

AGENCY: Enforcement and Compliance, International Trade Administration, Department of Commerce.

***47476** DATES: Applicable August 25, 2021.

SUMMARY: The Department of Commerce (Commerce) hereby publishes a list of scope rulings and anti-circumvention determinations made during the period April 1, 2021, through June 30, 2021. We intend to publish future lists after the close of the next calendar quarter.

FOR FURTHER INFORMATION CONTACT: Marcia E. Short, AD/CVD Operations, Customs Liaison Unit, Enforcement and Compliance, International Trade Administration, U.S. Department of Commerce, 1401 Constitution Avenue NW, Washington, DC 20230; telephone: 202-482-1560.

SUPPLEMENTARY INFORMATION:

Background

Commerce regulations provide that it will publish in the Federal Register a list of scope rulings on a quarterly basis.[FN1] Our most recent notification of scope rulings was published on May 28, 2021.[FN2] This current notice covers all scope rulings and anti-circumvention determinations made by Enforcement and Compliance between April 1, 2021, and June 30, 2021.

1 See 19 CFR 351.225(o).

2 See Notice of Scope Rulings, 86 FR 28751 (May 28, 2021).

Scope Rulings Made April 1, 2021 Through June 30, 2021

People's Republic of China (China)

A-570-112 and C-570-113: Certain Collated Steel Staples From China

Requestor: Zhejiang Best Nail Industrial Co., Ltd. Eleven models of insulated staples (JY01-01-JY11-01) are not covered by the scope of the antidumping or countervailing duty orders on certain collated steel staples from China because they are collated using plastic insulators which creates a distinct space between each staple in place of glue, adhesive, or paper tape; April 5, 2021.

A-570-979 and C-570-980: Certain Crystalline Silicon Photovoltaic Cells From China

Requestor: The Solaria Corporation (Solaria). Solaria's PowerXT photovoltaic cells and modules manufactured in the Republic of Korea (Korea) are included in the scope of the antidumping duty order on solar cells from China and the antidumping duty order on solar products from Taiwan because Solaria's solar cells are completed in China and Taiwan with a functioning p/n junction and imported into Korea for module assembly, a process that has already been determined to not substantially transform a cell to change its country of origin; April 8, 2021.

A-570-967 and C-570-968: Aluminum Extrusions From China

Requestor: Reflection Window + Wall, LLC. Four window wall kits are not covered by the scope of the antidumping and countervailing duty orders on aluminum extrusions from China because they meet the exclusion criteria for finished goods kits; April 26, 2021.

A-570-900: Diamond Sawblades and Parts Thereof From China

Requestor: Customs and Border Protection (CBP) (Enforcement and Protect Act (EAPA) referral). Diamond sawblades produced in Canada by Protech Diamond Tools, Inc. (Protech) with Chinese cores and Chinese segments, which are: (1) Exported by Protech and imported by Gogo International, Inc, (Gogo); or (2) exported by Gogo are covered merchandise subject to the antidumping duty order on diamond sawblades and parts thereof (diamond sawblades) from China; diamond sawblades produced in Canada by Protech with Chinese cores ***47477** and non-Chinese segments, which are: (1) Exported by Protech and imported by Gogo; or (2) exported by Gogo are covered merchandise subject to the order; diamond sawblades produced in Canada by Protech with non-Chinese cores or Chinese segments, which are: (1) Exported by Protech and imported by Gogo; or (2) exported by Gogo are not covered merchandise and not subject to the order, provided that CBP determines that the certification and/or documentation requirements identified in message 1007402 dated 01/07/2021 are met; April 27, 2021.

A-570-090 and C-570-091: Certain Steel Wheels 12 to 16.5 Inches in Diameter From China

Requestor: The Wheel Source, Inc. (Wheel Source). Certain passenger vehicle wheels which Wheel Source imports are outside the scope of the antidumping and countervailing duty orders because they have: (1) Different bolt patterns; (2) positive offsets; (3) different pilot diameters; and (4) lower load ratings that make them unsuitable for use on trailers or towable equipment. Certain other passenger vehicle wheels which Wheel Source imports are outside the scope of the antidumping and countervailing duty orders primarily because: (1) The expectations of the ultimate purchasers; (2) the ultimate use of the product; and (3) the manner in which the product is advertised and displayed are distinct from subject merchandise; April 30, 2021.

A-570-090 and C-570-091: Certain Steel Wheels 12 to 16.5 Inches in Diameter From China

Requestor: U.S. Wheel Corp (U.S. Wheel). Certain passenger vehicle and light truck rims and discs imported by U.S. Wheel are outside the scope of the antidumping and countervailing duty orders because they have: (1) Larger offsets; (2) different hub bore sizes; (3) multiple bolt patterns; and/or (4) lower load ratings that make them unsuitable for use on trailers or towable equipment; May 3, 2021.

A-570-947 and C-570-948: Certain Steel Grating From China

Requestor: Weihai Gaosai Metal Product Ltd. The steel decking of the tribar truss floor in the farrowing flooring system is covered by the scope of the antidumping and countervailing duty orders on certain steel grating from China because it has physical characteristics consistent with subject merchandise. However, the other components of the farrowing flooring system and the pig farrowing crate are not covered by the order because those components are not steel grating; May 11, 2021.

A-570-947 and C-570-948: Steel Grating From China

Requestor: Ikadan Systems USA Inc. Ductile cast iron flooring is not covered by the scope of the antidumping and countervailing duty orders on steel grating from China. This is because the orders apply only to steel grating, not cast iron, and because the cast iron grating is made from a mold forming a solid, one-piece grate, while the orders apply only to grating formed by two or more pieces of steel that are connected through welding, riveting, or otherwise; May 13, 2021.

A-570-900: Diamond Sawblades and Parts Thereof From China

Requestor: CBP (EAPA referral) and Lyke Industrial Tool, LLC. Diamond Sawblades exported by Like Tools Co. Ltd. and imported by Lyke Industrial Tool, LLC are covered by the scope of the antidumping duty order on diamond sawblades and parts thereof from China because Commerce determined that they are not substantially transformed, and Like Tools Co. Ltd. was not able to demonstrate that the cores and segments were joined in Thailand; June 3, 2021.

A-570-112 and C-570-113: Certain Collated Steel Staples From China

Requestor: Stanley Black & Decker, Inc. The model DRS18100 collated insulated staple is not covered by the scope of the antidumping or countervailing duty order on certain collated steel staples from China because it is collated using plastic insulators which creates a distinct space between each staple in place of glue, adhesive or paper tape; June 8, 2021.

A-570-106 and C-570-107: Wooden Cabinets and Vanities and Components Thereof From China

Requestor: Homewerks Worldwide, LLC. Medicine cabinets with moveable shelves (model numbers: #HF01-MAT-WH and #HF01-MAT-ES) imported from China are outside the scope of the antidumping and countervailing duty orders; June 11, 2021.

A-570-979 and C-570-980: Crystalline Silicon Photovoltaic Cells From China

Requestor: ET Solar, Inc. (ET Solar). Commerce upheld the substantial transformation analysis used in its preliminary scope determination to conclude that certain solar modules imported by ET Solar from Vietnam containing unfinished solar wafers imported from China (i.e., silicon wafers with p/n junctions imparted in China) are within the scope of the antidumping and countervailing duty orders on solar cells from China. Commerce continued to find that further processing undertaken in Vietnam on unfinished solar cells from China was insufficient to transform them from Chinese-origin merchandise to Vietnamese-origin merchandise; June 15, 2021.

A-570-831: Fresh Garlic From China

Requestor: RJ Van Drunen & Sons Inc. Commerce analyzed factors provided in 19 CFR 351.225(d) and 351.225(k)(1) and determined that individually quick frozen one-eighth-inch diced garlic (diced garlic) is not covered by the scope of the antidumping duty order on fresh garlic from China because the description of the merchandise from the Petition, the investigation, and prior scope determinations are dispositive in determining that the diced garlic at issue is not within the scope of the Order. Therefore, Commerce did not analyze the additional factors provided in 19 CFR 351.225(k)(2); June 28, 2021.

Taiwan

A-583-853: Certain Crystalline Silicon Photovoltaic Products From Taiwan

Requestor: Solaria. Solaria's PowerXT photovoltaic cells and modules manufactured in Korea are included in the scope of the antidumping duty order on solar cells from China and the antidumping duty order on solar products from Taiwan because Solaria's solar cells are completed in China and Taiwan with a functioning p/n junction and imported into Korea for module assembly, a process that has already been determined to not substantially transform a cell to change its country of origin; April 8, 2021.

Anti-Circumvention Determinations Made April 1, 2021 Through June 30, 2021

China

A-570-026 and C-570-027: Certain Corrosion-Resistant Steel Products (CORE) From China

Self-initiated: CORE completed in Malaysia from hot-rolled steel or cold-rolled steel substrate manufactured in China, and subsequently exported to the United States is circumventing the antidumping and countervailing duty orders on CORE from China. CORE produced in South Africa is not circumventing the orders; June 1, 2021.

***47478 Taiwan**

A-583-856: Certain Corrosion Resistant Steel Products (CORE) From Taiwan
Self-initiated: CORE completed in Malaysia from hot-rolled steel or cold-rolled steel substrate manufactured in Taiwan, and subsequently exported to the United States is circumventing the antidumping order on CORE from Taiwan; June 1, 2021.

Preliminary Determinations Made April 1, 2021, Through June 30, 2021

China

A-570-067 and C-570-068: Forged Steel Fittings From China
Requestor: Midwest Diversified Technologies, Inc. Fifteen self-drilling anchor bolt systems couplers are not covered by the scope of the antidumping duty and countervailing duty orders on forged steel fittings from China because they are not designed to connect pipes and cannot convey fluid at high pressure; May 17, 2021.

Notification to Interested Parties
Interested parties are invited to comment on the completeness of this list of scope inquiries and anti-circumvention determinations made during the period April 1, 2021, through June 30, 2021. Any comments should be submitted to James Maeder, Deputy Assistant Secretary for AD/CVD Operations, Enforcement and Compliance, International Trade Administration, via email to CommerceCLU@trade.gov.

This notice is published in accordance with 19 CFR 351.225(o).

Dated: August 20, 2021.

James Maeder,

Deputy Assistant Secretary for Antidumping and Countervailing Duty Operations.

[FR Doc. 2021-18291 Filed 8-24-21; 8:45 am]

BILLING CODE 3510-DS-P

EXHIBIT 3

A-570-979
C-570-980
Scope Inquiry: ET Solar
~~**Business Proprietary Information**~~ **Public Version**
E&C/OVII: LC

June 15, 2021

MEMORANDUM TO: James Maeder
Deputy Assistant Secretary
for Antidumping and Countervailing Duty Operations

THROUGH: Melissa G. Skinner
Senior Director, Office VII
Antidumping and Countervailing Duty Operations

FROM: Lauren Caserta LNC
International Trade Compliance Analyst, Office VII
Antidumping and Countervailing Duty Operations

RE: Final Scope Ruling on the Antidumping and Countervailing Duty Orders on Crystalline Silicon Photovoltaic Cells from the People's Republic of China: ET Solar Inc.

I. SUMMARY

On March 30, 2021, the Department of Commerce (Commerce) issued a preliminary scope ruling regarding solar modules imported by ET Solar Inc. (ET Solar) that are manufactured in Vietnam using certain components fabricated in the People's Republic of China (China).[1] At ET Solar's request,[2] the relevant scope inquiry was initiated to determine whether the solar modules at issue are covered by the antidumping duty (AD) and countervailing duty (CVD) orders on crystalline silicon photovoltaic cells (solar cells) from China.[3] Commerce examined the plain

[1] *See* Memorandum, "Preliminary Scope Ruling on the Antidumping and Countervailing Duty Orders on Crystalline Silicon Photovoltaic Cells from the People's Republic of China: ET Solar Inc.," dated March 30, 2021 (Preliminary Scope Ruling).
[2] *See* ET Solar's Letter, "Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules, from the People's Republic of China: Request for Scope Ruling on Certain Solar Modules Manufactured in Vietnam," dated June 4, 2020 (Incomplete Scope Request); *see also* ET Solar's Letter, "Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules, from the People's Republic of China: Supplemental Questionnaire," dated July 14, 2020 (Supplemental Scope Response).
[3] *See Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules, from the People's Republic of China: Amended Final Determination of Sales at Less Than Fair Value, and Antidumping Duty Order*, 77 FR 73018 (December 7, 2012) and *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules, from the People's Republic of China: Countervailing Duty Order*, 77 FR 73017 (December 7, 2012) (collectively, *Orders*).

language of the orders and performed a substantial transformation analysis to determine the country-of-origin of the merchandise at issue. Based on these analyses, Commerce preliminarily found that ET Solar's imported solar modules were within the scope of the *Orders*.[4]

II. BACKGROUND

On June 4, 2020, Commerce received an incomplete request from importer ET Solar to determine whether certain solar modules imported from Vietnam to the United States that contain unfinished solar cells from China are outside the scope of the *Orders*.[5] Commerce reviewed the information contained in this initial submission and determined it to be insufficient to make a scope determination with respect to the merchandise imported by ET Solar. On June 30, 2020, Commerce issued a supplemental questionnaire to ET Solar requesting further information and documentation regarding the complete production process for the merchandise at issue, which takes place partially in China and partially in Vietnam.[6] ET Solar submitted its supplemental response and additional documentation between July 2, 2020, and July 14, 2020.[7] Pursuant to 19 CFR 351.225(e), on August 27, 2020, Commerce initiated a formal scope inquiry and provided parties with 20 days to submit comments and factual information relating to this scope inquiry and 10 days to submit rebuttal comments.[8] Commerce received no comments in response to this initiation.

On January 21, 2021, Commerce issued a request for additional information pertaining to the five factors normally considered when using a substantial transformation analysis to determine a product's country of origin.[9] Commerce received responses from ET Solar and the American Alliance for Solar Manufacturing (the Alliance).[10]

Based on the information provided by ET Solar and the Alliance, Commerce issued its Preliminary Scope Ruling, as well as the source documentation (*e.g.*, prior scope rulings, excerpts from the petition, and a prior ruling issued by U.S. Customs and Border Protection) relied on in its preliminary analysis, on March 30, 2021.[11] Interested parties were invited to

[4] *See* Preliminary Scope Ruling.
[5] *See* Incomplete Scope Request.
[6] *See* Commerce's Letter, "ET Solar Scope Ruling Request: Supplemental Questionnaire," dated June 30, 2020.
[7] *See* Supplemental Scope Response; *see also* ET Solar's Letter, "Scope Ruling Request in Crystalline Silicon Photovoltaic Cells from China: Submission of Form 7501 for APO Application," dated July 2, 2020.
[8] *See* Commerce's Letter, "Crystalline Silicon Photovoltaic Cells from the People's Republic of China: Initiation of Scope Inquiry on Certain Solar Modules Imported from Vietnam Containing Components Manufactured in the People's Republic of China," dated August 27, 2020.
[9] *See* Memorandum, "Crystalline Silicon Photovoltaic Cells from the People's Republic of China: Request for Additional Information," dated January 21, 2021; *see also* Memorandum, "Crystalline Silicon Photovoltaic Cells from the People's Republic of China: Deadline Correction for Additional Information Request," dated January 22, 2021.
[10] *See* ET Solar's Letter, "Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules, from the People's Republic of China: Response to Request for Information," dated February 12, 2021; and the Alliance's Letter, "Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules, from the People's Republic of China: Response to Request for Information," dated February 12, 2021.
[11] *See* Preliminary Scope Ruling and associated attachments.

comment on the Preliminary Scope Ruling.[12] On May 12, 2021, Commerce received a case brief from ET Solar.[13] On May 19, 2021, Commerce received a rebuttal brief from the Alliance.[14]

Commerce has reviewed and analyzed all evidence and arguments on the administrative record and continues to find that the solar modules imported by ET Solar are subject to the scope of the *Orders*. Commerce's analysis for the final scope ruling is unchanged from the analysis contained in the Preliminary Scope Ruling. We have provided our responses to the interested parties' comments on the Preliminary Scope Ruling in the "Discussion of the Issues" section of this memorandum.

III. SCOPE OF THE *ORDERS*

The merchandise covered by these *Orders* is crystalline silicon photovoltaic cells, and modules, laminates, and panels, consisting of crystalline silicon photovoltaic cells, whether or not partially or fully assembled into other products, including, but not limited to, modules, laminates, panels and building integrated materials.

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

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

Excluded from the scope of these *Orders* are thin film photovoltaic products produced from amorphous silicon (a-Si), cadmium telluride (CdTe), or copper indium gallium selenide (CIGS). Also excluded from the scope of these *Orders* are 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 China are covered by these *Orders*; however, modules, laminates, and panels produced in China from cells

[12] *See* Memorandum, "Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules, from the People's Republic of China: Scope Ruling Request from ET Solar: Briefing Schedule," dated May 5, 2021.
[13] *See* ET Solar's Letter, "Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules, from the People's Republic of China: Final Scope Case Brief," dated May 12, 2021 (ET Solar's Case Brief).
[14] *See* the Alliance's Letter, "Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules, from the People's Republic of China: Scope Rebuttal Brief," dated May 19, 2021 (Alliance's Rebuttal Brief).

produced in a third-country are not covered by these *Orders*.

Merchandise covered by these *Orders* is currently classified in the Harmonized Tariff Schedule of the United States (HTSUS) under subheadings 8501.61.0000, 8507.20.80, 8541.40.6015, 8541.40.6020, 8541.40.6025, 8541.40.6030, 8541.40.6035, 8541.40.6045, and 8501.31.8000. These HTSUS subheadings are provided for convenience and customs purposes; the written description of the scope of these *Orders* is dispositive.

IV. DESCRIPTION OF MERCHANDISE SUBJECT TO THIS REQUEST

The merchandise at issue is solar modules that are assembled in Vietnam and imported into the United States by ET Solar, located in Pleasanton, CA.[15] Multiple companies located in China, Hong Kong, and Vietnam are involved in the supply and production chains for the finished modules, which consist of individual solar cells fabricated from silicon wafers.[16]

According to ET Solar, the production process for the modules at issue begins in China, where silicon wafers are manufactured and processed by [ ].[17] First, silicon wafers are cleaned and textured before a phosphorous dopant is diffused into the boron-doped wafer to form a p/n junction.[18] [ ] then removes a thin layer of silicon from the edge of the unfinished cell to separate the positive and negative layers created during the diffusion process, and applies an anti-reflective coating to the front of the cell that optimizes its ability to absorb sunlight.[19] These cells are then purchased by a Vietnamese company, Ha Noi Solar Technology Company Limited (Ha Noi Solar), through a Hong Kong supplier, [ ].[20] The unfinished cells undergo further processing at Ha Noi Solar, where aluminum and silver pastes are printed onto the surface of the cell to create an electrical grid capable of collecting the energy generated by the cell.[21] Ha Noi Solar then dries, sinters, tests, and sorts the cells, which are subsequently sold to companies that produce solar modules made up of multiple cells.[22]

To fabricate the modules at issue, finished solar cells are purchased from Ha Noi Solar by KRSolar Technology Co., Ltd. (KRSolar), an intermediary company [ ], and sold to Green Wing Solar Technology Co., Ltd. (GW Solar), a module production company located in Vietnam.[23] KR Solar also provides GW Solar with all other raw materials necessary to produce finished solar modules.[24] GW Solar then solders cells together, adds glass and an ethyl vinyl acetate (EVA) coating, and arranges cells into a matrix before sealing and laminating

[15] *See* Incomplete Scope Request at 2-3.
[16] *Id*.
[17] *Id*. at 2.
[18] *See* Supplemental Scope Response at 2-3 and Exhibit 14.
[19] *Id*.
[20] *See* Incomplete Scope Request at 2; *see also* Supplemental Scope Response at 2 and Exhibit 14.
[21] *See* Incomplete Scope Request at 2 and 9; *see also* Supplemental Scope Response at 2 and Exhibit 14.
[22] *See* Incomplete Scope Request at 3 and 9; *see also* Supplemental Scope Response at 2 and Exhibit 14.
[23] *See* Incomplete Scope Request at 2-3; *see also* Supplemental Scope Response at 2 and Exhibit 14.
[24] *See* Incomplete Scope Request at 3; *see also* Supplemental Scope Response at 2, 4, and Exhibits 6 and 14.

them.[25] Frames and junctions boxes are then affixed to the joined cells, and the finished modules are cleaned and inspected before being sold back to KR Solar.[26] ET Solar then purchases the finished solar modules from KR Solar for importation to the United States.[27]

V. LEGAL FRAMEWORK

When a request for a scope ruling is filed, Commerce examines the scope language of the order(s) at issue and the description of the product contained in the scope ruling request.[28] Pursuant to Commerce's regulations, Commerce may also examine other information, including the description of the merchandise contained in the petition, the records from the investigations, and relevant prior scope determinations made for similar products.[29] If Commerce determines that these sources are sufficient to decide the matter, it will issue a final scope ruling stating whether the merchandise is covered by the order(s).[30]

Where the descriptions of the merchandise in the sources described in 19 CFR 351.225(k)(1) are not dispositive, Commerce will consider the five additional factors set forth at 19 CFR 351.225(k)(2). These factors are: (i) the physical characteristics of the merchandise; (ii) the expectations of the ultimate purchasers; (iii) the ultimate use of the product; (iv) the channels of trade in which the product is sold; and (v) the manner in which the product is advertised and displayed. The determination as to which analytical framework is most appropriate in any given scope proceeding is made on a case-by-case basis after consideration of all evidence before Commerce.

Because AD and CVD orders apply to merchandise from particular countries, determining the country where the merchandise is produced is fundamental to proper administration and enforcement of the AD and CVD statute. The scope of an AD or CVD order is limited to merchandise that originates in the country covered by the order.[31] Commerce has explicitly stated that the scope of an AD order is "defined by the type of merchandise and the country-of-origin."[32]

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[25] *See* Incomplete Scope Request at 3; *see also* Supplemental Scope Response at 2 and Exhibit 14.
[26] *Id*.
[27] *Id.*
[28] *See Walgreen Co. v. United States*, 620 F.3d 1350, 1357 (Fed. Cir. 2010).
[29] *See* 19 CFR 351.225(k)(1).
[30] *See* 19 CFR 351.225(d).
[31] *See Stainless Steel Plate in Coils from Belgium: Final Results of Antidumping Duty Administrative Review*, 69 FR 74495 (December 14, 2004) (*SSPC from Belgium*) and the accompanying Issues and Decision Memorandum at Comment 4.
[32] *See Notice of Final Determination of Sales at Less Than Fair Value: Certain Cold-Rolled Carbon Steel Flat Products from Argentina*, 58 FR 37062 (July 9, 1993), where Commerce stated that "{the} scope of an antidumping or countervailing duty order is defined by the type of merchandise and by the country of origin (*e.g.*, widgets from Ruritania). For merchandise to be subject to an order it must meet both parameters, *i.e.*, product type and country of origin. In determining country of origin for scope purposes, Commerce applies a 'substantial transformation rule.'" This language was quoted by the Court of International Trade in *Advanced Tech & Materials Co., Ltd. v. United States*, 35 C.I.T. 1380, 1384 (CIT 2011) and *Ugine and ALZ Belgium, N.V. v. United States*, 517 F. Supp 2d 1333, 1345 (CIT 2007).

In determining the country-of-origin of a product, Commerce's practice has been to conduct a substantial transformation analysis.[33] The Court of International Trade (CIT) has upheld Commerce's "substantial transformation" analysis as a means to carry out its country-of-origin analysis.[34] The CIT states that "{the} 'substantial transformation' rule provides a yardstick for determining whether the processes performed on merchandise in a country are of such significance as to require that the resulting merchandise be considered the product of the country in which the transformation occurred."[35] Because the scope request addressed modules assembled in a third country that contain unfinished solar cells manufactured in China, we have used a substantial transformation analysis to determine whether the merchandise imported by ET Solar should be covered by the scope of the *Orders*.

VI. DISCUSSION OF THE ISSUES

Comment 1: Whether the Chinese-Origin Components Imported to Vietnam for Use in the Manufacture of the Modules at Issue are Solar Cells under the Scope of the *Orders*

ET Solar's Arguments:

- The scope of the *Orders* references "crystalline silicon photovoltaic *cells*" and "modules, laminates, and panels produced in a third-country from *cells* produced in China."[36] However, the plain language of the *Orders* does not specifically reference silicon wafers imported from China. Thus, the *Orders* would not apply to the merchandise at issue, which contains silicon wafers imported from China.[37]
- The scope of the *Orders* includes "crystalline silicon photovoltaic cells, and modules, laminates, and panels," which accordingly fall within the same class or kind of merchandise.[38] However, the term "silicon wafers" is presumed to have been deliberately excluded from this description by Commerce because the scope was not intended to cover silicon wafers.[39]
- Because of the presumably deliberate exclusion of the term "solar wafer" from the description of the scope of the *Orders*, Commerce cannot now determine that silicon wafers fall within the same class or kind of merchandise as solar cells, modules, laminates, and panels within the context of the substantial transformation analysis.[40]

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[33] *See*, *e.g.*, *Notice of Final Determination of Sales at Less Than Fair Value: Glycine from India*, 73 FR 16640 (March 28, 2008), and accompanying Issues and Decision Memorandum at Comment 5; *see also SSPC from Belgium* and accompanying Issues and Decision Memorandum at Comment 4.

[34] *See E.I. DuPont De Nemours & Company v. United States*, 8 F. Supp. 692, 695 (CIT 1993) as "noting that in determining if merchandise exported from an intermediate country is covered by an antidumping order, Commerce identified the country of origin by considering whether the essential component is substantially transformed in the country of exportation."

[35] *Id*.

[36] *See* ET Solar's Case Brief at 3 (emphasis in the original).

[37] *Id*. at 3-4.

[38] *Id*. at 4.

[39] *Id*. at 4-5.

[40] *Id*.

The Alliance's Arguments:

- The scope of the *Orders* clearly defines solar cells as having "a p/n junction formed by any means, *whether or not* the cell has undergone other processing" that includes, but is not limited to, the addition of metallization materials and conductor patterns.[41]
- Commerce previously noted in the Preliminary Scope Ruling that "it is the addition of a p/n junction that transforms a silicon wafer into a solar cell, even if the cell itself lacks certain additional processing that must be performed before cells can be used to transmit or channel electricity once they are assembled into solar modules or panels."[42]
- Despite ET Solar's attempt to reclassify the product produced in China and exported to Vietnam as a "solar wafer," this product is already a Chinese solar cell because it contains a p/n junction formed when phosphorous is diffused into the boron-infused silicon wafers in China.[43]
- Commerce should reject ET Solar's attempt to classify the product imported from China for further processing in Vietnam as a "wafer" simply because this word is not referenced in the language of the scope. Commerce should instead continue to find that the scope description of the *Orders* is dispositive and clearly contemplates the coverage of solar cells with p/n junctions formed in China prior to third-country processing.[44]
- In the Preliminary Scope Ruling, Commerce correctly determined that both the upstream product produced in China and the downstream product finished in Vietnam were of the same class or kind of product.[45] Regardless of whether the word "wafer" appears in the scope language of the *Orders*, the merchandise imported into Vietnam from China is considered to be a solar cell because it contains a p/n junction.[46]
- The merchandise imported into Vietnam from China is necessarily of the same class or kind of merchandise as fully finished solar cells and solar modules produced in Vietnam because they all contain a p/n junction.[47] Both the unfinished solar cells produced in China and the finished solar cells produced in Vietnam would also fall under the same HTSUS subheading as a result.[48]

Analysis:

Commerce agrees with the Alliance that the products exported from China and imported by Ha Noi Solar to be used in the construction of ET Solar's imported modules are solar cells, rather than solar wafers, in the context of the *Orders*. Consistent with the Preliminary Scope Ruling, Commerce finds that the process of imbuing silicon wafers with a p/n junction results in the creation of solar cells – albeit unfished solar cells – capable of converting sunlight into electricity via the photovoltaic effect.[49]

[41] *See* the Alliance's Rebuttal Brief at 3.
[42] *Id*.
[43] *Id*.
[44] *Id*. at 3-4.
[45] *Id*. at 4.
[46] *Id*.
[47] *Id*.
[48] *Id*. at 5.
[49] *See* Preliminary Scope Ruling at 8-9, 11.

ET Solar's arguments regarding the plain language of the *Orders* as well as the class or kind component of the substantial transformation analysis are contingent upon its classification of the merchandise exported from China as "solar wafers" rather than "solar cells." However, the scope of the *Orders* clearly defines solar cells as "having a p/n junction formed by any means, whether or not the cell has undergone other processing, including, but not limited to, cleaning, *etc*hing, coating, and/or the addition of materials (including, but not limited to, metallization and conductor patterns) to collect and forward the electricity that is generated by the cell." The information placed on the record by ET Solar clearly indicates that a p/n junction is present in both the unfinished merchandise exported from China and the finished merchandise exported from Vietnam.[50] Thus, both types of merchandise are classified as solar cells under the plain language of the scope of the *Orders*, and would fall within the same class or kind of merchandise in the context of a substantial transformation analysis.

Comment 2: Whether Third Country Manufacturing Changes the Important Qualities or Use of the Merchandise at Issue

ET Solar's Arguments:

- As part of its substantial transformation analysis, Commerce must consider whether processing in the country of export changes the important qualities or use of the component at issue.[51] Commerce claims that a cell's p/n junction imparts the essential quality of a solar cell, which is its ability to convert sunlight into electricity via the photovoltaic effect.[52] However, ET Solar has already demonstrated in its previous responses that the wafers exported from China cannot yet generate electricity and are, therefore, useless from a commercial and consumer standpoint.[53]
- The ability to generate power is the most important quality and use of a finished solar cell, and the record demonstrates that this quality is fully imparted during the manufacturing process in Vietnam. Commerce should, thus, find that the silicon wafers subject to this inquiry are outside the scope of the *Orders*.[54]

The Alliance's Arguments:

- Commerce has previously concluded that the essential component of the solar cell is the p/n junction, which was formed in China prior to further processing in Vietnam.[55] ET Solar argues that the merchandise was substantially transformed in a third country because the process enabling electricity to be forwarded from the cell occurred in Vietnam. However, this ignores the plain language of the *Orders*, which clearly identifies a solar cell as containing a p/n junction "whether or not the cell has undergone other processing, including but not limited to … addition of other materials … to collect and forward the electricity that is generate by the cell."[56]

[50] *See* Preliminary Scope Ruling at 8-9.
[51] *See* ET Solar's Case Brief at 5.
[52] *Id*.
[53] *Id*. at 5-6.
[54] *Id*. at 6.
[55] *See* the Alliance's Case Brief at 5.
[56] *Id*. at 5-6.

- ET Solar has acknowledged that the p/n junction of the solar cell is formed in China. Because the essential component of the solar cell is the ability to generate power and this ability is conferred by the p/n junction formed in China, Commerce should continue to find that the merchandise imported from China was not substantially transformed in Vietnam.[57]

Analysis:

Commerce agrees with the Alliance that the essential component of the solar cell is the p/n junction that was formed in China, and that this component is present in both the unfinished merchandise exported from China and the finished merchandise exported from Vietnam. Consistent with the Preliminary Scope Ruling, Commerce finds that the final processing of these solar cells in a third country does not change the important qualities or use of the essential components contained in the merchandise at issue.[58]

ET Solar argues that the essential component of a solar cell is the cell's ability to "generate power," which happens once metallic grids and ohmic contacts are added to a silicon wafer containing a p/n junction (*i.e.*, an unfinished solar cell) that allow electricity to be channeled out of a cell. However, Commerce has previously determined that the p/n junction is responsible for creating the conditions that induce the photovoltaic effect that ultimately generates electricity, and that the metallic grids and contacts are only responsible for channeling this electricity out of the cell. As determined during the investigation, the addition of a dopant, "which is a trace impurity element diffused into a thin layer of the wafers' surface to impart an opposite electrical orientation to the cell surface, creates the positive/negative junction that is needed for the conversion of sunlight into electricity, which is the purpose of solar cells."[59] Furthermore, Commerce has determined in a previous scope ruling that the presence of a p/n junction is the factor which ultimately separates a non-subject solar wafer from a subject solar cell:

> In sum, the raw material purchased from China by Irex, partially processed solar wafers, does not fall within this scope because there is not yet a p/n junction. Since there is not yet a p/n junction, the raw material is not a photovoltaic cell from China within the meaning of the scope of the Orders. Therefore, based on the record evidence and descriptions submitted by SunSpark and the language of the scope of the Orders, the merchandise at issue in this scope inquiry is not within the scope of the Orders.[60]

The essential component of the merchandise at issue is not defined solely by reference to end-use or commercial utility, and the plain language of the *Orders* clearly covers certain unfinished solar cells that may require additional processing steps before they are assembled into working

[57] *Id*. at 6.
[58] *See* Preliminary Scope Ruling at 11.
[59] *See* Memorandum, "Scope Clarification: Antidumping and Countervailing Duty Investigation of Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules, from the People's Republic of China," dated March 19, 2012.
[60] *See* Memorandum, "Antidumping and Countervailing Duty Orders on Crystalline Silicon Photovoltaic Cells from the People's Republic of China: SunSpark Technology Inc. Scope Ruling," dated October 23, 2020.

modules, implying that the essential component of a solar cell, module, or panel is completed before the final steps of processing necessary for consumer use. By analogy, a car is useless to a consumer without tires or a steering wheel, but it is doubtful that the addition of tires or a steering wheel to an otherwise complete car could reasonably be considered "substantial transformation." Moreover, the scope's explicit reference to both finished and unfinished products contradicts the notion that the essential component must be determined by reference to consumer utility, rather than to a solar cell's role as an intermediate product. Accepting ET Solar's rationale would result in a policy whereby substantial transformation would occur whenever final steps are taken in a third country that, however minor, are necessary for the consumer's use of the product. Thus, Commerce finds that further processing in Vietnam does not change the essential component of the solar cells at issue.

Comment 3: Whether the Nature of the Third-Country Processing in Vietnam is Substantial and Sophisticated

ET Solar's Arguments:

- As part of its substantial transformation analysis, Commerce must consider whether processing in the exporting country was substantial or sophisticated.[61] The record demonstrates that a number of companies are involved in the production of the merchandise at issue. Ha Noi Solar purchases unfinished silicon wafers from a Hong Kong supplier that are sourced from a manufacturer in China. Ha Noi Solar then transforms the wafers into fully functional solar cells in Vietnam.[62]
- The third-country manufacturing process requires four pieces of machinery: a serigraphy machine, a drying machine, a sintering machine, and a testing machine.[63] Wafers undergo a metallization process to form metallic grids and ohmic contacts on their surface. These contacts are critical points at which electricity generated and channeled across the wafer's surface is collected. Without the metallic grid created by the metallization process, the merchandise remains a non-functional silicon wafer.[64]
- Both sides of a wafer must be metallized and dried, then sintered to solidify the dry metal pastes onto the wafers. Once the wafers have been sintered, they have officially transitioned from solar wafers to unfinished solar cells.[65] In order to finish the solar cells and ready them for assembly into modules, they must be tested, classified, and sorted according to their efficiency ratings. Once this process is complete, the solar cell is deemed "finished."[66]
- The third-party information submitted to the record by the petitioners attempts to compare the manufacturing processes undertaken in China and Vietnam, but it does not contravene the fact that both processes are substantial and sophisticated.[67] The record clearly demonstrates that third-country processing in Vietnam is substantial and

[61] *See* ET Solar's Case Brief at 6.
[62] *Id*.
[63] *Id*.
[64] *Id*. at 6-7.
[65] *Id*. at 7.
[66] *Id*.
[67] *Id*. at 7-8.

sophisticated, which counsels in favor of finding the merchandise at issue to be outside the scope of the *Orders*.[68]

The Alliance's Arguments:

- In the Preliminary Scope Ruling, Commerce correctly determined that the extent of manufacturing that takes place in China is "more capital intensive and critical to the functioning of a finished solar cell" than the third-country manufacturing in Vietnam. ET Solar does not dispute this finding in its case brief and, instead, argues that this does not necessarily mean that the processes occurring in Vietnam were not significant in their own right.[69]
- The most effective way for Commerce to consider meaningfully the sophistication of the processing steps completed in two countries is to compare them, and this methodology is typical of the considerations made by Commerce in a substantial transformation analysis. Commerce should continue to find that the "more capital-intensive and critical" processing steps that take place in China should weigh in favor of finding that the solar cells were not substantially transformed in Vietnam.[70]
- Commerce should also consider the fact that ET Solar does not dispute the disparity between Chinese and Vietnamese processing when determining which is more capital-intensive and critical to the formation of the solar cell.[71]

Analysis:

Consistent with the Preliminary Scope Ruling, Commerce continues to find that while the processes performed in Vietnam help enable the solar cell to harness the electricity it produces, the steps performed in China to create the conditions necessary to induce the photovoltaic effect are more complex and extensive by comparison. This indicates that the merchandise exported from China and imported into Vietnam by Ha Noi Solar was not substantially transformed by third-country processing.

ET Solar does not dispute the finding that the manufacturing processes undertaken in China are more substantial and sophisticated than those taking place in Vietnam. Rather, ET Solar argues that the manufacturing processes of both countries may be categorized as substantial and sophisticated, and that this conclusion should preclude a comparison of their relative intensities for the purposes of Commerce's substantial transformation analysis. However, ET Solar does not offer a convincing explanation as to why these processes should not be compared as part of Commerce's substantial transformation analysis.

In the Preliminary Scope Ruling, Commerce determined that the steps necessary to impart the essential character of a solar cell take place in China.[72] These steps include the diffusion of phosphorous into the boron-doped wafer to form the cell's p/n junction, the edging process which fully separates the positive and negative layers created during the diffusion process, and

[68] *Id*. at 8.
[69] *See* the Alliance's Rebuttal Brief at 6.
[70] *Id*. at 6-7.
[71] *Id*. at 7.
[72] *See* Preliminary Scope Ruling at 12.

the application of an anti-reflective coating to increase its ability to absorb sunlight.[73] The capital-intensive and critical steps performed in China, therefore, include the formation of the p/n junction which induces the photovoltaic effect, as well as the physical changes that support light absorption and the viability of the electrical paths inside the cell. As demonstrated by the information on the record, these steps take place before the cells are exported to Ha Noi Solar in Vietnam. By contrast, the steps performed in Vietnam (including metallization, sintering, testing, and sorting) only transform an unfinished solar cell into a finished solar cell by enabling the cell to channel the energy it creates. Ultimately, the steps performed in Vietnam do not encompass the formation of the essential component that defines both finished and unfinished solar cells. The scope language itself makes the p/n junction the defining characteristic of a "solar cell" within the meaning of the *Orders*, regardless of whether the cell has undergone further processing and, therefore, we cannot agree with ET Solar's arguments about substantial and sophisticated processing in Vietnam.

Comment 4: Whether the Cost of Production and Value Added to the Merchandise at Issue in the Third Country is Significant

ET Solar's Arguments:

- Commerce does not have an established threshold for determining whether the cost of processing in a third country by itself represents a substantial transformation. However, Commerce has previously found in *Peer Bearing Co. – Changshan* that a 38 percent increase to the cost of production counsels in favor of finding that substantial transformation has occurred, even when this added cost is less than the cost incurred in the subject country.[74]
- ET Solar has already submitted evidence to the record demonstrating that the total additional cost of production in Vietnam is near the level found determinative in *Peer Bearing Co. – Changshan*, while the total added value imparted in Vietnam is significantly higher. Both the cost of production and added value attributed to processing in Vietnam are significant, and the latter is substantial in both absolute and relative terms.[75]
- A complete analysis of this factor points to the conclusion that the wafers imported into Vietnam and incorporated into ET Solar's modules are substantially transformed in Vietnam.[76]

The Alliance's Arguments:

- Commerce should consider the limited cost of production and value added during processing in Vietnam as weighing in favor of finding that no substantial transformation has occurred. Alternatively, Commerce should continue to find that the portion of production costs attributed to Vietnamese processing does not outweigh the four other components of the substantial transformation analysis.[77]

[73] *Id*.
[74] *See* the Alliance's Rebuttal Brief (citing *Peer Bearing Co. – Changshan v. United States*, 128 F. Supp.3d 1286, 1296 (CIT 2015) (*Peer Bearing Co. – Changshan*)).
[75] *Id*.
[76] *Id*.
[77] *See* the Alliance's Rebuttal Brief at 7.

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- In [ ], Commerce previously found that third-country processing that accounts for [ ] percent of the cost of production did not indicate that substantial transformation occurred when considered with other factors.[78] ET Solar claims that the total added cost of production in Vietnam is "roughly [ ] percent." In this determination, Commerce states that it is "[ ]."[79]
- ET Solar cites *Peer Bearing Co. – Changshan* to support its claims regarding the cost of production and value added in Vietnam. While the CIT ultimately affirmed Commerce's revised determination that substantial transformation occurred in Thailand, Commerce noted in its determination that a third-country cost of manufacturing of 38 percent "was not so significant as to outweigh the other factors which the Department must take into account."[80] The CIT also noted that "even if this 38 percent value-added calculation were *disregarded*, the record still would contain substantial evidence to support the ultimate determination that the {product at issue was substantially transformed}."[81]
- In *Peer Bearing Co. – Changshan*, the evidence supporting the other four factors of the substantial transformation analysis included the fact that none of the parts made in China and exported to a third country for further processing "possessed the physical properties, mechanical properties, or essential character" of the completed product. As such, the facts of *Peer Bearing Co. – Changshan* differ significantly from ET Solar's inquiry, in which the essential characteristic of the merchandise – the p/n junction – is imparted in China.[82]
- Evidence on the record exists that undermines ET Solar's cost of production estimate. The expert witness cited by the Alliance estimated that the cost of production attributable to production occurring in Vietnam [ ] of the total cost of production, with [ ] attributable to production occurring in China.[83]
- The circumstances of ET Solar's inquiry are more analogous to *Bell Supply Co. v. United States*, in which the CIT found that the proprietary cost of manufacturing at issue was outweighed by the fact that the "essential component" of the unfinished and finished products was conferred in China prior to further processing in a third country.[84] Thus, Commerce should continue to find that the cost of production and value added during further processing should not overcome other record evidence that substantial transformation has not occurred.

Analysis:

Consistent with the Preliminary Scope Ruling and the arguments put forth by the Alliance, Commerce continues to find that the cost of production and value added in Vietnam do not

[78] *Id.* (citing [ ]).
[79] *Id*. at 7.
[80] *Id*. at 8 (citing *Peer Bearing Co. – Changshan* at 1291).
[81] *Id*.
[82] *Id*. at 1293.
[83] *See* the Alliance's Rebuttal Brief at 8-9.
[84] *Id*. at 9 (citing *Bell Supply Co. v. United States*, 393 F. Supp. 3d 1229 (Ct. Int'l Trade 2019) (*Bell Supply Co. v. United States*) at 1243).

account for a portion of the overall solar cell production costs and price that is sufficient to outweigh the conclusions drawn from the other four factors of the substantial transformation analysis.[85] As noted by ET Solar in its case brief, Commerce does not have an established threshold for determining whether a certain cost in a third country, by itself, represents substantial transformation. Thus, Commerce has the discretion to weigh the non-insignificant portion of production costs and final prices that can be attributed to further processing in Vietnam against the other components of the overall analysis. ET Solar does not put forth any arguments in its case brief that lead Commerce to reconsider the importance of the cost of production and value-added factor when compared with the totality of factors under consideration for the merchandise at issue.

Comment 5: Whether the Level of Investment Imparted to the Merchandise at Issue in Vietnam is Significant

ET Solar's Arguments:

- Commerce affirmed in the Preliminary Scope Ruling that it has set no quantitative threshold for what qualifies as a significant level of investment for its substantial transformation analysis framework.[86] In *Peer Bearing Co. – Changshan*, the CIT held that a scenario in which processing in a subject country requires relatively more types of production equipment than processing in a third country does not necessarily support a finding that a third-country level of investment is not significant.[87]
- ET Solar has already demonstrated on the record that the baseline capital required to purchase the equipment and machinery necessary for the manufacturing process amounts to [ ].[88] This number represents a massive level of investment, and does not account for factory overhead, maintenance, labor, and raw material costs associated with processing in Vietnam.[89]
- Commerce must give greater weight to the specific investment data provided by ET Solar than the "general third-party musings regarding processes occurring in the subject country" provided by the Alliance. The record demonstrates that the level of investment attributed to processing in Vietnam is significant.[90]

The Alliance's Arguments:

- ET Solar cites *Peer Bearing Co. – Changshan* to support its claim that initial processing in a country that requires a greater amount of production equipment than further processing in a third country does not necessarily mean that a third-country level of investment is not significant.[91] However, that case can be distinguished from the facts of ET Solar's scope inquiry because the former involved Commerce's total reliance on qualitative data to support its initial determination that the relative levels of investment did not justify a finding of substantial transformation, as noted by the CIT.[92] ET Solar

[85] Preliminary Scope Ruling at 12-13.
[86] *See* ET Solar's Case Brief at 9.
[87] *Id*.
[88] *Id*.
[89] *Id*.
[90] *Id*.
[91] *Id*.
[92] *Id*. at 9-10.

did not provide a baseline for the cost of processing equipment in China, but the Alliance provided quantitative data regarding relative rates of capital depreciation that allow for a comparative calculation of relative investment levels.[93]

- The information provided by the Alliance demonstrates that the capital investment required for Chinese-based processing is substantially higher than that required for the processing that occurs in Vietnam.[94] Commerce should continue to find that the solar cell production processes that take place in China "are more technologically complex and capital-intensive than in Vietnam" and "require higher levels of capital investment."[95]

Analysis:

Consistent with the Preliminary Scope Ruling and the arguments put forth by the Alliance, Commerce continues to find that the information on the record demonstrates that the solar cell production processes occurring in China are more technologically complex and capital-intensive than in Vietnam, and thus require higher levels of capital investment.[96] In *Bell Supply Co. v. United States*, the CIT affirmed Commerce's comparison of the capital investment required for downstream processing as a proxy for the degree of transformation in a third country.[97] As noted in the CIT's determination:

> The greater the investment, the analysis goes, the greater the transformation of the product. This approach is reasonable, so as not to evaluate the level of investment in a vacuum. Different industries have different barriers to entry – a small capital investment in one industry might be significant in another. Therefore, in order to contextualize the investment in further processing, it is reasonable to compare the level of investment required at different processing stages within the same industry.[98]

ET Solar failed to provide a discussion of levels of investment in China that might serve as a basis for comparing initial China-based production stages with the further processing stages undertaken in Vietnam, and did not make any arguments in its case brief that lead Commerce to reconsider its determination regarding level of investment in the context of the substantial transformation analysis. Thus, Commerce continues to find that the level of investment associated with third-country processing in Vietnam is not indicative of a substantial transformation of the merchandise at issue.

VII. CONCLUSION

Based on the totality of the evidence and the comments made by both parties on the plain language of the orders and the five criteria of the substantial transformation analysis, Commerce

[93] *Id*. at 10.
[94] *Id*.
[95] *Id*. at 9.
[96] Preliminary Scope Ruling at 13-14.
[97] *See Bell Supply Co. v. United States* at 23.
[98] *Id*.

continues to find that the unfinished Chinese solar cells used to produce the imported modules described by ET Solar in its scope inquiry are not substantially transformed as a result of the production processes undertaken in Vietnam. Accordingly, we continue to find that the modules at issue, as described in ET Solar's scope request, are within the scope of the *Orders*.

VIII. RECOMMENDATION

We recommend determining that the merchandise produced in Vietnam using certain Chinese-manufactured solar cells and imported by ET Solar is covered by the scope of the *Orders*. If you accept this recommendation, we will issue this final scope ruling.

☒ Agree ☐ Disagree

6/15/2021

X James Maeder

Signed by: JAMES MAEDER

James Maeder
Deputy Assistant Secretary
for Antidumping and Countervailing Duty Operations

EXHIBIT 4

77 FR 73018-01, 2012 WL 6055343(F.R.)

NOTICES

DEPARTMENT OF COMMERCE

International Trade Administration

[A-570-979]

Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From the People's Republic of China: Amended Final Determination of Sales at Less Than Fair Value, and Antidumping Duty Order

Friday, December 7, 2012

AGENCY: Import Administration, International Trade Administration, Department of Commerce.

***73018** DATES: Effective Date: December 7, 2012.

SUMMARY: Based on affirmative final determinations by the Department of Commerce (the "Department") and the International Trade Commission ("ITC"), the Department is issuing an antidumping duty order on crystalline silicon photovoltaic cells, whether or not assembled into modules ("solar cells"), from the People's Republic of China ("PRC"). In addition, the Department is amending its final determination to correct certain ministerial errors.

FOR FURTHER INFORMATION CONTACT: Jeffrey Pedersen, Krisha Hill, or Drew Jackson, AD/CVD Operations, Office 4, Import Administration, International Trade Administration, U.S. Department of Commerce, 14th Street and Constitution Avenue NW., Washington, DC 20230; telephone: (202) 482-2769, (202) 482-4037, or (202) 482-4406, respectively.

SUPPLEMENTARY INFORMATION:

Background

In accordance with sections 735(d) and 777(i)(1) of the Tariff Act of 1930, as amended ("Act"), on October 17, 2012, the Department published the final determination of sales at less than fair value, and affirmative final determination of critical circumstances, in part, in the antidumping duty investigation of solar cells from the PRC.[FN1] On November 30, 2012, the ITC notified the Department of its affirmative determination of material injury to a U.S. industry.[FN2] In addition, the ITC notified the Department of its final determination that critical circumstances do not exist with respect to imports of solar cells from the PRC that are subject to the Department's affirmative critical circumstances finding.[FN3]

1 See 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) ("Final Determination").

FN2 See Crystalline Silicon Photovoltaic Cells and Modules from China (Investigation Nos. 701-TA-481 and 731-TA-1190 (Final), USITC Publication 4360, November 2012).

FN3 See id.

Scope of the Order

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

This order 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.

Merchandise under consideration may be described at the time of importation as parts for final finished products that are assembled after importation, including, but not limited to, modules, laminates, panels, building-integrated modules, building-integrated panels, or other finished goods kits. Such parts that otherwise meet the definition of merchandise ***73019** under consideration are included in the scope of this order.

Excluded from the scope of this order 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 order are crystalline silicon photovoltaic cells, not exceeding 10,000mm [FN2] 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 PRC are covered by this order; however, modules, laminates, and panels produced in the PRC from cells produced in a third-country are not covered by this order.

Merchandise covered by this order 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.[FN4] These HTSUS subheadings are provided for convenience and customs purposes; the written description of the scope of this order is dispositive.

4 U.S. Customs and Border Protection ("CBP") provided notification that HTSUS number 8501.31.8000 should be added to the scope of the investigation, as certain articles under this number may fall within the scope. See Memorandum from Gene H. Calvert through Mark Hoadley to the File, "ACE Case Reference File Update," dated May 16, 2012.

Amendment to the Final Determination

On October 17, 2012, the Department published its affirmative final determination in this proceeding.[FN5] On October 19, 2012, Wuxi Suntech Power Co., Ltd. ("Wuxi Suntech") respondent in the investigation, submitted timely ministerial error allegations and requested that the Department correct the alleged ministerial errors in the dumping margin calculations. On October 24, 2012, Solar World Industries America, Inc., ("Petitioner") submitted timely rebuttal comments. No other interested party submitted ministerial error allegations or replied to Wuxi Suntech's submission.

5 See Final Determination.

After analyzing all interested party comments and rebuttals, we have determined, in accordance with section 735(e) of the Act and 19 CFR 351.224(e), that we made the following ministerial errors in our calculations for the Final Determination with respect to Wuxi Suntech:

• In calculating net U.S. price, we incorrectly overstated the amount of certain advertising expenses that we deducted from gross price.

• In calculating the weighted average unit value of reported silicon wafers, we incorrectly overstated the quantity of silicon wafers purchased from non-market economy suppliers.

In addition to correcting the ministerial errors described above, we corrected an error regarding the valuation of Wuxi Suntech's installation manuals.[FN6]

6 For a detailed discussion of all alleged ministerial errors, as well as the Department's analysis, see memorandum regarding, "Ministerial Error Memorandum, Amended Final Determination of Sales at Less Than Fair Value: Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules, from the People's Republic of China," dated concurrently with this notice ("Ministerial Error Memorandum").

In the Final Determination, we determined that a number of companies, in addition to the mandatory respondents, qualified for a separate rate.[FN7] Since the cash deposit rate for the separate rate respondents is based on the average of the margins for the mandatory respondents, and the margin for Wuxi Suntech changed as a result of the aforementioned ministerial errors, we have revised the calculation of the dumping margin for the separate rate respondents in the amended final determination.[FN8] The amended weighted average dumping margins are provided, below.

7 See Final Determination.

FN8 See Ministerial Error Memorandum.

Antidumping Duty Order

As noted above, on November 30, 2012, in accordance with section 735(d) of the Act, the ITC notified the Department of its final determination in this investigation, in which it found material injury with respect to solar cells from the PRC. Because the ITC determined that imports of solar cells from the PRC are materially injuring a U.S. industry, unliquidated entries of such merchandise from the PRC, entered or withdrawn from warehouse, are subject to the assessment of antidumping duties.

Therefore, in accordance with section 736(a)(1) of the Act, the Department will direct CBP to assess, upon further instruction by the Department, antidumping duties equal to the amount by which the normal value of the merchandise exceeds the export price (or constructed export price) of the merchandise, for all relevant entries of solar cells from the PRC. These antidumping duties will be assessed on unliquidated entries from the PRC entered, or withdrawn from warehouse, for consumption on or after May 25, 2012, the date on which the Department published its Preliminary Determination,[FN9] but will not include entries occurring after the expiration of the provisional measures period and before publication of the ITC's final injury determination as further described below.

9 See 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) ("Preliminary Determination").

Continuation of Suspension of Liquidation

In accordance with section 735(c)(1)(B) of the Act, we will instruct CBP to continue to suspend liquidation on entries of subject merchandise from the PRC. We will also instruct CBP to require cash deposits equal to the estimated amount by which the normal value exceeds the U.S. price as indicated in the chart below. These cash deposit rates will be adjusted, where appropriate, for export subsidies. These instructions suspending liquidation will remain in effect until further notice.

Accordingly, effective on the date of publication of the ITC's final affirmative injury determination, CBP will require, at the same time as importers would normally deposit estimated duties on this subject merchandise, a cash deposit equal to the estimated weighted-average antidumping duty margins as discussed above, adjusted, where appropriate, for export subsidies.[FN10] The "PRC-wide" rate applies to all exporters of subject merchandise not specifically listed.

10 See section 736(a)(3) of the Act.

Provisional Measures

Section 733(d) of the Act states that instructions issued pursuant to an affirmative preliminary determination may not remain in effect for more than four months except where exporters representing a significant proportion of exports of the subject merchandise request the Department to extend that four-month period to no more than six months. At the request of exporters that account for a significant proportion of exports of solar cells from the PRC, we extended the four-month period to no more than six months.[FN11] In the underlying investigation, the Department published the Preliminary ***73020** Determination on May 25, 2012.[FN12] Therefore, the six-month period beginning on the date of the publication of the Preliminary Determination ended on November 21, 2012. Furthermore, section 737(b) of the Act states that definitive duties are to begin on the date of publication of the ITC's final injury determination.

11 See Preliminary Determination.

FN12 See Preliminary Determination.

Therefore, in accordance with section 733(d) of the Act and our practice, we will instruct CBP to terminate the suspension of liquidation and to liquidate, without regard to antidumping duties, unliquidated entries of solar cells from the PRC entered, or withdrawn from warehouse, for consumption after November 21, 2012, the date provisional measures expired, and through the day preceding the date of publication of the ITC's final injury determination in the Federal Register. Suspension of liquidation will resume on and after the date of publication of the ITC's final injury determination in the Federal Register.

The weighted-average dumping margins are as follows:

Exporter	Producer	Weighted-average percent margin
Changzhou Trina Solar Energy Co., Ltd. and Trina Solar (Changzhou) Science & Technology Co., Ltd	Changzhou Trina Solar Energy Co., Ltd	18.32
	Trina Solar (Changzhou) Science & Technology Co., Ltd	18.32
Wuxi Suntech Power Co., Ltd., Luoyang Suntech Power Co., Ltd., Suntech Power Co., Ltd. and Wuxi Sun-shine Power Co., Ltd	Wuxi Suntech Power Co., Ltd	29.14
	Luoyang Suntech Power Co., Ltd	29.14
	Suntech Power Co., Ltd	29.14
	Wuxi Sun-shine Power Co., Ltd	29.14
Baoding Tianwei Yingli New Energy Resources Co., Ltd	Baoding Tianwei Yingli New Energy Resources Co., Ltd	24.48
	Yingli Energy (China) Company Limited	24.48

Tianwei New Energy (Chengdu) PV Module Co., Ltd	Tianwei New Energy (Chengdu) PV Module Co., Ltd	24.48
Canadian Solar International Limited	Canadian Solar Manufacturing (Changshu) Inc	24.48
	Canadian Solar Manufacturing (Luoyang) Inc	24.48
Canadian Solar Manufacturing (Changshu) Inc	Canadian Solar Manufacturing (Changshu), Inc	24.48
Canadian Solar Manufacturing (Luoyang) Inc	Canadian Solar Manufacturing (Luoyang), Inc	24.48
Hanwha Solarone (Qidong) Co., Ltd	Hanwha Solarone (Qidong) Co., Ltd	24.48
CEEG (Shanghai) Solar Science Technology Co., Ltd	CEEG (Shanghai) Solar Science Technology Co., Ltd	24.48
	CEEG Nanjing Renewable Energy Co., Ltd	24.48
CEEG Nanjing Renewable Energy Co., Ltd	CEEG Nanjing Renewable Energy Co., Ltd	24.48
Jiawei Solarchina Co., Ltd	Jiawei Solarchina (Shenzhen) Co., Ltd	24.48
Yingli Energy (China) Company Limited	Yingli Energy (China) Company Limited	24.48
	Baoding Tianwei Yingli New Energy Resources Co., Ltd	24.48
LDK Solar Hi-tech (Nanchang) Co., Ltd	LDK Solar Hi-tech (Nanchang) Co., Ltd	24.48
LDK Solar Hi-tech (Suzhou) Co., Ltd	LDK Solar Hi-tech (Suzhou) Co., Ltd	24.48
Jiawei Solarchina (Shenzhen) Co., Ltd	Jiawei Solarchina (Shenzhen) Co., Ltd	24.48
Changzhou NESL Solartech Co., Ltd	Changzhou NESL Solartech Co., Ltd	24.48
China Sunergy (Nanjing) Co., Ltd	China Sunergy (Nanjing) Co., Ltd	24.48
Chint Solar (Zhejiang) Co., Ltd	Chint Solar (Zhejiang) Co., Ltd	24.48
Suzhou Shenglong PV-Tech Co., Ltd	Suzhou Shenglong PV-TECH Co., Ltd	24.48
tenKsolar (Shanghai) Co., Ltd	tenKsolar (Shanghai) Co., Ltd	24.48
Upsolar Group, Co., Ltd	HC Solar Power Co., Ltd	24.48
	Zhiheng Solar Inc	24.48
	Zhejiang Leye Photovoltaic Science & Technology Co., Ltd	24.48

	Tianwei New Energy (Chengdu) PV Module Co., Ltd		24.48
	Zhejiang ZG-Cells Co., Ltd		24.48
	Zhejiang Xinshun Guangfu Science and Technology Co., Ltd		24.48
	Zhejiang Jiutai New Energy Co., Ltd		24.48
Wanxiang Import & Export Co., Ltd	Zhejiang Wanxiang Solar Co., Ltd		24.48
Jinko Solar Import and Export Co., Ltd	Jinko Solar Co., Ltd		24.48
JinkoSolar International Limited	Jinko Solar Co., Ltd		24.48
CNPV Dongying Solar Power Co., Ltd	CNPV Dongying Solar Power Co., LTD		24.48
CSG PVTech Co., Ltd	CSG PVTech Co., Ltd		24.48
Delsolar Co., Ltd	DelSolar (Wujiang) Ltd		24.48
Dongfang Electric (Yixing) MAGI Solar Power Technology Co., Ltd	Dongfang Electric (Yixing) MAGl Solar Power Technology Co., Ltd		24.48
Eoplly New Energy Technology Co., Ltd	Eoplly New Energy Technology Co., Ltd		24.48
ERA Solar Co., Ltd	ERA Solar Co., Ltd		24.48
ET Solar Energy Limited	ET Solar Industry Limited		24.48
Hangzhou Zhejiang University Sunny Energy Science and Technology Co., Ltd	Hangzhou Zhejiang University Sunny Energy Science and Technology Co., Ltd		24.48
Himin Clean Energy Holdings Co., Ltd	Himin Clean Energy Holdings Co., Ltd		24.48
JA Solar Technology Yangzhou Co., Ltd	JingAo Solar Co., Ltd		24.48
Jetion Solar (China) Co., Ltd	Jetion Solar (China) Co., Ltd		24.48
Jiangsu Green Power PV Co., Ltd	Jiangsu Green Power PV Co., Ltd		24.48
Jiangsu Sunlink PV Technology Co., Ltd	Jiangsu Sunlink PV Technology Co., Ltd		24.48
JingAo Solar Co., Ltd	JingAo Solar Co., Ltd		24.48
Konca Solar Cell Co., Ltd	Konca Solar Cell Co., Ltd		24.48
Leye Photovoltaic Co., Ltd	Leye Photovoltaic Co., Ltd	24.48	
Lightway Green New Energy Co., Ltd	Lightway Green New Energy Co., Ltd		24.48

Motech (Suzhou) Renewable Energy Co., Ltd	Motech (Suzhou) Renewable Energy Co., Ltd	24.48
Ningbo ETDZ Holdings, Ltd	Hangzhou Zhejiang University Sunny Energy Science and Technology Co., LTD	24.48
Ningbo Komaes Solar Technology Co., Ltd	Ningbo Komaes Solar Technology Co., Ltd	24.48
Ningbo Qixin Solar Electrical Appliance Co., Ltd	Ningbo Qixin Solar Electrical Appliance Co., Ltd	24.48
Ningbo Ulica Solar Science & Technology Co., Ltd	Ningbo Ulica Solar Science & Technology Co., Ltd	24.48
Perlight Solar Co., Ltd	Perlight Solar Co., Ltd	24.48
Risen Energy Co., Ltd	Risen Energy Co., Ltd	24.48
Shanghai BYD Company Limited	Shanghai BYD Company Limited	24.48
Shanghai JA Solar Technology Co., Ltd	Shanghai JA Solar Technology Co., Ltd	24.48
Shanghai Solar Energy Science & Technology Co., Ltd	Shanghai Solar Energy Science & Technology Co., Ltd	24.48
Shenzhen Topray Solar Co., Ltd	Shenzhen Topray Solar Co., Ltd	24.48
Solarbest Energy-Tech (Zhejiang) Co., Ltd	Solarbest Energy-Tech (Zhejiang) Co., Ltd	24.48
Sopray Energy Co., Ltd	Sopray Energy Co., Ltd	24.48
Sumec Hardware & Tools Co., Ltd	Phono Solar Technology Co., Ltd	24.48
Sun Earth Solar Power Co., Ltd	Sun Earth Solar Power Co., Ltd	24.48
Yuhuan Sinosola Science & Technology Co., Ltd	Yuhuan Sinosola Science & Technology Co., Ltd	24.48
Yuhuan Solar Energy Source Co., Ltd	Yuhuan Solar Energy Source Co., Ltd	24.48
Zhejiang Jiutai New Energy Co., Ltd	Zhejiang Topoint Photovoltaic Co., Ltd	24.48
Zhejiang Shuqimeng Photovoltaic Technology Co., Ltd	Zhejiang Shuqimeng Photovoltaic Technology Co., Ltd	24.48
Zhejiang Sunflower Light Energy Science & Technology Limited Liability Company	Zhejiang Sunflower Light Energy Science & Technology Limited Liability Company	24.48
PRC-Wide Rate		249.96

***73018** With regard to the ITC's negative critical circumstances determination on imports of the solar cells from the PRC, we will instruct CBP to lift suspension and to release any bond or other security, and refund any cash deposit made, to secure the

payment of estimated antidumping duties with respect to entries of the merchandise entered, or withdrawn from warehouse, for consumption on or after February 25, 2012 (i.e., 90 days prior to the date of publication of the Preliminary Determination), but before May 25, 2012.

This notice constitutes the antidumping duty order with respect to solar cells from the PRC pursuant to section 736(a) of the Act. Interested parties may contact the Department's Central Records Unit, Room 7043 of the main Commerce building, for copies of an updated list of antidumping duty orders currently in effect.

This order and amended final determination are published in accordance with sections 736(a) and 735(e) of the Act and 19 CFR 351.211 and 351.224(e).

Dated: December 3, 2012.

Ronald K. Lorentzen,

Acting Assistant Secretary for Import Administration.

[FR Doc. 2012-29668 Filed 12-6-12; 8:45 am]

BILLING CODE 3510-DS-P

EXHIBIT 5

77 FR 73017-01, 2012 WL 6055342(F.R.)

NOTICES

DEPARTMENT OF COMMERCE

International Trade Administration

[C-570-980]

Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From the People's Republic of China: Countervailing Duty Order

Friday, December 7, 2012

AGENCY: Import Administration, International Trade Administration, Department of Commerce.

***73017** SUMMARY: Based on an affirmative final determination by the U.S. International Trade Commission (ITC), the Department of Commerce (the Department) is issuing a countervailing duty order on crystalline silicon photovoltaic cells, whether or not assembled into modules (solar cells), from the People's Republic of China (PRC). On November 30, 2012, the ITC notified the Department of its affirmative determination of material injury to a U.S. industry.[FN1] [FN1] See Crystalline Silicon Photovoltaic Cells and Modules from China, Investigation Nos. 701-TA-481 and 731-TA-1190 (Final), USITC Publication 4360 (November 2012).

DATES: Effective Date: December 7, 2012.

FOR FURTHER INFORMATION CONTACT: Gene Calvert, Jun Jack Zhao, or Emily Halle, AD/CVD Operations, Office 6, Import Administration, U.S. Department of Commerce, Room 7866, 14th Street and Constitution Avenue NW., Washington, DC 20230; telephone: (202) 482-3586, (202) 482-1396, or (202) 482-0176, respectively.

SUPPLEMENTARY INFORMATION:

Case History

In accordance with section 705(d) of the Tariff Act of 1930, as amended (the Act), on October 17, 2012, the Department published its final determination in the countervailing duty investigation of solar cells from the PRC.[FN2]

2 See 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).

Scope of the Order

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

This order 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.

Merchandise under consideration may be described at the time of importation as parts for final finished products that are assembled after importation, including, but not limited to, modules, laminates, panels, building-integrated modules, building-

integrated panels, or other finished goods kits. Such parts that otherwise meet the definition of merchandise under consideration are included in the scope of this order.

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

Modules, laminates, and panels produced in a third-country from cells produced in the PRC are covered by this order; however, modules, laminates, and panels produced in the PRC from cells produced in a third-country are not covered by this order.

Merchandise covered by this order 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.[FN3] These HTSUS subheadings are provided for convenience and customs purposes; the written description of the scope of this order is dispositive.

3 U.S. Customs and Border Protection (CBP) provided notification that HTSUS number 8501.31.8000 should be added to the scope of the order, as certain articles under this number might fall within the scope. See the May 16, 2012 Memorandum to The File, "ACE Case Reference File Update."

Countervailing Duty Order

On November 30, 2012, the ITC notified the Department of its final determination, pursuant to section 705(b)(1)(A)(i) of the Act, that an industry in the United States is materially injured as a result of subsidized imports from the PRC. The ITC also determined that critical circumstances do not exist with respect to subject imports from the PRC.

As a result of the ITC's final determination, in accordance with section 706(a) of the Act, the Department will direct CBP to assess, upon further instruction by the Department, countervailing duties on unliquidated entries of solar cells from the PRC entered, or withdrawn from warehouse, for consumption on or after March 26, 2012, the date on which the Department published its preliminary countervailing duty determination in the Federal Register, and before July 24, 2012, the date on which the Department instructed CBP to discontinue the suspension of liquidation in accordance with section 703(d) of the Act. Section 703(d) of the Act states that the suspension of liquidation pursuant to a preliminary determination may not remain in effect for more than four months. Entries of solar cells from the PRC made on or after July 24, 2012, and prior to the date of publication of the ITC's final determination in the Federal Register are not liable for the assessment of countervailing duties, due ***73018** to the Department's discontinuation, effective July 24, 2012, of the suspension of liquidation.

The ITC determined that critical circumstances do not exist with respect to subject imports from the PRC. Because of the ITC's negative determination of critical circumstances, the Department will direct CBP to refund all cash deposits collected on entries of solar cells from the PRC which were entered, or withdrawn from warehouse, for consumption on or after December 27, 2011, and before March 26, 2012. The interest provisions of section 778 of the Act do not apply.

In accordance with section 706 of the Act, the Department will direct CBP to reinstitute the suspension of liquidation of solar cells from the PRC, effective the date of publication of the ITC's notice of final determination in the Federal Register, and to assess, upon further advice from the Department pursuant to section 706(a)(1) of the Act, countervailing duties for each entry of the subject merchandise in an amount based on the net countervailable subsidy rates for the subject merchandise. On or after

the date of publication of the ITC's final injury determination in the Federal Register, CBP must require, at the same time as importers would normally deposit estimated duties on this merchandise, a cash deposit equal to the rates noted below:

Company	Subsidy rate
Changzhou Trina Solar Energy Co., Ltd.; Trina Solar (Changzhou) Science and Technology Co., Ltd. (collectively, Trina Solar)	15.97 percent ad valorem.
Wuxi Suntech Power Co., Ltd.; Luoyang Suntech Power Co., Ltd.; Suntech Power Co., Ltd.; Yangzhou Rietech Renewal Energy Co., Ltd.; Zhenjiang Huantai Silicon Science & Technology Co., Ltd.; Kuttler Automation Systems (Suzhou) Co., Ltd.; Shenzhen Suntech Power Co., Ltd.; Wuxi Sunshine Power Co., Ltd.; Wuxi University Science Park International Incubator Co., Ltd.; Yangzhou Suntech Power Co., Ltd.; and Zhenjiang Rietech New Energy Science & Technology Co., Ltd; (collectively, Wuxi Suntech)	14.78 percent ad valorem.
All Others Rate	15.24 percent ad valorem.

This notice constitutes the countervailing duty order with respect to solar cells from the PRC pursuant to section 706(a) of the Act. Interested parties may contact the Department's Central Records Unit, Room 7046 of the main Commerce building, for copies of an updated list of countervailing duty orders currently in effect.

This countervailing duty order is issued and published in accordance with sections 705(c)(2) and 706 of the Act, and 19 CFR 351.211.

Dated: December 3, 2012.

Ronald K. Lorentzen,

Acting Assistant Secretary for Import Administration.

[FR Doc. 2012-29669 Filed 12-6-12; 8:45 am]

BILLING CODE 3510-DS-P

EXHIBIT 6

A-570-979
C-570-980
Scope Ruling
Public Document
E&C Office VII: DSA

October 23, 2020

MEMORANDUM TO: James Maeder
Deputy Assistant Secretary
for Antidumping and Countervailing Duty Operations

THROUGH: Melissa G. Skinner
Senior Director, Office VII
Antidumping and Countervailing Duty Operations

FROM: Daniel Alexander
International Trade Compliance Analyst, Office VII
Antidumping and Countervailing Duty Operations

SUBJECT: Antidumping and Countervailing Duty Orders on Crystalline Silicon Photovoltaic Cells from the People's Republic of China: SunSpark Technology Inc. Scope Ruling

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SUMMARY

Based on our analysis of SunSpark Technology Inc.'s (SunSpark's) complete scope ruling request, we recommend determining that the photovoltaic products at issue are not covered by the scope of the *Orders*, to the extent that the silicon wafers exported from the People's Republic of China (China) to the Socialist Republic of Vietnam (Vietnam) lack the physical properties necessary to be considered crystalline silicon photovoltaic cells (solar cells), as described within the scope of the *Orders*.[1] (Under the *Orders*, solar "products," including modules, laminates, and/or panels produced/assembled outside China may be subject to the Chinese *Orders* on solar "cells" if produced/assembled from Chinese origin cells.)

BACKGROUND

On July 22, 2020, the Department of Commerce (Commerce) received a complete scope ruling request from SunSpark Technology Inc. (SunSpark), an importer of crystalline solar panels and solar cells that were manufactured in Vietnam by the solar company, Irex Energy Joint Stock

[1] *See Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, from the People's Republic of China: Amended Final Determination of Sales at Less Than Fair Value, and Antidumping Duty Order*, 77 FR 73018 (December 7, 2012) and *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, from the People's Republic of China: Countervailing Duty Order*, 77 FR 73017 (December 7, 2012) (*Orders*).

Company (Irex), and then exported to the United States.[2] Irex is a Vietnamese solar cell and solar panel manufacturer and supplier. SunSpark requested under 19 CFR 351.225(c) that Commerce determine whether certain crystalline photovoltaic solar panels and cells imported from Vietnam are within the scope of the antidumping duty (AD) and countervailing duty (CVD) *Orders* on solar cells from China.[3]

In response to a previous request filed by SunSpark, Commerce issued a final scope determination on January 23, 2020, that solar modules, laminates and/or panels assembled in Vietnam consisting of Vietnamese solar cells containing unprocessed wafers from the People's Republic of China (China) which SunSpark imports are not within the scope of the AD and CVD orders on crystalline silicon photovoltaic products from China (A-570-010 and C-570-011).[4] Commerce determined that solar modules, laminates and/or panels assembled in Vietnam consisting of Vietnamese solar cells produced from unprocessed wafers from China are outside the scope of the order because they are assembled in Vietnam and therefore differ from the merchandise subject to the orders on modules, laminates, and/or panels, which are assembled in China from cells originating outside of China. The new scope ruling request was made in response to Custom and Border Patrol's (CBP) message to SunSpark on April 10, 2020, wherein CBP informed SunSpark through an email message that after consultation with a National Import Specialist it believes that the merchandise is subject to A-552-988 and A-552-989 (case numbers in CBP's Automated Commercial Environment (ACE) module for Chinese solar cells CBP considers as originating in Vietnam due to the substantial transformation of the Chinese inputs in Vietnam).[5] The products within this request consist of certain crystalline photovoltaic solar panels and cells that are manufactured in Vietnam, then exported to the United States.

SCOPE OF THE *ORDERS*

The merchandise covered by the *Orders* is crystalline silicon photovoltaic cells, and modules, laminates, and panels, consisting of crystalline silicon photovoltaic cells, whether or not partially or fully assembled into other products, including, but not limited to, modules, laminates, panels and building integrated materials.

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

Merchandise under consideration may be described at the time of importation as parts for final finished products that are assembled after importation, including, but not limited to, modules, laminates, panels, building-integrated modules, building-integrated panels, or other finished

[2] *See* Letter to the Secretary from SunSpark, "Scope Inquiry on Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules, from the PRC," (July 22, 2020) (SunSpark Scope Request).
[3] *See* SunSpark Scope Request at 1.
[4] *See* "Antidumping and Countervailing Duty Orders on Crystalline Silicon Photovoltaic Products from the People's Republic of China: SunSpark Technology Inc. Scope Ruling," (January 23, 2020).
[5] *See* SunSpark Scope Request at 26.

goods kits. Such parts that otherwise meet the definition of merchandise under consideration are included in the scope of the *Orders*.

Excluded from the scope of the *Orders* are thin film photovoltaic products produced from amorphous silicon (a-Si), cadmium telluride (CdTe), or copper indium gallium selenide (CIGS). Also excluded from the scope of the *Orders* 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.

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

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

Also excluded from the scope of the *Orders* are:
(1) Off grid CSPV panels in rigid form with a glass cover, with the following characteristics:
(A) A total power output of 100 watts or less per panel;
(B) a maximum surface area of 8,000 cm2 per panel;
(C) do not include a built-in inverter;
(D) must include a permanently connected wire that terminates in either an 8mm male barrel connector, or a two-port rectangular connector with two pins in square housings of different colors;
(E) must include visible parallel grid collector metallic wire lines every 1–4 millimeters across each solar cell; and
(F) must be in individual retail packaging (for purposes of this provision, retail packaging typically includes graphics, the product name, its description and/or features, and foam for transport); and
(2) Off grid CSPV panels without a glass cover, with the following characteristics:
(A) A total power output of 100 watts or less per panel;
(B) a maximum surface area of 8,000 cm2 per panel;
(C) do not include a built-in inverter;
(D) must include visible parallel grid collector metallic wire lines every 1–4 millimeters across each solar cell; and
(E) each panel is
1. permanently integrated into a consumer good;

2. encased in a laminated material without stitching, or
3. has all of the following characteristics:
(i) the panel is encased in sewn fabric with visible stitching, (ii) includes a mesh zippered storage pocket, and (iii) includes a permanently attached wire that terminates in a female USB–A connector.

Modules, laminates, and panels produced in a third country from cells produced in China are covered by the *Orders*; however, modules, laminates, and panels produced in China from cells produced in a third country are not covered by the *Orders*.

Merchandise covered by the *Orders* is currently classified in the 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 the *Orders* is dispositive.

LEGAL FRAMEWORK

When a request for a scope ruling is filed, we examine the scope language of the order at issue and the description of the product contained in the scope ruling request.[6] Pursuant to Commerce's regulations, we may also examine other information, including the description of the merchandise contained in the petition, the record from the investigation, and prior scope determinations made for the same product.[7] If we determine that these sources are sufficient to decide the matter, we will issue a final scope ruling as to whether the merchandise in question is covered by an order.[8]

Conversely, where these descriptions of the merchandise are not dispositive, we will consider the five additional factors set forth in section 351.225(k)(2) of Commerce's regulations. These criteria are: (i) the physical characteristics of the merchandise; (ii) the expectations of the ultimate purchasers; (iii) the ultimate use of the product; (iv) the channels of trade in which the product is sold; and (v) the manner in which the product is advertised and displayed. The determination as to which analytical framework is most appropriate in any given scope inquiry is made on a case-by-case basis after careful consideration of all evidence before Commerce.

DESCRIPTION OF MERCHANDISE SUBJECT TO THIS REQUEST

The merchandise at issue is crystalline silicon photovoltaic solar panels manufactured and assembled in Vietnam by Irex, a Vietnamese producer and supplier of solar cells and solar panels.[9] Such panels could be considered within the *Orders* if produced/assembled from solar cells originating in China. SunSpark states that the Chinese inputs at issue consist of raw wafers that are imported into Vietnam from China and are then manufactured into solar cells in Vietnam.[10] The solar cells embedded in the panels at issue are produced using solar wafers

[6] *Id.* at 5.
[7] *See* 19 CFR 351.225(k)(1).
[8] *See* 19 CFR 351.225(d).
[9] *See* SunSpark Scope Request at 3-4.
[10] *Id.* at 3.

purchased and imported from Suzhou Firtsource New Energy Science & Technology Co., Ltd. (Firtsource), a Chinese solar wafer manufacturer.[11] According to SunSpark, Irex purchases solar wafers, the raw material that Irex uses to produce the solar cells it sells to SunSpark after further conversion and assembly into panels, from Firtsource.[12] SunSpark cites to Vietnamese import declaration forms, as well as solar cell processing procedures conducted by Irex within Vietnam as examples of the products it imports from China and the processing that takes place in Vietnam.[13] SunSpark states that Irex then manufactures solar cells from the imported raw wafers in Vietnam by performing a series of high-tech production processes in order to transform them into energy-collecting solar cells, including the addition of the p/n junctions necessary to convert solar energy into electrical currents, before they are further processed and assembled into panels that are exported to the United States.[14]

COMMENTS FROM INTERESTED PARTIES

SunSpark states that the raw wafers imported into Vietnam from China fall outside of the scope of the *Orders* on photovoltaic products from China because the product imported into Vietnam from China lacks the physical characteristics required to be considered a solar cell. These characteristics are the result of a series of highly technical production processes, including the creation of a p/n junction, which is the characteristic that plays the key role in converting solar energy into electrical current.[15] SunSpark further states that the products that it imports into the United States are not produced or assembled in China, as the production and manufacturing occurs at Irex's facility within Vietnam. As such, SunSpark contends, based on the evidence provided within its scope request, the solar cells at issue do not fall within the scope of the *Orders* under A-570-979 and C-570-980 and therefore are not subject merchandise under A-552-988 and C-552-989.[16]

No additional comments were filed by interested parties, including the domestic industry.

ANALYSIS

In its complete scope request, SunSpark submitted a production flowchart and accompanying narrative describing the various processes, including chemical etching, gas diffusion, creation of a p/n junction and metallic screen-printing, that are utilized by Irex to process solar wafers (a raw silicon input for solar cells) and transform them into photovoltaic cells and then into assembled panels/modules (finished, functional solar panels) in Vietnam.[17] SunSpark also submitted an invoice, packing list, import declaration form, workshop production record, and wire transfer receipt as well as photographs of the raw wafers and finished solar cells, indicating that Irex purchased the unfinished solar wafers from Chinese producer Firtsource and imported them from

[11] *Id.* at 32.
[12] *Id.* at 3.
[13] *Id.* at 32-40 and 43.
[14] *Id.* at 3-4.
[15] *Id.* at 4.
[16] *Id.* at 7.
[17] *See* SunSpark Scope Request at 43.

China to Irex's production factory in Vietnam, where the raw wafers were used to produce solar cells and, subsequently, solar panels.[18]

Also included within the documents is a detailed flow chart of how Irex's production facility takes raw silicon wafers and performs all of the chemical and heat-based processes required to transform a silicon wafer into a solar cell. These processes include shipping raw wafers from the warehouse to the production facility, texturing the wafer, acid cleaning, the creation of a p/n junction, and performing plasma-enhanced chemical vapor deposition, all of which are critical steps in manufacturing a solar cell from a silicon wafer. The import declarations from Vietnam classify the imports under commodity code 3818, which are considered "chemical elements doped for use in electronics, in the form of discs, wafers or similar forms; chemical compounds doped for use in electronics" (accurately describing a silicon wafer).[19] However, while the wafers imported from China are already partially doped, the p/n junction is not created in the wafer until the doping is completed by the diffusion process that takes place in Vietnam.[20]

In sum, the raw material purchased from China by Irex, partially processed solar wafers, does not fall within this scope because there is not yet a p/n junction. Since there is not yet a p/n junction, the raw material is not a photovoltaic cell from China within the meaning of the scope of the *Orders*. Therefore, based on the record evidence and descriptions submitted by SunSpark and the language of the scope of the *Orders*, the merchandise at issue in this scope inquiry is not within the scope of the *Orders*.

RECOMMENDATION

For the reasons listed above, we recommend finding that solar cells produced in Vietnam from raw wafers imported from China are not subject to the scope of the *Orders* on solar cells from China. We also recommend that this ruling be applicable to all solar cells and panels/modules produced in Vietnam, irrespective of the producer, importer, or exporter, from wafers imported from China without a p/n junction.

[18] *Id.* at 28-48.
[19] *Id.* at 32-40
[20] *See* SunSpark Scope Request at 5 and Exhibit F (flow chart).

Pursuant to 19 CFR 351.225(l)(3), we will instruct CBP not to suspend liquidation of entries, and to discontinue the suspension of liquidation of entries, if any, of the products covered by this scope ruling.

☒	☐
Agree	Disagree

10/23/2020

X James Maeder

Signed by: JAMES MAEDER

James Maeder
Deputy Assistant Secretary
for Antidumping and Countervailing Duty Operations

EXHIBIT 7

HQ H301813

May 24, 2019

OT:RR:CTF:FTM H301813 YAG

CATEGORY: Origin

Center Director, Industrial & Manufacturing Materials CEE
U.S. Customs and Border Protection
Office of Field Operations
Port of San Francisco
555 Battery St., RM#417
San Francisco, CA 94111

Attn: Mr. Charles Ho, Import Specialist, Validation and Compliance 059

Re: Country of Origin; Substantial Transformation; Solar Cells; Solar Panels; Applicability of Section 201 Safeguard Measures

Dear Center Director:

This is in reference to the internal advice request, dated November 9, 2018, filed on behalf of Merlin Solar Technologies ("Merlin"), regarding the country of origin and the applicability of Section 201 of the Trade Act of 1974, as amended (19 U.S.C. § 2252) ("Section 201 safeguard measures") measures with respect to the importation of certain Crystalline Silicon Photovoltaic ("CSPV") solar modules, assembled in India from solar cells produced in Taiwan.

FACTS:

Merlin purchases CSPV cells produced by a company in Taiwan. These solar cells undergo substantial manufacturing processes in Taiwan, and already have a positive-negative, or P/N junction, but lack the metallization and conductor patterns that collect and forward the electricity that is generated by the cell. The Taiwanese solar cells are then shipped to a contract manufacturer in India, Waaree Inc. ("Waaree"). In India, Waaree further processes the solar cells by attaching Merlin's proprietary metalized grid to the front of the solar cell and a copper mesh to the back. Waaree then assembles solar cells into finished solar modules and panels. Merlin has prepared and submitted for our review a summary document that details the manufacturing process performed by Waaree in India to complete the solar cells and then assemble the solar cells into modules or panels.

ISSUE:

Whether the CSPV products at issue fall within the scope of the Section 201 safeguard measures and are consequently subject to increased duties.

LAW AND ANALYSIS:

Effective January 23, 2018, Presidential Proclamation 9693 imposed safeguard measures on imports of CSPV cells and certain products incorporating CSPV cells in the form of additional tariffs or tariff rate quotas for a period of three years. Products classified under subheading 8541.40, HTSUS, unless specifically excluded, are subject to the additional duties. *See* Note 18 to Chapter 99 and subheadings 9903.45.21 through 9903.45.25, HTSUS.

According to Note 18(g) to Chapter 99, "modules" within the meaning of subheading 9903.45.25, HTSUS, include, *inter alia*, products of subheading 8541.40.60 of the permanent HTSUS consisting of "a joined group of CSPV cells…capable of generating electricity." *See* Note 18 to Chapter 99 and subheadings 9903.45.21 through 9903.45.25, HTSUS. Regarding the latter criterion, CSPV cells are defined in Note 18(c) as "crystalline silicon photovoltaic cells of a thickness equal to or greater than 20 micrometers…having a p/n junction."

Subheading 9903.45.25, HTSUS, applies to modules which are "the product or originating good of a country other than a country described in note 18(b)." Note 18(b) in turn provides that "for the purposes of this note and the application of subheadings 9903.45.21 through 9903.45.25," certain enumerated "developing countries that are members of the World Trade Organization shall not be subject to the rates of duty…provided for therein." As stated above, the solar modules at issue are assembled in India, which is included in the list of countries exempt from the rates of duty appertaining to subheading 9903.45.25, HTSUS. However, the solar cells which are contained in the solar modules are produced in Taiwan. Therefore, we must determine whether the production steps undertaken in India render the modules "products" of India, in which case they would not fall within the scope of the subheading.

In cases involving Section 201 safeguard measures, CBP has consistently applied a traditional "substantial transformation" analysis for purposes of interpreting "product of." *See* Headquarters Ruling Letter ("HQ") 563205, dated June 28, 2006; HQ 563211, dated April 26, 2005; and HQ 734479, dated January 29, 1993; *see also Belcrest Linens v. United States,* 6 C.I.T. 204, 573 F. Supp. 1149 (1983), *aff'd*, 741 F.2d 1370-71 (Fed. Cir. 1984) (finding that "the term 'product of' at the least includes manufactured articles of such country or area" and that substantial transformation "is essentially the test used…in determining whether an article is a manufacture of a given country"). Consequently, for purposes of the Section 201 safeguard, solar cells and solar panels are "products of" the country in which they were last substantially transformed.

In *Energizer Battery, Inc. v. United States*, 190 F. Supp. 3d 1308 (2016), the Court of International Trade ("CIT") interpreted the meaning of the term "substantial transformation" as used in the Trade Agreements Act of 1979 ("TAA") for purposes of government procurement. *Energizer* involved the determination of the country of origin of a flashlight, referred to as the

Generation II flashlight, under the TAA. All of the components of the Generation II flashlight were of Chinese origin, except for a white LED and a hydrogen getter. The components were imported into the United States where they were assembled into the finished Generation II flashlight.

The court reviewed the "name, character and use" test in determining whether a substantial transformation had occurred, and reviewed various court decisions involving substantial transformation determinations. The court noted, citing *Uniroyal, Inc. v. United States*, 3 C.I.T. 220, 226, 542 F. Supp. 1026, 1031, aff'd, 702 F.2d 1022 (Fed. Cir. 1983), that when "the post-importation processing consists of assembly, courts have been reluctant to find a change in character, particularly when the imported articles do not undergo a physical change." *Energizer* at 1318. In addition, the court noted that "when the end-use was pre-determined at the time of importation, courts have generally not found a change in use." *Energizer* at 1319, citing as an example, *National Hand Tool Corp. v. United States*, 16 C.I.T. 308, 310, aff'd 989 F.2d 1201 (Fed. Cir. 1993). Furthermore, courts have considered the nature of the assembly, i.e., whether it is a simple assembly or more complex, such that individual parts lose their separate identities and become integral parts of a new article.

In reaching its decision in *Energizer*, the court expressed the question as one of whether the imported components retained their names after they were assembled into the finished Generation II flashlights. The court found "[t]he constitutive components of the Generation II flashlight do not lose their individual names as a result [of] the post-importation assembly." *Energizer* at 1322. The court also found that the components had a pre-determined end-use as parts and components of a Generation II flashlight at the time of importation and did not undergo a change in use due to the post-importation assembly process. Finally, the court did not find the assembly process to be sufficiently complex as to constitute a substantial transformation. Thus, the court found that Energizer's imported components did not undergo a change in name, character, or use as a result of the post-importation assembly of the components into a finished Generation II flashlight. The court determined that China, the source of all but two components, was the correct country of origin of the finished Generation II flashlights under the government procurement provisions of the TAA.

In HQ H095409, dated September 29, 2010, CBP found that turning bare glass tubes into functional solar panels in the United States constituted making a product with a new name, character, and use such that a substantial transformation had occurred. Key to CBP's finding that a substantial transformation had taken place in HQ H095409 was the complex manufacturing process of the solar cells themselves. This process—which involved depositing thin films of chemicals on the inside of glass tubes—took five of the six and a half days it took to manufacture the finished solar panels.

In HQ H261693, dated September 16, 2015, solar panels were manufactured in Korea and Poland from solar cells (product of Malaysia or Korea), glass (China), frames (China/Belgium), junction box, cable, and connector (China/Czech Republic), back sheets (China/Germany), EVA (Korea/Japan), and interconnect ribbons. In addition to considering the country of origin of all of the components and the duration of the assembly process, CBP stated that the most important aspect of the case was the fact that the solar cells were produced in

Malaysia or Korea and not in the countries where the solar panels were put together. Therefore, CBP found that assembling solar cells into finished solar panels did not result in a product with a new name, character, and use. CBP opined that solar cells imparted the essential character of the solar panels. Accordingly, where Malaysian solar cells were used, the country of origin was Malaysia, and in the scenario where Korean solar cells were used, the country of origin was Korea.

In HQ H298653, dated November 19, 2018, solar panels were assembled in China using both Chinese and non-Chinese components. However, the polycrystalline solar cells, which constituted the very essence of the solar panels, were entirely manufactured in Germany. CBP determined that solar cells did not lose their identity and became an integral part of the solar panels when they were combined with other components during the processing in China. The end-use of the solar cells and other components was pre-determined before the components were imported into China, and the solar cells (and other components) remained solar cells during processing in China. Therefore, CBP found that the country of origin of solar panels was Germany.

The reasoning and results in the above referenced decisions and judicial precedent are directly applicable to this case. In this case, solar cells are manufactured in Taiwan and shipped to India for further processing, which includes attaching the metalized grid to the front of the solar cell and a copper mesh to the back. The solar cells have already undergone the substantial processing prior to being shipped to India, including the process known as "doping," in which phosphorous is diffused into a thin layer of the wafer surface to create a negatively charged phosphosilicate layer terminating in a positive-negative, or P/N junction. This is a critical partition in the functioning of a solar cell. After the P/N junction is created, the cells can optimally gather photons and produce electricity. The essential characteristic of the solar cell is to convert sunlight into electricity,[1] and it can do so when the P/N junction is put in place. The addition of the gridlines and circuitry allows the solar cell to collect and forward the electricity; however, it does not result in the article with the new "name, character and use" since the end-use of the solar cells is pre-determined when these cells leave Taiwan. In other words, solar cells remain intact in India and do not lose their identity as a result of the subsequent gridding process. Therefore, solar cells are the products of Taiwan. Furthermore, in line with our decisions in HQ H095409, HQ H261693, and HQ H298653, solar cells impart the essential character of the solar panels and assembling solar cells into finished solar panels does not result in a product with a new name, character, and use. Accordingly, as the solar cells are not substantially transformed in India, the solar cells remain the products of Taiwan, and therefore, the solar panels at issue are also the products of Taiwan.

HOLDING:

Based on the information submitted in this case, the country of origin of solar cells and solar panels at issue is Taiwan. Thus, the finished solar panels are subject to Section 201 safeguard measures.

---

[1] *See* Crystalline Silicon Photovoltaic Cells (Whether or not Partially or Fully Assembled into Other Products), Inv. No. TA-201-75, USITC Pub. 4739, I-11 (Nov. 2017) (Final), and Crystalline Silicon Photovoltaic Cells and Modules from China, Inv. Nos. 701-TA-481 and 731-TA-1190, 9 (Nov. 2012) (Final).

Sixty days from the date of the decision, the Office of Trade, Regulations, and Rulings will make the decision available to CBP personnel, and to the public on the Customs Rulings Online Search System ("CROSS") at https://rulings.cbp.gov/ which can be found on the U.S. Customs and Border Protection website at http://www.cbp.gov and other methods of public distribution.

Please do not hesitate to contact us at (202) 325-0042 if you have any questions or concerns.

Sincerely,

Tom P. Beris, Acting Chief
Food, Textiles and Marking Branch

EXHIBIT 8

HQ H301201

October 18, 2019

CLA-2 OT:RR:CTF:EMAIN H301201 TPB

CATEGORY: Classification

TARIFF NO.: 8541.40.60

Dr. Bo Denysyk
Global USA, Inc.
Suite 650
2121 K Street, N.W.
Washington, D.C. 20037

RE: Revocation of HQ 957189; Classification of anti-reflection coated silicon wafers

Dear Dr. Denysyk:

On January 11, 1995, U.S. Customs and Border Protection (CBP) issued Headquarters (HQ) Ruling Letter 957189 to you, classifying anti-reflection coated silicon wafers under subheading 8541.90.00, HTSUS, as "Diodes, transistors and similar semiconductor devices; photosensitive semiconductor devices, including photovoltaic cells whether or not assembled in modules or made up into panels; light-emitting diodes; mounted piezoelectric crystals; parts thereof...Parts." After reviewing HQ 957189, we have found it to be in error with respect to the tariff classification.

Pursuant to section 625(c)(1), Tariff Act of 1930 (19 U.S.C. §1625(c)(1)), as amended by section 623 of Title VI, notice proposing to revoke HQ 957189 was published on September 4, 2019, in Volume 53, Number 31, of the Customs Bulletin. No comments were received in response to this Notice.

FACTS:

In HQ 957189, the anti-reflection silicon wafers were described as follows:

> "… Kyocera will import Japanese manufactured multi-crystalline silicon wafers [into the United States]. The manufacturing operation in Japan consists of:

1. silicon wafer fabrication;
2. surface treatment;
3. P/N junction formation;
4. back N type layer etching;
5. back surface field formation; and
6. anti-reflection coating.

After importation into the U.S., the anti-reflection coated silicon wafers will be further manufactured into a complete solar panel. The manufacturing operations to be performed in the U.S. entail:

1. patterning;
2. metalization;
3. solder coating;
4. cell inspection;
5. lead wiring;
6. string formation;
7. lamination;
8. curing;
9. framing;
10. joint box fixing; and
11. inspection.

The complete solar panels will then be exported to Mexico and/or Canada."

ISSUE:

Whether the anti-reflection coated silicon wafers are classified as unfinished diodes or parts of unfinished diodes under the HTSUS.

LAW AND ANALYSIS:

Classification under the HTSUS is made in accordance with the General Rules of Interpretation ("GRIs"). GRI 1 provides that the classification of goods shall be determined according to the terms of the headings of the tariff schedule and any relative section or chapter notes. In the event that the goods cannot be classified solely on the

basis of GRI 1, and if the headings and legal notes do not otherwise require, the remaining GRIs 2 through 6 may then be applied in order.

In determining the classification of the articles at issue, HQ 957189 determined that the anti-reflection coated silicon wafers were classified under heading 8541 rather than heading 3818 by application of GRI 1. That determination is affirmed in this ruling. With regard to classification under heading 8541, HQ 957189 classified the goods under subheading 8541.40.90, a "parts" provision for photosensitive semiconductor devices. However, considering the condition the anti-reflection coated silicon wafers are in when presented to Customs, an analysis should be made as to whether these are incomplete or unfinished articles, as described by GRI 2(a), which reads:

> 2. (a) Any reference in a heading to an article shall be taken to include a reference to that article incomplete or unfinished, provided that, as presented, the incomplete or unfinished article has the essential character of the complete or finished article. It shall also be taken to include a reference to that article complete or finished (or falling to be classified as complete or finished by virtue of this Rule), presented unassembled or disassembled.

In this case, we must determine whether the articles, as presented to Customs, have the essential character of the complete or finished article. As described above, the articles are imported from Japan having already undergone extensive work, including P/N junction formation, back N type layer etching, back surface field formation, and the addition of the anti-reflection coating. Formation of the P/N junction is critical in the functioning of the solar cell. After the P/N junction is created, the cells can optimally gather photons and produce electricity. The essential characteristic of the solar cell is to convert sunlight into electricity,[1] and it can do so once the P/N junction is put in place.

As such, the subject merchandise are in a state that can convert solar energy into electrical energy, which is the essential character of these goods of subheading 8541.40.60. Therefore, the articles have the essential character of a photosensitive semiconductor devices and should be classified as such, by application of GRI 2(a), under subheading 8541.40.60, HTSUS.

HOLDING:

By application of GRIs 1, 2(a) and 6, the anti-reflection coated silicon wafers are classified under heading 8541, HTSUS, and specifically under subheading 8541.40.60, HTSUS, which provides for "Diodes, transistors and similar semiconductor devices; photosensitive semiconductor devices, including photovoltaic cells, whether or not

[1] *See* Crystalline Silicon Photovoltaic Cells (Whether or not Partially or Fully Assembled into Other Products), Inv. No. TA-20 1-75 , USITC Pub. 4739, 1-11 (Nov.2017) (Final), and Crystalline Silicon Photovoltaic Cells and Modules from China, Inv. Nos. 70 l-TA-481 and 73 l-T A-1190 , 9 (Nov. 2012) (Final).

assembled in modules or made up into panels; light-emitting diodes; mounted piezoelectric crystals; parts thereof… Other diodes." The column one, general rate of duty is free.

Duty rates are provided for your convenience and subject to change. The text of the most recent HTSUS and the accompanying duty rates are provided at www.usitc.gov.

EFFECT ON OTHER RULINGS:

HQ 957189, dated January 11, 1995, is hereby REVOKED.

In accordance with 19 U.S.C. § 1625(c), this ruling will become effective 60 days after its publication in the Customs Bulletin.

Sincerely,

Myles B. Harmon,
Director,
Commercial and Trade Facilitation Division

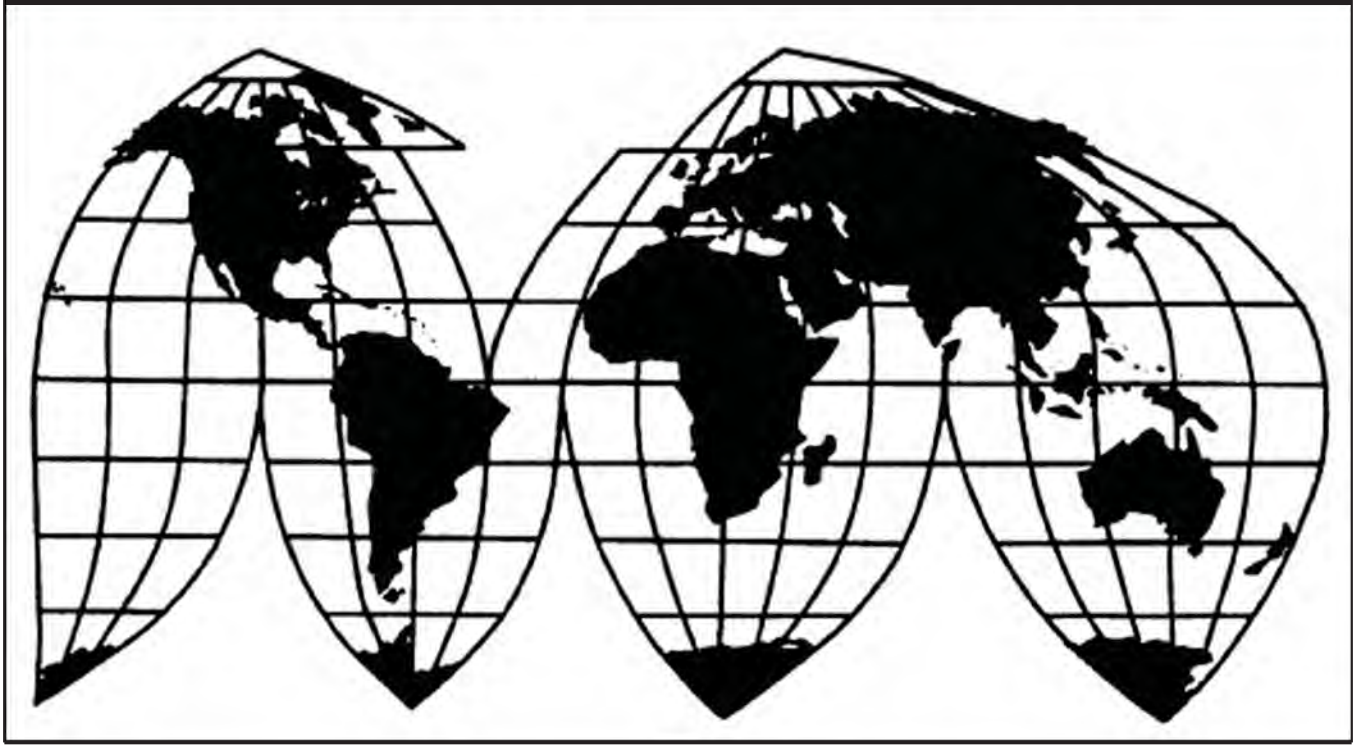
EXHIBIT 9

Crystalline Silicon Photovoltaic Cells and Modules From China

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

Publication 4360 **November 2012**

U.S. International Trade Commission



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U.S. International Trade Commission

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Washington, DC 20436

U.S. International Trade Commission

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Crystalline Silicon Photovoltaic Cells and Modules From China

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

Publication 4360

November 2012

C O N T E N T S

Page

C O N T E N T S

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.

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.

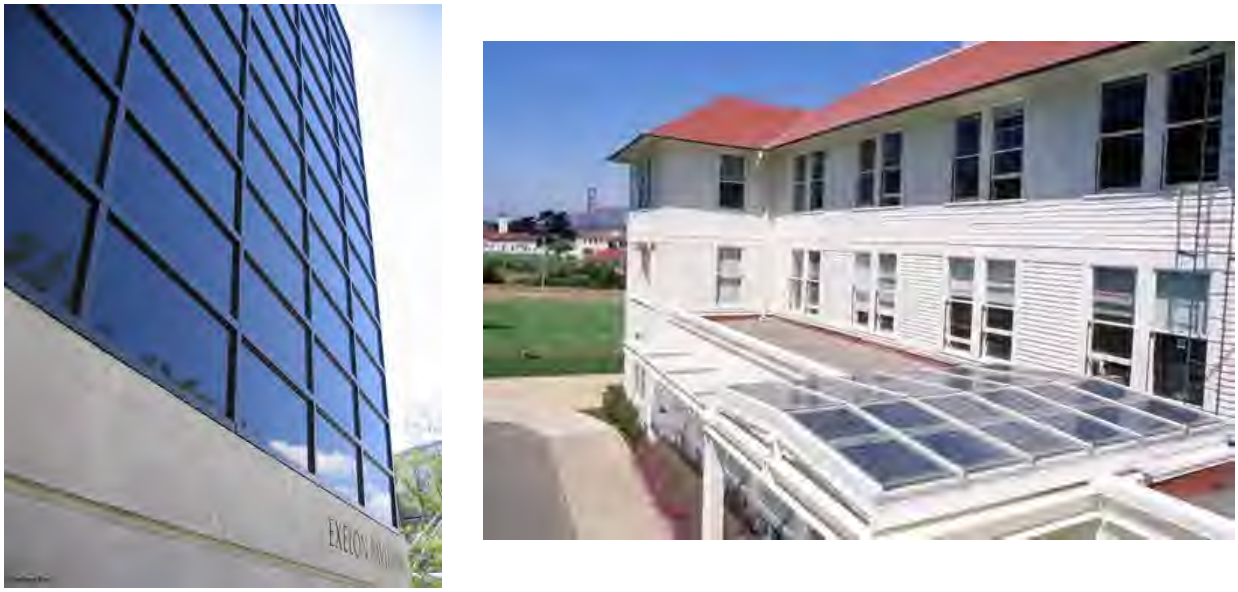
[19] European Photovoltaic Industry Association (EPIA), *Solar Generation 6*, 2011, p. 20.

[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).

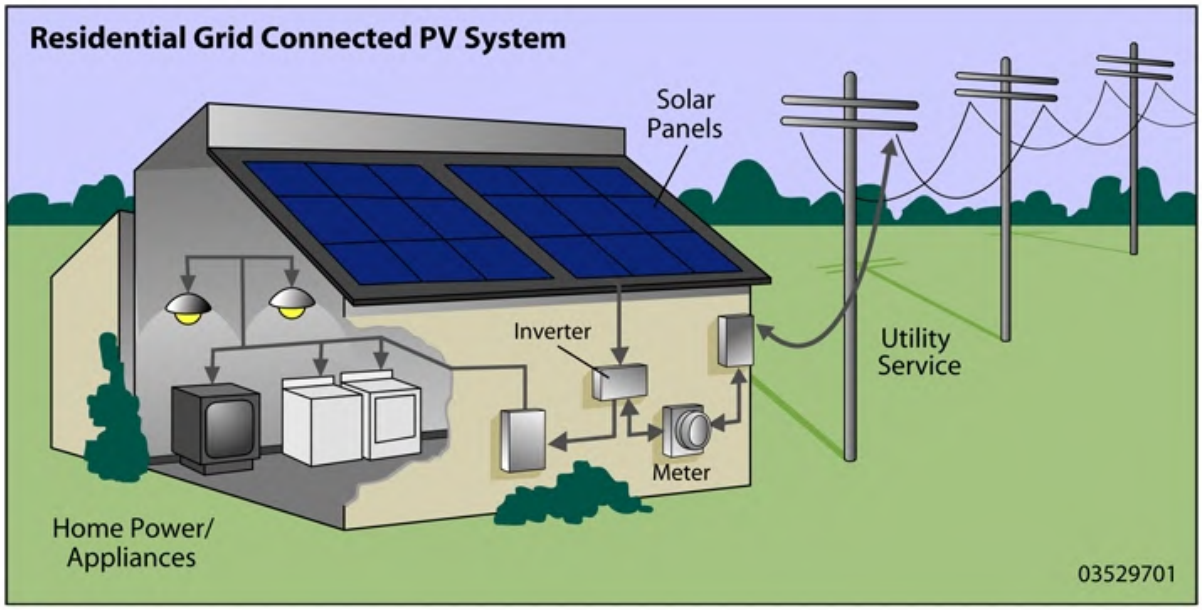
[29] Conference transcript, pp. 232–233 (King).

[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]

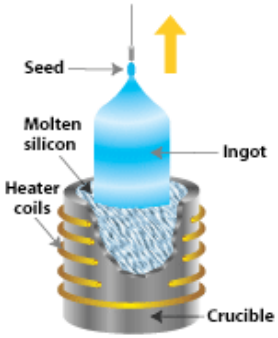
[39] Nitol Web site, http://www.nitolsolar.com/entechnologies (accessed November 6, 2011).

[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).

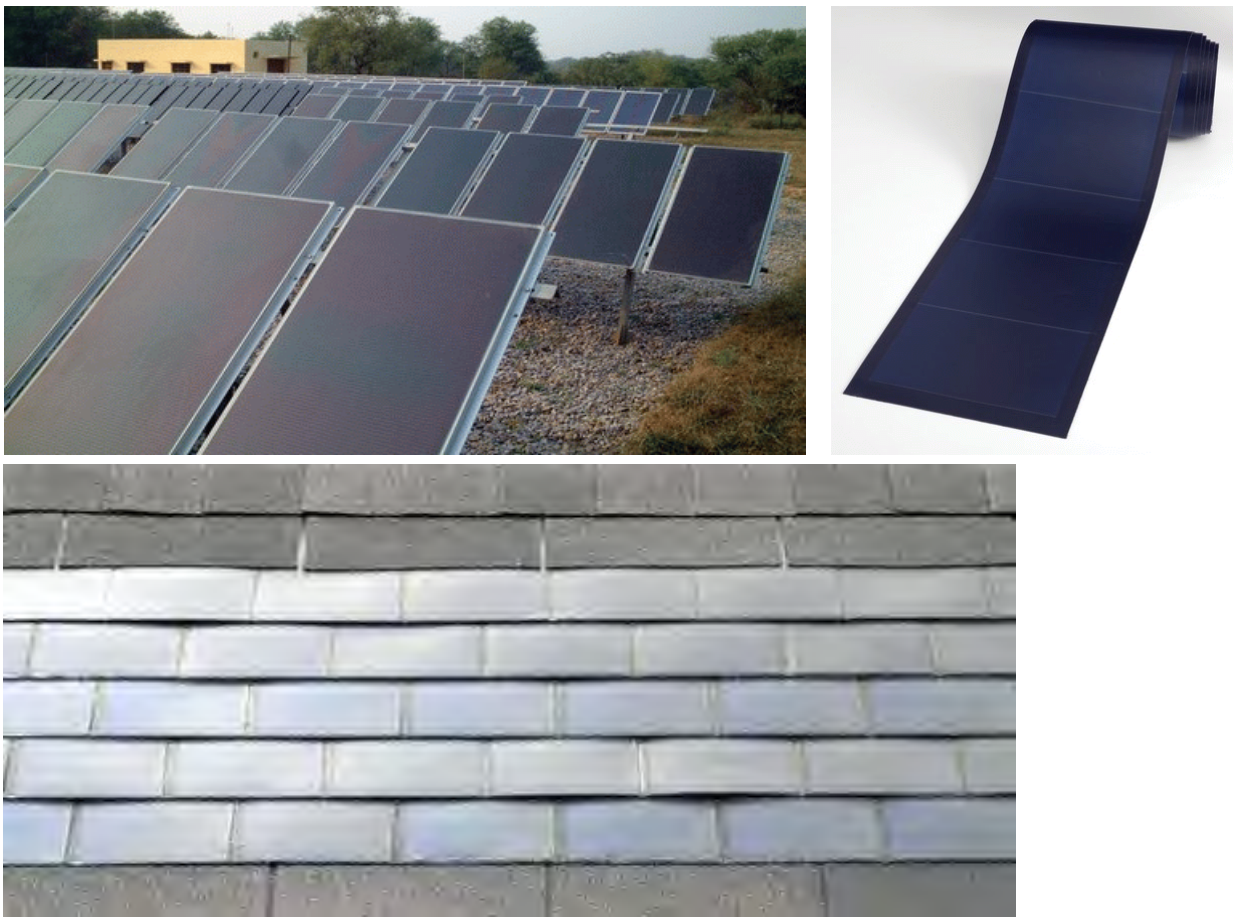
[71] Sharp, 135 Watt Thin Film Module brochure; Sharp, 135 Watt Frameless, Glass-on-Glass Thin Film Module brochure; Sharp Web site, http://www.sharpusa.com/SolarElectricity/SolarProducts/UtilityScaleProducts.aspx (accessed November 17, 2011).

[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.

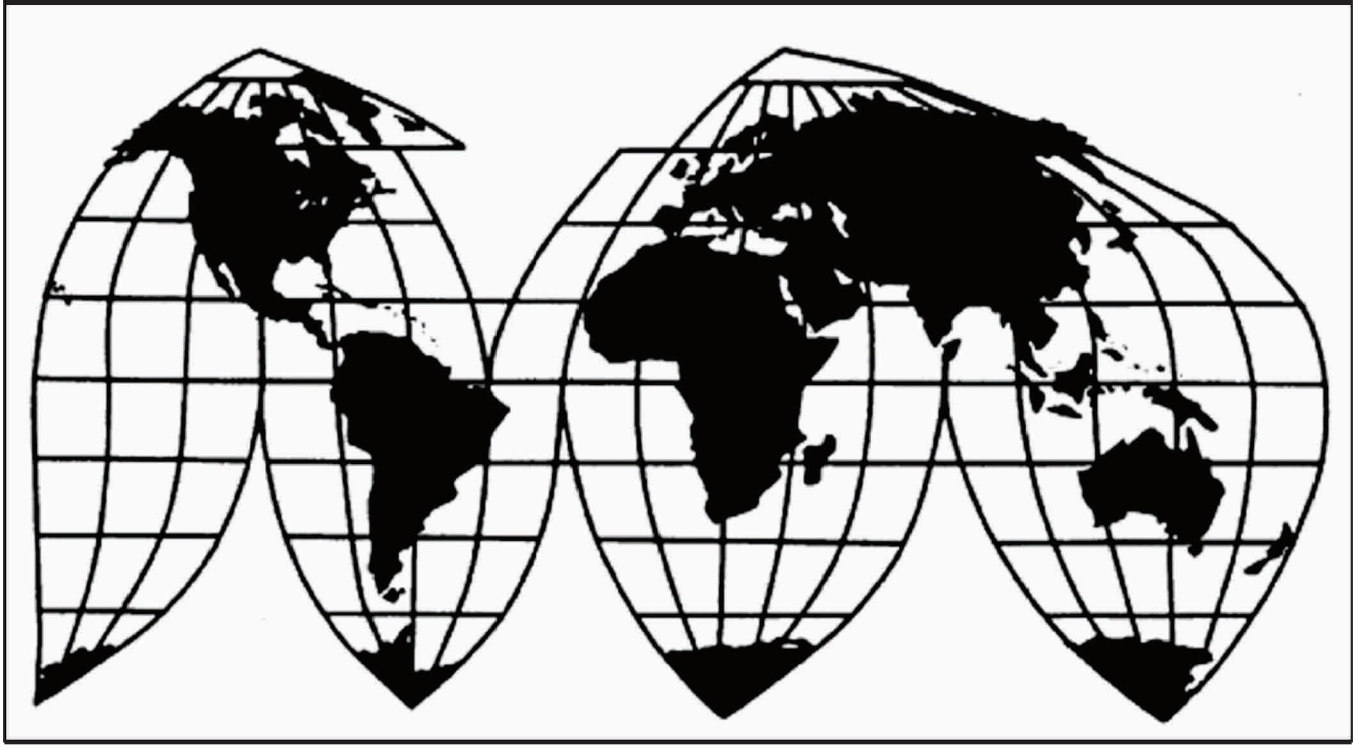
EXHIBIT 10

Crystalline Silicon Photovoltaic Cells, Whether or Not Partially or Fully Assembled Into Other Products

Investigation No. TA-201-75 (Extension)

Publication 5266 **December 2021**

U.S. International Trade Commission



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Crystalline Silicon Photovoltaic Cells, Whether or Not Partially or Fully Assembled Into Other Products

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Appendixes

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

dispositive. Decisions on the tariff classification and treatment of imported articles are within the authority of U.S. Customs and Border Protection ("Customs").

The like or directly competitive product

To determine whether an article is being imported into the United States in such increased quantities as to be a substantial cause of serious injury or the threat thereof, the Commission first defines "the domestic industry producing an article like or directly competitive with the imported article."[161] When assessing what constitutes the product(s) that is/are like or directly competitive with the imported article(s), the Commission takes into account such factors as (1) the physical properties of the article, (2) its customs treatment, (3) its manufacturing process (i.e., where and how it is made), (4) its uses, and (5) the marketing channels through which the product is sold. In its safeguard determination, the Commission found that domestically produced CSPV products are "like" the imported CSPV products. Specifically, domestically produced CSPV cells are "like" the imported CSPV cells and domestically produced CSPV modules are "like" imported CSPV modules within the scope of the investigation. Additionally, the Commission defined a single domestic product corresponding to the imported products within the scope of the investigation that includes CSPV cells and CSPV modules. It found that although CSPV modules are not "like" CSPV cells, the facts indicated that they are "directly competitive" within the meaning of the safeguard statute and there were no clear lines differentiating them. Consistent with its definition of the like or directly competitive domestic product, the Commission defined the domestic industry as all U.S. producers of CSPV cells (whether or not partially or fully assembled into other products), including integrated producers of CSPV cells and modules and independent module producers.[162]

Description and applications[163]

CSPV cells are the essential element in CSPV modules (also commonly referred to as panels), which in turn are the main components of CSPV systems (figure I-3). Solar CSPV

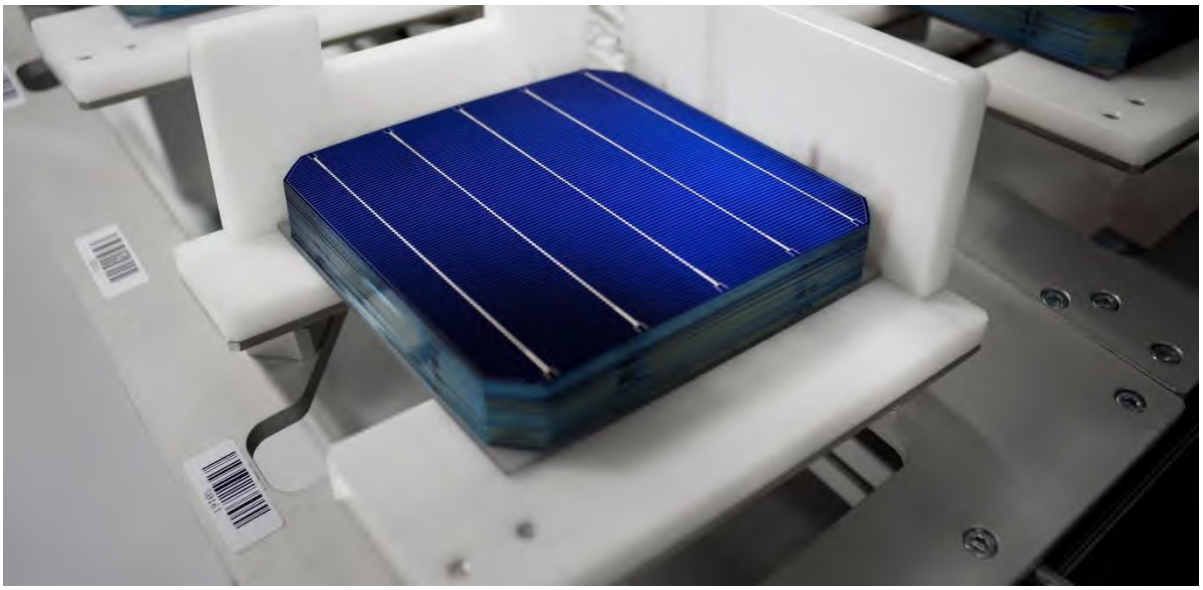
[161] 19 U.S.C. § 2252(b)(1)(A).

[162] Safeguard publication, pp. 13 and 16-18.

[163] This section will cover CSPV cells and modules generally, with a focus on the most common product characteristics. The "discussion of specific products" section will cover various other CSPV technologies and products. Unless otherwise noted, this section is derived from Monitoring publication, pp. I-54–I-59 and I-72–80. Citations to direct quotes, pictures, and data were retained.

systems[164] convert sunlight into electricity for on-site use or for distribution through the electric grid.

Figure I-3
CSPV products: CSPV cell with 5 busbars



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

CSPV cells

CSPV cells use crystalline silicon to convert sunlight to electricity and are the basic elements of a CSPV module. CSPV cells may be full square or may have slightly rounded corners ("pseudo square"). Common sizes of CSPV cells, as measured by the side length of the cell, and the type of wafer used in producing cells of that size are shown in Table I-19.

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

Table I-19
CSPV cells: Examples of wafer sizes used in monocrystalline cell production

Wafer	Side length in mm
M0	156
M2	156.75
G1	158.75
M4	161.7 or 161.75
M6	166
M10	182
M12/G12	210

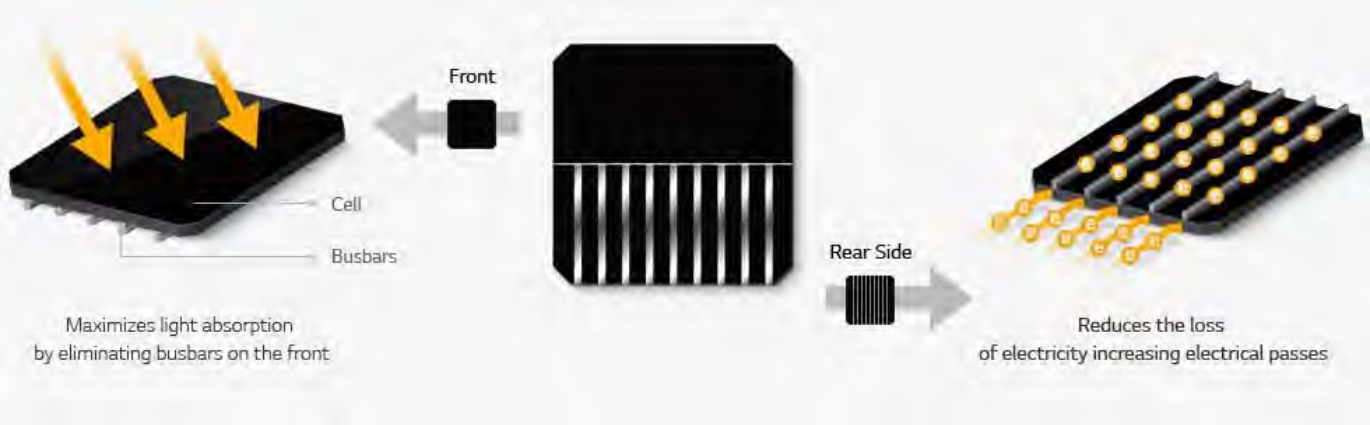
Sources: ITRPV, *Results 2019 Including Maturity Report 2020*, p. 17, https://itrpv.vdma.org, retrieved September 29, 2021; ITRPV, 2020 Results, p. 14, https://itrpv.vdma.org, retrieved September 28, 2021; Pickerel, Kelly, "Big-Wafer Solar Panels Aren't Quite Ready for Their Residential Debut," *Solar Power World*, August 31, 2020, https://www.solarpowerworldonline.com/2020/08/big-wafer-solar-panels-arent-quite-ready-for-their-residential-debut/.

CSPV cells have a positive layer, a negative layer and a positive-negative junction (p/n junction). Electricity is generated when sunlight strikes the CSPV cell, knocking electrons loose that flow onto thin metal "fingers" that run across the CSPV cell and conduct electricity to the busbars.[165] The number of busbars in cells varies, and has increased over time as more busbars improve efficiency and power output.[166] Further, some cells contain no busbars ("busbarless"), which can provide benefits such as reducing electrical losses and increasing the surface area of the CSPV cell that can absorb sunlight. Alternatively, some cells have metal contacts on the rear side of the CSPV cell, creating back (or rear contact) cells (including integrated back contact or IBC cells) (figure I-4). This provides several advantages such as reduced shading, improved cell interconnection, and better aesthetics.

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

[166] In 2018, 3 and 4 busbar cells accounted for more than 40 percent of the global market, with 5 busbar cells accounting for most of the remaining market. In 2020, there was almost no production of cells with fewer than 5 busbars and cells with more than 6 busbars accounted for more than 40 percent of the global market. International Technology Roadmap for Photovoltaic (ITRPV), *Results 2018 Including Maturity Report 2019*, p. 37, https://itrpv.vdma.org, retrieved September 28, 2021; ITRPV, *2020 Results,* p. 27, https://itrpv.vdma.org, retrieved September 28, 2021.

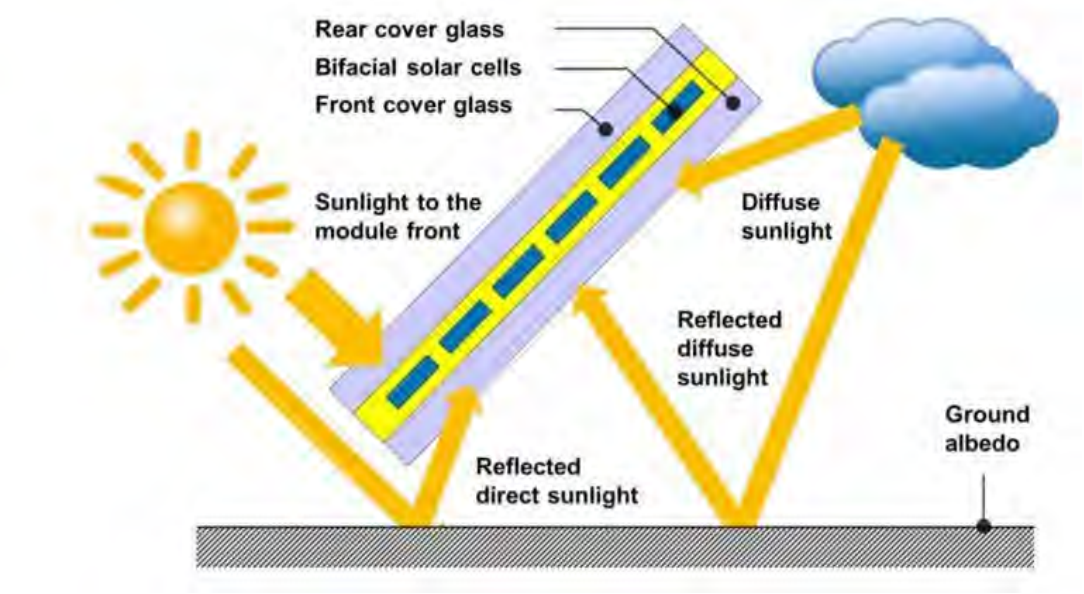
Figure I-4
CSPV products: Back contact CSPV cells



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

CSPV cells can be either monofacial or bifacial. Bifacial CSPV cells convert light that hits both the front and back of the CSPV cell into electricity (figure I-5). Whereas most CSPV cells have a metalized back layer, bifacial cells allow light through to the back side of the CSPV cell. They often incorporate either the PERC or heterojunction technologies. When assembled into CSPV modules, they use a transparent back sheet or rear glass layer to allow reflected sunlight on the rear of the CSPV cell.

Figure I-5
CSPV products: Bifacial PV modules absorb sunlight on both sides of the module



Source: Glazer, Becca and Kevin Mayer, "Bifacial or Bust? Engineering Solar Financings of the Future," April 4, 2019, Sol Source, https://www.solsystems.com/blog/2019/04/04/bifacial-or-bust-engineering-solar-financings-of-the-future/, retrieved November 3, 2019.

The two main types of CSPV cells are monocrystalline and multicrystalline (or polycrystalline) silicon, though there are various subtypes within these two categories, as discussed below. Monocrystalline cells are made from a single grown crystal and tend to convert sunlight into electricity more efficiently. Multicrystalline cells have a random crystal structure and tend to have a lower conversion efficiency, though there are a range of conversion efficiencies for monocrystalline and multicrystalline CSPV modules.[167]

Monocrystalline and multicrystalline cells commonly use Passive Emitter Rear Contact ("PERC") and related technologies.[168] PERC cells incorporate an additional rear dielectric layer that reflects light that did not generate electricity as it initially passed through the CSPV cell back into the CSPV cell. There is, therefore, another opportunity for the CSPV cell to absorb this light. PERC cells have a higher efficiency, and improved performance in certain conditions, such as low light and high heat conditions.

Monocrystalline cells can be either p-type or n-type. In the production of p-type of monocrystalline CSPV wafers, the silicon is doped with boron or gallium to create a positive

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

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

electrical orientation.[169] In the production of n-type mono wafers, the silicon is doped with phosphorous to create a negative electrical orientation. In the CSPV cell production process, a positive layer is added to create the p/n junction.

N-type CSPV cells can be more expensive to produce, but have a number of benefits, such as higher conversion efficiencies and no light-induced degradation. Heterojunction n-type CSPV cells (including heterojunction with intrinsic thin layer ("HIT")) add thin layers of photosensitive semiconductor materials (such as amorphous silicon) on top of an n-type monocrystalline wafer. These additional layers increase the absorption of sunlight and the overall efficiencies of the CSPV cells, as well as improve performance in hot climates. Tunnel Oxide Passivated Contacts (TOPCon) is another technology used for n-type cells. TOPCon cells are created by "depositing a nanometer scale layer of silicon oxide, followed by a thicker polycrystalline silicon layer, between the silicon wafer and metal contacts. The layers reduce charge recombination between the wafer and the contacts, increasing carrier lifetime and resulting in a conversion efficiency boost."[170]

CSPV laminates

CSPV laminates consist of the CSPV cells that are connected, encapsulated (most commonly in an ethyl vinyl acetate ("EVA") film), and covered with a glass front layer and a back sheet or rear glass (figure I-6). The back sheet is most commonly a plastic film composite, though glass is also used in some applications such as bifacial CSPV modules. CSPV laminates can use full cells or cells cut in smaller pieces, such as half-cut cells. These are standard CSPV cells that are cut, such that a standard 60-cell CSPV module would instead have 120 half cells. Half-cut cells result in lower cell currents and, therefore, reduce power losses and increase cell efficiency and overall module output. Some products use shingling, paving, and other low or zero gap technologies to reduce the distance between cells.

[169] ITRPV, *2020 Results*, pp. 8–9, https://itrpv.vdma.org, retrieved September 28, 2021.

[170] Gifford, Jonathan, "Topcon N-Type Solar Cell Technology Could Be a Rival to Mono PERC," *PV Magazine*, March 7, 2020, https://pv-magazine-usa.com/2020/03/07/topcon-n-type-solar-cell-technology-could-be-a-rival-to-mono-perc/, retrieved October 6, 2021.

Figure I-6
CSPV products: Layers of a typical CSPV laminate

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

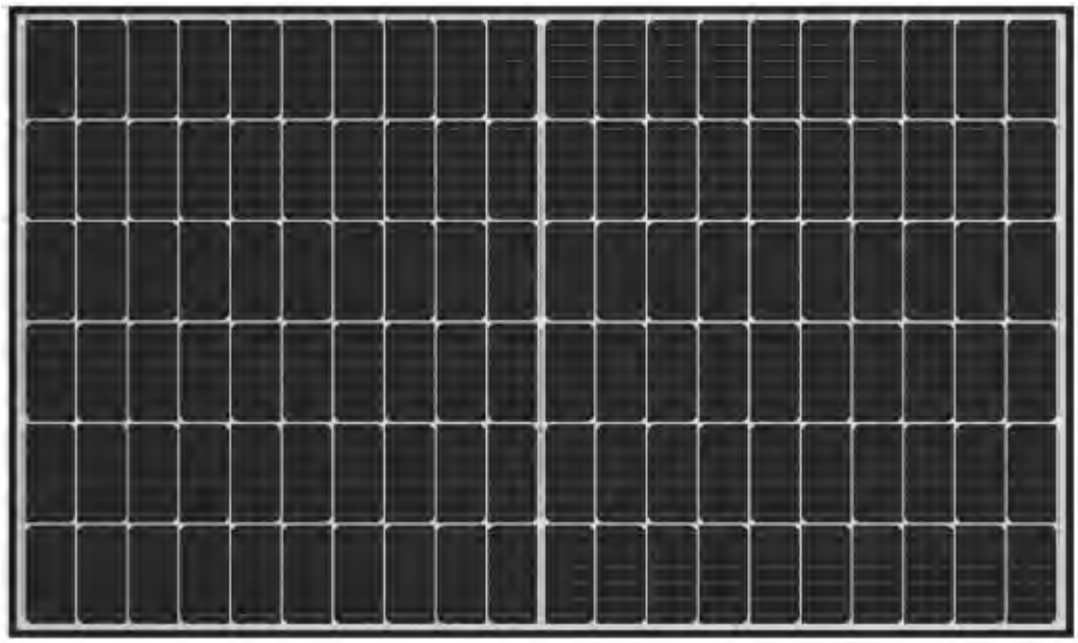
CSPV modules

CSPV modules typically consist of the laminate that is typically framed in aluminum, and then attached to one or more junction boxes (figure I-7).[171] 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.[172] The junction box can be connected to other modules, an inverter (which converts the direct current generated by the system to alternating current), or, in the case of off-grid modules, a battery and a charge controller (which controls battery charging).

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

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

Figure I-7
CSPV products: CSPV module with half-cut cells



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

The most common on-grid CSPV modules have 60 cells (or 120 half cut cells) or 72 cells (or 144 half cut cells). Common sizes of 72 cell solar modules, depending on the size of the wafer, are shown in Table I-20. The average module efficiency, for global module production in 2020, was 19 percent for PERC (and related technologies) p-type multicrystalline, 20 percent for PERC (and related technologies) and TOPCon p-type monocrystalline, more than 20.5 percent for n-type TOPCon, 21 percent for n-type heterojunction, and more than 21 percent for n-type back contact.[173]

[173] ITRPV, *2020 Results*, p. 44, https://itrpv.vdma.org, retrieved September 28, 2021;

Table I-20
CSPV modules: Typical 72 cell module area by wafer size, 2020

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

Sources: Chunduri, Shravan K. and Michael Schmela, *500W+ Solar Modules, 2020 Edition*, Taiyang News, p. 10, http://taiyangnews.info/reports/500w-solar-modules-2020/, retrieved September 13, 2021.

The average output of monocrystalline 60/120 half-cut cell module models newly listed on the California Energy Commission's equipment list increased from 301 watts for models listed in 2018 to 328 watts for models listed in 2020. During January to September 2020, the average output was 370 watts. The average output of monocrystalline 72/144 half-cut cell module models newly listed on the California Energy Commission's equipment list increased from 359 watts in 2018 to 397 watts in 2020 and reached 451 watts during the January–September 2021. A declining number of multicrystalline modules were added to the list during 2018–20. However, for 60/120 half-cut cell module models added to the list the average power increased from 274 watts in 2018 to 285 watts in 2020. For 72/144 half-cut cells the average power increased from 333 watts in 2018 to 344 watts in 2020.[174]

In addition to standard size CSPV modules, CSPV cells can be used in building-integrated PV ("BIPV modules" or "BIPV products"). BIPV products are materials integrated into the building envelope, such as the façade or roof, containing CSPV cells. These building integrated materials replace conventional construction materials, such as glass or roof shingles, taking over the function that conventional materials would otherwise perform while also producing electricity.

CSPV modules are also used in off-grid applications. In many instances, CSPV modules typically used in on-grid applications may also be used in off-grid applications. For example, a house that is not connected to the electrical grid could use the same CSPV modules as a house that is grid-connected. However, there are a broad range of off-grid applications, such as power

[174] No multicystalline modules were added during January to September 2021. California Energy Commission, PV Module List - Full Data, October 1, 2021, https://www.energy.ca.gov/sites/default/files/2021-10/PV_Module_List_Full_Data_ADA.xlsx, retrieved October 6, 2021.

generation in remote locations, mobile power solutions, telecommunications power and lighting systems, and portable consumer goods (such as systems for recharging consumer electronics like tablets and phones). The CSPV modules used in some of these applications may be different from those typically used in on-grid applications. For example, these products are often designed for specific power and portability requirements, and some CSPV modules have different wattages than CSPV modules used in grid-connected applications.

Uses and market segments[175]

There are four primary market segments for CSPV products. There are three grid-connected market segments–residential, nonresidential, and utility–and an off-grid market. In the grid-connected market, installations are usually either ground-mounted or roof-mounted. In addition to the CSPV module, there are a number of other components of the installation called the balance of system ("BOS"). The BOS includes components such as the inverter and the racking on which the modules are installed.[176]

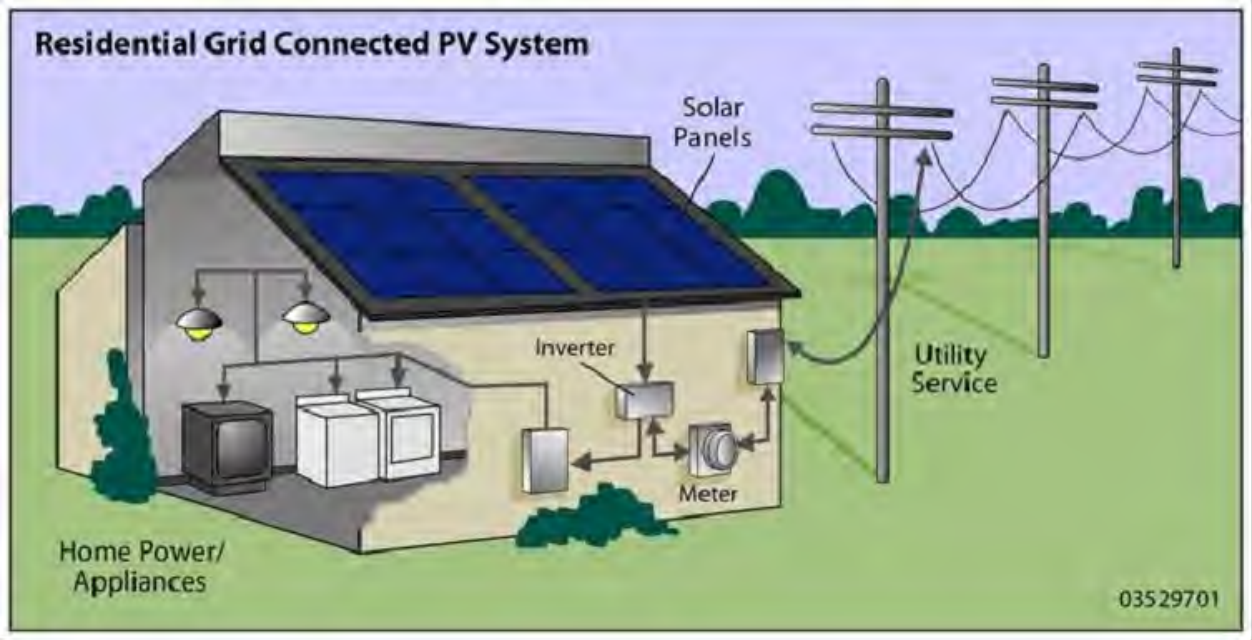
Residential grid-connected systems are installed at individual homes. CSPV modules are typically installed on the roof, though they can also be ground-mounted, and connected to an inverter. The system can use a central inverter, which converts the power from multiple CSPV modules, or each module can have its own microinverter attached. In residential installations, the electricity generated by the system is used for power in the individual home (figure I-8). Homeowners use grid energy when solar electricity generation is not sufficient to meet demand, and often feed energy back into the grid when solar electricity generation exceeds home use. In the United States, the median size of a residential PV installation was 6.5 kW in 2020.[177]

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

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

[177] Barbose, Galen, Naïm Darghouth, Eric O'Shaughnessy, and Sydney Forrester, *Tracking the Sun, 2021 Edition*, Lawrence Berkeley National Laboratory, September 2021, p. 11, https://emp.lbl.gov/sites/default/files/2_tracking_the_sun_2021_report.pdf, retrieved October 6, 2021.

Figure I-8
Residential grid-connected CSPV system



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

Residential systems use a variety of module types. Modules with 60 cells are the most commonly used in residential systems, accounting to 69 percent of installations according to data compiled using module models listed in the Lawrence Berkeley National Lab (Berkeley Lab) *Tracking the Sun* data set.[178] In addition, 63 cell modules (2 percent of installations), 66 cell

[178] Information on U.S. installations by product type in the residential and nonresidential sectors in this section for 2020 is based on a data set of installations in these sectors compiled by Lawrence Berkeley National Laboratory (Berkeley Lab) for their annual *Tracking the Sun* report. Projects 1 MW or larger in the data set are excluded from the data presented here so as to not overlap with the utility sector data discussed below. After excluding large projects and those without module information, the data set includes information for 1.8 GW of installations in 2020. This includes 1.4 GW in residential installations, representing 44 percent of U.S. residential installations in 2020. It also includes 0.4 GW in nonresidential installations, which represents about *** of nonresidential installations (excluding community solar), though this value is only approximate due to differences in sector definitions. A small share of installations do not specify a sector and are not included in the sector-specific data, though they are included in the data that are not sector specific. The data set includes an indicator for whether each module is bifacial. However, the data set does not include the number of cells, which was added based on information from publicly available data sources. All cell counts are based on the full cell equivalent number of cells (e.g., a 120 half-cut cell module is included with 60 cell modules). The mounting type (ground or roof) was not available for all systems. Barbose, Galen, Naïm Darghouth, Eric O'Shaughnessy, and Sydney Forrester, *Tracking the Sun*, 2021 Edition, Public Data File, https://emp.lbl.gov/tracking-the-sun; Petitioner Hanwha/LG/Mission's prehearing brief, exhibit 18.

modules (5 percent), 72 cell modules (7 percent), 96 cell modules (15 percent),[179] and shingled modules produced by Solaria[180] with various cell counts (2 percent) (figure I-9) are used.[181] The 72 and 128 cell modules commonly used in residential applications include both monocrystalline and multicrystalline modules, many of which are installed in both roof and ground mount systems (table I-21). The most commonly used modules are 1.9 to 2.2 square meters, weigh 45 to 56 pounds, and many can be used in systems up to 1,500 volts.[182]

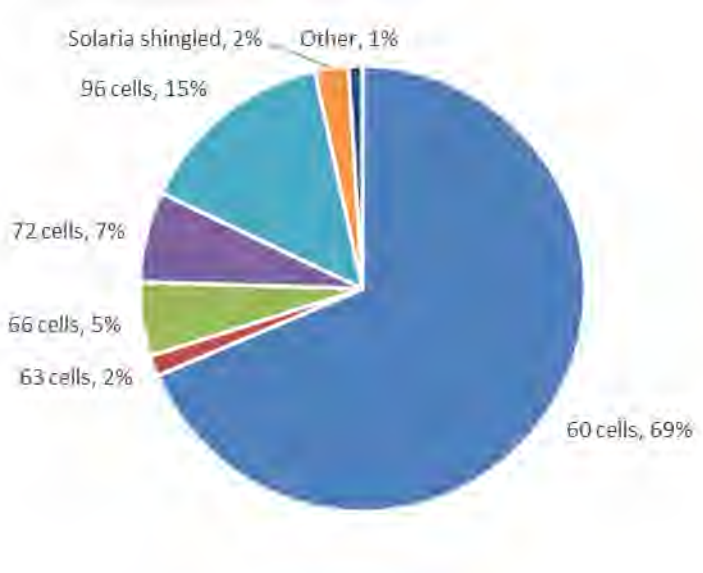
[179] Though 96 cell modules have more cells than 72 cell modules, they are generally SunPower and Panasonic modules that use smaller cells. They are typically more similar in size to 60 cell modules than to 72 cell modules. SunPower E-Series modules, for example, use 96 cells and are 1.6 square meters. SunPower, "SunPower E-Series: E20-327-COM," June 10, 2020, https://us.sunpower.com/solar-resources/sunpower-e-series-commercial-e20-327-com-e20-320-com, retrieved November 11, 2021.

[180] The cell equivalent for Solaria modules was not available in all instances, so they are grouped together. They include a mix of modules, including models with similar dimensions to both 60 and 72 cell modules.

[181] Barbose, Galen, Naïm Darghouth, Eric O'Shaughnessy, and Sydney Forrester, *Tracking the Sun*, 2021 Edition, Public Data File, https://emp.lbl.gov/tracking-the-sun; California Energy Commission, PV Module List - Full Data, October 1, 2021, https://www.energy.ca.gov/sites/default/files/2021-10/PV_Module_List_Full_Data_ADA.xlsx, retrieved October 6, 2021; other publicly available data sources.

[182] Barbose, Galen, Naïm Darghouth, Eric O'Shaughnessy, and Sydney Forrester, *Tracking the Sun*, 2021 Edition, Public Data File, https://emp.lbl.gov/tracking-the-sun; California Energy Commission, PV Module List - Full Data, October 1, 2021, https://www.energy.ca.gov/sites/default/files/2021-10/PV_Module_List_Full_Data_ADA.xlsx, retrieved October 6, 2021; other publicly available data sources.

Figure I-9
CSPV modules: Share of residential and nonresidential installations by module size, 2020



Source: Barbose, Galen, Naïm Darghouth, Eric O'Shaughnessy, and Sydney Forrester, *Tracking the Sun*, 2021 Edition, Public Data File, https://emp.lbl.gov/tracking-the-sun; California Energy Commission, PV Module List - Full Data, October 1, 2021, https://www.energy.ca.gov/sites/default/files/2021-10/PV_Module_List_Full_Data_ADA.xlsx, retrieved October 6, 2021; other publicly available data sources.

Note: Other includes modules with different cell counts and installations that use modules with different cell configurations in the same system. The cell equivalent for Solaria modules was not available in all instances, so they are grouped together. They include a mix of modules, including models with similar dimensions to both 60 and 72 cell modules.

Table I-21
Characteristics of 72 and 128 cell modules commonly used in U.S. residential installations, 2020

Efficiency in percent; size in square meters, weight in pounds, n.a.=not available

Model	Company	Cells	Watts	Type	Efficiency	Maximum volts (UL)	Size	Weight	Roof or ground
LG400N2W-V5	LG	72	400	Mono	19.3	1,500	2.07	44.8	Roof
SPR-E20-435-COM	SunPower	128	435	Mono	20.3	1,500	2.22	56.0	Both
AC-385MH/144S	Axitec	72	385	Mono	19.4	1,000	1.98	40.8	Both
Q.PEAK DUO L-G5.2 400	Hanwha	72	400	Mono	19.9	1,500	2.02	51.8	Both
LG400N2W-A5	LG	72	400	Mono	19.3	1,500	2.07	47.8	Both
Q.PEAK L-G4.2 370	Hanwha	72	370	Mono	18.6	1,500	1.99	52.9	Both
Q.PRO L G4 320	Hanwha	72	320	Multi	n.a.	n.a.	n.a.	n.a.	Roof
Q.PLUS L-G4.2 345	Hanwha	72	345	Multi	17.3	1,500	1.99	50.7	Both
72M370	Heliene	72	370	Mono	19.3	1,500	1.94	52.4	Both
JKM395M-72HL-V	Jinko Solar	72	395	Mono	19.6	1,500	2.01	49.6	Both

Source: Barbose, Galen, Naïm Darghouth, Eric O'Shaughnessy, and Sydney Forrester, *Tracking the Sun*, 2021 Edition, Public Data File, https://emp.lbl.gov/tracking-the-sun; California Energy Commission, PV Module List - Full Data, October 1, 2021, https://www.energy.ca.gov/sites/default/files/2021-10/PV_Module_List_Full_Data_ADA.xlsx, retrieved October 6, 2021; other publicly available data sources.

Note: All modules listed are monofacial. According to the data sheet for the LG400N2W-A5, the cells are capable of absorbing light on both sides of the cell, but it is not identified as a bifacial module in the data sheet. The modules listed are the ten most commonly installed 72 and 128 cell modules from the *Tracking the Sun* data set, but an exact market share is not included as it is possible that the same model will appear elsewhere in the data set with a slightly different naming convention. Nevertheless, the models provide a useful list from which to view common characteristics. Maximum volts represents the maximum system volts for the system into which the module is installed, per the module data sheet. Roof or ground mount is the type of residential system into which the module was installed in 2020 in the *Tracking the Sun* data set. The number of cells is based on the full cell equivalent number of cells.

Bifacial modules are used in residential systems, but systems with bifacial modules (including those that used a mix of mononfacial and bifacial modules) only accounted for 0.3 percent of residential installations in 2020.[183] Bifacial modules were installed in both roof and

[183] Bifacial module data in this section only includes modules that are specifically identified as bifacial modules by the manufacturer. Modules with bifacial cells that do not have transparent rear glass or a transparent backsheet are not included with bifacial modules in these data.

ground mount systems, with installations in roof mounted systems more common.[184] During year-to-date 2021, systems using bifacial modules accounted for 0.8 percent of residential installations in five states for which data were readily available (California, Connecticut, New Hampshire, New York, and Rhode Island).[185] Table I-22 presents the characteristics of the bifacial module models that were among the most commonly used in residential installations in 2020.

[184] Barbose, Galen, Naïm Darghouth, Eric O'Shaughnessy, and Sydney Forrester, *Tracking the Sun*, 2021 Edition, Public Data File, https://emp.lbl.gov/tracking-the-sun.

[185] The residential installations in this data set totaled 784 MW and include *** in the fourth quarter of 2020. The most recent available data varies by state and the data sets may not include all installations in these states. Petitioner Hanwha/LG/Mission's prehearing brief, exhibit 18; Barbose, Galen, Naïm Darghouth, Eric O'Shaughnessy, and Sydney Forrester, *Tracking the Sun*, 2021 Edition, Public Data File, https://emp.lbl.gov/tracking-the-sun; California Energy Commission, "Distributed Generation Interconnection Program Data," https://www.californiadgstats.ca.gov/downloads/, retrieved November 17, 2021; New York Office of Information and Technology Services, "Solar Electric Programs Reported by NYSERDA: Beginning 2000," https://data.ny.gov/Energy-Environment/Solar-Electric-Programs-Reported-by-NYSERDA-Beginn/3x8r-34rs, retrieved November 15, 2021.

Table I-22
Characteristics of bifacial modules commonly used in U.S. residential installations, 2020

Efficiency in percent, size in square meters, weight in pounds, n.a.=not available

Model	Company	Cells	Watts	Type	Efficiency	Maximum volts (UL)	Size	Weight	Roof or ground
LG400N2T-J5	LG	72	400	Mono	19.3	1,500	2.07	44.8	Both
LR6-60BP-310M	Longi	60	310	Mono	18.7	1,500	1.66	48.1	Roof
LG390N2T-A5	LG	72	390	Mono	18.5	1,500	2.11	48.7	Both
LR6-60HBD-310M	Longi	60	310	Mono	18.3	1,500	1.69	48.5	Roof
CS3U-380MB-AG	Canadian Solar	72	380	Mono	18.9	1,500	2.01	57.1	Both
SD25-72BDE-385V	S-Energy	72	NA	Mono	NA	NA	NA	NA	NA
CS3W-400PB-AG	Canadian Solar	72	400	Multi	17.9	1,500	2.23	62.6	Both
LR6-60BP-290M	Longi	60	290	Mono	17.5	n.a.	1.66	48.5	Roof
LG405N2T-J5	LG	72	405	Mono	19.5	1,500	2.07	44.8	Both
LR6-60BP-305M	Longi	60	305	Mono	18.4	1,500	1.66	48.1	Roof
AXN6M612B370	Auxin	72	370	Mono	***	***	***	***	Both
CS3U-350PB-AG	Canadian Solar	72	350	Multi	17.4	1,500	2.01	57.1	Both
CS3U-370MB-AG	Canadian Solar	72	370	Mono	18.5	1,500	2.01	56.7	Both
LR6-60BP-315M	Longi	60	315	Mono	19.0	1,500	1.66	48.1	Both
CS3U-355PB-AG	Canadian Solar	72	355	Multi	17.7	1,500	2.01	57.1	Both

Source: Barbose, Galen, Naïm Darghouth, Eric O'Shaughnessy, and Sydney Forrester, *Tracking the Sun*, 2021 Edition, Public Data File, https://emp.lbl.gov/tracking-the-sun; California Energy Commission, PV Module List - Full Data, October 1, 2021, https://www.energy.ca.gov/sites/default/files/2021-10/PV_Module_List_Full_Data_ADA.xlsx, retrieved October 6, 2021; data sheets for each module model; ***.

Note: NA=not available. All modules listed are monofacial. The modules listed are the ten most commonly installed bifacial module models from the *Tracking the Sun* data set, but an exact market share is not included as it is possible that the same model will appear elsewhere in the data set with a slightly different naming convention. Nevertheless, the models provide a useful list from which to view common characteristics. Maximum volts represents the maximum system volts for the system into which the module is installed, per the module data sheet. Roof or ground mount is the type of residential system into which the module was installed in 2020 in the *Tracking the Sun* data set. The number of cells is based on the full cell equivalent number of cells. ***.

Nonresidential systems are installed at commercial, industrial, government, and similar buildings and sites.[186] Nonresidential installations are typically larger than residential installations—for nonresidential systems, the median size in 2020 was 42 kW, though systems can be substantially larger.[187] However, they function similarly to residential installations, providing electricity to meet onsite needs, pulling additional electricity from the grid when needed, and feeding excess electricity back into the grid when it is not needed.

Nonresidential installations use a variety of different cell configurations, with variation in the share of the market accounted for by 60 cell modules between small nonresidential (≤100 kW) and large nonresidential (100 to 999 kW) installations (figure I-10). In the small nonresidential market segment, 60 cell modules accounted for 22 percent of installations and the generally small format 96 cell modules for another 8 percent in 2020. In the large nonresidential market segment, these decline to 3 percent and 4 percent, respectively.[188] Systems with bifacial modules accounted for 3 percent of small nonresidential installations and 4 percent of large nonresidential installations in 2020. Bifacial modules were used in both roof and ground mount systems, but ground mount systems accounted for a larger share of bifacial modules installed in nonresidential applications.[189] During year-to-date 2021, systems using bifacial modules accounted for 5 percent of small residential installations and 10 percent of

[186] Community solar was historically included in the nonresidential sector in WoodMac/SEIA market reports, but is now broken out into a separate sector. Community solar is defined by the U.S. Department of Energy as "any solar project or purchasing program, within a geographic area, in which the benefits of a solar project flow to multiple customers such as individuals, businesses, nonprofits, and other groups. In most cases, customers are benefitting from energy generated by solar panels at an off-site array. Community solar customers can either buy or lease a portion of the solar panels in the array, and they typically receive an electric bill credit for electricity generated by their share of the community solar system—similar to someone who has rooftop panels installed on their home." U.S. Department of Energy Website, "Community Solar Basics," https://www.energy.gov/eere/solar/community-solar-basics, retrieved October 12, 2021.

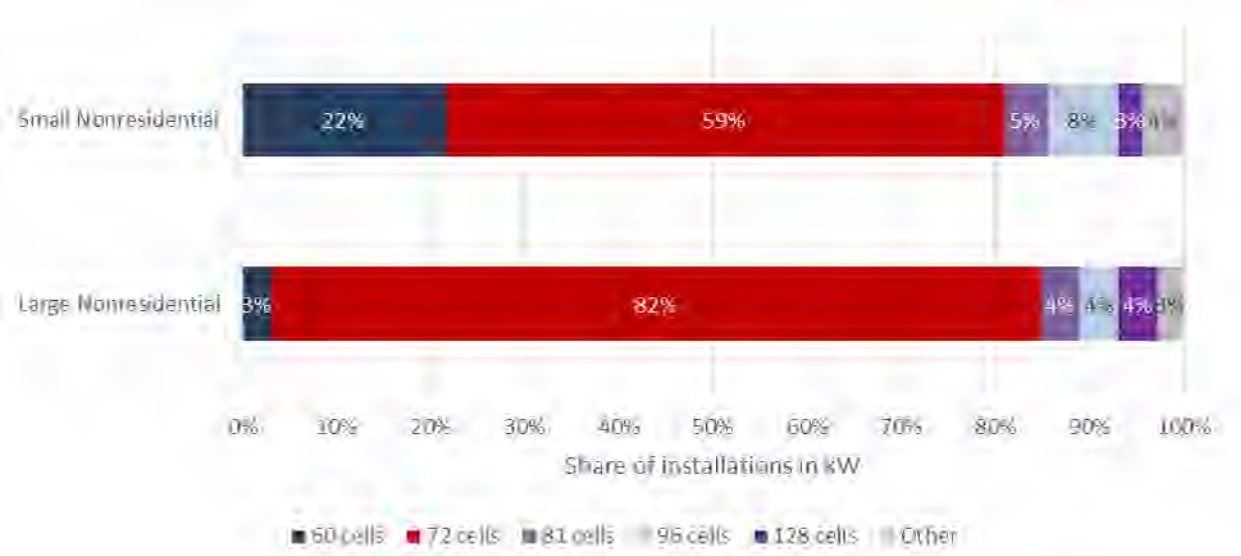
[187] Barbose, Galen, Naïm Darghouth, Eric O'Shaughnessy, and Sydney Forrester, *Tracking the Sun, 2021 Edition*, Lawrence Berkeley National Laboratory, September 2021, p. 11, https://emp.lbl.gov/sites/default/files/2_tracking_the_sun_2021_report.pdf, retrieved October 6, 2021.

[188] Barbose, Galen, Naïm Darghouth, Eric O'Shaughnessy, and Sydney Forrester, *Tracking the Sun*, 2021 Edition, Public Data File, https://emp.lbl.gov/tracking-the-sun; California Energy Commission, PV Module List - Full Data, October 1, 2021, https://www.energy.ca.gov/sites/default/files/2021-10/PV_Module_List_Full_Data_ADA.xlsx, retrieved October 6, 2021; other publicly available data sources.

[189] Barbose, Galen, Naïm Darghouth, Eric O'Shaughnessy, and Sydney Forrester, *Tracking the Sun*, 2021 Edition, Public Data File, https://emp.lbl.gov/tracking-the-sun.

large nonresidential installations in five states for which data were readily available (California, Connecticut, New Hampshire, New York, and Rhode Island).[190]

Figure I-10
CSPV modules: Share of residential and nonresidential installations by module size, 2020



Source: Barbose, Galen, Naïm Darghouth, Eric O'Shaughnessy, and Sydney Forrester, *Tracking the Sun*, 2021 Edition, Public Data File, https://emp.lbl.gov/tracking-the-sun; California Energy Commission, PV Module List - Full Data, October 1, 2021, https://www.energy.ca.gov/sites/default/files/2021-10/PV_Module_List_Full_Data_ADA.xlsx, retrieved October 6, 2021; other publicly available data sources.

Note: Other includes modules with different cell counts and installations that use modules with different cell configurations in the same system.

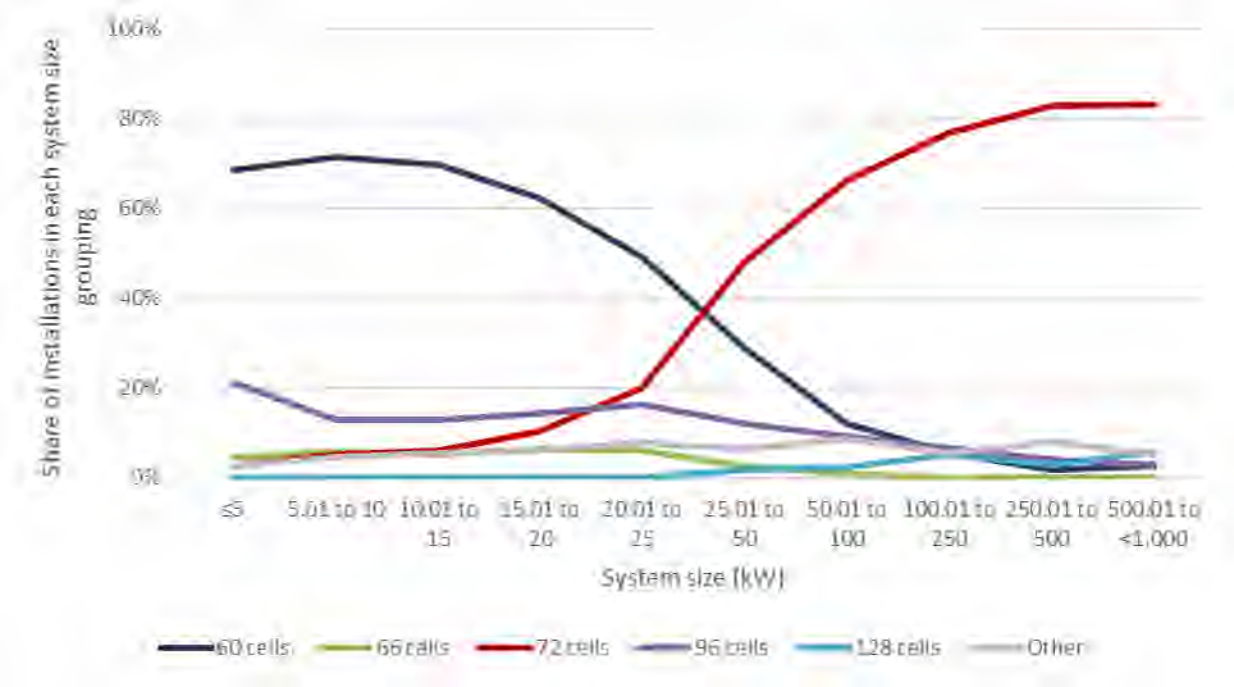
Combining data for the residential and nonresidential sectors, which can overlap in terms of system sizes, figure I-11 shows the share of modules, by the number of cells, used in residential and nonresidential installations of various sizes in 2020. Sixty and 72 cell modules are used in all of the size ranges shown in the figure, with the share of installations accounted

[190] The residential installations in this data set totaled 221 MW and include *** in the fourth quarter of 2020. The most recent available data varies by state and the data sets may not include all installations in these states. Petitioner Hanwha/LG/Mission's prehearing brief, exhibit 18; Barbose, Galen, Naïm Darghouth, Eric O'Shaughnessy, and Sydney Forrester, *Tracking the Sun*, 2021 Edition, Public Data File, https://emp.lbl.gov/tracking-the-sun; California Energy Commission, "Distributed Generation Interconnection Program Data," https://www.californiadgstats.ca.gov/downloads/, retrieved November 17, 2021; New York Office of Information and Technology Services, "Solar Electric Programs Reported by NYSERDA: Beginning 2000," https://data.ny.gov/Energy-Environment/Solar-Electric-Programs-Reported-by-NYSERDA-Beginn/3x8r-34rs, retrieved November 15, 2021.

for by 60 cell modules decreasing as system sizes increase and the share accounted for by 72 cell modules increasing as system sizes increase. The leading suppliers of 60, 63, and 96 cell modules in 2020 were Hanwha (28 percent of 2020 installations), LG (14 percent), SunPower (12 percent), Jinko Solar (9 percent), REC Solar (8 percent), Longi (7 percent), Panasonic (5 percent), Silfab (5 percent), Canadian Solar (3 percent), and Mission (2 percent). The leading suppliers of 72 and 128 cell modules were Hanwha (17 percent), LG (11 percent), Canadian Solar (8 percent), JA Solar (7 percent), Trina Solar (7 percent), Jinko Solar (6 percent), SunPower (5 percent), REC Solar (4 percent), Bovet Solar (3 percent), and Astronergy (3 percent).[191]

[191] Systems with multiple module suppliers are included in the "other" category as it was not possible to break out the share of modules supplied by firms in some instances. Systems that used more than one size module are also included in the other category. The total installations of systems using 60, 63 and 96 cell modules in the data set for which a manufacturer was available totaled 1.2 GW. The total installations of systems using 72 and 128 cell modules in the data set for which a manufacturer names was available totaled 0.4 GW. Barbose, Galen, Naïm Darghouth, Eric O'Shaughnessy, and Sydney Forrester, *Tracking the Sun*, 2021 Edition, Public Data File, https://emp.lbl.gov/tracking-the-sun; California Energy Commission, PV Module List - Full Data, October 1, 2021, https://www.energy.ca.gov/sites/default/files/2021-10/PV_Module_List_Full_Data_ADA.xlsx, retrieved October 6, 2021; other publicly available data sources.

Figure I-11
CSPV modules: Share of the residential and nonresidential installations in each system size grouping, by number of cells, 2020



Source: Barbose, Galen, Naïm Darghouth, Eric O'Shaughnessy, and Sydney Forrester, *Tracking the Sun*, 2021 Edition, Public Data File, https://emp.lbl.gov/tracking-the-sun; California Energy Commission, PV Module List - Full Data, October 1, 2021, https://www.energy.ca.gov/sites/default/files/2021-10/PV_Module_List_Full_Data_ADA.xlsx, retrieved October 6, 2021; other publicly available data sources.

Note: Other includes modules with different cell counts and installations that use modules with different cell configurations in the same system.

Utility systems are generally the largest systems, and provide electricity directly to the electric grid for sale to customers rather than for on-site use (table I-23). These systems are generally ground-mounted and currently tend to use central inverters rather than microinverters. CSPV utility systems may involve fixed-tilt, single-axis tracking (panels rotate to follow the east-west movement of the sun), or dual-axis tracking (panels also move to follow the north-south movement of the sun during the year). Most large systems use single-axis tracking. The majority of utility projects completed in 2020 were small, 5 MW or less in size, though these projects accounted for only 8 percent of the installations in MW. There were 37 projects more than 100 MW in size in 2020, which accounted for 60 percent of installations in

MW.[192] CSPV projects 1 MW or larger in size most commonly use 72 cell monofacial or bifacial modules, but also use a variety of other cell configurations including 60, 81, 96, and 128 cell modules.[193]

Table I-23
U.S. utility installation, 2020

Project size (in MW)	Projects (in number of)	Share of projects (percent)	Volume installed (in MW)	Share of volume installed (percent)
5 or less	350	69	818	8
5.1 to 10	53	10	356	3
10.1 to 20	28	6	423	4
20.1 to 50	15	3	463	4
50.1 to 100	25	5	2,105	20
Greater than 100	37	7	6,244	60
Total	508	100	10,409	100

Source: U.S. Department of Energy, Energy Information Administration, 2020 Form EIA-860 Data - Schedule 3, Solar Technology Data (Operable Units Only), 2020, https://www.eia.gov/electricity/data/eia860/, retrieved October 6, 2021.

As noted above, there are a broad range of off-grid applications, such as power generation in remote locations, mobile power solutions, telecommunications power and lighting systems, and portable consumer goods (such as systems for recharging consumer electronics like tablets and phones). These systems often have additional BOS components, such as a battery and charge controller, though inverters are not needed for all off-grid applications.

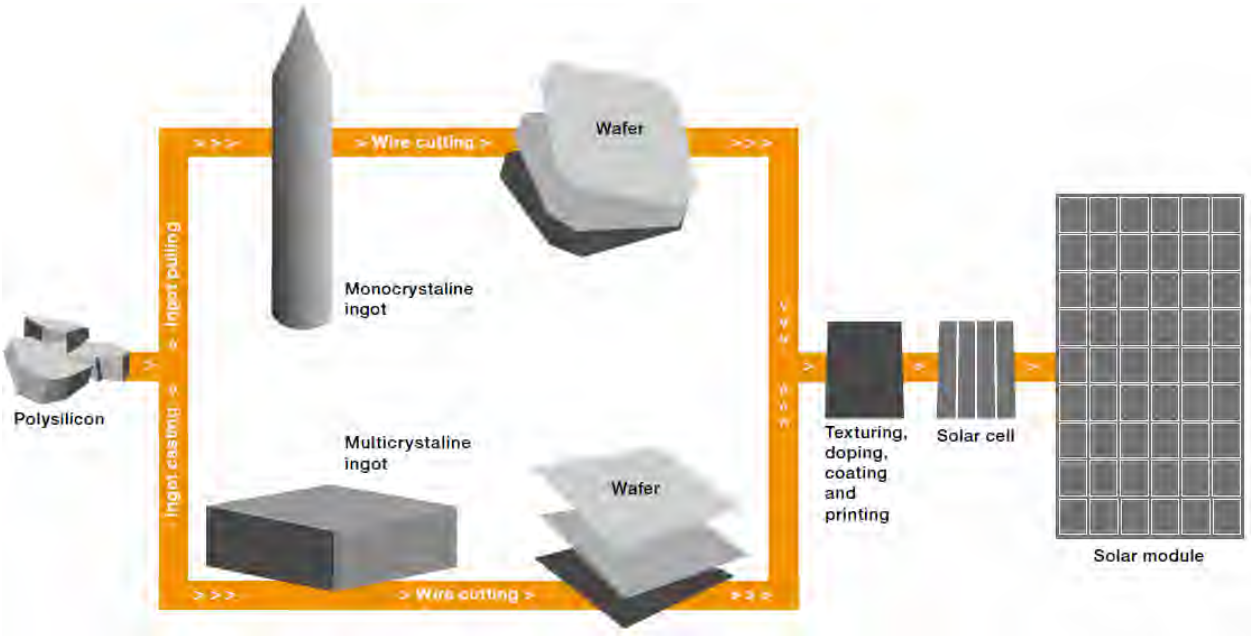
[192] The EIA defines utility projects as those 1 MW or larger in size. The solar portion of the project may be even smaller where multiple technologies are used. U.S. Department of Energy, Energy Information Administration, 2020 Form EIA-860 Data - Schedule 3, Solar Technology Data (Operable Units Only), 2020, https://www.eia.gov/electricity/data/eia860/, retrieved October 6, 2021; USDOE, EIA, "Most U.S. Utility-scale Solar Photovoltaic Power Plants are 5 Megawatts or Smaller," February 7, 2019, https://www.eia.gov/todayinenergy/detail.php?id=38272.

[193] Based on data on CSPV installations 1 MW or larger in size compiled from publicly available data sources and ***. Some of these installations may not fit all definitions of utility solar projects.

Manufacturing facilities and processes[194]

There are five principal stages involved in the manufacture of CSPV products (figure I-12). These are discrete production steps that may be done in different plants or locations, and may be produced in-house or sourced from other companies. First, polysilicon is refined, then it is formed into ingots, using different processes to produce monocrystalline ingots (sometimes referred to as crystals) and multicrystalline ingots. The ingots are then sliced into wafers and converted to CSPV cells, which are then assembled into the finished product, CSPV modules. The following discussion covers some of the most common production processes for each of the five steps.

Figure I-12
CSPV module production process



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

[194] Unless otherwise noted, this section is derived from Monitoring publication, pp. I-59–I-68.

Polysilicon

The first step in the CSPV value chain is refining polysilicon.[195] In the Siemens process (figure I-13), used in the majority of global polysilicon production, first quartz (silicon dioxide) and carbon are heated to around 1,800 degrees Celsius. The carbon reacts with the oxygen, resulting in carbon dioxide and silicon with a purity of around 98 to 99 percent. The silicon is then combined with hydrogen chloride gas at 300 to 350 degrees Celsius, with the reaction resulting in the liquid trichlorosilane. The trichlorosilane is then distilled to increase its purity. Next, heated silicon rods are inserted into a chemical vapor deposition reactor, and hydrogen and trichlorosilane gas are fed into the reactor where they are heated to 1,000 degrees Celsius or more. The silicon from the trichlorosilane is deposited onto the rods, which steadily increase in size until they are removed from the reactor. The resulting high purity polysilicon is crushed into chunks or rocks, then washed, inspected and packaged.

[195] This discussion will focus on the Siemens method, which accounted for 95 percent of global production in 2020. Fluidized bed reactor ("FBR") technology accounted for most of the remaining market. Instead of inserting rods, "FBR uses seed granules of purified silicon. The seed granules are fed into a chamber that has heated silane gas entering from below and exiting above. The flow of gas 'fluidizes' the silicon granules, causing them to flow like a liquid, as the silane gas breaks down and deposits silicon layers on them. The granules grow larger and heavier and exit when they are sufficiently large. As they do so, new seed granules and gas are introduced into the chamber and the process continues." The FBR process, which is newer than the Siemens process, uses 80 to 90 percent less energy, requires a smaller footprint, is a continuous process, takes up less space in shipping, and can increase downstream production efficiency. However, the process is difficult to scale and achieve high purity production at low cost. ITRPV, Results 2017 Including Maturity Report, Ninth Edition, September 2018, p. 8; REC Silicon webpage, http://www.recsilicon.com/technology/rec-silicons-fluidized-bedreactor-process, retrieved June 12, 2017; ITRPV, 2020 Results, p. 7, https://itrpv.vdma.org, retrieved September 28, 2021.

Figure I-13
CSPV products: Polysilicon refining process (Siemens method)

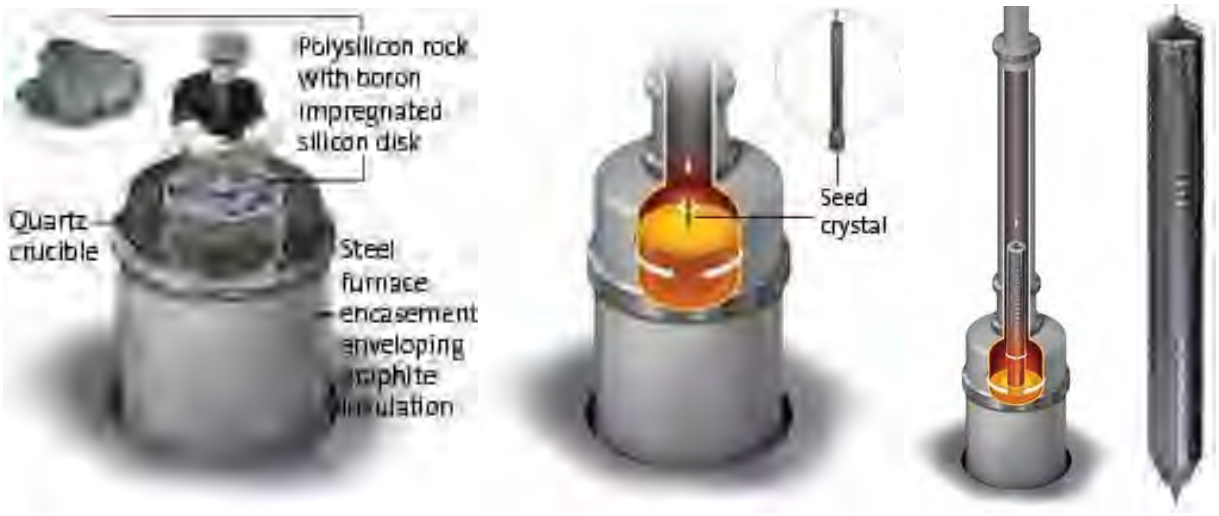
Source: Wacker Chemie AG, "Polysilicon," n.d., p. 8, https://www.wacker.com/cms/media/publications/downloads/7416_EN.pdf, retrieved October 8, 2019.

Ingots

In the Czochralski ("Cz") process[196] for producing crystals used in monocrystalline ingots, polysilicon chunks are first placed into a quartz crucible along with a dopant (boron or gallium), which is used to provide a positive electric orientation (figure I-14).[197] The polysilicon often includes both virgin polysilicon and waste polysilicon generated at later stages of the production process. The crucible is then loaded into a Cz furnace and heated to about 2,500 degrees Fahrenheit. Once the polysilicon is melted, a seed crystal is lowered into the material and rotated, with the crucible rotated in the opposite direction. The melt starts to solidify on the seed and the seed is slowly raised out of the melt—creating a single long crystal. The crystal is then cooled before it is moved onto the next step.

[196] This discussion will focus on the Czochralski process.
[197] ITRPV, *2020 Results*, pp. 8–9, https://itrpv.vdma.org, retrieved September 28, 2021.

Figure I-14
CSPV products: Czochralski process, crucible loading/charging (left), seed crystal (second from left), crystal growing (second from right), and finished crystal (right)



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

The speed of ingot pulling has increased over time, as has the size of ingots. Firms are moving toward rechargeable Czochralski ("RCz") and continuous Czochralski ("CCz") production processes. These processes enable firms increase the amount that they can cast in a crucible and RCz use has been accompanied by a shift toward using larger crucibles. These processes thus produce larger ingots, reduce energy use and downtime, and increase crucible life.

For multicrystalline ingots, the first step is loading polysilicon (including virgin and recovered waste) into a quartz crucible in a Directional Silicon Solidification ("DSS") furnace for melting (figure I-15). Argon is fed into the furnace to "remove impurities and inhibit oxidation." The "molten silicon is cast into a block and crystallized, forming a multicrystalline structure as the molten silicon and crucible cool." For cast mono (also referred to as quasi-mono or mono-like ingots), which has higher conversion efficiencies, seed ingots are used in the furnace to produce an ingot with a more mono type crystal structure.

Figure I-15
Furnace for multicrystalline ingots: Cross-section (left), single unit (middle), and installed units (right)

Source: ALD Vacuum Technologies, "SCU450 / SCU800 / SCU1200 / SCU1500 Silicon Crystallization Units," October 2016, p. 2, https://www.ald-vt.com/wp-content/uploads/2018/01/SCU2016.pdf, retrieved October 9, 2019; ALD Vacuum Technologies Webpage, https://www.ald-vt.com/portfolio/engineering/vacuum-metallurgy/silicon-crystallization-unit/, retrieved October 9, 2019.

Wafers

Once the ingot has cooled, it is processed into wafers. For monocrystalline ingots: (1) the top and tail (each end of the cylindrical crystal) are cut off, (2) the remaining portion of the crystal (or ingot) is cut into equal length pieces, (3) the ingot is squared,[198] (4) edges are ground, and (5) a wire saw then slices the ingots into wafers. For multicrystalline ingots (1) the ingot is squared, (2) the squared ingot is cut into blocks, (3) the blocks are tested and any parts of the block that do not pass these tests are cropped off, and (4) the blocks are sliced into wafers using a wire saw. Finally, the wafers are cleaned, dried, and inspected. Manufacturers have generally switched to diamond wire saws, which have several benefits, including increasing the speed of the production process.

Another technology for wafer production is Direct-to-Wafer or Direct Wafer technology. This technology involves converting convert molten silicon (or another feedstock) directly into wafers, bypassing the ingot stage. One such process is shown in figure I-16.

[198] In monocrystalline ingot squaring, the rounded sides of the ingot are cut into four flat sides, leaving—in some cases—rounded corners.

Figure I-16
CSPV products: Direct wafer manufacturing process

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

CSPV cells[199]

The monocrystalline and multicrystalline wafers are next processed into CSPV cells (figure I-17). The main steps in producing a standard, p-type, aluminum back surface field CSPV cell are as follows:

- **Cleaning and texturing:** First, the wafers are cleaned, then the surface of the wafer undergoes a chemical treatment that reduces the reflection of sunlight and increases light absorption.
- **Diffusion:** In the next step, "phosphorus is diffused into a thin layer of the wafer surface. The molecular-level impregnation occurs as the wafer surface is exposed to phosphorus gas at a high heat, a step that gives the surface a negative potential electrical orientation. The combination of that layer and the doped layer below creates a positive-negative, or p/n, junction–a critical partition in the functioning of a PV cell."[200]
- **Edge isolation:** A thin layer of silicon is then removed from the edge of the CSPV cell to separate the positive and negative layers.
- **Coating:** Next, a silicon nitride antireflective coating is added to the CSPV cells to increase the absorption of sunlight.
- **Printing:** Metals are then printed on the solar CSPV cell to collect the electricity. On the front of the CSPV cell, these metals are printed in thin metal strips called fingers, which are connected to the rest of the CSPV module via busbars. A metal layer, typically aluminum, is also printed on the back of the CSPV cell.

[199] The cell manufacturing process varies by company and technology. This section will only describe the process for producing an aluminum back surface field cell and a monocrystalline PERC cell.

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

- **Co-firing:** The CSPV cells then enter a furnace, where the "high temperature causes the silver paste to become imbedded in the surface of the silicon layer, forming a reliable electrical contact."[201]
- **Testing and sorting:** The final step in the process is the testing and sorting of the CSPV cells based on their characteristics and efficiency.

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

Figure I-17
CSPV cell production process

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

CSPV modules

The CSPV cells are next assembled into CSPV modules (figure I-18). If half-cut cells are used, the CSPV cells are first cut in half using a laser. Next, a piece of glass is placed on the production line, on top of which is added a piece of ethyl vinyl acetate ("EVA") or another encapsulant. Then a group of CSPV cells is placed in a line and soldered together, creating a

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

string. The strings are then placed on top of the encapsulant, and the string interconnections are soldered together. After this, another layer of EVA and a backsheet are added, then the product is laminated and cured (creating what is referred to as a “laminate”). Excess material is then trimmed, usually a frame is added, and a junction box is attached to the back. CSPV modules are then tested, sorted, and packaged.

EXHIBIT 11

A-570-979, C-570-980, A-583-853
Scope Inquiry
Solar Cells and Products
Public Document
E&C/OVII: PS

April 8, 2021

MEMORANDUM TO: James Maeder
Deputy Assistant Secretary
for Antidumping and Countervailing Duty Operations

THROUGH: Melissa G. Skinner
Senior Director, Office VII
Antidumping and Countervailing Duty Operations

FROM: Peter Shaw
International Trade Compliance Analyst
Antidumping and Countervailing Duty Operations

SUBJECT: Antidumping and Countervailing Duty Orders on Crystalline Silicon Photovoltaic Cells from the People's Republic of China, and Certain Crystalline Silicon Photovoltaic Products from Taiwan: The Solaria Corporation Scope Ruling

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I. Summary

On January 19, 2021, the Department of Commerce (Commerce) received a scope ruling request from The Solaria Corporation (Solaria),[1] requesting that Commerce find Solaria's PowerXT photovoltaic (PV) cells and modules, manufactured in the Republic of Korea (Korea), are not included in the scope of the antidumping duty (AD) and countervailing duty (CVD) orders on crystalline silicon photovoltaic (CSPV) cells, whether or not assembled into modules from the People's Republic of China (China), and the AD order on certain crystalline silicon photovoltaic products from Taiwan (collectively, the *Orders*).[2] On the basis of our analysis of Solaria's

[1] *See* Solaria's Letter, "Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, from the People's Republic of China (A-570-979 and C-570-980); and Certain Crystalline Silicon Photovoltaic Products from Taiwan (A-583-853): Scope Ruling Request for Modules and Cells Manufactured In and Imported From Korea," dated January 15, 2021 (Solaria's Scope Request). We note that these requests were filed after 5pm on Friday, January 15, 2021. Because of that and the fact that Monday, January 18, 2021 was a Federal holiday and Commerce was closed, the filed date of these letters for purposes of calculating Commerce's deadlines is Tuesday, January 19, 2021.

[2] *See Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, from the People's Republic of China: Amended Final Determination of Sales at Less Than Fair Value, and Antidumping Duty Order*, 77 FR 73018 (December 7, 2012); and *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, from the People's Republic of China: Countervailing Duty Order,* 77 FR 73017 (December 7, 2012) (collectively, *China Solar I Orders*); *see also Certain Crystalline Silicon Photovoltaic Products from Taiwan: Antidumping Duty Order,* 80 FR 8596 (February 18, 2015) (*Taiwan Order*) (collectively, *Orders*).

request and the sources described in 19 CFR 351.225(k)(1), we determine that Solaria's PowerXT PV cells and modules are included in the scope of the *Orders*.

II. Background

On December 7, 2012, Commerce published the China Solar I Orders and on February 18, 2015, Commerce published the Taiwan Order.[3] On October 7, 2020, Solaria submitted a request for Commerce to issue a scope ruling that its PowerXT PV cells and modules are not included in the scope of the *Orders*.[4] On November 13, 2020, Commerce determined that the request was missing certain information that was necessary for Commerce to make a scope ruling and, accordingly, we rejected Solaria's scope request and issued a supplemental questionnaire to Solaria requesting additional information.[5] On January 19, 2021, Solaria submitted its responses to Commerce's supplemental questionnaire and refiled its original scope ruling request.[6]

On February 24, 2021, we extended the deadline for issuing a final scope ruling until April 19, 2021.[7] On April 1, 2021, we received comments from the American Alliance for Solar Manufacturing (the petitioner).[8]

III. Scope of the *Orders*

China Solar I Orders

The merchandise covered by the orders is crystalline silicon photovoltaic cells, and modules, laminates, and panels, consisting of crystalline silicon photovoltaic cells, whether or not partially or fully assembled into other products, including, but not limited to, modules, laminates, panels and building integrated materials.

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

Merchandise under consideration may be described at the time of importation as parts for final finished products that are assembled after importation, including, but not limited to, modules,

[3] *See China Solar I Orders*; *see also Taiwan Order*.
[4] *See* Solaria's Letter, "Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From the People's Republic of China (A-570-979 and C-570-980); and Certain Crystalline Silicon Photovoltaic Products from Taiwan (A-583-853): Scope Ruling Request for Modules and Cells Manufactured In and Imported from Korea," dated October 7, 2020.
[5] *See* Commerce's Letter, "Scope Ruling Request on Solaria's Modules and Cells Manufactured in Korea, Supplemental Questionnaire," dated November 13, 2020.
[6] *See* Solaria's Scope Request.
[7] *See* Memorandum, "Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, from the People's Republic of China and Certain Crystalline Silicon Photovoltaic Products from Taiwan – Solaria's Scope Ruling Request: Extension," dated February 24, 2021.
[8] *See* Petitioner's Letter, "Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules, from the People's Republic of China, and Certain Crystalline Silicon Photovoltaic Products from Taiwan: Response to Solaria's Scope Ruling Request," dated April 1, 2021.

laminates, panels, building-integrated modules, building-integrated panels, or other finished goods kits. Such parts that otherwise meet the definition of merchandise under consideration are included in the scope of the orders.

Excluded from the scope of the orders are thin film photovoltaic products produced from amorphous silicon (a-Si), cadmium telluride (CdTe), or copper indium gallium selenide (CIGS). Also excluded from the scope of the orders are crystalline silicon photovoltaic cells, not exceeding 10,000 mm^2 in surface area, that are permanently integrated into a consumer good whose function is other than power generation and that consumes the electricity generated by the integrated crystalline silicon photovoltaic cell. Where more than one cell is permanently integrated into a consumer good, the surface area for purposes of this exclusion shall be the total combined surface area of all cells that are integrated into the consumer good.

Additionally, excluded from the scope of the orders are panels with surface area from 3,450 mm^2 to 33,782 mm^2 with one black wire and one red wire (each of type 22 AWG or 24 AWG not more than 206 mm in length when measured from panel extrusion), and not exceeding 2.9 volts, 1.1 amps, and 3.19 watts. For the purposes of this exclusion, no panel shall contain an internal battery or external computer peripheral ports.

Also excluded from the scope of the orders are:

(1) Off grid CSPV panels in rigid form with a glass cover, with the following characteristics:

(A) A total power output of 100 watts or less per panel;

(B) a maximum surface area of 8,000 cm2 per panel;

(C) do not include a built-in inverter;

(D) must include a permanently connected wire that terminates in either an 8mm male barrel connector, or a two-port rectangular connector with two pins in square housings of different colors;

(E) must include visible parallel grid collector metallic wire lines every 1–4 millimeters across each solar cell; and

(F) must be in individual retail packaging (for purposes of this provision, retail packaging typically includes graphics, the product name, its description and/or features, and foam for transport); and

(2) Off grid CSPV panels without a glass cover, with the following characteristics:

(A) A total power output of 100 watts or less per panel;

(B) a maximum surface area of 8,000 cm2 per panel;

(C) do not include a built-in inverter;

(D) must include visible parallel grid collector metallic wire lines every 1–4 millimeters across each solar cell; and

(E) each panel is

1. permanently integrated into a consumer good;

2. encased in a laminated material without stitching, or

3. has all of the following characteristics:

(i) the panel is encased in sewn fabric with visible stitching, (ii) includes a mesh zippered storage

pocket, and (iii) includes a permanently attached wire that terminates in a female USB–A connector.

Filed By: Peter Shaw, Filed Date: 4/8/21 1:29 PM, Submission Status: Approved

Modules, laminates, and panels produced in a third country from cells produced in China are covered by the orders; however, modules, laminates, and panels produced in China from cells produced in a third country are not covered by the orders.

Merchandise covered by the orders is currently classified in the 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 the orders is dispositive.

Taiwan Order

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

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

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

Excluded from the scope of this order 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 order 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 cells. Where more than one cell is permanently integrated into a consumer good, the surface area for purposes of this exclusion shall be the total combined surface area of all cells that are integrated into the consumer good.

Further, also excluded from the scope of this order are any products covered by the existing antidumping and countervailing duty orders on crystalline silicon photovoltaic cells, whether or not assembled into modules, from China.[9]

Also excluded from the scope of this order are modules, laminates, and panels produced in China from crystalline silicon photovoltaic cells produced in Taiwan that are covered by an existing proceeding on such modules, laminates, and panels from China.

Additionally, excluded from the scope of this order are solar panels that are: (1) less than 300,000 mm^2 in surface area; (2) less than 27.1 watts in power; (3) coated across their entire surface with a polyurethane doming resin; and (4) joined to a battery charging and maintaining unit (which is an acrylonitrile butadiene styrene (ABS) box that incorporates a light emitting

[9] *See China Solar I Orders*.

diode (LED)) by coated wires that include a connector to permit the incorporation of an extension cable. The battery charging and maintaining unit utilizes high-frequency triangular pulse waveforms designed to maintain and extend the life of batteries through the reduction of lead sulfate crystals. The above-described battery charging and maintaining unit is currently available under the registered trademark "SolarPulse."

Merchandise covered by the order is currently classified in the HTSUS under subheadings 8501.61.0000, 8507.20.8030, 8507.20.8040, 8507.20.8060, 8507.20.8090, 8541.40.6015, 8541.40.6020, 8541.40.6030, 8541.40.6035, and 8501.31.8000. These HTSUS subheadings are provided for convenience and customs purposes; the written description of the scope of the order is dispositive.

IV. Legal Framework

When a request for a scope ruling is filed, Commerce examines the scope language of the order(s) at issue and the description of the product contained in the scope ruling request.[10] Pursuant to Commerce's regulations, Commerce may also examine other information, including the description of the merchandise contained in the petition, the record from the investigation, and prior scope determinations made for the same product.[11] If Commerce determines that these sources are sufficient to decide the matter, we will issue a final scope ruling as to whether the merchandise in question is covered by an order.[12]

Conversely, where the descriptions of the merchandise in the sources described in 19 CFR 351.225(k)(1) are not dispositive, Commerce will consider the five additional factors set forth at 19 CFR 351.225(k)(2). These factors are: (i) the physical characteristics of the merchandise; (ii) the expectations of the ultimate purchasers; (iii) the ultimate use of the product; (iv) the channels of trade in which the product is sold; and (v) the manner in which the product is advertised and displayed. The determination as to which analytical framework is most appropriate in any given scope proceeding is made on a case-by-case basis after consideration of all evidence before Commerce.

V. Description of Merchandise Subject to this Scope Request

The products subject to this scope ruling request are Solaria's Power XT PV cells and modules. Solaria imports fully assembled solar modules from Korea, manufactured from Solaria's proprietary PowerXT PV cells. The PowerXT PV cells are, according to Solaria, solar cells manufactured in Korea using partially processed solar wafers, or feedstock, produced in China and Taiwan.[13] The feedstock is a crystalline silicon wafer measuring approximately 0.025 square meters, and possesses certain attributes such as material dopants, chemical etching, and anti-reflective coatings. The feedstock possesses a p/n junction as well as an asymmetric metallization pattern that renders the feedstock useless when used in conventional solar panels. According to Solaria, the feedstock is transformed into PowerXT PV cells and incorporated into modules through Solaria's proprietary PowerXT manufacturing process in Korea, resulting in a

[10] *See Walgreen Co. v. United States*, 620 F.3d 1350, 1357 (Fed. Cir. 2010).
[11] *See* 19 CFR 351.225(k)(1).
[12] *See* 19 CFR 351.225(d).
[13] *See* Solaria's Scope Request at Attachment A, 3-4.

solar module that has superior performance and aesthetics.[14] The solar modules Solaria imports from Korea are classifiable under HTS subheading 8541.40.6015.

VI. Arguments from Solaria

Solaria's Scope Request[15]

- The language of the scope covers, and is limited to, crystalline silicon photovoltaic cells manufactured in China or Taiwan and modules manufactured outside of China or Taiwan, from CSPV cells manufactured in China or Taiwan.[16]
- Solaria's PowerXT cells are manufactured in Korea using proprietary manufacturing technology and dedicated equipment, which utilizes unique crystalline solar cell wafer feedstock from China or Taiwan.[17]
- The feedstock does not and cannot function as a conventional solar cell. The feedstock does not have a functional p/n junction and cannot be interconnected into a useful solar panel in its original state.[18]
- The language of the scope states that the products covered by the *Orders* are solar cells "having a p/n junction … to collect and forward the electricity that is generated by the cell."[19] The feedstock lacks a functional p/n junction and is, therefore, physically incapable of converting sunlight into electricity. It is only the end result of the PowerXT manufacturing process that allows the cell to be capable of generating electricity.[20]
- Solaria's feedstock material is not a functional solar cell that can be interconnected into a useful solar panel, in contrast with solar PV cells contemplated by and covered by the scope of the *Orders*.[21] The feedstock cannot be used to manufacture solar panels without the substantial transformation that occurs in Korea.[22]
- Solaria's PowerXT cells are formed by cutting the feedstock into five distinct and separate strips of wafer cell material, and making a direct large-area electrical p/n junction within the PowerXT cell, between the top of one wafer cell strip with the bottom of another wafer cell strip by slightly overlapping them.[23]
- Solaria's feedstock is unique because Solaria's goal is not to maximize the efficiency of the feedstock, but rather to optimize the efficiency of the PowerXT PV cell. Furthermore, Solaria's feedstock is unique in its color uniformity requirements.[24]
- There is no commercial market for Solaria's feedstock material because it cannot be used by any other customer due to Solaria's patented design. Solaria must purchase the entire production distribution from its suppliers.[25]
- Solaria's solar modules are produced from PV cells manufactured in Korea.[26]

[14] *Id.* at Attachment A, 5-7.
[15] *Id.* at Attachment A, 4-25.
[16] *Id.* at Attachment A, 6.
[17] *Id.*
[18] *Id.*
[19] *Id.*
[20] *Id.*
[21] *Id.* at Attachment A, 8.
[22] *Id.*
[23] *Id.* at Attachment A, 10.
[24] *Id.* at Attachment A, 12-13.
[25] *Id.* at Attachment A, 14.
[26] *Id.* at Attachment A, 15.

- Manufacturing PowerXT cells requires an integrated shingling and bussing manufacturing line that consists of three pieces of equipment that perform five processes.[27] The processes include: laser scribing, singulation, adhesive dispense, curing, and ribbon wire bonding, after which, the feedstock is physically and electrically transformed into a functioning solar cell.[28]
- Solaria addresses the criteria of 19 CFR 351.225(k)(2), as follows:
  - **Physical Characteristics:** The feedstock has different physical characteristics from conventional solar cells. The feedstock possesses asymmetric metallization patterns and does not have a functional p/n junction. Solaria transforms the feedstock through a five-step process requiring three sets of equipment in order for the feedstock to go through substantial physical and electrical transformation.[29]
  - **The Expectations of the Ultimate Purchasers:** The ultimate consumer for the feedstock is Solaria itself, as the feedstock is highly customized and specialized, it cannot be converted into functional PV cells outside of Solaria's manufacturing process.[30]
  - **The Ultimate Use of the Product:** The feedstock cannot be used to manufacture conventional solar panels without Solaria's manufacturing process. In particular, Solaria's manufacturing goal is not to maximize efficiency of the feedstock, but rather to optimize the efficiency of Solaria's PowerXT PV cell. This runs counter to traditional solar cell manufacturing goals.[31]
  - **The Channels of Trade in Which the Product are Sold:** There is no commercial market for Solaria's feedstock because there is no practical use of the feedstock outside of Solaria's manufacturing process. There are no channels of trade for the feedstock.[32]
  - **The Manner in Which the Product is Advertised and Displayed:** The feedstock is a patented, highly customized, and specialized material with no commercial market, therefore there is no advertising or display of the feedstock.[33]

Solaria's Supplemental Response [34]

- Solaria substantially transforms the non-functional feedstock it purchases from China and Taiwan into functioning PV cells through a unique, multi-step manufacturing process using specially designed custom equipment in Korea.[35]
- Given the amount of processing, capital investment, costs incurred, and value-addition created by Solaria's manufacturing locations in Korea, Solaria believes Korea is the correct country of origin for the products Solaria imports into the United States.[36]
- The downstream product, Solaria's PowerXT solar cell, is capable of converting sunlight into electricity, whereas the upstream product, the feedstock, cannot. Because the physical characteristics and functions of the PowerXT solar cell and feedstock are not the same, they are not the same class or kind of merchandise.[37]

[27] *Id.* at Attachment A, 16.
[28] *Id.* at Attachment A, 20.
[29] *Id.* at Attachment A, 22.
[30] *Id.* at Attachment A, 23.
[31] *Id.*
[32] *Id.* at Attachment A, 24.
[33] *Id.*
[34] *Id.* at Attachment B, 1-22.
[35] *Id.* at Attachment B, 1.
[36] *Id.* at Attachment B, 2.
[37] *Id.* at Attachment B, 2-3.

- Solaria's processing in Korea changes the important physical qualities of the feedstock, and results in a functioning solar cell capable of converting sunlight into electricity and, therefore, capable of module assembly.[38]
- During the manufacturing process in Korea, the feedstock loses its identity as a square wafer material with visible metallization patterns. The new monolithic, rectangular, and functional solar cells are ready for module assembly.[39]
- The nature and sophistication of the PowerXT cell production is significant. The process is covered by over 250 patents and is a unique process not used by other solar companies. This process is more expensive and capital-intensive than conventional solar cell manufacturing and module assembly.[40]
- The cost of production and value added to make Solaria's PowerXT cell in Korea is six cents per watt. This is 67 percent more than the cost of conventional solar cells. The feedstock is only 40 percent of the total cost of the PowerXT cell.[41]
- The advanced manufacturing process employs proprietary and specialized materials, including metal interconnects and electrically-conductive adhesives, a custom production line, specialized facilities, and skilled assembly labor.[42]
- The level of additional capital investment to produce PowerXT cell is significant. The capital investment required for converting feedstock to functional cells is almost identical to that for manufacturing conventional solar cells.[43]
- Solaria defines a p/n junction to be functional if it is capable of transmitting power that can be collected and utilized in a product. Given that the feedstock does not have a functional p/n junction, it is not physically capable of generating electricity unless the feedstock undergoes PowerXT manufacturing.[44]
- Solaria states that the feedstock cannot generate "energy" when struck by sunlight, and defines energy as power over time, *i.e.*, kWh.[45]
- The feedstock material has traditional solar cell dopants of boron and phosphorus, which are deposited in the feedstock in China or Taiwan. A non-functional p/n junction is formed in China or Taiwan, and a functional p/n junction is formed in Korea.[46]
- The functional p/n junction is formed only when the feedstock is cut into 5 separate strips and the strips are overlapped slightly one over the other. This overlapping process creates a large-format solar PV cell and the functional p/n junction is formed between the strips. This process occurs in Korea.[47]
- Solaria's two-step manufacturing process was not contemplated at the time of the *China Solar I Orders*. The manufacturing process began development and commercialization in 2014.[48]
- Commerce noted Solaria excluded a portion of the scope definition, which references "whether or not the cell has undergone other processing to collect and forward the electricity

[38] *Id.* at Attachment B, 3.
[39] *Id.* at Attachment B, 4-6.
[40] *Id.* at Attachment B, 7.
[41] *Id.* at Attachment B, 8.
[42] *Id.* at Attachment B, 9.
[43] *Id.* at Attachment B, 10.
[44] *Id.* at Attachment B, 13-14.
[45] *Id.* at Attachment B, 14-15.
[46] *Id.* at Attachment B, 15-16.
[47] *Id.* at Attachment B, 16.
[48] *Id.* at Attachment B, 17.

that is generated by the cell."[49] Solaria states that regardless of whether or not a portion of the scope language has been excluded, the issue is the same. The scope covers solar "cells" whose "essential" function is to convert sunlight into electricity. Without a functional p/n junction, the feedstock cannot do that, and is not a "cell" as described in the scope of the *Orders*.[50]

- The p/n junction in the feedstock is non-functional because no viable end product can be manufactured from it. The p/n junction in the feedstock has no capability to produce electricity, as any standard interconnect process would create an electrical short. This is because the metallic busbars that carry the electrical current created from the p/n junction are formed on the top and bottom, but are specifically offset from each other to facilitate cutting and overlapping of the strips from the feedstock. This offset prevents any practical method to carry the current effectively, thus rendering the p/n junction non-functional.[51]
- The p/n junction can only be activated by forming a new p/n junction from the top of one PV strip to the bottom of another PV strip after the feedstock is cut and further processed in Korea.[52]

VII. Analysis

In a scope inquiry, Commerce first examines the scope language of the order, the description of the merchandise contained in the Petition, records of the underlying investigations, the International Trade Commission (ITC) Report, and the description of the merchandise in the scope ruling request. We find that the description of the products, the scope language, and the Petitions[53] are, together, dispositive as to whether the products at issue are subject merchandise, in accordance with 19 CFR 351.225(k)(1). Accordingly, for this determination, we find it unnecessary to consider the additional factors specified in 19 CFR 351.225(k)(2). We find that Solaria's PowerXT PV cells and modules meet the criteria for "modules, laminates, and panels produced in a third-country from cells produced in China{/Taiwan}," and therefore determine Solaria's PowerXT cells and modules to be covered by the scope of the *Orders*.

The *Orders* define the subject merchandise as "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."[54] The scope language further specifies that the *Orders* cover:

> crystalline silicon photovoltaic cells of thickness equal to or greater than 20 micrometers, having a p/n junction formed by any means, whether or not the cell has undergone other processing, including, but not limited to, cleaning, etching, coating, and/or addition of materials (including, but not limited to, metallization

[49] *Id.* at Attachment B, 18.
[50] *Id.*
[51] *Id.* at Attachment B, 20.
[52] *Id.*
[53] *See* Petitioner's Letter, "Petition for the Imposition of Antidumping and Countervailing Duties: Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, from the People's Republic of China", dated October 19, 2011 at Exhibit II-19, 3 (China Solar I Petition); *see also* Petitioner's Letter, "Petition for the Imposition of Antidumping and Countervailing Duties: Certain Crystalline Silicon Photovoltaic Products from the People's Republic of China and Taiwan," dated December 31, 2013 at 15 (Taiwan Petition) (collectively, Petitions).
[54] *See Orders.*

> and conductor patterns) to collect and forward the electricity that is generated by the cell.[55]

The *Orders* also stipulate that "{m}odules, laminates, and panels produced in a third-country from cells produced in China{/Taiwan} are covered by this investigation; however, modules, laminates, and panels produced in China{/Taiwan} from cells produced in a third-country are not covered by this investigation."[56]

Accordingly, the plain language of the scope presents two key factors for analysis in regard to Solaria's feedstock, PowerXT cells and modules, and whether or not they are covered by the *Orders*. Specifically, Commerce will consider whether or not: (1) the feedstock has a p/n junction; and (2) if the modules are produced in a third country from cells that were produced in China or Taiwan. In accordance with 19 CFR 351.225(k)(1), in considering these factors, Commerce will evaluate the descriptions of the merchandise contained in the Petitions, the initial investigations, and any prior scope determinations by Commerce or the ITC.

Positive/Negative Junction

In considering whether Solaria's feedstock imported from China or Taiwan satisfies the criteria of having a p/n junction, we analyzed whether the feedstock meets the definition of a solar cell as defined by the scope language, the Petitions, and the scope clarification memo (SCM)[57] accompanying the final determination in the investigation of solar cells from China. The SCM provided a narrative description of the cell conversion process, where silicon wafers are processed into solar cells capable of generating electricity.[58]

> Solar cells are made from crystalline silicon wafers. A dopant, which is a trace impurity element diffused into a thin layer of the wafers' surface to impart an opposite electrical orientation to the cell surface, **creates the positive/negative junction that is needed for the conversion of sunlight into electricity**, which is the purpose of solar cells.[59] (emphasis added)

As the SCM states, once a wafer is doped and an opposite electrical orientation is imparted on the surface, it results in the creation of a p/n junction. When sunlight strikes the cell, the positive and negative charge carriers are released, causing electrical current to flow.[60] It is at this point

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[55] *Id*.
[56] *Id*.
[57] *See* Memorandum, "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," dated March 19, 2012 (SCM). We note that in *Certain Crystalline Silicon Photovoltaic Products from Taiwan: Final Determination of Sales at Less Than Fair Value,* 79 FR 76966 (December 23, 2014) (*Taiwan Solar Products*), and accompanying Issues and Decision Memorandum (IDM) Commerce determined that its analysis in the China Solar I Orders, regarding the processing of solar cells into solar modules, was equally applicable for the purpose of solar cells produced in Taiwan and used in the manufacturing of solar modules in Taiwan or third countries other than China. *Id.* at 20-21.
[58] *See* SCM at 6.
[59] *Id.*; *see also Taiwan Solar Products* IDM at 18-19.
[60] *See Crystalline Silicon Photovoltaic Cells and Modules from China: Investigation Nos. 701-TA-481 and 731-TA-1190 (Prelim),* USITC Publication 4295, dated December 2011 (ITC Solar Cells and Modules Prelim) at 6.

that the cell is capable of generating electricity from sunlight.[61] In Exhibit 2 of Attachment B of its scope request, Solaria submitted production flowcharts, narrative descriptions, and image representations of the silicon wafer, feedstock, and PowerXT cell and module manufacturing processes.[62] According to the silicon wafer manufacturing process provided by Solaria, at step three of this process, the silicon wafer is doped with boron.[63] Additionally, at step three of the feedstock manufacturing process flowchart, phosphorus, a dopant of opposite electrical orientation of the wafer, is diffused into the wafer.[64] Thus, it is at this step in the feedstock manufacturing process, after the wafer has been fully doped, that a p/n junction is created. As specified in the SCM, a solar cell is capable of converting sunlight into electricity once the p/n junction at this step is created.[65] As noted in the exhibit, the steps involved to form the p/n junction take place in the suppliers' manufacturing facilities in China or Taiwan, and not in Korea.[66]

Solaria's interpretation of the scope language refers to cells "having a p/n junction … to collect and forward the electricity that is generated by the cell." Solaria claims that the feedstock it purchases from China or Taiwan is not capable of transmitting power that can be collected and utilized due to its non-functioning p/n junction and, therefore the feedstock is excluded by the language of the scope.[67] We disagree with this interpretation. Solaria omitted, from that quote by the use of ellipses, language that states the *Orders* cover cells whether or not the cell has undergone other processing to collect and forward the electricity that is generated by the cell. Thus the full quote is: "This order 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."[68] As previously stated, Solaria's feedstock has a p/n junction formed in China or Taiwan, and is capable of converting sunlight into electricity. The feedstock undergoes further processing in Korea in order for it to be capable of collecting and forwarding the electricity that is generated by the cell. By the language of the scope, this further processing is irrelevant in determining whether or not the cell is included in the scope. Per the language of the *Orders*, the SCM, and the Petitions, Solaria's feedstock possesses a p/n junction capable of converting sunlight into electricity prior to import into Korea.

Solaria states that the feedstock it purchases from China or Taiwan does not and cannot function as a CSPV cell due to its lack of a "functional" p/n junction and inability to generate electricity.

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[61] *See Crystalline Silicon Photovoltaic Cells and Modules from China: Investigation Nos. 701-TA-481 and 731-TA-1190 (Final),* USITC Publication 4360, dated November 2012 (ITC Solar Cells and Modules Final) at I-9.
[62] *See* Solaria Scope Request at Attachment B, Exhibit 2, 4-9. We note that in Exhibit 2, at page 5 "Feedstock processing" Solaria made three previously undisclosed alterations to the provided figure sourced from the National Renewable Energy Lab. *See* Solaria's Letter, "Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From the People's Republic of China (A-570-979 and C-570-980); and Certain Crystalline Silicon Photovoltaic Products From Taiwan (A–583–853): Comments to Clarify and Correct Factual Information on the Record," dated March 26, 2021.
[63] *Id*. at 4
[64] *Id.* at 6.
[65] *See* SCM at 6.
[66] *See* Solaria Scope Request at Attachment B, Exhibit 2, 6; and Attachment B, 15.
[67] *Id.* at Attachment B, 18.
[68] *See* SCM at 3.

As described above, Solaria's feedstock possesses a p/n junction formed in China or Taiwan, and is capable of converting sunlight into electricity. The fact that the cell may not collect or forward electricity prior to processing in Korea does not render the p/n junction useless or immaterial. In addition, the Petitions detail the complete solar cell manufacturing process, including the final steps of the cell conversion process following the creation of the p/n junction.[69] The process includes coating the solar cells with silicon nitride, and the addition of conductive metals such as silver to form electrically conducive channels that channel electricity generated by the cell into electricity collection points.[70] Solaria's feedstock processing flowchart describes the feedstock undergoing these steps in China or Taiwan.[71] Specifically, step six of the feedstock processing flowchart describes the deposition of silicon nitride on both sides, and step eight of the flowchart describes the "front and rear screen-printing of metal pastes for electrode formation, and firing." Furthermore, silver is included in the added materials section at this step. As noted in Solaria's feedstock processing exhibit, these steps take place in China or Taiwan, and not in Korea.[72] The Petitions explicitly state that following these steps, the individual cell is completed and that "the next production step involves the assembly of cells into modules or panels."[73] Based on the language of the Petitions, the silicon wafer has completed its conversion into a solar cell, and therefore, despite Solaria's reference to its feedstock, Solaria's feedstock is indeed a finished solar cell once it has completed these production steps.

Solaria argues that the feedstock cannot function as a CSPV cell due to its patented asymmetric metallization patterns that render the feedstock material useless in conventional solar PV panels.[74] This is because the busbars that are processed onto the feedstock are purposefully misaligned on the top from the bottom, in order to facilitate cutting and overlapping of the strips from the feedstock.[75] According to Solaria, the offset renders the p/n junction non-functional, and only by cutting and overlapping the strips to create a large-area electrical p/n junction can the solar cell generate electricity from sunlight.[76] This process occurs in Korea and creates a shingled solar module. We have concluded above that the feedstock already has a functional p/n junction prior to further manufacturing in Korea and, therefore, is capable of converting sunlight into electricity. Furthermore, the language of the scope specifically states that the addition of materials, including metallization and conductor patterns, to collect and forward the electricity that is generated by the cell, is not relevant in determining whether the cell is within the scope of the *Orders*.[77] Accordingly, the addition of Solaria's patented asymmetric metallization patterns is not relevant in determining whether the cell is within scope. Therefore, we find that the feedstock can function as a CSPV cell due to its p/n junction.

Country-of-Origin

The *Orders* specify that solar modules produced in a third country from cells produced in China or Taiwan are covered by the scope.[78] As explained in the previous section, we find that the

[69] *See* Petitions.
[70] *See* China Solar I Petition at Exhibit II-19, 3.
[71] *See* Solaria Scope Request at Attachment B, Exhibit 2, 6.
[72] *See* China Solar I Petition at Exhibit II-19, 3.
[73] *Id*.
[74] *See* Solaria Scope Request at Attachment A, 6.
[75] *Id*. at Attachment B, 20.
[76] *Id*. at Attachment B, 20; Attachment A, 10.
[77] *See Orders*.
[78] *Id*.

feedstock imported into Korea are solar cells produced in China or Taiwan. Therefore, the solar modules Solaria produces in Korea using these cells are within the scope of the *Orders*.

We disagree with Solaria that the production process taking place in Korea constitutes substantial transformation. We determine that the product leaving China or Taiwan is a solar cell and that the PowerXT cell and assembly process performed in Korea constitutes module assembly and does not substantially transform the solar cell such that it changes the country of origin of the cell. We addressed the scenario of module assembly taking place in a third country in the investigations.[79]

Solaria describes its PowerXT cell and module assembly as an eight-step process, where steps one through four are described as cell assembly and steps five through eight are module assembly.[80] The four steps of the PowerXT cell assembly include: (1) starting feedstock; (2) singulation; (3) strip formulation; and (4) module layup. Step three, strip formulation, is described by Solaria as applying electrically-conductive adhesives onto the strips and curing the strips to solidify the adhesives and create a monolithic cell structure.[81] Step four, module layup, is described as the placing and attaching of an end-ribbon wire to connect individual PowerXT cells together.[82] We find these two steps to be part of module assembly and, thus; according to the SCM, do not rise to the level of what is needed to substantially transform a solar cell. Thus, the only remaining steps of the PowerXT cell assembly are: (1) the starting feedstock; and (2) singulation. The first is, on its face, not transformative, as it is the start of the process, and the second step, singulation, is described as laser scribing to create a partial incision and then cutting the feedstock into five rectangular strips.[83] We find that the singulation, or the cutting of the feedstock, in and of itself, does not substantially transform Solaria's "feedstock" or solar cells and, thus, does not change their country of origin. Solaria itself noted in its scope request that Commerce has concluded the essential component of solar modules/panels is the solar cell, because the purpose of solar modules is to convert sunlight into electricity and that process occurs in the solar cell.[84] This essential component was formed in the solar cell during the cell conversion process in China or Taiwan. The process of cutting and overlapping the strips does not change the basic nature of the solar cell and does not transform its essential components. Furthermore, we note the ITC has stated that modules are made from "cells that are conductively connected to one another in the form of a string or matrix."[85] Solaria's process of applying electrically-conductive adhesives onto the strips (strip formation), and attaching a ribbon wire to place the strips into strings, is the process of conductively connecting cells into a string or matrix

[79] *See* SCM at 7-8.
[80] *See* Solaria Scope Request at Attachment B, Exhibit 2, 9. We note that in the Scope Request at Attachment A, 17-20, Solaria describes the PowerXT cell manufacturing process in five steps. At Attachment B, 12-13, Solaria describes the PowerXT cell manufacturing process in eight steps. According to Attachment B, Exhibit 2, Step 4, Module Layup, the feedstock undergoes the placement and tabbing of strings into a complete circuit, which requires the added material of copper ribbons. This corresponds to the last step of the PowerXT cell manufacturing process as described in Attachment A, 17-20, and Attachment B, 12-13.
[81] *See* Solaria Scope Request at Attachment A, 18-19.
[82] *Id*. at Attachment A, 19; Attachment B, 12.
[83] *Id*. at Attachment A, 17-18.
[84] *See* Solaria Scope Request at Attachment B, 17 (citing *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) and accompanying IDM at Comment 1); *see also* Taiwan Solar Products and accompanying IDM at 19.
[85] *See* ITC Solar Cells and Modules Prelim at 6.

(module layup) and, therefore, consists of module assembly and not a process by which the solar cell is substantially transformed.

According to the ITC, following the connection of cells together to form a string or matrix, a sealant such as ethyl vinyl acetate (EVA) is added to strengthen and weatherproof the cells before laminating the cells in a vacuum. The laminate is then "attached to a frame, and a junction box is mounted on the back."[86] Solaria's module assembly process, as listed in steps five through eight of the PowerXT cell and module assembly flowchart, are described here.[87] Step five consists of the lamination of the circuit including, the addition of EVA; step six is the aluminum framing of the laminate; and step seven is the attachment of the junction box. Step eight is immaterial, as it consists of testing, inspection, and sticker placement.[88] Additionally, according to the Petitions, the "petitioner, Trina Solar, a mandatory respondent, and the ITC all describe module assembly as stringing together 60 or 72 solar cells, laminating them, and fitting them in a glass-covered aluminum frame."[89] Again we find these steps are encompassed in steps one through eight of Solaria's self-described "PowerXT Cell and Module Assembly."[90] Accordingly, these steps would better be described as module assembly.

As stated in the SCM, module assembly "does not substantially alter the essential nature of solar cells, nor does it constitute significant processing such that it changes the country of origin of the cell, as it is an assembly process that only strings cells together, adding a protective covering and aluminum base."[91] Therefore, we disagree that Solaria's PowerXT cell and module assembly process substantially transforms the solar cell such that it changes the country of origin of the cell. We find that Solaria's PowerXT modules are produced in Korea from cells produced in China or Taiwan, and are covered by the *Orders*.

VIII. Recommendation

For the reasons discussed above, and in accordance with 19 CFR 351.225(d) and 19 CFR 351.225(k)(1), we recommend finding that Solaria's PowerXT cells and modules meet the criteria for "modules, laminates, and panels produced in a third-country from cells produced in China{/Taiwan}" and, therefore, are covered by the scope of the *Orders*. Because we reached this final scope ruling on the basis of the sources described in 19 CFR 351.225(k)(1), including the plain language of the scope, as explained above, we have not examined the criteria under 19 CFR 351.225(k)(2).

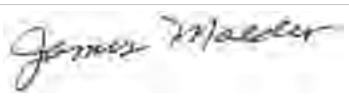
If the recommendation in this memorandum is accepted, we will serve a copy of this memorandum on all interested parties on the scope service list via FEDEX in lieu of first-class mail, as directed in 19 CFR 351.225. We will also issue the appropriate instructions to U.S.

[86] *See* ITC Solar Cells and Modules Final at 6.
[87] *See* Solaria Scope Request at Attachment B, Exhibit 2, 9.
[88] *Id*.
[89] *See* SCM at 8.
[90] *See* Solaria Scope Request at Attachment B, Exhibit 2, 9.
[91] *See* SCM at 8; *see also* Taiwan Final IDM at 21 ("we believe that {Commerce's} analysis in *Solar I* {regarding the fact that module assembly does not constitute substantial transformation} is equally applicable to this investigation.")

Customs and Border Protection stating that we found Solaria's PowerXT cells and modules to be within the scope of the *Orders*.

☒	☐
Agree	Disagree

4/8/2021

X 

Signed by: JAMES MAEDER

James Maeder
Deputy Assistant Secretary
for Antidumping and Countervailing Duty Operations

EXHIBIT 12

UNITED STATES DEPARTMENT OF COMMERCE
International Trade Administration
Washington, D.C. 20230

A-570-979
C-570-980
~~Proprietary Document~~
AD/CVD O4: JDP

Public Version

March 19, 2012

MEMORANDUM TO: Gary Taverman
Acting Deputy Assistant Secretary
for Antidumping and Countervailing Duty Operations

THROUGH: Abdelali Elouaradia
Director, Office 4
AD/CVD Operations

Howard Smith
Program Manager, Office 4
AD/CVD Operations

FROM: Jeff Pedersen
Case Analyst
AD/CVD Operations, Office 4

SUBJECT: 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

Summary

One day prior to the initiation of the above-referenced investigations, Petitioner[1] submitted proposed scope language stating that the scope covers modules/panels produced in the People's Republic of China ("PRC") regardless of where the cells in the modules/panels were manufactured and covers modules/panels produced in a third-country from cells manufactured in the PRC. The Department did not include this proposed language in the scope because it did not have sufficient time to evaluate the language prior to initiation. Since that time we have evaluated Petitioner's proposed language and, for the reasons noted below, recommend clarifying the scope of these investigations to state that modules/panels produced in a third-country from cells produced in the PRC are covered by the scope; however, modules/panels produced in the PRC from cells produced in a third-country are not covered by the scope.

Background

On November 8, 2011, the Department of Commerce (the "Department") initiated antidumping duty ("AD") and countervailing duty ("CVD") investigations of crystalline silicon photovoltaic

[1] The petitioner is SolarWorld Industries America Inc. ("Petitioner").

cells ("solar cells"), whether or not assembled into solar modules, from the PRC.[2] In the AD and CVD Initiation Notices the Department noted that Petitioner submitted revised scope language one day before initiation. The revised language included, among other things, the following substantive provision:

> These proceedings cover … 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 crystalline silicon PV modules or panels produced in a third country from crystalline silicon PV cells manufactured in the PRC … .

See AD Initiation Notice, 76 FR at 70960; CVD Initiation Notice, 76 FR at 70967; see also Standing Analysis and Revised Scope Language: Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules, from the People's Republic of China dated November 7, 2011 at Attachment 2.

The Department stated in the AD and CVD Initiation Notices that it has not adopted this specific revision recommended by Petitioner for the purposes of initiation. The Department explained that because the recommendation was filed one day prior to the statutory deadline for initiation the Department did not have sufficient 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.[3]

The AD and CVD Initiation Notices set aside a period for interested parties to raise issues regarding product coverage. On November 28, 2011, we received comments from Petitioner, and the following interested parties: SolarOne Solutions; Yingli Green Energy Holding Company Limited and Yingli Green Energy Americas, Inc. (collectively, "Yingli"); Canadian Solar Inc. ("Canadian Solar"); Wuxi Suntech Power Co., Ltd., Suntech America, Inc. and Suntech Arizona, Inc. (collectively, "Suntech"); Changzhou Trina Solar Energy Co. Ltd. ("Trina Solar"); DelSolar Co. Ltd. and DelSolar (Wujiang) Ltd. (collectively, "DelSolar"); tenKsolar (Shanghai) Co., Ltd. ("tenK"); Jiangsu Green Power PV Co., Ltd. ("Jiangsu Green"); Transform Solar; Suniva; Q-Cells North America; Hanwha SolarOne ("Qidong") Co., Ltd. ("SolarOne"); Shanghai BYD Company Limited ("Shanghai BYD"); and Konca Solar Cell Co., Ltd. On December 1, 2011, SunPower Corporation submitted rebuttal comments, as did Yingli, Canadian Solar, Suntech, and Trina Solar on December 5, 2011, and Petitioner on December 13, 2011.[4]

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[2] See 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) ("AD Initiation Notice"); Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From the People's Republic of China: Initiation of Countervailing Duty Investigation, 76 FR 70966 (November 16, 2011) ("CVD Initiation Notice") (collectively "AD and CVD Initiation Notices").

[3] See AD Initiation Notice, 76 FR at 70960; CVD Initiation Notice, 76 FR at 70967.

[4] SolarOne, Shanghai BYD, tenK, Jiangsu Green, Zamp Solar, LLC, and Petitioner also submitted additional comments on the scope of this investigation but they were not applicable to the issue covered in this memorandum, country-of-origin.

Scope

The scope from the AD and CVD Initiation Notices is 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 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 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.

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 and 8541.40.6030. These HTSUS subheadings are provided for convenience and customs purposes; the written description of the scope of this investigation is dispositive.

Parties' Comments

Petitioner:

- The only way to address the material injury caused by Chinese cells and modules/panels is to include both modules/panels produced in the PRC regardless of

included: 1) whether the processed downstream product falls into a different class or kind of product when compared to the upstream product; 2) whether the essential component of the merchandise is substantially transformed in the country of exportation; or 3) the extent of processing.[11] We have examined these criteria in conducting our substantial transformation analysis:

Class or Kind

The Department "has generally found that substantial transformation has taken place when the upstream and downstream products fall within two different 'classes or kinds' of merchandise.... Conversely, the Department almost invariably determines substantial transformation has not taken place when both products are within the same 'class or kind' of merchandise."[12] The merchandise subject to an investigation, i.e., the class or kind of merchandise to be investigated, is described in the scope. The scope of these investigations covers both solar cells and solar modules/panels.[13] Thus solar cells and solar modules/panels are within the same "class or kind" of product. We further note that the International Trade Commission ("ITC") in its companion preliminary determination defined solar cells and solar modules/panels as one domestic like product.[14]

Essential Component

In examining whether the essential component of the merchandise is substantially transformed in the country of exportation, the Department considers whether processing in the exporting country changes the important qualities or use of the component.[15] The essential component of solar modules/panels is the solar cell since the purpose of solar modules/panels is to convert sunlight into electricity and this process occurs in the solar cells.[16] Thus, in this case, the Department is considering whether the processing of solar cells into solar modules/panels changes the nature or use of the solar cells.

Module/panel assembly does not change the important qualities, i.e., the physical or chemical characteristics, of the solar cell itself. As stated in the original petition, solar cells are made from crystalline silicon wafers. A dopant, which is a trace impurity element diffused into a thin layer of the wafers' surface to impart an opposite electrical orientation to the cell surface, creates the positive/negative junction that is needed for the conversion of sunlight into electricity, which is the purpose of solar cells. Solar cells are normally coated with silicon nitride to increase light

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[11] See, e.g., Notice of Final Determination of Sales at Less Than Fair Value: Glycine from India, 73 FR 16640 (March 28, 2008), and accompanying Issues and Decision Memorandum at Comment 5.
[12] See Notice of Final Determination of Sales at Less Than Fair Value: Wax and Wax/Resin Thermal Transfer Ribbons from France, 69 FR 10674, 10675-10676 (March 8, 2004).
[13] See AD Initiation Notice, 76 FR at 70965 and CVD Initiation Notice, 76 FR at 70970.
[14] See Crystalline Silicon Photovoltaic Cells and Modules from China: Investigation Nos. 701-TA-481 and 731-TA-1190 (Preliminary), USITC Publication 4295 (December 2011) ("ITC Solar Cells and Modules Prelim") at 11.
[15] See also Erasable Programmable Read Only Memories (EPROMs) From Japan; Final Determination of Sales at Less Than Fair Value, 51 FR 39680, 39691-39692 (October 30, 1986) ("EPROMs").
[16] See Petition at Exhibit II-19 at 3.

absorption (this results in a blue-purple color) and undergo a screening process where conductive metal is printed into the cell. Metal conduits or busbars channel electricity generated by the cell into electricity collection points.[17] None of these characteristics are changed during module/panel assembly. Petitioner, Trina Solar, a mandatory respondent, and the ITC all describe module assembly as stringing together 60 or 72 solar cells, laminating them, and fitting them in a glass-covered aluminum frame.[18] These processes do not change the basic nature of a solar cell. Moreover, the function of a solar cell is not changed when assembled into modules/panels; the cell still functions to convert sunlight into electricity. The ITC also noted that "the physical characteristics and functions of cells and solar modules essentially are the same."[19] The purpose of both solar cells and solar modules/panels is to convert sunlight into electricity. Thus, neither the physical qualities nor the function of solar cells are changed when they are assembled into modules/panels.

The instant case is similar to EPROMs.[20] In EPROMs, the scope of the investigation included processed wafers and dice. In that case, the issue was whether processed wafers and dice that were produced in Japan, yet encapsulated in a third country, became a product of the country where the encapsulation occurred. The Department determined that the processed wafers or dice were not just a major component of the finished device, rather they were "the essential active component{s} which define{d} the merchandise under investigation."[21] The Department further found that the assembly process in the third country was not a sophisticated process.[22] Accordingly, the encapsulation of processed wafers or dice in a third country did not qualify as substantial transformation for purposes of determining country-of-origin. Similarly, solar module assembly connects cells into their final end-use form but does not change the "essential active component," the solar cell, which defines the module/panel.

Extent of Processing

When considering the extent of processing, we examine whether the processing was substantial and/or sophisticated.[23] As noted above, module/panel assembly consists of stringing together solar cells, laminating them, and fitting them in a glass-covered aluminum frame for protection. Thus, this stage of production is principally an assembly process. Numerous interested parties, aside from Petitioner, argued that solar module/panel assembly is relatively insubstantial in terms of number of steps, inputs, research and development required, and time.[24] Consistent with these arguments, Trina Solar identified six stages of production when manufacturing solar

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[17] See Petition for the Imposition of Antidumping and Countervailing Duties: Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules, from the People's Republic of China, dated October 19, 2011 ("Petition") at Exhibit II-19 at 3.
[18] See Petition at Exhibit A-26. See also ITC Solar Cells and Modules Prelim at 6 and 10.
[19] See ITC Solar Cells and Modules Prelim at 10.
[20] See EPROMs.
[21] See EPROMs, 51 FR at 39692.
[22] See id.
[23] See, e.g., Notice of Final Determination of Sales at Not Less Than Fair Value: Wax and Wax/Resin Thermal Transfer Ribbon from the Republic of Korea, 69 FR 17645, 17647 (April 5, 2004).
[24] See November 28, 2011 scope comments submitted by tenK, Transform Solar, Suniva, and Q-Cells North America.

modules/panels, five of which were dedicated to solar cell production and only one pertained to solar module/panel assembly.[25] Petitioner and the ITC also indicated that solar module assembly is one stage of production.[26] Petitioner and Trina Solar also reported consuming many more types of inputs in cell production compared with module assembly.[27] Further, Trina Solar reported a production time for solar cells that is [ ] of module assembly.[28] Accordingly, the assembly of solar cells into solar modules does not rise to the level of changing the country-of-origin of the subject merchandise.

Based on our analysis of the foregoing factors we find that solar module assembly does not substantially transform solar cells such that it changes the country-of-origin. Solar cells and solar modules/panels are within the same class of merchandise. Further, module assembly does not substantially alter the essential nature of solar cells nor does it constitute significant processing such that it changes the country-of-origin of the cell, as it is an assembly process that only strings cells together, adding a protective covering and an aluminum base. Therefore, we believe the scope should be clarified to state that modules/panels produced in a third-country from solar cells produced in the PRC are covered by the scope; however, modules/panels produced in the PRC from solar cells produced in a third-country are not covered by the scope.

While we understand the intent of Petitioner's argument that the scope should cover solar modules/panels produced in the PRC, regardless of the origin of the solar cells, this is not tenable because doing so would either necessitate making inconsistent country-of-origin determinations for a single product,[29] or require ignoring the country-of-origin when considering whether merchandise entering the United States is covered by the scope of these investigations. A product can only have one country-of-origin for AD/CVD purposes, and AD and CVD investigations only cover products with a country-of-origin that is the country under investigation.[30] Petitioner has not cited any example where the Department has found that a product could have two countries-of-origin. Thus, while the Department is not excluding solar modules/panels from the scope of these investigations, in conjunction with the above described substantial transformation analysis, we are clarifying that where solar cell production occurs in a different country from solar module assembly, the country-of-origin of the solar modules/panels is the country in which the solar cell was produced.

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[25] See also Trina Solar's January 10, 2012 Section A response at Exhibit A-26.

[26] See Petition at Exhibit A-26. See also ITC Solar Cells and Modules Prelim at 11 where the ITC noted in its preliminary determination that the "{p}roduction of the finished product, modules, involves four primary steps – crystallization, wafer production, cell conversion, and module assembly – along with packing and inspection of the final product. {Solar} cells undergo only one additional production step, the assembly into modules, before transformation into the finished product."

[27] See Trina Solar's February 6, 2012 Section D response at Exhibit D-4. See also Petition at Exhibits II-19 and II-20.

[28] See Trina Solar's February 6, 2012 Section D response at Exhibit D-4.

[29] Namely, finding that module assembly in the PRC using solar cells produced in a third-country constitutes substantial transformation and thus the country of origin of the module is the PRC while also finding that module assembly outside the PRC using PRC produced solar cells does not constitute substantial transformation and thus the country of origin of the module is the country where the solar cells were produced, the PRC.

[30] See Cold-Rolled from Argentina, 58 FR at 37065.

Petitioner's claim that not adopting their proposed language in the scope creates an unenforceable scope that can be easily circumvented. While we acknowledge that the Department has on occasion explicitly addressed the possibility of circumvention as a consideration in determining the country-of-origin of merchandise under investigation, circumvention is not the sole or controlling factor relied upon in making a country-of-origin determination.[31] Nonetheless, whether explicitly stated or not, the factors we consider for making country-of-origin determinations inherently reflect the agency's concern that the relief afforded by AD/CVD orders not be eviscerated by moving minor processing outside of the country covered by the order. Thus, circumvention concerns are reflected in the country-of-origin determination. As stated above, adopting the language proposed by Petitioner would result in two inconsistent country-of-origin determinations.

The Department routinely meets with U.S. Customs and Border Protection ("CBP") to ensure that our AD/CVD orders are enforced. Towards that end, and with respect to these cases in particular, the Department has begun an inter-agency dialogue with CBP that is designed to fulfill that goal. Specifically, Import Administration and CBP staff are meeting to develop procedures which will ensure that Chinese solar cells subject to any potential duties are properly identified at the border. Efforts to evade enforcement will be identified and thwarted. While the Department works closely with CBP, if an importer is declaring the wrong country-of-origin for imported merchandise, this is a matter appropriately dealt with by CBP. Lastly, Petitioner has the option of bringing additional petitions to address any dumping concerns it has regarding solar modules/panels assembled from solar cells produced in a third country.

[31] As demonstrated above, the Department considers various factors in a substantial transformation analysis.

Recommendation

We recommend that the Department find that solar module/panel assembly does not constitute substantial transformation of the solar cells included in the module. We further recommend clarifying the scope of these investigations to state that modules/panels produced in a third-country from cells produced in the PRC are covered by the scope; however, modules/panels produced in the PRC from cells produced in a third-country are not covered by the scope.[32]

✓

Agree Disagree

Gary Taverman
Acting Deputy Assistant Secretary
for Antidumping and Countervailing Duty Operations

3/19/12

Date

[32] See Attachment I.

Attachment I

Scope of the Investigation

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 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 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 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.

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 and 8541.40.6030. These HTSUS subheadings are provided for convenience and customs purposes; the written description of the scope of this investigation is dispositive.

EXHIBIT 13

C-570-980
Investigation
1/1/10 – 12/31/10
Public Document
o6:meh

October 9, 2012

MEMORANDUM TO: Paul Piquado
Assistant Secretary
for Import Administration

FROM: Christian Marsh
Deputy Assistant Secretary
for Antidumping and Countervailing Duty Operations

SUBJECT: Issues and Decision Memorandum for the Final Determination in the Countervailing Duty Investigation of Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, from the People's Republic of China

I. Summary

On March 25, 2012, the Department published the Preliminary Determination in this investigation.[1] The Department conducted verification of the questionnaire responses submitted by Suntech from June 25 through July 6, 2012, by the GOC from July 9 through July 13, 2012, and by Trina from July 16 through July 25, 2012.[2]

On June 26, 2012, the Department issued the Post-Preliminary Analysis Memorandum, which addressed several additional subsidy allegations including: the Provision of Land for LTAR to Suntech, the Provision of Electricity for LTAR, the Enterprise Income Tax Law R&D program, the Provision of Float Glass for LTAR, the Over-Rebate of VAT Export Rebates, and the creditworthiness of Suntech and Trina during certain years.[3]

The "Subsidies Valuation Information" and "Analysis of Programs" sections below describe the subsidy programs and the methodologies used to calculate benefits for the programs under investigation. Additionally, we have analyzed the comments submitted by the interested parties in their case and rebuttal briefs in the "Analysis of Comments" section below, which contains the Department's responses to the issues raised in the briefs. Based on the comments received and our verification findings, we have made certain modifications to the Preliminary Determination and the Post-Preliminary Analysis Memorandum, which are discussed below under each program. We recommend that you approve the positions described in this memorandum.

[1] Attached to this memorandum are tables of acronyms and abbreviations, and administrative and legal authorities.
[2] See Suntech Verification Report, GOC Verification Report, and Trina Verification Report.
[3] See Post-Preliminary Analysis Memorandum.

On February 3, 2012, we published a preliminary affirmative determination of critical circumstances, finding that there was a reasonable basis to believe or suspect that certain subsidy allegations under investigation are inconsistent with the SCM agreement, and that there have been massive imports of solar cells over a relatively short period from Suntech, Trina Solar, and other producers or exporters. As such, we determined that critical circumstances exist for Suntech, Trina, and all other PRC producers and exporters, pursuant to section 703(e)(1) of the Act, and 19 CFR 351.206.[4] Consequently, after the Preliminary Determination, we instructed CBP to suspend all entries on or after December 27, 2011, which is 90 days before the publication of the Preliminary Determination on March 26, 2012.[5] After reviewing comments from all parties concerning the preliminary determination of critical circumstances (Comments 3, 4, and 5, below), we continue to determine that critical circumstances exist for Suntech, Trina, and all other producers and exporters.

Below is a complete list of the issues in this investigation for which we received case brief and rebuttal comments from interested parties.

General
Comment 1: Simultaneous Application of CVD and AD NME Measures
Comment 2: Cut-Off Date for Measurement of Subsidies

Critical Circumstances
Comment 3: Critical Circumstances: Early Knowledge
Comment 4: Critical Circumstances: Other Factors Contributing to Import Surges
Comment 5: Critical Circumstances: The Length of the Base and Comparison Periods

Provision of Goods and Services for LTAR
Comment 6: Whether Polysilicon Producers Are Authorities
Comment 7: Whether Polysilicon Producers Were Entrusted or Directed to Supply Polysilicon to the Solar Cells Industry for LTAR
Comment 8: Specificity of the Provision of Polysilicon for LTAR
Comment 9: Use of an In-Country Benchmark to Measure the Benefit from the Provision of Polysilicon for LTAR
Comment 10: The Department's Determinations Not to Investigate Aluminum Extrusions and Rolled Glass Provided at LTAR
Comment 11: The Provision of Land to Trina
Comment 12: Use of AFA to Determine an Electricity Benchmark

[4] See Preliminary CVD Critical Circumstances Determination, 77 FR at 5489.
[5] On July 24, 2012, we instructed CBP to terminate suspension of entries, beginning on that date, in accordance with our obligations under the SCM, until a final affirmative ITC determination is published.

II. Subsidy Valuation Information

A. Period of Investigation

The POI for which we are measuring subsidies is January 1, 2010, through December 31, 2010.

B. Attribution of Subsidies

The Department's regulations at 19 CFR 351.525(b)(6)(i) state that the Department will normally attribute a subsidy to the products produced by the corporation that received the subsidy. However, 19 CFR 351.525(b)(6)(ii)-(v) provides that the Department will attribute

examine any alleged fraud, assuming sufficient evidence is presented. Finally, we do not find that Petitioner included new information in its September 18, 2012 submission. In the Department's view, Petitioner's submission was limited to arguments regarding its original fraud allegations and there is no need to reject the submission.

Comment 32: Scope of the Investigation

Petitioner's Arguments

- All modules assembled in the PRC, regardless of the country in which the solar cell was manufactured, should be included in the scope of the investigation because, inter alia: (1) the Department is legally required to give effect to the intent of the petition which was to cover modules from the PRC; (2) doing so will facilitate effective enforcement by CBP and prevent circumvention; (3) all PRC modules, regardless of the origin of the cells, are dumped into the United States; (4) the PRC module industry benefits from subsidies; (5) circumvention will be prevented and; (6) competition, and, consequently, price setting, occurs primarily in the module distribution channel.

- The Department's preliminary substantial transformation analysis is flawed. First, it was based on a two-stage production process (cell and module production) when there are actually three production stages (wafer, cell, and module production). When wafer production is viewed as a separate process from cell production, cell production becomes the least costly of the three stages. Second, the Department considered the cell as the essential active component of the module but both cells and modules are essential active components of the finished product. Third, the Department should not conduct a linear substantial transformation analysis but refine its substantial transformation test by focusing on the country where the aggregate of production occurs.

Alternatively, the Department should clarify the scope to cover PRC modules containing wafers that were converted into solar cells in third countries in order to prevent PRC exporters from avoiding dumping duties by producing wafers in the PRC, sending them to a third country to be processed into solar cells, and assembling those solar cells into modules in the PRC before exporting them to the United States. Adoption of the proposed alternative scope clarification is consistent with a substantial transformation test that focuses on the country in which the aggregate of production occurs, would not violate the due process rights of those affected by the clarification, and is warranted in light of evidence that suggests that PRC producers have changed or may change their production practices to avoid duties. Further, the CIT's reference to the Department's examination of "processes" and "operations" in cases involving the Department's country-of-origin test supports a substantial transformation test that considers more than a single production stage.

Arguments of the GOC, SunPower Corporation, Suntech, Trina, TenKsolar (Shanghai) Co. Ltd.

- The Department should maintain the scope of the investigation as defined in the Preliminary Determination by continuing to exclude modules, laminates, and panels produced in the PRC from solar cells produced in a third country because: (1) the

substantial transformation analysis used to clarify the scope is accurate, and properly avoids creating conflicting country of origin findings for a single product; (2) Petitioner's proposed alternative substantial transformation test is not supported by law or precedent; (3) the Department is not legally required to accept Petitioner's scope revision when there is an overarching reason to modify it; (4) circumvention concerns were addressed in the Department's scope clarification and the clarified scope can be administered effectively; and (5) at this late stage of the proceeding, the Department is not permitted to expand the scope to cover PRC modules containing wafers that were converted into solar cells in third countries.

Small Steps Solar's Arguments

- The scope should exclude "cells, not exceeding 4,000 mm^2 in surface area per cell, that are permanently integrated into or with a consumer good whose function is other than power generation and that consumes the electricity generated by the integrated crystalline silicon photovoltaic cells." The small products covered by the proposed exclusion are different than domestic like product described in the petition because they can be distinguished by their physical characteristics and channels of distribution. The Department's failure to issue a quantity and value questionnaire to Small Steps Solar's PRC supplier demonstrates that the small consumer products were not the focus of this investigation.

Department's Position:

We continue to find that modules assembled in the PRC from solar cells produced in third countries are not covered by the scope of this investigation. Although generally the Department will exercise its authority to define or clarify the scope of an investigation in a manner that reflects the intent of the petition and provides the relief requested by the petitioning industry, it cannot merely accept a scope proposed by the industry when the agency's ability to administer any resulting order requires that it modify the proposed scope, which is the case here.[195] The scope of an AD or CVD order is limited to merchandise that is produced in the country covered by the order.[196] Thus, Petitioner's proposal that modules assembled in the PRC using solar cells produced in third countries be covered by the scope could only be accepted to the extent that it covers products determined to be of PRC origin. In determining the country-of-origin of a product, the Department's practice has been to conduct a substantial transformation analysis.[197] The CIT has upheld the Department's "substantial transformation" test as a means to carry out its country-of-origin analysis.[198] Hence, this is the analysis that was conducted early in the investigation which we affirm in this final determination. In its substantial transformation analysis, the Department found that solar cells are the "essential active component" that define the module/panel and that stringing third-country solar cells together and assembling them with other components into a module in the PRC does not constitute substantial transformation such

[195] See Ribbons from Taiwan Preliminary Determination, 75 FR at 7247 (unchanged in Ribbons from Taiwan Final Determination); see also Lumber from Canada IDM at section entitled, "Scope Issues," which follows Comment 49.
[196] See Plate from Belgium IDM at Comment 4.
[197] See, e.g., Glycine from India IDM at Comment 5; see also SSPC from Belgium IDM at Comment 4.
[198] See E.I. DuPont De Nemours, 8 F. Supp. 2d at 858.

that the assembled module could be considered a product of the PRC. Contrary to Petitioner's claim, for the reasons explained below, the substantial transformation analysis performed by the Department was not flawed.

First, record evidence supports the Department's finding that the solar cell is the essential active component of the solar module. Petitioner argues, inter alia, that certain physical qualities of the solar cell are changed when it is incorporated into a module, and, consequently, "wafer, cell, and components of the assembled module are essential active components of the finished module."[199] In support of this argument, Petitioner states, inter alia, that an individual solar cell cannot generate a commercially significant amount of electricity until it is joined together with other cells during the module assembly process. Petitioner further states that the processes of soldering individual solar cells together and laminating them, which occur during module assembly, changes the physical characteristics of the solar cell. Petitioner, however, apparently misinterprets the essential component criterion of the Department's substantial transformation analysis. Under this criterion, the Department considers whether processing in the exporting country changes the important qualities or use of the component.[200] Thus, the Department's essential component analysis focused on the third-country solar cells shipped into, and processed in, the exporting country (the PRC) and the significance of the changes in physical qualities or use of the component that occurred as a result of the processing. Evidence of a change or changes to the physical qualities of a component as a result of further processing does not inevitably lead to the conclusion that further processing substantially transformed the component. In the instant investigation, the Department found that the essential component of solar modules/panels is the solar cell since the purpose of solar modules/panels is to convert sunlight into electricity and this process occurs in the solar cells.[201] Accordingly, the Department considered whether the processing of solar cells into solar modules changes the nature or use of the solar cells.[202] As stated in the Scope Clarification Memorandum, the Department found that a number of the significant physical characteristics of the solar cell were not changed during the module assembly process.[203] As the ITC stated, "the physical characteristics and functions of cells and solar modules essentially are the same."[204] Moreover, the Department noted that its finding that solar module assembly connects cells into their final end-use form but does not change the "essential active component," the solar cell, which defines the module/panel, is consistent with the Department's precedent.[205] Accordingly, based on a consideration of record

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[199] See Petitioner's Case Brief at 9.

[200] See also EPROMs, 51 FR at 39691-39692 (emphasis added).

[201] See Scope Clarification Memorandum at 6 (citing the Petition at Exhibit II-19 at 3).

[202] See Preliminary Scope Clarification Memorandum at 6.

[203] See Preliminary Scope Clarification Memorandum at 6-7 which states, inter alia, the following:
"Module/panel assembly does not change the important qualities, i.e., the physical or chemical characteristics, of the solar cell itself. As stated in the original petition, solar cells are made from crystalline silicon wafers. A dopant, which is a trace impurity element diffused into a thin layer of the wafers' surface to impart an opposite electrical orientation to the cell surface, creates the positive/negative junction that is needed for the conversion of sunlight into electricity, which is the purpose of solar cells. Solar cells are normally coated with silicon nitride to increase light absorption (this results in a blue-purple color) and undergo a screening process where conductive metal is printed into the cell. Metal conduits or busbars channel electricity generated by the cell into electricity collection points." (citations omitted).

[204] See Preliminary Scope Clarification Memorandum at 6 (citing ITC Preliminary Report at 10).

[205] See Preliminary Scope Clarification Memorandum at 6 (citing EPROMs).

evidence and Department's precedent, the Department continues to find that the solar cell is the essential active component of the module.

Second, we disagree with Petitioner's contention that the extent of processing criterion does not support the Department's substantial transformation finding. Petitioner believes the Department erred because it assumed modules are produced in two steps (cell production and module assembly) rather than three (wafer production, cell production, and module assembly) and alleges that out of these three steps, cell production is the least cost-intensive step.[206] However, when considering the "extent of processing" criterion used in the substantial transformation analysis, the Department only needed to examine whether the assembly of solar cells into modules was substantial and/or significant.[207] The Department did not need to identify each step undertaken in producing and assembling module components and then determine where the aggregate of production occurred to determine the country of origin of the module. Petitioner's contention does not reject how the Department applies the substantial transformation test.[208] The Department has explicitly acknowledged that solar module producers have identified more than two production stages.[209]

However, identifying the number of production stages and determining where most of these stages occur was not the issue in the Department's "extent of processing" analysis. Rather, the Department examined the extent of processing at the module assembly stage in relation to the prior production stages and the nature of the processing at the module assembly stage to determine whether module assembly substantially transformed the solar cells such that the final product could be considered a product of the PRC.[210] The Department concluded that the module assembly stage of production is principally an assembly process, which consists of stringing together solar cells, laminating them, and fitting them in a glass-covered aluminum frame for protection.[211] For the reasons explained in the Scope Clarification Memorandum, the Department continues to find that the module assembly stage of production is a comparatively less sophisticated process than cell conversion or the production stages that precede it, and thus it does not substantially transform the solar cell. We note that none of the evidence cited by Petitioner contradicts this finding.[212] Additionally, because the Department finds that the application of its substantial transformation test is an appropriate means to resolve country-of-origin issues like the one presented in the instant investigation, the Department has not adopted Petitioner's suggestion to modify the test.

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[206] See Petitioner's Case Brief at 11.

[207] See Preliminary Scope Clarification Memorandum at 7 (citing Ribbons from Korea, 69 FR at 17647).

[208] See, e.g., EPROMs.

[209] Scope Clarification Memorandum at 7-8, states the following: "Numerous interested parties, aside from Petitioner, argued that solar module/panel assembly is relatively insubstantial in terms of number of steps, inputs, research and development required, and time. Consistent with these arguments, Trina Solar identified six stages of production when manufacturing solar modules/panels, five of which were dedicated to solar cell production and only one pertained to solar module/panel assembly." (emphasis added) (citations omitted).

[210] See Scope Clarification Memorandum at 7-8.

[211] See Preliminary Scope Clarification Memorandum at 7.

[212] See Petitioner's Case Brief at 11.

Furthermore, Petitioner's other arguments for why modules that are assembled in the PRC using third-country solar cells should be covered by the scope are not persuasive. The Department agrees with Petitioner that the scope of the investigation always included modules from the PRC; however, as noted above, using a substantial transformation analysis the Department has determined that modules from the PRC are those that have been assembled in the PRC using solar cells produced in the PRC. Additionally, the Department has determined that modules assembled in third countries using solar cells produced in the PRC are also PRC products covered by the scope. While the Department will exercise its authority to define or clarify the scope of an investigation in a manner which reflects the intent of the petition and provides the relief requested by the petitioning industry, it may not accept a proposed scope that covers merchandise that originates from a third country not covered by the investigation. As noted above, the scope of an AD or CVD order is limited to subject merchandise that originates in the country covered by the investigation.[213] Petitioner argues that all modules assembled in the PRC must be covered by the scope, regardless of the origin of the solar cells, because they are benefitting from subsidies and being dumped in the United States and competition occurs in the module channel of distribution, but these concerns do not address the main issue. The main issue is that an investigation covering modules from the PRC cannot at the same time cover modules whose country of origin is not the PRC. Determining that all modules assembled in the PRC are covered by the scope of the investigation, no matter where the solar cells in the module were produced, would either necessitate making inconsistent country-of-origin determinations for a single product,[214] or require ignoring the country-of-origin when considering whether merchandise entering the United States is covered by the scope of the investigation. Petitioner has not explained how its proposed scope could be adopted without such a result. Moreover, even if the substantial transformation test focused on the country where the aggregate of production occurs, as suggested by Petitioner, Petitioner has not explained how such an analysis would support its request that the scope cover all modules assembled in the PRC, even when all of the other production steps occurred in a third country. Lastly, Petitioner has the option of bringing additional petitions to address any dumping concerns it has regarding solar modules/panels assembled from solar cells produced in a third country.

With respect to Petitioner's contention that all modules assembled in the PRC must be included in the scope of the investigation in order for CBP to effectively enforce any order imposed and to prevent widespread circumvention, we note that the Department, working in conjunction with CBP, has taken additional measures to ensure that the scope of any order imposed as a result of the investigation will be enforced. Specifically, the Department has informed CBP that importers claiming that the solar panels/modules they import do not contain solar cells that were produced in the PRC are required to maintain importer certifications and documentation to that effect. Additionally, the Department has notified CBP that both the importer and exporter are required to maintain exporter certifications if the exporter of the panels/modules which the importer claims contain no PRC-produced solar cells is located in the PRC. These certifications and documents must be presented to CBP officials on request. As noted in the Preliminary

[213] See Plate from Belgium IDM at Comment 4.

[214] Namely, finding that module assembly in the PRC using solar cells produced in a third-country constitutes substantial transformation and thus the country of origin of the module is the PRC while also finding that module assembly outside the PRC using PRC produced solar cells does not constitute substantial transformation and thus the country of origin of the module is the country where the solar cells were produced, the PRC.

Determination, if the certification or documentation is not provided, the Department has instructed CBP to suspend all unliquidated entries for which the certification or documentation were not provided and require the posting of a cash deposit or bond on those entries equal to the PRC-wide rate in effect at the time of the entry.[215] If a solar panel/module contains some solar cells produced in the PRC, but the importer is unable or unwilling to identify the total value of the panel/module that is subject merchandise, the Department has instructed CBP to require the posting of a cash deposit or bond on the total entered value of the panel/module equal to the PRC-wide rate in effect at the time of the entry. Thus, the Department has taken additional steps to ensure that efforts to evade enforcement of any order imposed as a result of this investigation will be identified and thwarted. If an importer is declaring the wrong country-of-origin for imported merchandise, this is a matter appropriately dealt with by CBP, and thus the Department will work closely with CBP in this regard.

Furthermore, the Department does not agree with Petitioner's alternative request to clarify the scope of this investigation to include modules/panels produced in the PRC from solar cells produced in a third country when the wafer production process has occurred in the PRC. In the context of this investigation the Department is not deciding whether wafers produced in the PRC and converted into cells in a third country are a product of the third country. The Department also notes that unlike solar cells, the wafers are not identified in the scope of this investigation. Moreover, the Department disagrees with Petitioner's assertion that the CIT's use of the terms "processes"[216] and "operations"[217] in cases involving the Department's country-of-origin analysis supports an approach that considers multiple production events. Only one of the cases cited by Petitioner involves a scope determination made by the Department and, in that case, there is no indication that the Department's substantial transformation analysis considered multiple, non-sequential production stages in the manner proposed by Petitioner.

With respect to Small Steps Solar's request to exclude certain smaller consumer products from the scope, we find that such an exclusion is not warranted. The current scope of the investigation specifically excludes smaller solar cells integrated into consumer goods if and only if those cells meet the following description:

> 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.

We have not granted Small Steps Solar's request to exclude cells, not exceeding 4,000 mm^2 in surface area per cell, which are integrated into small solar products because it is inconsistent with the intent of the petition. Small Steps Solar's request would exclude from the scope merchandise

[215] For a full discussion of the Department's certification requirements, see the AD Preliminary Determination.
[216] See E.I. DuPont De Nemours, 8 F. Supp. at 858.
[217] See Ferostaal Metals Corp., 664 F. Supp at 537.

that is expressly covered by the current scope (i.e., solar products with a total combined solar cell surface area that exceeds 10,000mm^2). As noted above, with certain limited exceptions, the Department exercises its authority to define or clarify the scope in a manner which reflects the intent of the petition. Moreover, we do not find that there is an overarching reason to modify Petitioner's scope exclusion.

Also, we disagree with Small Steps Solar that the small products covered by the proposed exclusion are different than the domestic like product described in the petition based on their physical characteristics and channels of distribution. Small Steps Solar asserts that the small solar products it wishes to exclude have a smaller peak power output than those described in the petition. We note, however, that the scope of the investigation does not exclude solar products on the basis of peak power output. Further, the scope of the investigation includes both cells and modules of PRC origin, meaning that a single cell with a lower peak power wattage output than the solar products that Small Steps Solar wishes to exclude is explicitly covered by the scope. Accordingly, we disagree with Small Steps Solar's assertion that the products it wishes to exclude can be distinguished on the basis of their physical characteristics. Additionally, we disagree with Small Step Solar's contention that the products it seeks to exclude from the scope can be distinguished from subject merchandise because they have different channels of distribution. The record lacks evidence that would enable the Department to compare the channels of distribution for the small products that Small Steps Solar seeks to exclude from the scope. Therefore, we find no reason to conclude that that products covered by Small Steps Solar's requested exclusion are distinguishable from subject merchandise.

Additionally, we disagree with Small Steps Solar's contention that the fact that the Department did not issue a quantity and value questionnaire to its PRC producer of solar products indicates that the investigation does not cover small consumer products.[218] In the AD investigation, the Department requested quantity and information from 75 companies that Petitioner identified as potential exporters of solar cells from the PRC. In the AD Initiation Notice, the Department publically invited parties that did not receive a quantity and value questionnaire from the Department to file a response to the questionnaire, which was published and made publically available on the Department's website. The Department's issuance of quantity and value questionnaires does not define the universe of producers or products subject to the investigation. In fact, the Department's invitation for the submission of additional quantity and value questionnaires clearly indicates the Department's provided all exporters of subject merchandise an opportunity to provide a quantity and value questionnaire.

For the foregoing reasons, the Department has made no revisions to the scope of the investigation to implement Petitioner's proposals nor has it granted the exclusion requested by Small Steps Solar.

[218] Small Steps Solar's argument regarding the issuance of quantity and value questionnaires pertains to the companion AD investigation of solar cells from the PRC.

EXHIBIT 14

HQ H261693

September 16, 2015

OT:RR:CTF:VS H261693 RMC

CATEGORY: Country of Origin

Chip Purcell
Cooley LLP
1299 Pennsylvania Ave. NW
Suite 700
Washington, DC 20004-2400

Re: U.S. Government Procurement; Country of Origin of Solar Modules; Substantial Transformation

Dear Mr. Purcell:

This is in response to your letter dated January 12, 2015, requesting a final determination on behalf of Hanwha USA pursuant to Subpart B of Part 177 of the U.S. Customs and Border Protection ("CBP") Regulations (19 C.F.R. Part 177). Under these regulations, which implement Title III of the Trade Agreements Act of 1979 ("TAA"), as amended (19 U.S.C. § 2511 *et seq.*), CBP issues country of origin advisory rulings and final determinations as to whether an article is or would be a product of a designated country or instrumentality for the purposes of granting waivers of certain "Buy American" restrictions in U.S. law or for products offered for sale to the U.S. Government. This final determination concerns the country of origin of certain solar modules. As a U.S. importer, Hanwha USA is a party-at-interest within the meaning of 19 C.F.R. § 177.22(d)(1) and is entitled to request this final determination.

FACTS:

Hanwha USA acts as the U.S. wholesaler and distributor of solar modules manufactured by Hanwha GmbH in Korea and Poland. The solar modules convert sunlight into energy and are generally incorporated into a system that includes other components such as inverters, racking systems, cable management systems, and monitoring systems. The systems are installed at facilities in order to generate electricity.

Hanwha USA provided the following information on each component that goes into a finished product.

1. Solar Cells – Product of Malaysia or Korea
2. Glass – Product of China
3. Frames – Product of China or Belgium
4. Junction Box, Cable, and Connector – Product of China or Czech Republic
5. Back Sheets – Product of China or Germany
6. EVA – Product of Korea or Japan
7. Interconnect Ribbon – Product of Korea for solar panels assembled in Korea; product of Austria or Germany for solar panels assembled in Poland.

The solar cells represent slightly more than half of the cost of the finished solar modules. Hanwha states that the components are assembled into finished products either in Korea or Poland in the following nine-step process:

1. Incoming Inspection: Each component undergoes an incoming quality inspection and testing based on standard operating procedures.
2. Cell and String Soldering: Individual solar cells are soldered together using tin-coated copper ribbons to form cell strings.
3. Matrix Preparation and Bus Bar Soldering: A robot places the cell strings on glass panels and workers complete the matrix layup.
4. Lamination: After inspection and electroluminescence testing, the matrix layups are transferred into vacuum laminators.
5. Trimming and Framing: Excess material is removed from the edge of the laminate and the aluminum frame is press-fit together.
6. Junction Box Installation: The junction box is attached to the back of the solar module using silicone glue.
7. Electrical Test: Each solar module undergoes a high-potential test at 6,000 volts, and electroluminescence test to inspect for micro-cracks and other defects, a flash test to measure performance, and a grounding test.
8. Final Inspection, Sorting, and Packaging: The junction box lids are applied and the solar modules are allowed to cure, followed by a final visual inspection of all solar modules.
9. Outgoing Quality Inspection: A sample of solar modules is removed after packaging for a final quality check.

Hanwha USA notes that this process takes "less than one day" to complete. Hanwha USA also states that it conducts research and development in Korea and Poland related to the manufacturing process and the development of methods and systems to ensure stable production.

ISSUE:

Whether the manufacturing process described above "substantially transforms" the solar-module components such that the country of origin of the finished product is either Korea or Poland for U.S. Government procurement purposes.

LAW AND ANALYSIS:

Pursuant to Subpart B of Part 177, 19 C.F.R. § 177.21 *et seq.*, which implements Title III of the Trade Agreements Act of 1979, as amended (19 U.S.C. § 2511 *et seq.*), CBP issues country-of-origin advisory rulings and final determinations as to whether an article is a product of a designated country for the purpose of granting waivers of certain "Buy American" restrictions on U.S. Government procurement.

In rendering final determinations for purposes of U.S. Government procurement, CBP applies the provisions of Subpart B of Part 177 consistent with the Federal Procurement Regulations. *See* 19 C.F.R. § 177.21. The rule of origin applicable in this context states that "[a]n article is a product of a country or instrumentality only if (i) it is wholly the growth, product, or manufacture of that country or instrumentality, or (ii) in the case of an article which consists in whole or in part of materials from another country or instrumentality, it has been substantially transformed into a new and different article of commerce with a name, character, or use distinct from that of the article or articles from which it was so transformed." 19 U.S.C. § 2518(4)(B); 19 C.F.R. § 177.22(a). Here, Hanwha cannot satisfy paragraph (i) of C.F.R. § 177.22(a), so the issue is whether the solar-module components are "substantially transformed" in Hanwha's manufacturing processes in the Republic of Korea or Poland, as the case may be.

In order to determine whether a substantial transformation occurs when components of various origins are assembled to form completed articles, CBP considers the totality of the circumstances and makes its decisions on a case-by-case basis. The country of origin of the article's components, the extent of the processing that occurs within a given country, and whether such processing renders a product with a new name, character, and use are primary considerations in such cases. CBP also considers resources expended on product design and development, the extent and nature of post-assembly inspection procedures, and the worker skill required during the actual manufacturing process; however, no one factor is determinative.

A substantial transformation will not result from a minor manufacturing or combining process that leaves the identity of the article intact. *See United States v. Gibson-Thomsen Co.*, 27 C.C.P.A. 267 (1940); and *National Hand Tool Corp. v. United States*, 989 F.2d 1201 (Fed. Cir. 1992). The Court of International Trade has applied the "essence test" to determine whether the identity of an article is changed through assembly or processing. For example in *Uniroyal, Inc. v. United States*, 3 CIT 220, 225, 542 F. Supp. 1026, 1030 (1982), *aff'd* 702 F.2d 1022 (Fed. Cir. 1983), the court held that imported shoe uppers added to an outer sole in the United States were the "very essence of the finished shoe" and thus were not substantially transformed into a product of the United States.

Similarly, in *National Juice Prods. Ass'n v. United States*, 10 CIT 48, 61, 628 F. Supp. 978, 991 (1986), the court held that imported orange juice concentrate "imparts the essential character" to the completed orange juice and thus was not substantially transformed into a product of the United States.

In HQ H095409, dated Sept. 29, 2010, a U.S. manufacturer produced finished panels in California. Forty three percent of the cost content of the parts originated from the United States and all research and development took place in California. Key to our finding that a substantial transformation had taken place was the manufacturing process of the solar cells themselves. This process—which involved depositing thin films of chemicals on the inside of glass tubes—took five of the six and a half days it took to manufacture the finished solar panels. We found that turning bare glass tubes into functional solar cells in the United States constituted making a product with a new name, character, and use such that a substantial transformation had occurred.

Here, Hanwha's assembly processes fall short of those described in H095409. For one, Hanwha's assembly processes take less than a day, whereas those in H095409 took more than six. Moreover, although Hanwha conducts research and development in Korea and Poland, it is focused on the manufacturing process, not on product design and development.

In the scenario where Malaysian solar cells are used, almost none of the parts in the finished panels come from either Korea or Poland, the two countries where the panels are assembled. Unlike H095409, which involved a 43% cost content of the country of assembly, here, where Malaysian solar cells are used, the cost content is at most 8.6% Korean for the panels assembled in Korea and 0% Polish for the panels assembled in Poland. Most importantly, however, the solar cells themselves are produced in Malaysia. As noted above, the complex manufacturing process of the solar cells themselves was key to our finding that a substantial transformation had occurred in H095409. Turning glass tubes into functioning solar cells resulted in a product with a new name, character, and use. Here, assembling solar cells into finished solar panels does not. Rather, we find that the solar cells impart the essential character of the solar panels. Therefore, where Malaysian solar cells are used, the country of origin for government-procurement purposes is Malaysia.

Similarly, in the scenario where Korean solar cells are used, the country of origin for government-procurement purposes is Korea.

HOLDING:

Based on the facts of this case, the solar panels' country of origin for U.S. Government procurement is Malaysia when Malaysian solar cells are used and Korea when Korean solar cells are used.

Sincerely,

Harold Singer, Acting Executive Director
Regulations & Rulings
Office of International Trade

EXHIBIT 15

HQ H095409

September 29, 2010

OT:RR:CTF:VS H095409 KSG

Joshua Holzer
Wilson Sonsini Goodrich & Rosati
1700 K Street NW
Fifth Floor
Washington, D.C. 20006-3817

Re: U.S. Government Procurement; Title III, Trade Agreements Act of 1979; Country of Origin of solar photovoltaic panel system; substantial transformation

Dear Mr. Holzer:

This is in response to your letter, dated February 17, 2010, requesting a final determination on behalf of Solyndra, Inc., pursuant to subpart B of 19 CFR Part 177. Your submission of August 4, 2010, was considered as part of the file.

Under these regulations, which implement Title III of the Trade Agreements Act of 1979, as amended (19 U.S.C. 2511 et seq.) ("TAA"), CBP issues country of origin advisory rulings and final determinations as to whether an article is or would be a product of a designated country or instrumentality for the purposes of granting waivers of certain "Buy American" restrictions in U.S. law or practice for products offered for sale to the U.S. Government.

This final determination concerns the country of origin of certain photovoltaic panel systems that Solyndra may sell to the U.S. Government. We note that Solyndra is a party-at-interest within the meaning of 19 CFR 177.22(d)(1) and is entitled to request this final determination.

FACTS:

The photovoltaic panels convert sunlight on low-slope commercial rooftops into electricity. The solar photovoltaic ("PV") panel systems contain both U.S. and foreign-origin raw materials and components. The following components are of U.S. origin: ammonium hydroxide, an optical coupling agent, the middle tube, the outer tube, a frit, a gas bag, grease, a frame adhesive, wire harnesses, and the label nameplate.

The following raw materials are from foreign sources (Austria, Japan, the Netherlands, the United Kingdom, Belgium, and Switzerland): molybdenum, copper, indium, gallium, selenium, cadmium sulfide, hydrochloric acid, and

transparent conductive oxide. The manufactured components, which are produced in Germany, Switzerland, Singapore, Malaysia, Belgium, and China, are: an inner glass tube, an outer cap, an assembled pin, an inner contact, harness adhesive, beam, frames, universal, welded aluminum mounts, panel mount screw, lateral clip, grounding strap assembly, and a grounding strap screw.

Solyndra has a manufacturing facility in California where both a front end process and a back end process are performed, which takes approximately six and one half days to complete. Solyndra also conducts all its research and development for its product in the U.S. The front end process converts bare glass tubes into functional PV cells. The back end process encapsulates these tubes in a glass outer tube, isolating the active material from the environment by a true hermetic seal. The last step in the back end process is to assemble these finished modules onto a panel frame, resulting in a solar panel ready for rooftop installation.

The front end process includes five steps which turn a raw glass tube into a component for a PV system. The five steps are as follows:

1) Bare glass tubes are cleaned using standard ultra-sonic bath and surfactant technology.

2) Quality assurance testing is conducted using precisely calibrated machinery.

3) Using Solyndra's proprietary in-line vacuum systems and physical vapor deposition and evaporation techniques, several layers of different thin films of molybdenum, copper, indium, gallium, and selenium, are deposited on the glass tube.

4) The glass tubes are immersed into a precise chemical mixture, at a controlled temperature and Cadmium Sulfide is deposited onto the glass at a controlled thickness.

5) Using either lasers or mechanical scribes to define solar cells and interconnect them, the deposited films are precisely patterned to increase the solar collection efficiency of the glass tubes.

The back end process, which includes eight steps described below, subjects the treated glass tubes to additional processes to create finished modules that protect the solar cells from degradation over their 25-year service life in a rooftop installation. The Modules are then assembled into panels and combined with mounts, cable management components, and mounting hardware, resulting in a finished PV system. The eight steps are as folllows:

1) The processed glass tubes are encapsulated in a plastic middle tube and a glass outer tube, creating a Module.

2) Metal connectors are placed at each end of the Module to enable the Module to float in the completed PV System.

3) Through a complex process that involves melting glass and metal together, the ends of each Module are covered with a stainless steel cap, creating a hermetic seal.

4) After removing water and air from the Module, an optical coupling agent is used to fill the space between the inner and outer glass tubes and a plug is placed at the end of the Module to complete the sealing process.

5) The plug is laser welded in place, and the weld is inspected for defects.

6) Using a mass spectrometer based Helium leak detection system, each Module is checked for leaks.

7) The approved Modules are then subjected to artificial sunlight and tested to determine the level of electricity being produced.

8) Based on their performance, tubes are grouped in sets of 40 to make each solar panel.

Forty (40) finished Modules are pressed into each panel frame. Solyndra's customized mounts and mounting hardware are added to each panel to create a complete PV system, ready for rooftop installation.

ISSUE:

What is the country of origin of the solar PV panel system described above for the purposes of U.S. government procurement.

LAW AND ANALYSIS:

Pursuant to Subpart B of Part 177, 19 CFR § 177.21 et seq., which implements Title III of the Trade Agreements Act of 1979, as amended (19 U.S.C. § 2511 et seq.), CBP issues country of origin advisory rulings and final determinations as to whether an article is or would be a product of a designated country or instrumentality for the purposes of granting waivers of certain "Buy American" restrictions in U.S. law or practice for products offered for sale to the U.S. Government.

The rule of origin set forth in 19 U.S.C. § 2518(4)(B) states:

> An article is a product of a country or instrumentality only if (i) it is wholly the growth, product, or manufacture of that country or instrumentality, or (ii) in the case of an article which consists in whole or in part of materials from another country or instrumentality, it has been substantially transformed into a new and different article of commerce with a name, character, or use distinct from that of the article or articles from which it was so transformed. See also 19 C.F.R. § 177.22(a) defining "country of origin" in identical terms.

In rendering advisory rulings and final determinations for purposes of U.S. Government procurement, CBP applies the provisions of Subpart B of Part 177 consistent with the Federal Procurement Regulations. See 19 C.F.R. § 177.21. In this regard, CBP recognizes that the Federal Procurement Regulations restrict the U.S. Government's purchase of products to U.S. - made or designated country end products for acquisitions subject to the TAA. See 48 C.F.R. § 25.403(c)(1). The Federal Procurement Regulations define ''U.S.-made end product'' as: . . . an article that is mined, produced, or manufactured in the United States or that is substantially transformed in the United States into a new and different article of commerce with a name, character, or use distinct from that of the article or articles from which it was transformed. 48 C.F.R. § 25.003. Therefore, the question presented in this final determination is whether, as a result of the operations performed in the United States, the foreign materials and components are substantially transformed into a product of the United States.

In determining whether the combining of parts or materials constitutes a substantial transformation, the determinative issue is the extent of the operations performed and whether the parts lose their identity and become an integral part of the new article. Belcrest Linens v. United States, 6 Ct. Int'l Trade 204, 573 F. Supp. 1149 (1983), aff'd, 741 F.2d 1368 (Fed. Cir. 1984). If the manufacturing or combining process is a minor one that leaves the identity of the imported article intact, a substantial transformation has not occurred. Uniroyal, Inc. v. United States, 3 Ct. Int'l Trade 220, 542 F. Supp. 1026 (1982). Assembly operations that are minimal or simple, as opposed to complex or meaningful, generally will not result in a substantial transformation. See C.S.D. 80-111, C.S.D. 85-25, C.S.D. 89-110, C.S.D. 89-118, C.S.D. 90-51, and C.S.D. 90-97.

In order to determine whether a substantial transformation occurs when components of various origins are assembled to form completed articles, CBP considers the totality of the circumstances and makes such decisions on a case-by-case basis. The country of origin of the article's components, the extent of the processing that occurs within a given country, and whether such processing renders a product with a new name, character, and use are primary considerations in such cases. Additionally, resources expended on product

design and development, the extent and nature of post-assembly inspection procedures, and the worker skill required during the actual manufacturing process will be considered when analyzing whether a substantial transformation has occurred; however, no one factor is determinative.

In this case, the solar PV systems are produced in a production facility located in the U.S. All the research and development for the solar PV panel system is performed in the U.S. A significant number of the components used to make these products are of U.S.-origin. Further, this case clearly involves complex and meaningful assembly operations performed in the U.S. Several layers of thin film deposits are placed on the bare glass tubes which are then transformed into a module for a solar PV panel system with a new name, different and specialized characteristics and use. Therefore, we find that the imported components are substantially transformed in the U.S. and that the country of origin of the solar PV panel systems is the U.S. for purposes of U.S. Government procurement.

We suggest that you contact the Federal Trade Commission to determine whether the solar panel systems may be marked "Made in the U.S.A.", which is within their jurisdiction.

HOLDING:

Based on the facts of this case, the country of origin of the solar PV panel systems is the U.S. for purposes of U.S. Government procurement.

Notice of this final determination will be given in the Federal Register, as required by 19 CFR § 177.29. Any party-at-interest other than the party which requested this final determination may request, pursuant to 19 CFR § 177.31 that CBP reexamine the matter anew and issue a new final determination. Pursuant to 19 CFR § 177.30, any party-at-interest may, within 30 days after publication of the Federal Register Notice referenced above, seek judicial review of this final determination before the Court of International Trade.

Sincerely,

Sandra L. Bell
Executive Director
Office of Regulations and Rulings
Office of International Trade

EXHIBIT 16

November 19, 2018

HQ H298653

OT:RR:CTF:FTM H298653 YAG

CATEGORY: Origin

Ms. Laura Callesano
CBC America Corp.
55 Mall Drive
Commack, NY 11725

RE: Modification of NY N227976; Country of Origin Marking; Solar panels

Dear Ms. Callesano:

This letter is to inform you that U.S. Customs and Border Protection ("CBP") has partially reconsidered New York Ruling Letter ("NY") N227976, issued to CBC America Corp. on August 22, 2012. In NY N227976, CBP found that the processing performed in China substantially transformed all of the Chinese and non-Chinese components into solar panels. Therefore, CBP determined that China was the country of origin of the finished solar panels. We have reviewed NY N227976 and found the country of origin determination to be incorrect. For the reasons set forth below, we are modifying this ruling. CBP's analysis of appropriate marking requirements pursuant to 19 C.F.R. § 134.46 and 19 C.F.R. § 134.47 in NY N227976 remains unchanged.

Pursuant to 19 U.S.C. § 1625(c)(1), a notice was published in the *Customs Bulletin*, Volume 52, No. 42 on October 17, 2018, proposing to modify NY N227976, and any treatment accorded to substantially similar transactions. One comment was received in response to this notice, supporting CBP's modification and this ruling, as they adhere to CBP's prior decisions on this issue.

FACTS:

In NY N227976, CBP described the solar panels as follows:

> The items concerned are solar panels, which are assembled in China using both Chinese and non-Chinese components. There are 5 different sized solar panels concerned (GSP-6, GSP-12, GSP-30, GSP-40, GSP-55). The polycrystalline solar cells are manufactured in Germany. The front sheet is manufactured in Japan. The remainder of the parts, such as Ethylene Vinyl Acetate copolymer ("EVA"), anodized aluminum back board, edge protector, grommet, junction box, cable protection, output cable, inter connector, buss bar, insulation tape, blocking diodes,

fuse and ring terminals, are all stated to be products of China. All the parts are sent to an assembler in China for assembly into a finished solar panel.

These particular solar panels are for off-grid usage only. They are described as semi-flexible solar panels. They use a semi-flexible aluminum backing and an unbreakable protective plastic film coating. They are used on boats and in RV's. Typical applications for these solar panels include, trickle charging 12V batteries, maintenance charging for boats at moorings, maintenance charging for emergency vehicles and sole source charging for auxiliary recreational equipment (RV's, jet skis, traffic signs, small appliances & other electronics). These solar panels are not made of glass and cannot be installed on a roof top to produce solar energy for homes.

Based on the information submitted in NY N227976, CBP found that the processing performed in China substantially transformed all of the components into a new and different article (solar panels). CBP considered the finished solar panels to be products of China and determined that they should be marked accordingly. We have now reconsidered our country of origin determination. However, we also find the analysis of the proposed marking in NY N227976 to be correct. Accordingly, we are only modifying the country of origin determination, as reflected in NY N227976.

ISSUE:

What is the country of origin of solar panels for country of origin marking purposes?

LAW AND ANALYSIS:

The marking statute, section 304, Tariff Act of 1930, as amended (19 U.S.C. § 1304) provides that, unless excepted, every article of foreign origin imported into the United States shall be marked in a conspicuous place as legibly, indelibly, and permanently as the nature of the article (or container) will permit, in such a manner as to indicate to the ultimate purchaser in the United States the English name of the country of origin of the article. Congressional intent in enacting 19 U.S.C. § 1304 was "that the ultimate purchaser should be able to know by an inspection of the marking on the imported goods the country of which the goods is the product. The evident purpose is to mark the goods so that at the time of purchase the ultimate purchaser may, by knowing where the goods were produced, be able to buy or refuse to buy them, if such marking should influence his will." *United States v. Friedlaender & Co. Inc.*, 27 CCPA 297, 302, C.A.D. 104 (1940).

Part 134, Customs Regulations (19 C.F.R. Part 134), implements the country of origin marking requirements and the exceptions of 19 U.S.C. § 1304. Section 134.1(b), Customs Regulations (19 C.F.R. § 134.1(b)), defines "country of origin" as the country of manufacture, production or growth of any article of foreign origin entering the United States. Further work or material added to an article in another country must effect a substantial transformation in order to render such other country the "country of origin" within the meaning of the marking laws and regulations.

In determining whether the combining of parts or materials constitutes a substantial transformation, the determinative issue is the extent of the operations performed and whether the parts lose their identity and become an integral part of the new article. *Belcrest Linens v. United States,* 6 C.I.T. 204, 573 F. Supp. 1149 (1983), *aff'd*, 741 F.2d 1368 (Fed. Cir. 1984). If the manufacturing or combining process is a minor one that leaves the identity of the imported article intact, a substantial transformation has not occurred. *Uniroyal, Inc. v. United States,* 3 C.I.T. 220, 542 F. Supp. 1026 (1982).

In *Energizer Battery, Inc. v. United States*, 190 F. Supp. 3d 1308 (2016), the Court of International Trade ("CIT") interpreted the meaning of "substantial transformation." *Energizer* involved the determination of the country of origin of a flashlight, referred to as the Generation II flashlight. All of the components of the Generation II flashlight were of Chinese origin, except for a white LED and a hydrogen getter. The components were imported into the United States where they were assembled into the finished Generation II flashlight.

The court reviewed the "name, character and use" test utilized in determining whether a substantial transformation has occurred and noted, citing *Uniroyal, Inc. v. United States*, 3 C.I.T. at 226, 542 F. Supp. at 1031, *aff'd*, 702 F.2d 1022 (Fed. Cir. 1983), that when "the post-importation processing consists of assembly, courts have been reluctant to find a change in character, particularly when the imported articles do not undergo a physical change." *Energizer* at 1318. In addition, the court noted that "when the end-use was pre-determined at the time of importation, courts have generally not found a change in use." *Energizer* at 1319, citing as an example, *National Hand Tool Corp. v. United States*, 16 C.I.T. 308, 310, *aff'd,* 989 F.2d 1201 (Fed. Cir. 1993).

In reaching its decision in *Energizer*, the court expressed the question as one of whether the imported components retained their names after they were assembled into the finished Generation II flashlights. The court found "[t]he constitutive components of the Generation II flashlight do not lose their individual names as a result [of] the post-importation assembly." The court also found that the components had a pre-determined end-use as parts and components of a Generation II flashlight at the time of importation and did not undergo a change in use due to the post-importation assembly process. Finally, the court did not find the assembly process to be sufficiently complex as to constitute a substantial transformation. Thus, the court found that Energizer's imported components did not undergo a change in name, character, or use as a result of the post-importation assembly of the components into a finished Generation II flashlight. The court determined that China, the source of all but two components, was the correct country of origin of the finished Generation II flashlights under the government procurement provisions of the TAA.

In Headquarters' Ruling Letter ("HQ") H095409, dated Sept. 29, 2010, a U.S. manufacturer produced finished solar panels in California. Forty three percent of the cost content of the parts originated from the United States and all research and development took place in California. Key to CBP's finding that a substantial transformation had taken place in the United States was the complex manufacturing process of the solar cells themselves. This process—which involved depositing thin films of chemicals on the inside of glass tubes—took five of the six and a half days it took to manufacture the finished solar panels. CBP found that turning bare glass tubes

into functional solar cells in the United States constituted making a product with a new name, character, and use such that a substantial transformation had occurred.

However, in HQ H261693, dated September 16, 2015, CBP determined that the assembly processes fell short of those described in HQ H095409. In HQ H261693, solar panels were manufactured in Korea and Poland from solar cells (product of Malaysia or Korea), glass (China), frames (China/Belgium), junction box, cable, and connector (China/Czech Republic), back sheets (China/Germany), EVA (Korea/Japan), and interconnect ribbons. In addition to considering the country of origin of all of the components, CBP stated that the most important aspect of the case was the fact that the solar cells were produced in Malaysia or Korea and not in the countries where the solar panels were put together. Therefore, CBP found that assembling solar cells into finished solar panels did not result in a product with a new name, character, and use. CBP opined that solar cells imparted the essential character of the solar panels. Accordingly, where Malaysian solar cells were used, the country of origin was Malaysia, and in the scenario where Korean solar cells were used, the country of origin was Korea.

We find that this case is similar to HQ H261693. In this case, solar panels are assembled in China using both Chinese and non-Chinese components. However, the polycrystalline solar cells, which constitute the very essence of the solar panels, are entirely manufactured in Germany. Solar cells do not lose their identity and become an integral part of the solar panels when they are combined with other components during the processing in China. The end-use of the solar cells and other components was pre-determined before the components were imported into China, and the solar cells (and other components) remained solar cells during processing in China. Therefore, in accordance with CBP's decision in HQ H261693 and the judicial precedent cited above, we find that the solar cells and other components are not substantially transformed by the processing in China, and thus the country of origin of the solar panels is Germany.

HOLDING:

Based on the facts provided, the solar cells from Germany are not substantially transformed into the solar panels by the processes that take place in China. As such, the country of origin of solar panels at issue is Germany.

EFFECT ON OTHER RULINGS:

NY N227976, dated August 22, 2012, is hereby **MODIFIED** in accordance with the above analysis.

In accordance with 19 U.S.C. § 1625(c), this ruling will become effective 60 days after its publication in the Customs Bulletin.

Sincerely,

Myles B. Harmon, Director
Commercial and Trade Facilitation Division