wiley

PUBLIC VERSION

August 16, 2021

DOC Case Nos. A-570-979/C-570-980
Total Pages: 644
Anti-Circumvention Inquiry
AD/CVD Operations
A-SMACC's Business Proprietary Information
Removed from: Pages 1, 2, 4, 20, 23-27, 40, 46, 50, EL-1, EL-2, Client Certifications, and Exhibits 1, 8, and 15
PUBLIC VERSION

The Honorable Gina M. Raimondo
Secretary of Commerce
International Trade Administration
Attn: Enforcement and Compliance
APO/Dockets Unit, Room 18022
U.S. Department of Commerce
14th Street and Constitution Avenue, NW
Washington, DC 20230

Re: ***Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules, from the People's Republic of China*****:** Request for Circumvention Ruling Pursuant to Section 781(b) of the Tariff Act of 1930

Dear Secretary Raimondo:

On behalf of the American Solar Manufacturers Against Chinese Circumvention ("A-SMACC"), including domestic [ ], domestic [ ], and domestic [ ], we respectfully request that the U.S. Department of Commerce (the "Department") determine, pursuant to section 781(b) of the Tariff Act of 1930 (the "Act"), *codified as amended at* 19 U.S.C. § 1677j(b), that imports from certain producers of crystalline silicon photovoltaic ("CSPV") cells and modules from the People's Republic of China ("China") that are completed in Thailand prior to exportation to the United States are circumventing the antidumping ("AD") and countervailing duty ("CVD") orders on imports of CSPV cells, whether or not assembled into

modules, from China (collectively, the "Orders").[1] A-SMACC is a domestic interested party pursuant to 19 C.F.R. § 351.102(b)(17) and 19 U.S.C. § 1677(9)(F). [ ] are interested parties within the meaning of 19 U.S.C. § 1677(9)(C), [ ].

As discussed below, information reasonably available to A-SMACC demonstrates that certain Chinese producers are diverting Chinese-origin components through Thailand to undergo minor processing to complete CSPV cells and modules subject to the Orders and subsequently to export the merchandise to the United States to avoid AD/CVD duties. Specifically, certain companies are completing the production of CSPV cells in Thailand using wafers manufactured in China from Chinese polysilicon with additional Chinese-origin components and then exporting the cells to the United States or assembling such cells into modules with additional Chinese-origin components before exporting to the United States. These companies are Canadian Solar Manufacturing (Thailand) Co., Ltd. ("Canadian Solar Thailand"), a subsidiary of Canadian Solar Inc. ("Canadian Solar");[2] Trina Solar Science & Technology (Thailand) Co., Ltd. ("Trina Solar Thailand"), a subsidiary of Trina Solar Co., Ltd ("Trina Solar" or "Trina Solar Group");[3] Talesun Solar Technologies Thailand or Talesun Technologies (Thailand) Co., Ltd. (collectively, "Talesun Thailand"), the Thailand base of Chinese producer Talesun Solar;[4] and Astroenergy Solar Thailand Co., Ltd ("Astroenergy Thailand"), the Thai base of Chinese producer Astroenergy/Chint Solar,

---

1 *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From the People's Republic of China*, 77 Fed. Reg. 73,018 (Dep't Commerce Dec. 7, 2012) (amended final deter. of sales at less than fair value, and antidumping duty order) ("AD Order"); *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From the People's Republic of China*, 77 Fed. Reg. 73,017 (Dep't Commerce Dec. 7, 2012) (countervailing duty order) ("CVD Order").

2 Canadian Solar 2020 Annual Report, excerpts attached at **Exhibit 12**.

3 Trina Solar 2020 Auditor's Report, excerpts attached at **Exhibit 2**.

4 Talesun Website Excerpts, attached at **Exhibit 3**; Talesun Company Brochure, excerpts attached at **Exhibit 4**.

which in turn is a subsidiary of the Chinese CHINT group.[5] These companies are subject to high AD/CVD rates under the Orders.[6]

China's dominance in the global supply chain for CSPV products has grown significantly in recent years and is well documented in the industry. Following the imposition of AD/CVD duties on Chinese-origin solar cells, Chinese integrated producers started building cell and module assembly plants across Southeast Asia, while continuing to rely heavily on Chinese labor, raw materials, and inputs. Chinese producers have developed a circumvention scheme that involves moving the end of the production process for CSPV products, which entails only minor processing, to a third country for the express purpose of avoiding AD/CVD duties, while at the same time retaining as much of the subsidized supply chain and labor as possible in China.[7]

As described below, an assessment of global capital expenditures for ingots, wafers, CSPV cells, and modules as a whole shows that China's share of global capital expenditures continues to

---

[5] Astroenergy/Chint Solar Website Excerpts, attached at **Exhibit 5**.

[6] The current AD China-wide rate is 238.95 percent. *See Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From the People's Republic of China*, 85 Fed. Reg. 79,165, 79,167 (Dep't Commerce Dec. 9, 2020) (notice of correction to the final results of the 2017-2018 antidumping duty admin. rev.). Certain Canadian Solar companies received a 95.50 AD rate in the last completed review. *See id.* Certain Trina Solar companies received a 92.52 AD rate in the last completed review. *See id.* Certain Chint Solar companies received a 2.67 AD rate in the 16-17 AD review. *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From the People's Republic of China*, 84 Fed. Reg. 36,886 (Dep't Commerce July 30, 2019) (final results of antidumping duty admin. rev. and final deter. of no shipments; 2016-2017). The CVD all others rate is 15.24 percent. *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From the People's Republic of China*, 77 Fed. Reg. 63,788, 63,789 (Dep't Commerce Oct. 17, 2012) (final affirm. countervailing duty deter. and final affirm. critical circumstances deter.). Certain Canadian Solar and Trina Solar companies received a 11.97 CVD rate in the last completed review. *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From the People's Republic of China*, 86 Fed. Reg. 17,356 (Dep't Commerce Apr. 2, 2021) (notice of amended final results of the 2017 countervailing duty admin. rev.). Certain Chint Solar companies received a 11.76 CVD rate in the 2016 CVD review. *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From the People's Republic of China*, 84 Fed. Reg. 68,102 (Dep't Commerce Dec. 13, 2019) (amended final results of countervailing duty admin. rev.; 2016).

[7] For instance, with respect to its Thai facility, Trina Solar's chairman and CEO stated in 2016 that "{t}he investment in Thailand fits our strategy of prudent capacity expansion in select overseas markets to deliver industry leading products to customers in the US and Europe in particular as we strive to increase the profitability of the company." *Trina Solar starts ramping cell and module production in Thailand*, PV Tech (Mar. 29, 2016), attached at **Exhibit 6**.

grow and to dwarf the rest of the world.[8] For example, in 2020, China accounted for [ ] of global polysilicon capacity,[9] and [ ] of global ingot and solar wafer capacity.[10] In terms of production, China accounted for approximately 80 percent of solar-related polysilicon production in 2020,[11] and 95 percent of global production of wafers in 2019.[12] Chinese companies have made the bare minimum investment outside of China in order to be able to avoid AD/CVD duties, while the vast majority of investments and expenditures remain in China. Industry experts also confirm that the majority of CSPV products imported into the United States arrive from Southeast Asia post-assembly (with most of the assembly plants being owned by Chinese firms), but "70% of the actual value of that equipment accrues to China where key, pre-assembly steps in the making of the equipment take place, including production of solar-grade silicon, ingots, wafers and cells."[13] For this reason, generally, production costs from "Southeast Asian nations account for just 27% of the value of a typical PV module exported to the U.S., despite those nations being most likely to be the last port of call before final, assembled equipment arrives in the U.S."[14] As discussed below, an assessment of the statutory factors demonstrates that the Department should determine that imports of CSPV cells and modules produced and/or

---

8 *See Crystalline Silicon Photovoltaic Cells, Whether or Not Partially or Fully Assembled Into Other Products: Monitoring Developments in the Domestic Industry*, Inv. No. TA-201-075, USITC Pub. 5021 (Feb. 2020) (Monitoring) at F-26 – F-27 ("USITC Pub. 5021"), excerpts attached at **Exhibit 7**.

9 Expert Report at 4, attached at **Exhibit 1**.

10 [ ], excerpts attached at **Exhibit 8**. [ ].

11 Expert Report at 4, attached at **Exhibit 1**.

12 *Id.* at 7.

13 *Solar PV Trade and Manufacturing: A Deep Dive*, BloombergNEF (Feb. 2021) at 22, excerpts attached at **Exhibit 9**.

14 *Id.*

exported by these companies in Thailand are circumventing the Orders and that such imports should be included within the scope of the Orders.

A-SMACC requests that the Department initiate an anti-circumvention inquiry on imports of CSPV cells and modules from Thailand that are produced and/or exported by the companies subject to this request and simultaneously issue an affirmative preliminary circumvention determination as soon as possible to provide the domestic industry with the relief to which it is entitled to under these Orders.

I. BACKGROUND

The AD and CVD investigations on imports of CSPV cells, whether or not assembled into modules, from China, were initiated on November 8, 2011.[15] On October 17, 2012, the Department published its final determination that subject merchandise was being sold, or was likely to be sold, in the United States at less than fair value.[16] On the same day, the Department issued a final determination that countervailable subsidies were being provided to producers and exporters of subject merchandise.[17] Following the U.S. International Trade Commission's ("Commission") determination that the domestic industry was materially injured by reason of imports of subject merchandise,[18] the Department imposed the AD and CVD orders on December 7, 2012.[19] On

---

15 *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From the People's Republic of China*, 76 Fed. Reg. 70,960 (Dep't Commerce Nov. 16, 2011) (initiation of antidumping duty inv.); *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From the People's Republic of China*, 76 Fed. Reg. 70,966 (Dep't Commerce Nov. 16, 2011) (initiation of countervailing duty inv.).

16 *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules, from the People's Republic of China*, 77 Fed. Reg. 63,791 (Dep't Commerce Oct. 17, 2012) (final deter. of sales at less than fair value, and affirm. final deter. of critical circumstances, in part).

17 *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From the People's Republic of China*, 77 Fed. Reg. at 63,788.

18 *Crystalline Silicon Photovoltaic Cells and Modules From China*, 77 Fed. Reg. 72,884 (Int'l Trade Comm'n Dec. 6, 2012).

19 AD Order, 77 Fed. Reg. at 73,018; CVD Order, 77 Fed. Reg. at 73,017.

March 20, 2019, after the completion of the first sunset review of the Orders by the Department and the Commission, the Department published the continuation of both the AD and CVD orders.[20]

The scope of the Orders provides that:

> 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 cover{s} 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 mm 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 this order are panels with surface area from 3,450 mm to 33,782 mm 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

[20] *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From the People's Republic of China*, 84 Fed. Reg. 10,300 (Dep't Commerce Mar. 20, 2019) (continuation of antidumping duty order); *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From the People's Republic of China*, 84 Fed. Reg. 10,299 (Dep't Commerce Mar. 20, 2019) (continuation of countervailing duty order).

of this exclusion, no panel shall contain an internal battery or external computer peripheral ports.

Also excluded from the scope of this order 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 cm^2 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-part 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 cm 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 this order; however, modules, laminates, and panels produced in China 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 (HTS) of the United States under subheadings 8501.61.0010, 8507.20.80, 8541.40.6015, 8541.40.6025, and 8501.31.8010. These HTSUS subheadings are provided for convenience and customs purposes; the written description of the scope of this order is dispositive.[21]

[21] *See, e.g.*, Preliminary Decision Memorandum accompanying *Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled Into Modules, From the People's Republic of China*, 86 Fed. Reg. 21,277 (Dep't Commerce Apr.

The Department has found that cells manufactured in China, modules manufactured in China with Chinese cells, and modules manufactured in third countries from Chinese cells are subject to the Orders.

Since the imposition of the Orders, U.S. imports of CSPV cells and modules from China have declined significantly. For instance, from 2011, the year the petitions were filed in the underlying investigations, to 2020, the value of Chinese imports decreased 86 percent, from $2.8 billion to $392 million.[22] The sharp decline has continued into 2021, with less than $7.5 million of imports from China from January through May of this year.[23] At the same time, U.S. imports of CSPV cells and modules from Thailand have surged. In 2011, the United States imported a mere $336,806 of CSPV cells and modules from Thailand.[24] Since then, imports from Thailand have significantly increased to over $1.4 billion in 2020.[25] This trend has continued into 2021, with more than $532 million of imports in just the first five months of the year.[26] Notably, in ten years, Thai import value share of CSPV cells and modules went from a .01 percent value share of

22, 2021) (prelim. results of antidumping duty admin. rev., partial rescission of antidumping admin. rev., and prelim. deter. of no shipments; 2018-2019) at 3-5 (internal citations omitted).

[22] Official Import Statistics, attached at **Exhibit 10**. Merchandise subject to the Orders is provided for in HTS subheading 8541.40.60. "Within subheading 8541.40.60, subject merchandise was included in statistical reporting numbers 8541.40.6020 ('solar cells, assembled into modules or made up into panels') and 8541.40.6030 ('solar cells, other') through June 30, 2018. As of July 1, 2018, a superior text for crystalline silicon photovoltaic cells (described in statistical note 11 to chapter 85) applies to two subordinate reporting categories, 8541.40.6015 ('assembled into modules or made up into panels') and 8541.40.6025 ('other')." *See* USITC Pub. 5021 at I-15 – I-16, excerpts attached at **Exhibit 7**. A-SMACC provides official import data for HTS numbers 8541.40.6020 and 8541.40.6030 for the period from 2010 through June 30, 2018 and data for HTS numbers 8541.40.6015 and 8541.40.6025 for the period from July 1, 2018 to date. The HTS numbers through June 30, 2018, *i.e.*, 8541.40.6020 and 8541.40.6030 included thin film products.

[23] Official Import Statistics, attached at **Exhibit 10**.

[24] *Id.*

[25] *Id.*

[26] *Id.*

total U.S. imports in 2010 to nearly 20 percent in the first five months of 2021.[27] As detailed below, the evidence indicates that these imports include CSPV cells and modules that are circumventing, and should be included within, the scope of the Orders.

II. DESCRIPTION OF THE PRODUCT AND MANUFACTURING PROCESS

CSPV cells use crystalline silicon to convert sunlight to electricity, and have a positive layer, a negative layer, and a positive-negative junction ("p/n junction").[28] 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.[29] CSPV cells are a primary component of CSPV modules (also called panels), which in turn are the main components of CSPV systems.[30] CSPV laminates consist of CSPV cells that are connected, encapsulated in an ethyl vinyl acetate ("EVA") film, and covered with a glass front sheet and a back sheet.[31] The back sheet is most commonly a plastic film composite, but glass is also used on the back of the module in some applications, like bifacial modules, to improve efficiency.[32] CSPV modules typically are comprised of the laminate that is framed in aluminum and attached to a junction box.[33] CSPV modules can be used in both ground-mounted and rooftop-mounted systems.[34] In addition, CSPV modules can be used in both the off-grid market segment and the three on-grid market

---

27 *Id.*

28 *Crystalline Silicon Photovoltaic Cells and Modules from China*, Inv. Nos. 701-TA-481 and 731-TA-1190, USITC Pub. 4874 (Mar. 2019) (Review) at I-30 ("USITC Pub. 4874"), excerpts attached at **Exhibit 11**.

29 *Id.*

30 *Id.*

31 *Id.* at I-31.

32 *Id.*

33 *Id.* at I-32.

34 *Id.*

segments – residential, nonresidential, and utility.[35] The junction box of CSPV modules 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).[36] In addition to standard size modules, CSPV cells can be used in building-integrated PV.[37] Solar CSPV systems convert sunlight into electricity for on-site use or for distribution through the electric grid.[38] The two main types of CSPV cells and modules are monocrystalline silicon and multicrystalline (or polycrystalline) silicon, with various products within these two categories.[39] Within these two categories, there are a number of cell and module technologies.[40]

There are five main stages in the manufacturing process for CSPV products.[41] Polysilicon is refined, then it is formed into ingots, which are sliced into wafers, doped and converted into CSPV cells, and then assembled into modules.[42] A large part of the process involves procurement of the polysilicon itself. These are discrete production steps that may occur in different plants or locations, and producers may source products at each stage of the value chain or produce the products in-house.[43] CSPV cells and modules are tested and inspected at various points during the production process.[44]

---

35 *Id.*

36 *Id.*

37 *Id.* at I-38.

38 *Id.* at I-30.

39 *Id.* at I-33.

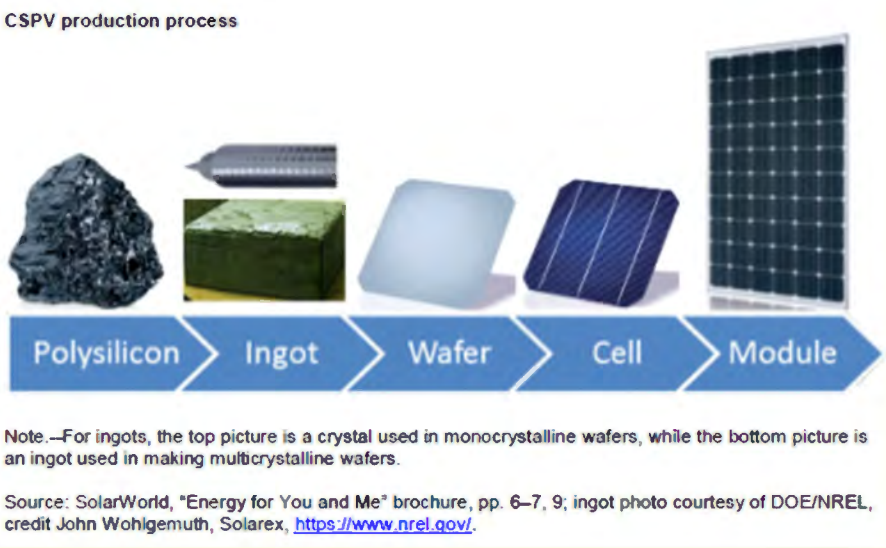
40 *Id.* at I-35 – I-38.

41 *Id.* at I-43.

42 *Id.*

43 *Id.*

44 *Id.*



Source: USITC Pub. 4874 at I-44, excerpts attached **Exhibit 11**.

The first stage in the manufacturing process is refining polysilicon. This is an extremely important step, requiring very high levels of energy, labor, and capital investment (approximately $1.4 billion for a largescale polysilicon production factory).[45] Indeed, the capital cost requirements for polysilicon are the most significant in the PV module supply chain.[46] Polysilicon is the primary raw material in the production of CSPV cells.[47] Polysilicon and wafers have higher technical hurdles and factories are larger, more expensive and time-consuming to build compared to the downstream production stages,[48] and as discussed below, polysilicon facilities require very substantial investments. There are multiple approaches to polysilicon refining.[49] The Siemens

45 *See* Expert Report at 6, attached at **Exhibit 1**.

46 *Id.*

47 USITC Pub. 5021 at I-7, excerpts attached at **Exhibit 7**.

48 *Solar PV Trade and Manufacturing: A Deep Dive*, BloombergNEF (Feb. 2021) at 4, excerpts attached at **Exhibit 9**.

49 USITC Pub. 4874 at I-44, excerpts attached at **Exhibit 11**.

method accounted for more than 85 percent of global production in 2017.[50] The fluidized bed reactor ("FBR") technology accounts for most of the remaining market.[51]

> 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 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.[52]

In the Czochralski process for producing crystals used in monocrystalline wafers:

> {P}olysilicon rocks are first placed into a quartz crucible along with a small amount of boron, which is used to provide a positive electric orientation . . . . 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 . . . . The remaining portion of the crystal (or ingot) is cut into equal length pieces and then it is squared. In squaring, the rounded

---

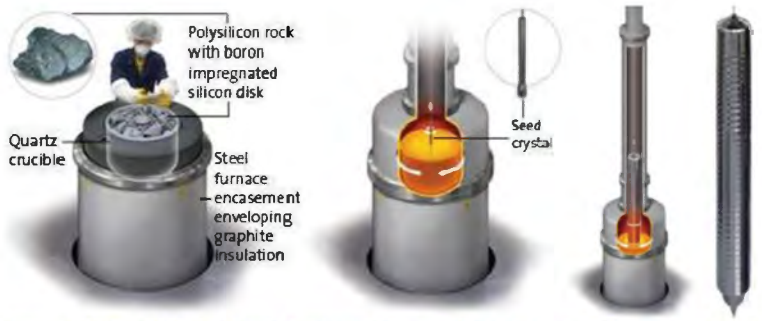
50 *Id.*

51 *Id.*

52 *Id.* at I-44 – I-45 (internal citations omitted).

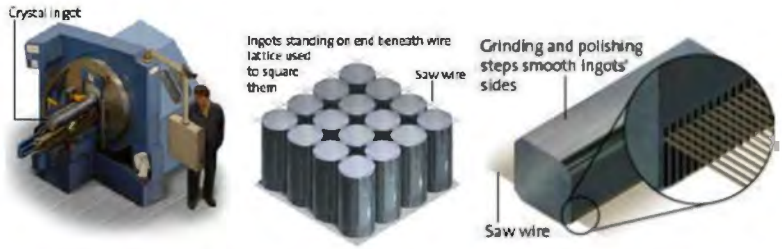
sides of the ingot are cut into four flat sides, leaving only rounded corners. A wire saw then slices the ingots into wafers. A majority of global manufacturers have switched to diamond wire saws for monocrystalline wafer slicing, which has several benefits including increasing the speed of the production process. The wafers are then cleaned, dried, and inspected.[53]

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.

Source: USITC Pub. 4874 at I-46, excerpts attached **Exhibit 11**.

The second stage involves forming the refined polysilicon into ingots. The third stage involves slicing the ingots into wafers. These processes often result in high yield losses which add significantly to the overall costs. The ingot and wafer production processes are different for monocrystalline and multicrystalline cells.

[53] *Id.* at I-45 (internal citations omitted).

For multicrystalline ingots:

> {T}he 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.[54]

According to an industry expert, "{t}he wafer is the most critical component with respect to PV module performance."[55]

The fourth stage involves processing the wafers into CSPV cells.[56] The cell manufacturing process varies by company and technology.[57] In addition, some firms use a highly automated manufacturing process, while others mix automation and manual labor in their production processes.[58] The main steps in the process 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 . . . .

---

[54] *Id.* at I-46 – I-47. *See also* Expert Report at 7-9, attached at **Exhibit 1**.

[55] Expert Report at 7, attached at **Exhibit 1**.

[56] A-SMACC submits that wafers from China that have already been doped and contain a p/n junction, which are then shipped to Thailand for finishing prior to export to the United States, are already in-scope merchandise and should be subject to duties, consistent with the Department's recent scope rulings. *See* Memorandum from Lauren Caserta, Int'l Trade Compliance Analyst, Off. VII, AD/CVD Operations, through Melissa G. Skinner, Senior Director, Off. VII, AD/CVD Operations, to James Maeder, Deputy Assistant Sec'y for AD/CVD 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.* (June 15, 2021) (PUBLIC VERSION) ("ET Solar Scope Ruling"), attached at **Exhibit 13**; Memorandum from Peter Shaw, Int'l Trade Compliance Analyst, AD/CVD Operations, through Melissa G. Skinner, Senior Director, Off. VII, AD/CVD Operations, to James Maeder, Deputy Assistant Sec'y for AD/CVD Operations, 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* (Apr. 8, 2021) ("Solaria Scope Ruling"), attached at **Exhibit 14**. To the extent such merchandise is not already considered subject, and to the extent that Chinese wafers that do not yet contain a p/n junction and/or other Chinese inputs are being used in the production processes described herein, such merchandise is circumventing the Orders.

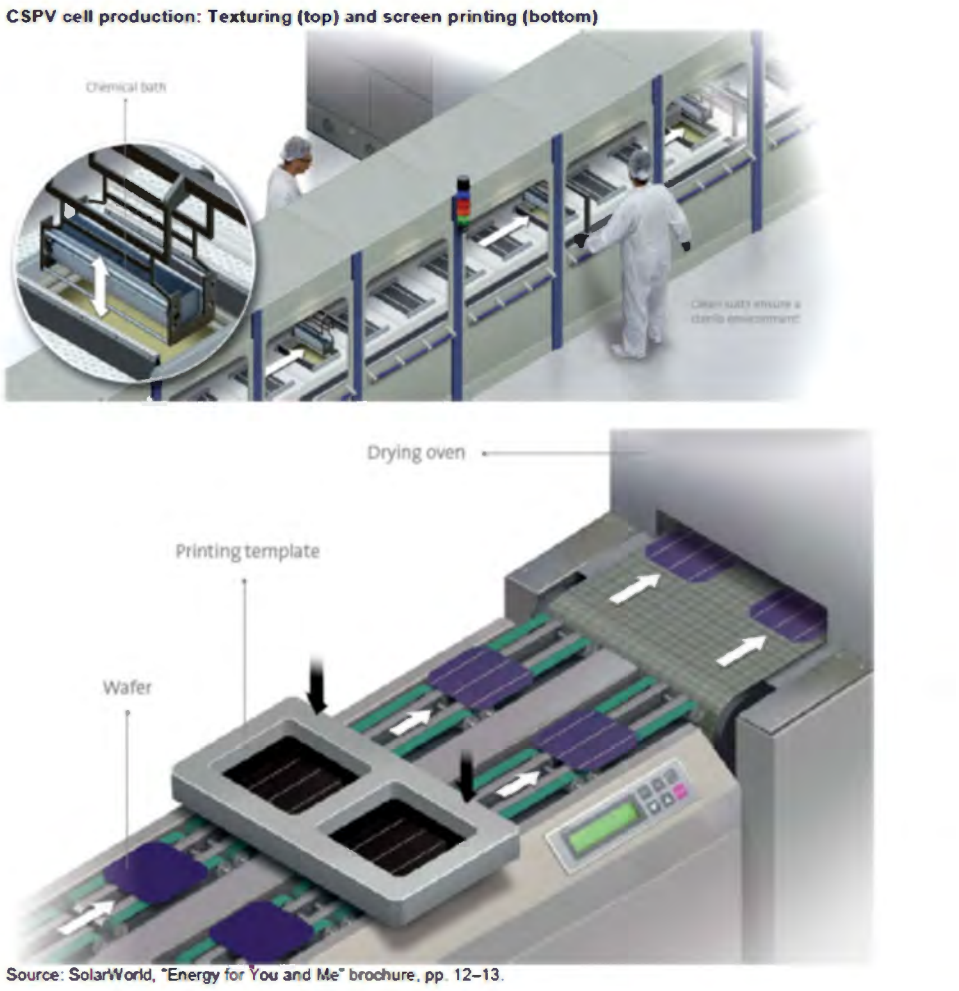
[57] USITC Pub. 4874 at I-47, excerpts attached at **Exhibit 11**.

[58] *Id.*

- **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."[59]
- **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, 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."
- **Testing and sorting:** The final step in the process is the testing and sorting of the CSPV cells based on their characteristics and efficiency.[60]

[59] Based on the Department's scope rulings, by this point in the process (creation of the p/n junction), the wafer is now considered a solar cell and therefore, when produced in China, merchandise subject to the scope of these investigations.

[60] *Id.* (internal citations omitted).



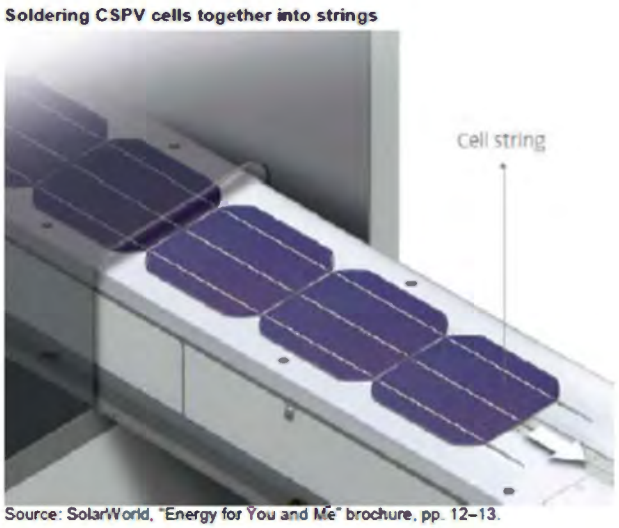
Source: USITC Pub. 4874 at I-48, excerpts attached **Exhibit 11**.

The fifth and last stage involves assembling the CSPV cells into modules. The extent of automation and manual labor involved in module assembly varies depending on the producer.[61] Generally during the assembly process:

> a string of CSPV cells is soldered together. . . . A piece of glass is placed on the production line, on top of which is added a piece of {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. Frames are then usually

[61] *Id.* at I-49.

attached to the laminate, and a junction box is attached to the back. In the final step, modules are cleaned and inspected.[62]



Source: USITC Pub. 4874 at I-49, excerpts attached **Exhibit 11**.

III. IMPORTS OF CSPV CELLS AND MODULES COMPLETED IN THAILAND ARE CIRCUMVENTING THE ORDERS

Congress has provided the Department with the necessary tools to combat the circumvention of AD/CVD duties.[63] The statute expressly contemplates that it may be necessary to include within the scope of an AD/CVD order merchandise that has been completed or assembled in another foreign country before being imported into the United States. Specifically, section 781(b)(1) of the Act provides with respect to merchandise assembled or completed in a third country that if (A) the merchandise imported into the United States is of the same class or kind as merchandise produced in the foreign country that is subject to the existing order; (B) before importation into the United States, such merchandise is completed or assembled in another foreign country from merchandise which is (i) subject to such order, or (ii) produced in the foreign country

62 *Id.* (internal citations omitted).

63 *See Deacero S.A. de C.V. v. United States*, 817 F.3d 1332, 1337 (Fed. Cir. 2016).

with respect to which such order applies; (C) the process of assembly or completion in the third country is minor or insignificant; (D) the value of the merchandise produced in the foreign country to which the order applies is a significant portion of the total value of the merchandise exported to the United States; and (E) the Department determines that action is appropriate to prevent evasion of such order, the agency may include such imported merchandise within the scope of the existing order, after taking into account any advice provided by the Commission pursuant to section 781(e) of the Act.[64]

While A-SMACC recognizes that the Department has previously found that solar cells/modules produced in a third country (Vietnam) from raw wafers imported from China without a p/n junction are not subject to the scope of the Orders, as the Department has previously explained, the agency's practice for determining substantial transformation in country-of-origin determinations is distinct from its practice under section 781 of the Act of determining whether merchandise being completed or assembled into a product in a third country is circumventing an AD/CVD order.[65] For instance, in *Cold-Rolled Steel from Korea*, the Department found that because the analyses are distinct, a finding that the process of finishing hot-rolled steel or cold-rolled steel into corrosion-resistant steel products constitutes substantial transformation does not preclude finding that the process is minor or insignificant in an analysis under section 781(b) of

---

[64] *See* 19 U.S.C. §1677j(b)(1). The legislative history to section 781(b) of the Act indicates that Congress intended the Department to make circumvention determinations on a case-by-case basis, in recognition that the facts of individual cases and the nature of specific industries are widely variable. *See* Preliminary Decision Memorandum accompanying *Certain Cold-Rolled Steel Flat Products From the Republic of Korea*, 84 Fed. Reg. 32, 875 (Dep't Commerce July 10, 2019) (affirm. prelim. deter. of anti-circumvention inquiries on the antidumping duty and countervailing duty orders) ("CR from Korea PDM") at 11 n.49 (citing S. Rep. No. 103-412, at 81-82 (1994)).

[65] Issues and Decision Memorandum accompanying *Certain Cold-Rolled Steel Flat Products From the Republic of Korea*, 84 Fed. Reg. 70,934 (Dep't Commerce Dec. 26, 2019) (affirm. final deter. of circumvention of the antidumping and countervailing duty orders) ("Cold-Rolled from Korea IDM") at cmt. 9; *see also* Issues and Decision Memorandum accompanying *Diamond Sawblades and Parts Thereof From the People's Republic of China*, 84 Fed. Reg. 33,920 (Dep't Commerce July 16, 2019) (final deter. of anti-circumvention inquiry) at cmt. 4.

the Act.[66] In fact, the Court of Appeals for the Federal Circuit has explained that if the Department "applies the substantial transformation test and concludes that the imported article has a country of origin different from the country identified in an AD or CVD order, then {the Department} can include such merchandise within the scope of an AD and CVD order only if it finds circumvention under {section 781(b) of the Act}."[67]

In determining whether the process of assembly or completion in the third country is minor or insignificant, the Department must take into account: (A) the level of investment in the foreign country; (B) the level of research and development in the foreign country; (C) the nature of the production process in the foreign country; (D) the extent of production facilities in the foreign country, and; (E) whether the value of the processing performed in the foreign country represents a small proportion of the value of the merchandise imported into the United States.[68]

The statute also directs the Department to consider additional factors in determining whether to include merchandise assembled or completed in a foreign country under the order at issue, such as the pattern of trade, including sourcing patterns; whether the manufacturer or exporter of the merchandise that is subject to the order at issue or produced in the country with respect to which such order applies is affiliated with the person who uses that merchandise to assemble or complete in the foreign country the merchandise that is subsequently imported into the United States; and whether imports into the third country of the merchandise that is subject to

---

66 Cold-Rolled from Korea IDM at 43.

67 *Id.* at 47 (citing *Bell Supply Co. v. United States*, 888 F.3d 1222, 1230 (Fed. Cir. 2018)).

68 19 U.S.C. §1677j(b)(2). Although the Department must consider all five factors in its analysis, no single factor is dispositive, and the agency's practice is to evaluate each of these five factors as they exist in the third country, depending on the totality of the circumstances of the particular inquiry. *See* 19 C.F.R. § 351.225(h); *U.K. Carbon and Graphite Co. v. United States*, 931 F. Supp. 2d 1322, 1335 (Ct. Int'l Trade 2013) ("The Court notes that the five factors {in 19 U.S.C. § 1677j(b)(2)(A)-(E)} are to be separately taken into consideration, as appropriate, and their totality weighed."); CR from Korea PDM at 11.

the order at issue or produced in the country with respect to which such order applies have increased after initiation of the underlying investigation which resulted in the issuance of the order at issue.[69] An assessment of these statutory factors demonstrates that the CSPV cells and/or modules completed in Thailand by Canadian Solar Thailand, Trina Solar Thailand, Talesun Thailand, and Astroenergy Thailand using Chinese-origin components are circumventing, and thus should be included within the scope of, the Orders.

A. The Merchandise Imported into the United States is of the Same Class or Kind as Merchandise Produced in China that is Subject to the Orders

The merchandise imported into the United States completed by Canadian Solar Thailand, Trina Solar Thailand, Talesun Thailand, and Astroenergy Thailand in the third country are CSPV cells and/or modules that are identical to the CSPV cells and modules from China that are subject to the Orders. Chinese-origin components are being shipped to Thailand to be completed into CSPV cells and modules for the express purpose of avoiding AD/CVD duties. But for the desire to circumvent the Orders, the final production stages for the CSPV cells and modules would take place in China. Specifically, [ ] indicate that Canadian Solar Thailand, Trina Solar Thailand, and Talesun Thailand exported merchandise described as solar cells, solar modules and bifacial solar modules to the United States, which meet the description of merchandise subject to the Orders.[70] Similarly, A-SMACC understands that Astroenergy Thailand exports subject merchandise to the United States.[71]

---

69 *See* 19 U.S.C. §1677j(b)(3).

70 [ ] Data, attached at **Exhibit 15**. [

].

71 While Astroenergy Thailand is [ ], A-SMACC believes based on market knowledge that the company is [ ] *See id.* For instance, Astroenergy's CSPV products are sold

B. The CSPV Cells and Modules Imported into the United States are Completed in Thailand Using Chinese-Origin Components Prior to Importation into the United States

Evidence reasonably available to A-SMACC demonstrates that before importation into the United States, Chinese-origin components are being completed into CSPV cells and/or modules in Thailand. As detailed above, the production process for CSPV products generally includes the following main five stages: (1) polysilicon is refined, (2) the polysilicon is formed into ingots, (3) the ingots are sliced into wafers, (4) the wafers are converted to CSPV cells, and (5) the CSPV cells are assembled into modules. A-SMACC understands that certain companies are completing the production of CSPV cells and/or modules in the third country using Chinese-origin components in multiple ways to avoid AD/CVD duties. These include completing the production process through polysilicon refinement, ingot formation and the production of the wafers in China, after which the wafers are converted to CSPV cells in Thailand using additional and substantial Chinese-origin components. At this point, the companies may export the completed CSPV cells to the United States or assemble the cells into modules using additional and substantial Chinese-origin components. In addition, the companies may be taking some of the preliminary steps for converting wafers to cells within China, after which only the remaining cell production steps and

---

through an online solar energy equipment and system supplier based in the United States, with the website noting that the products are made in "Malaysia, Germany, and **Various**." Solaris Website Excerpts, attached at **Exhibit 16** (emphasis added). Astroenergy Solar, Inc. also has a U.S. office. *See* Astroenergy/Chint Solar Website Excerpts, attached at **Exhibit 5**. In addition, a legal opinion from 2016 (translated through Google Translate) on Zhejiang Chint Electric Co., Ltd.'s ("Zhejiang Chint") issuance of shares appears to reference a solar cell factory under construction in Thailand with a design capacity of 600MW and indicates that components from this plant will be sold to European and American markets. *Chint Electric: Supplementary Legal Opinions of Beijing King & Wood Mallesons on the issuance of shares by Zhejiang Chint Electric Co., Ltd.*, excerpts attached at **Exhibit 17**. Astroenergy/Chint Solar's website states that a 600MW solar cell factory was put into operation in 2016 in Thailand. Astroenergy/Chint Solar Website Excerpts, attached at **Exhibit 5**. Similarly, a 2020 article featuring Chint Solar's rating as a Foreign Trade Leading Enterprise states that the company's current factories are located in Thailand, Hangzhou, and Haining, and that Chint's PV modules are sold to 55 countries, including the United States. *Chint Solar won the Hangzhou Foreign Trade Export Leading Enterprise in 2019*, attached at **Exhibit 18**. Based on the above information, A-SMACC reasonably believes that Astroenergy's CSPV products completed in Thailand are also likely sold in the United States.

module assembly take place in the third country, again using additional and substantial Chinese-origin components, before the companies export the completed CSPV cells and/or modules to the United States.

A-SMACC believes that the vast majority of the materials and equipment for the process of converting the Chinese wafers to CSPV cells are being sourced from China, including but not limited to: silane, phosphorus oxychloride (POCI3), aluminum and/or silver paste. Similarly, the vast majority of the materials and equipment for the process of converting the CSPV cells to modules are also being sourced from China, including but not limited to: solar glass, EVA, backsheet, aluminum frames, and junction boxes.

First, A-SMACC provides evidence indicating that each of the companies that is subject to this request obtains Chinese-origin wafers and/or cells to complete into CSPV cells or modules in the third country.

- **Canadian Solar Thailand** has two cell processing facilities, for which operations commenced in 2017 and 2019, respectively, and two module processing facilities, for which operations commenced in 2016 and 2019, respectively.[72] Canadian Solar does not produce polysilicon, ingots, or wafers in Thailand.[73] Thus, the Thai facility must source wafers (produced from polysilicon ingots) elsewhere. A number of Canadian Solar's subsidiaries in China produce ingots and wafers, in addition to cells and modules.[74] Canadian Solar states that it is "one of the world's largest solar power companies and a leading vertically-integrated provider of solar power products,"[75] and also that it intends to use substantially all of the silicon wafers that it manufactures to supply its own solar cell plants and to use substantially all of the solar cells that it manufactures to produce its own solar module products.[76] Canadian Solar also reports that the company purchases silicon raw materials, silicon wafers, and solar cells from a limited number of third-party material suppliers.[77] The company's major silicon

72 Canadian Solar 2020 Annual Report at 53, excerpts attached at **Exhibit 12**.

73 *Id.*

74 *Id.* at F-73.

75 *Id.* at 34.

76 *Id.* at 35.

77 *Id.* at 20.

wafer suppliers in 2020 included Chinese producers Longi and Zhenjiang Rende New Energy Science Technology Co., Ltd.[78] Given the above, the evidence shows that Canadian Solar Thailand obtains from or through its affiliates Chinese wafers manufactured from Chinese polysilicon to complete the production of cells and modules in Thailand. While Canadian Solar does not appear to refine polysilicon itself, the company indicates that it purchases silicon raw material. Given China's dominance in the polysilicon market, as discussed below, it is reasonable to assume that the company purchases polysilicon from Chinese suppliers for its own Chinese wafer production, as well as purchasing wafers directly from Chinese entities. In fact, Canadian Solar appears to purchase polysilicon from GCL Poly, a Chinese polysilicon producer.[79]

- **Trina Solar Thailand** has cell and module processing facilities in Thailand.[80] Trina Solar Thailand does not appear to produce polysilicon, ingots, or wafers in Thailand.[81] Thus, the Thai facility must source wafers (produced from polysilicon ingots) elsewhere. According to an industry publication, Trina Solar produces wafers in China, in addition to cells and modules.[82] Trina Solar's 2020 auditor's report also identifies Chinese company Lijiang Longji silicon material Co., Ltd as an "important associate" of the company whose nature of business is the manufacturing and sales of silicon rod.[83] Trina Solar also recently entered into a three-year polysilicon supply agreement with China's Daqo New Energy Corp for the supply of between 30,000 tonnes and 37,600 tonnes of high-purity mono-grade polysilicon for the period November 2020-December 2023.[84] The company also shored up its short-term wafer supply line with the purchase of 1.2 billion wafers from Chinese manufacturer Zhonguan for $990 million.[85]

  Trina Solar has indicated that its Thai facility is an export platform. For instance, a company representative previously stated that Trina Solar supplies U.S. orders from Thailand and Vietnam.[86] When Trina Solar first launched operations in Thailand, the Chairman and CEO of Trina Solar stated that this and other major Trina Solar projects

---

78 *Id.*

79 Nathan Vanderklippe, *Canadian Solar denies use of forced labour at its solar farm in western China*, The Globe and Mail (Jan. 28, 2021), attached at **Exhibit 19**.

80 [ ], excerpts attached at **Exhibit 8**.

81 *Id.*

82 *Id.*

83 Trina Solar 2020 Auditor's Report at 136, excerpts attached at **Exhibit 2**.

84 *Daqo seals 3-year polysilicon supply deal with Trina Solar*, Renewables Now (Nov. 30, 2020), attached at **Exhibit 20**.

85 *Trina Solar seals 1.2 billion wafer supply deal with Zhonghuan Semiconductor*, PV Tech (Nov. 23, 2020), attached at **Exhibit 21**.

86 Christian Roselund, *The long view: an interview with Steven Zhu of Trina Solar*, PV Magazine (Oct. 2, 2019), attached at **Exhibit 22**.

in the pan-Asia region align the company with the Chinese government's "One Belt, One Road" initiative.[87] Based on such statements, it is reasonable to assume that Trina Solar is retaining as much of the subsidized supply chain as possible in China for the cells and modules that it is completing in Thailand, including Chinese wafers produced from Chinese polysilicon and other components for cells and modules from or through its Chinese affiliates. Notably, Trina Solar recently signed three joint venture agreements with another Chinese manufacturer, Tongwei Co., to gain "bigger advantages than simple vertical integrations within themselves."[88] Together the two Chinese companies entered into a long term procurement cooperation framework agreement investing in a "a high-purity crystalline silicon project with an annual output of 40,000 tons, a ingot project of an annual output of 15GW, a wafer cutting project of an annual output of 15GW, and a high-efficiency crystalline silicon cell project with an annual output of 15GW."[89] The three projects have operational starts ranging between September 2021 through September 2022.[90] The total investment was about $2.3 billion, and Trina Solar holds 35% of the shares in each joint venture.[91] Tongwei claimed that Trina Solar or its affiliates would enjoy prioritized supply of high purity c-Si, silicon rods and cells produced by all project companies.[92] The evidence thus indicates that even if Trina Solar may not produce all of the upstream components in China itself, it sources these components from Chinese suppliers.

- **Talesun Thailand** processes solar cells and modules in Thailand.[93] Talesun does not produce polysilicon, ingots, or wafers in Thailand.[94] Thus, Talesun Thailand must source wafers (produced from polysilicon ingots) elsewhere. Talesun stated in a company presentation from May 2019 that it is "{t}otally vertically integrated through partnerships with key market players," indicating that it obtains silicon, ingots, and wafers from Chinese producer GCL[95] for its cells and modules.[96] An industry publication also indicates that Talesun may have its own wafer production in China.[97]

---

87 *Trina Solar Launches Operations at Thailand Manufacturing Facility and Signs a US$143 million Syndicated Financing Facilities Agreement*, Trina Solar (Mar. 28, 2016), attached at **Exhibit 23**.

88 Trina Solar Website Excerpts, attached at **Exhibit 24**.

89 *Id.*

90 Carrie Xiao, *Trina, Tongwei unveil major, multi-billion-dollar solar silicon, wafer and cell alliance*, PV Tech (Nov. 18, 2020), attached at **Exhibit 25**.

91 Trina Solar Website Excerpts, attached at **Exhibit 24**.

92 Carrie Xiao, *Trina, Tongwei unveil major, multi-billion-dollar solar silicon, wafer and cell alliance*, PV Tech (Nov. 18, 2020), attached at **Exhibit 25**.

93 Talesun Thailand 2019 Financial Statements at 9, attached at **Exhibit 26**.

94 *See id.*

95 Talesun Company Presentation (May 2019) at 13, excerpts attached at **Exhibit 27**; GCL Website Excerpts, attached at **Exhibit 28**.

96 Talesun Company Presentation (May 2019) at 13, excerpts attached at **Exhibit 27**.

97 [ ], excerpts attached at **Exhibit 8**.

Given the affiliation, it is reasonable to assume that Talesun Thailand obtains Chinese wafers produced from Chinese polysilicon and ingots from or through its Chinese affiliates. The above indicates that Talesun obtains its wafers from its own operations in China or other Chinese suppliers.

- **Astroenergy/Chint Solar's** 600 MW solar cell processing factory in Thailand was put into operation in 2016.[98] Based on information reasonably available to A-SMACC, there is no indication that Astroenergy Thailand produces polysilicon, ingots, or wafers in Thailand. Chint Solar also produces cells and modules in China.[99] Information regarding Chint Solar's supply chain is not reasonably available to A-SMACC. Even if Chint Solar may not produce polysilicon, ingots, or wafers itself, given China's dominance in the CSPV supply chain and the fact that the company's production is mainly focused in China, as discussed below, it is likely that the company obtains these inputs from Chinese suppliers. Tellingly, in September 2019, China's Longi Green Energy Technology (identified as the world's largest maker of monocrystalline silicon wafers) secured a three-year contract to supply 660 million monocrystalline silicon wafers to three units of Chint Electric for the period January 2020 through December 2022.[100] Given the affiliation, Astroenergy Thailand likely used Chinese-origin wafers obtained through its Chinese affiliates to complete into cells in Thailand.

A-SMACC submits that the CSPV cells/modules completed in Thailand by Canadian Solar, Trina Solar, Talesun, and Astroenergy/Chint Solar using Chinese-origin wafers and/or cells are circumventing the Orders. As demonstrated above, reasonably available evidence indicates that each of the companies that is subject to this request likely obtains Chinese-origin CSPV wafers – "the most critical component with respect to PV module performance . . . ."[101] In addition, to the best of A-SMACC's knowledge, there is no wafer production in Thailand.[102]

---

98 Astroenergy/Chint Solar Website Excerpts, attached at **Exhibit 5**. Based on information reasonably available to A-SMACC, it is unclear whether Astroenergy Thailand also produces solar modules in Thailand.

99 [ ], excerpts attached at **Exhibit 8**.

100 Tang Shihua, *China's Solar Wafer Giant Longi Bags Big Three-Year Supplier Deal*, Yicai Global (Sept. 10, 2019), attached at **Exhibit 29**.

101 Expert Report at 7, attached at **Exhibit 1**.

102 As of 2018, Thailand's Ministry of Energy and PV Status Report Committee reported that "Thailand has no production of feedstocks, ingots and wafers for crystalline silicon industry." *See National Survey Report of PV Power Applications in Thailand*, IEA International Energy Agency (2018) at 16, attached at **Exhibit 30**. The 2018 report is the most recent available report for Thailand. Industry publication [ ] reports that Thailand has no wafer production capacity [ ]. [

Indeed, China's dominance in the CSPV supply chain generally and in the polysilicon and wafer markets in particular is well known. China's production of polysilicon increased more than 450 percent from 2010 to 2018 and accounted for 58 percent of global production in 2019.[103] By last year, China accounted for approximately 80 percent of solar-grade polysilicon production worldwide.[104] Similarly, China's production of wafers increased more than 850 percent from 2010 to 2018 and accounted for **93 percent of global production** in 2018.[105] China's production of CSPV cells and modules both increased almost 700 percent from 2010 to 2018 and accounted for 73 percent and 72 percent of global production in 2018, respectively.[106] China's dominance of the solar supply chain has only increased even further more recently. For instance, the following graphic demonstrates that China has a near monopoly on most solar manufacturing, with estimates based on capacity:[107]

], excerpts attached at **Exhibit 8**. While there appears to be one company engaged in solar material, cell, and wafer R&D in Thailand, it does not appear to be involved in production. SGS Thailand Limited Website Excerpts, attached at **Exhibit 31**. The company explains on its website that "SGS (Thailand) Limited is a leading company specializing in providing inspection, testing, verification, and certification services," and describes its microelectronics services as including R&D support, environmental analysis, reliability testing, failure and damage analysis, and quality control. *See id.*

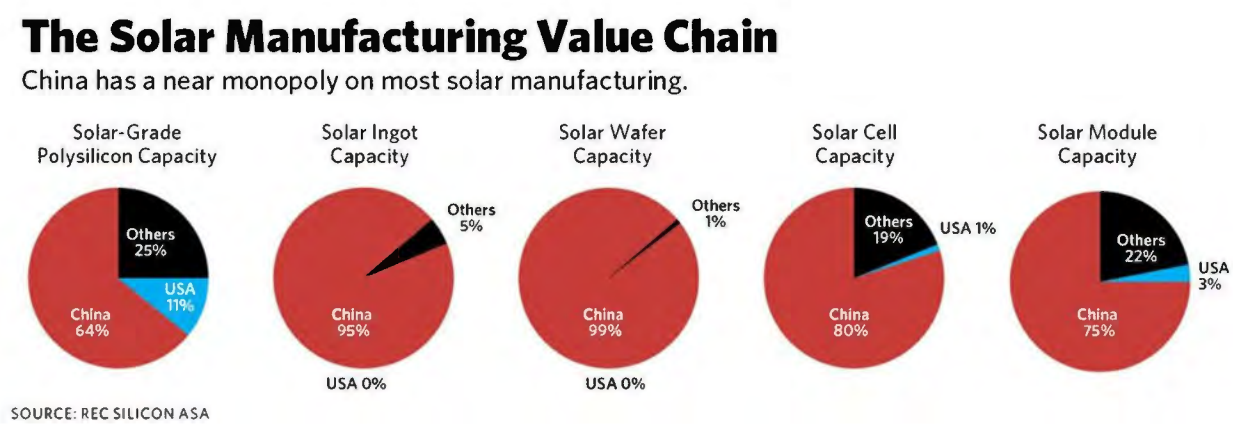
103 USITC Pub. 5021 at F-16, excerpts attached at **Exhibit 7**.

104 Expert Report at 4, attached at **Exhibit 1**.

105 USITC Pub. 5021 at F-20, excerpts attached at **Exhibit 7**.

106 *Id.* at F-22, F-24.

107 Joan Fitzgerald, *The Case for Taking Back Solar*, The American Prospect (Mar. 24, 2021), attached at **Exhibit 32**.



In fact, according to [ ], an industry publication, in 2020, China's capacity for polysilicon was [ ], while the rest of the world's capacity, combined, was [ ], *i.e.*, **China's share was approximately [ ] percent of total global capacity**.[108] For ingots and wafers, China's capacity in 2020 was [ ], while the rest of the world's capacity was [ ], *i.e.*, **China's share was [ ] percent of total global capacity**.[109] According to another industry publication, BloombergNEF, the top ten polysilicon producers supplied 83 percent of the market in 2019,[110] with seven of those producers being Chinese.[111] According to the CPIA, the top ten wafer manufacturers are all located in mainland China.[112] BloombergNEF also reports that the top ten wafer producers supplied 95 percent of the

---

108 [ ], excerpts attached at **Exhibit 8**. *See also* Expert Report at 4, attached at **Exhibit 1** (estimating that China accounted for 84 percent of global polysilicon capacity in 2020). As the Department is aware, U.S. companies are unable to ship polysilicon to China due to trade restrictions in China. [ ].

109 [ ], excerpts attached at **Exhibit 8**. [ ].

110 *Solar PV Trade and Manufacturing: A Deep Dive*, BloombergNEF (Feb. 2021) at 1, excerpts attached at **Exhibit 9**.

111 *Id.* at 9.

112 Expert Report at 7, attached at **Exhibit 1**.

market in 2019, with all of the companies being based in China, except for Canadian Solar (which is a Chinese company headquartered in Canada but with the vast majority of its production facilities in China).[113]

In addition to CSPV wafers and/or cells, A-SMACC has reason to believe that all, or the majority, of the other materials used to convert the Chinese wafers to cells and then assemble the cells into modules in Thailand are obtained from China. Again, based on information reasonably available to A-SMACC, these materials include silane, phosphorus oxychloride (POCI3), aluminum and/or silver paste for converting the wafers to cells, and solar glass, EVA, backsheet, aluminum frames, and junction boxes for assembling the cells into modules. China is also a major supplier of these other components for CSPV cells and modules. Indeed, industry publications confirm that the vast majority of the key components for solar panel assembly in Thailand are now being produced in China.[114] According to BloombergNEF, "{b}esides ample supply of components along the PV value chain such as cells and wafers, China is also home to the largest manufacturers of key materials such as PV glass and aluminum frames."[115] China's market share of solar glass has stayed above 90 percent in the global market for years.[116] Two Chinese producers alone, Xinyi Solar and Flat Glass, were projected to supply more than 50 percent of the market in

---

113 *Solar PV Trade and Manufacturing: A Deep Dive*, BloombergNEF (Feb. 2021) at 12, excerpts attached at **Exhibit 9**; Canadian Solar Inc., United States Securities and Exchange Commission, Form 20-F (for the fiscal year ended December 31, 2020) at F-73, excerpts attached at **Exhibit 33**.

114 *See Solar PV Trade and Manufacturing: A Deep Dive*, BloombergNEF (Feb. 2021) at 16, excerpts attached at **Exhibit 9**.

115 *Id.* at 20.

116 Hong Wang, *New Policies Set to Ease China Solar Glass Production Constraints Amidst Soaring Costs*, PV Tech (Nov. 19, 2020), attached at **Exhibit 34**.

2020.[117] In addition, the world's largest solar silver paste suppliers have their factories in China.[118] Producers like Canadian Solar and Jinko Solar also own subsidiaries that produce the aluminum frames, junction boxes, and EVA in China.[119]

In addition, while the exact sourcing patterns for the companies that are subject to this request are not reasonably available to A-SMACC, publicly available evidence indicates that these companies are in fact sourcing many of the other materials for completing CSPV cells and assembly into modules from China. For instance, Canadian Solar has Chinese subsidiaries that produce junction boxes and EVA,[120] in addition to aluminum frames.[121] Trina Solar also recently announced a RMB2.1 billion ($319 million) contract to acquire 85 million square meters of photovoltaic glass from China's Changzhou Almaden in an agreement that will run from January through December 2023.[122] While the sourcing patterns for other components for solar cells and modules for Talesun are not reasonably available to A-SMACC, as noted above, the company has emphasized that it is "{t}otally vertically integrated through partnerships with key market players," indicating in particular that it obtains silicon, ingots, and wafers from Chinese producer GCL.[123] Similarly, while the exact sourcing patterns for Astroenergy/Chint Solar are not reasonably available to A-SMACC, the company states on its website that "Astroenergy is

---

117 *Solar PV Trade and Manufacturing: A Deep Dive*, BloombergNEF (Feb. 2021) at 18, excerpts attached at **Exhibit 9**.

118 *Id.* at 14.

119 *Id.* at 18.

120 Canadian Solar 2020 Annual Report at F-73, excerpts attached at **Exhibit 12**.

121 *Solar PV Trade and Manufacturing: A Deep Dive*, BloombergNEF (Feb. 2021) at 18, excerpts attached at **Exhibit 9**.

122 Max Hall, *Trina sweeps up another 30,000-plus tons of polysilicon*, PV Magazine (Nov. 30, 2020), attached at **Exhibit 35**.

123 Talesun Company Presentation (May 2019), excerpts attached at **Exhibit 27**.

currently one of the largest domestic PV power generation enterprises with 8000 MWp module production capacity," and that "{d}epending on the advantage of CHINT group's full industrial chain and the professional teams, Chint can provide the total solution of PV power station to {its} customers."[124] Given China's dominance in the CSPV supply chain generally and the fact that these companies' production is mainly based in China as discussed below, it is reasonable to believe that Talesun and Astroenergy/Chint Solar also obtain the other components to complete the production of cells and modules in Thailand from Chinese suppliers.

A-SMACC obtained Thai import data from a subscription database made available by Global Trade Information Services ("GTIS") for the period from 2011 through 2020.[125] In the decade after the petitions for the underlying investigations were filed in 2011, the data from GTIS shows that Thai imports of Chinese wafers, cells, and many components and chemicals used in the manufacturing process for CSPV cells and modules have increased significantly. For instance, in 2020, the value of Thai imports of goods under HS code 3818.00 from China, which covers wafers and chemical compounds that have been doped, amounted to more than 11.2 million kilograms, an increase of approximately 1,141,348 percent compared to 987 kilograms in 2011. This trend continues in the cell production step: imports under HS code 7115.90, which covers silver and aluminum paste, a key component, increased over 1600 percent by volume from 2011 to 2020. Finally, the data show that the volume of imports of HS code 8544.42, which covers junction boxes used in solar modules, increased over 240 percent from 2011 to 2020, and the volume of imports of HS code 7314.19, which covers screen frames used in solar module assembly, increased by over

---

124 Astroenergy/Chint Solar Website Excerpts, excerpts attached at **Exhibit 5**.

125 *See* Global Trade Information Services Thailand Import Data, attached at **Exhibit 36**.

633 percent in the same timeframe. A summary of data for components and inputs appears at **Exhibit 10**.[126]

Given that Canadian Solar Thailand, Trina Solar Thailand, Talesun Thailand, and Astroenergy Thailand are affiliated with large integrated Chinese producers , it is even more likely that a substantial portion of the components for completing the production of CSPV cells and assembling into modules in the third country are obtained through the Chinese affiliates. As the Commission has previously noted, Chinese CSPV cell and module producers have benefited not only from policies through which they directly received support, but also through policies directed at the supply chain.[127] For instance, just recently, Chinese engineering company Triumph Group, a unit of state-owned conglomerate China National Building Materials Group Corporation, signed an agreement with the government of Suqian City, Jiangsu Province, to build a solar glass factory at the Grand Canal Suqian Port Industrial Park.[128] The Triumph Group is also the controlling shareholder of state-owned manufacturer Luoyang Glass, another producer of solar glass.[129] The European Commission previously identified subsidy rates of 3.2 percent to 16.7 percent for participating producers of solar glass in a CVD investigation.[130] Chinese producers of aluminum extrusions (which include module frames) benefit from a range of government policies to support

---

126 Some of the HS codes are basket categories and may include other goods. Nonetheless, that imports of merchandise under these HS codes from China increased substantially following the imposition of the Orders further corroborates other information discussed in this petition demonstrating that the subject companies are importing Chinese materials to complete the production of cells/modules in Thailand. These HS codes are examples and may not be the best or only appropriate codes for these goods.

127 USITC Pub. 5021 at F-47, excerpts attached at **Exhibit 7**.

128 Vincent Shaw & Max Hall, *Chinese PV Industry Brief: New Solar Glass Factory in Jiangsu, Longi Maintains Wafer Prices Unchanged*, PV Magazine (June 25, 2021), attached at **Exhibit 37**.

129 *Id.*

130 USITC Pub. 5021 at F-47, excerpts attached at **Exhibit 7**.

the aluminum industry.[131] The Chinese government has also supported energy intensive polysilicon production through reduced electricity rates and other policies.[132] For example, LDK received significant electricity fee subsidies from the Financial Bureau of Xin Yu Economic Zone for its polysilicon production operations.[133] Similarly, Daqo received reduced electricity rates from the government in Xinjiang as part of the approval for the expansion of its polysilicon manufacturing plant and in 2018, received "unrestricted cash government subsidies" totaling $13.1 million.[134] By obtaining the bulk of their raw materials (including the critical wafer input) from China, these companies with minor Thai finishing facilities are benefiting from the same Chinese government subsidies that subsidize Chinese producers directly. The evidence discussed above establishes that Chinese producers are completing CSPV cells and modules in Thailand from merchandise manufactured in China before exporting them to the United States.

C. The Completion of the CSPV Cells and Modules in Thailand is Minor and Insignificant

1. The Level of Investment in Thailand is Minimal

In determining the relative level of total investment, as the Department has done in recent proceedings, the agency should compare the level of investment in Thailand for a facility to complete the production of CSPV cells or complete the production of the cells and assemble them into modules to the investment required to produce CSPV cells/modules using a fully integrated production process.[135]

---

131 *Id.*

132 *Id.* at F-47 – F-48.

133 *Id.* at F-48.

134 *Id.*

135 *See, e.g.*, Issues and Decision Memorandum accompanying *Certain Cold-Rolled Steel Flat Products From the Republic of Korea*, 84 Fed. Reg. 70,934 (Dep't Commerce Dec. 26, 2019) (affirm. final deter. of circumvention of the

The resources and investment needed to produce CSPV cells/modules using a fully integrated process are very significant. For an integrated supplier covering polysilicon to ingot/wafer, the required capital investment would likely exceed $1.7 billion for a 20 GW supply of polysilicon, ingot, and wafers.[136]

Industry publications confirm that the investment required for the upstream production processes through the wafer stage is much more significant than the investment required for the final cell and module finishing stages. For instance, according to BloombergNEF, "{t}echnical hurdles are highest for plants that make polysilicon and wafers. These plants are also costly to build and take longest to construct. Cell and module factories can be built faster . . . ."[137] In fact, "{v}ertical integration, high factory capex and technical hurdles have made the wafer market the most consolidated segment of the PV value chain."[138] Indeed, "{w}afer factories require high upfront capital expenditure and bear many technical hurdles, which makes it difficult for new factories to be built outside of China."[139]

---

antidumping duty and countervailing duty orders) ("CR from Korea IDM") at 62-65. The statute does not instruct the Department to use a particular analysis when evaluating the level of investment in the foreign country for purposes of section 781(b)(2)(A) of the Act, and the Department may determine an appropriate analysis to apply. The Department has explained that its "past practice has been to compare the total investment required (as well as, separately, the research and development, production process, and facilities) from the beginning of the production process in the country subject to an {AD or CVD} order to the investment required (as well as, separately, the research and development, production process, and facilities) to finish the final product in a third country, rather than to compare the investments (as well as, separately, the research and development, production process, and facilities) required to perform the same finishing steps in each country." In doing so, the Department has emphasized that this reflects the agency's concerns with circumvention being achieved by shifting one or more of the last few minor or insignificant steps of the production process to a third country. *See id.*

136 Expert Report at 9, attached at **Exhibit 1**. This assumes 30,000 tons of polysilicon required for 10 GW of wafers using the assumptions as detailed in the NREL PV Manufacturing Report. This equates to a 60,000 ton polysilicon facility meeting the supply requirements 20 GW ingot/wafer facility.

137 *Solar PV Trade and Manufacturing: A Deep Dive*, BloombergNEF (Feb. 2021) at 1, excerpts attached at **Exhibit 9**.

138 *Id.* at 10.

139 *Id.* at 11.

Building a new polysilicon production facility also requires substantial investment. Recent announcements place the cost for a new facility in the range of $1.4 billion per 100,000 tons.[140] For instance, in 2018, Daqo New Energy announced a new 35,000 ton polysilicon facility in Xinjiang, China, with the capital expenditure quoted as approximately $502M.[141] In 2020, Tongwei Group announced a new 40,000 ton facility in Yunnan Province, China covering approximately 800 acres, with the capital expenditure noted as $563M.[142] In March 2021, Xinte Energy Co Ltd announced a new project to build a 100,000-tonne per year high-purity polysilicon production plant in Inner Mongolia, northern China, with the total investment estimated to be around CNY 8.799 billion ($1.36 billion).[143] The expansions noted above are supported by long-term supply contracts with Chinese PV Suppliers.[144] For instance, JA Solar and LONGi Group have 5-year contracts with Xinte for 97,200 and 270,000 tons of polysilicon, respectively.[145]

In addition to being capital intensive, polysilicon manufacturing is also energy intensive.[146] The CPIA quoted the average power consumption for a polysilicon production facility at 70 kWh/kg, which equates to 7,000 GWh of power for a 100,000 ton factory.[147] Actual investments by producers confirm the large investment required for polysilicon production facilities. For instance, GCL-Poly invested $826 million in constructing a 60,000 tonne polysilicon plant in

---

140 Expert Report at 5, attached at **Exhibit 1**.

141 *Id.* at 6.

142 *Id.*

143 Sladjana Djunisic, *Xinte Energy Proposes to Build 100,000-Tonne-Per Year Polysilicon Production Plant*, Renewables Now (Mar. 2, 2021), attached at **Exhibit 38**.

144 Expert Report at 6, attached at **Exhibit 1**.

145 *Id.*

146 *Id.* at 5.

147 *Id.* at 6.

China in 2017.[148] In Tennessee, Dow/Hemlock invested $1.2 billion to build a polysilicon production facility, with a $3 billion expansion originally planned.[149] In contrast, "{b}uilding a new module factory has low technical hurdles compared with wafer and polysilicon."[150] In fact, BloombergNEF notes that "{g}iven low technical and financial barriers, it is also easier for module companies to open shop in other countries in response to tariffs or other policy developments. Once duties on Chinese solar cells were imposed by the {United States}, large integrated manufacturers built both cell and module assembly plants across Southeast Asia."[151] This is precisely what is happening here – moving the relatively low-investment portions of the process to third countries like Thailand to evade the AD/CVD orders while maintaining the high-investment portions of the process in China, causing injury to the domestic industry.

The substantial level of investment required for the production of CSPV products through the completion of wafers is confirmed by the actual investment of Chinese producers. For instance, Chinese producer LONGi Green Energy Technology Co., Ltd. announced in 2019 plans for a new 15 GW ingot and wafer production facility, which is expected to cost around $643 million.[152] Another Chinese producer JA Solar announced in 2020 plans for a new 20 GW ingot/wafer expansion in China, with the capital expenditure expected to be around RMB5.8 billion ($857

---

148 Ian Clover, *GCL-Poly Investing $826m in Construction of 60,000 MT Polysilicon Plant in China*, PV Magazine (Apr. 6, 2017), attached at **Exhibit 39**.

149 *Hemlock Semiconductor Corporation*, Wikipedia (last accessed July 6, 2021), attached at **Exhibit 40**.

150 *Solar PV Trade and Manufacturing: A Deep Dive*, BloombergNEF (Feb. 2021) at 19, excerpts attached at **Exhibit 9**.

151 *Id.*

152 Mark Osborne, *LONGi Investing US$875 Million in 2020 Production Capacity Expansion Plans*, PV Tech (Apr. 17, 2019), attached at **Exhibit 41**.

million).[153] China's GCL-Poly Energy Holdings Ltd announced in 2018 plans to build a 20 GW monocrystalline silicon manufacturing facility for the research and development, production and sale of monosilicon ingots in Qujing at a total cost of CNY 9 billion (USD 1.43 billion).[154] Canadian Solar recently announced plans to build a new wafering plant in China with a capacity of 10 GW at a cost of RMB 1.9 billion (US$155 million).[155] While the exact investment levels are not reasonably available to A-SMACC, Canadian Solar likely made similarly substantial investments for its integrated operations to produce ingots and wafers in China. As discussed above, the available evidence indicates that Trina Solar and Talesun also produce wafers in China, and these companies likely made substantial investments for such operations in China, in accordance with the investments made by other Chinese producers for the same types of operations. As noted above, Astroenergy/Chint Solar's sourcing pattern is not reasonably available to A-SMACC. While some of the companies covered by this circumvention petition may not directly themselves engage in all of the upstream production processes in China (*e.g.*, polysilicon, ingots, and wafers), the available evidence indicates that these companies obtain the upstream components to be completed into CSPV cells and modules in Thailand, *i.e.*, the circumventing merchandise, from Chinese suppliers. In other words, the investment for the production of polysilicon, ingots, and wafers is being made in China. Accordingly, the Department should compare the level of investment required for the first three stages of production for

---

153 Mark Osborne, *JA Solar's Capacity Expansion Announcements in 2020 Top 104GW Across Wafer, Cell and Modules*, PV Tech (Sept. 24, 2020), attached at **Exhibit 42**.

154 *GCL-Poly Energy plans 20-GW ingot factory in China*, Renewables Now (Apr. 11, 2018), attached at **Exhibit 43**.

155 Mark Osborne, *CHINA ROUND-UP: Solar manufacturing capacity announcements continue from SMSL members*, PV Tech (Jan. 4, 2021), attached at **Exhibit 44**.

cells/modules in China to the investment required for the final two stages of production taking place in Thailand.

In particular, as these companies are using Chinese polysilicon in their production, the Department should take into account the level of investment required for the initial raw polysilicon stage of production. As indicated above, the level of investment required to build a polysilicon production facility can range between $502 million and $3 billion. For instance, Chinese polysilicon supplier and solar cell producer Tongwei recently signed an agreement with the government of Leshan City and the Wuhua district for a new polysilicon manufacturing site with a capacity of 200,000 metric tons and the total investment around RMB14 billion ($2.1 billion).[156] This is corroborated by industry publications. Specifically, according to BloombergNEF, the cost of building a new factory in China for polysilicon manufacturing is estimated to be about $15 million per thousand tons, or $39 million per gigawatt.[157] Even these levels of investment are likely highly subsidized by the Chinese government. For instance, GCL-Poly, a Chinese polysilicon producer, has close ties to the China People's Liberation Army and the Chinese government.[158] Similarly, TBEA Co., Ltd, the parent company of Xinte Energy,[159] another Chinese polysilicon supplier, states on its website that it "actively practices the national strategy of 'the Belt and Road

---

156 Vincent Shaw & Max Hall, *Chinese PV Industry Brief: Tongwei plans 200,000 MT polysilicon factory*, PV Magazine (July 2, 2021), attached at **Exhibit 45**.

157 *Solar PV Trade and Manufacturing: A Deep Dive*, BloombergNEF (Feb. 2021) at 8, excerpts attached at **Exhibit 9**. While this provides an average cost per gigawatt and is informative, as discussed above, many polysilicon production facilities appear to be much larger, indicating that polysilicon facilities generally need to be built on a larger scale and thus would require much larger investments to initially build the facility. In addition, it is the level of investment required for polysilicon, ingot, and wafer production combined (*i.e.*, the production stages taking place in China) that should be compared with the investment required to complete CSPV cells and modules in the third country.

158 Steven Mufson, *China's Growing Share of Solar Market Comes at a Price*, Washington Post (Dec. 16, 2011), attached at **Exhibit 46**.

159 *TBEA Announces Plan of Domestic Listing of Its Subsidiary Xinte Energy*, PVTIME (Jan. 15, 2021), attached at **Exhibit 47**.

initiative' and is devoted to sharing the advanced electricity construction experience of China with the world.'"[160]

By comparison, the level of investment required in Thailand to simply finalize the CSPV cells and assemble the cells with other Chinese-origin components into modules is much lower. For instance, the capital costs are in the range of $40 million to $50 million per GW of production capacity for cell manufacturing facilities, and recent announcements of new module production facilities indicate capital costs in the range of $20 million to $30 million for module-only factories, making this the least capital-intensive step in the supply chain.[161]

The actual investments in Thailand by the companies subject to this circumvention petition confirm the much smaller investment levels for cell and/or module production facilities compared to the investment required for integrated production facilities in China that engage in the upstream production processes. For instance, Trina Solar invested $160 million when it first established its facility in Thailand with 500 MW of module and 700 MW of cell capacity.[162] Talesun reported investing RMB450 million (approximately $70.7 million)[163] when it first built its 500 MW solar cell and module assembly plant in Thailand.[164] Canadian Solar reported that as of February 28, 2021, $96.4 million of its credit facility had been used to finance the construction of its solar cell

---

160 TBEA Website Excerpts, attached at **Exhibit 48**.

161 Expert Report at 10 and 13, attached at **Exhibit 1**.

162 *Trina Solar Announces Establishment of New Manufacturing Base in Thailand to Add 500 MW Module and 700 MW Cell Capacity*, Trina Solar (May 6, 2015), attached at **Exhibit 49**.

163 Federal Reserve Exchange Rates, attached at **Exhibit 50**. A-SMACC relied on the exchange rate as of September 15, 2015.

164 Mark Osborne, *Zhongli Talesun starts production at 500MW PERC production plant in Thailand*, PV Tech (Nov. 12, 2015), attached at **Exhibit 51**; *Zhongli Talesun Solar Financial Due Diligence Report*, Clean Energy Associates (Sept. 15, 2015) at 26, excerpts attached at **Exhibit 52**.

and module facilities in Thailand.[165] The investment made by Astroenergy/Chint Solar for its operations in Thailand is not reasonably available to A-SMACC. However, the company states on its website that a 600 MW solar cell factory was put into operation in Thailand in 2016.[166] The company thus likely made similar levels of investment to launch its operations in Thailand as the other companies described above, given the similarity in facility capacity.

While not required, in addition to the fact that these companies' investments in Thailand for cell and module production are much smaller scale than the investments required in China for the upstream production processes, the investments made by the Chinese affiliates of these companies in China for production facilities that solely produce cells and modules appear to be generally much more larger scale than the finishing facilities in Thailand. For instance, Talesun announced in April 2020 plans for a solar module factory in Zibu city of China's Shandong province that will have an annual production capacity of 5 GW, and that construction on the facility was expected to cost RMB2 billion ($281.68 million)[167] – quadruple the cost of its Thailand facility. Similarly, Trina Solar is building a 10 GW module assembly plant in China that will cost around RMB2.5 billion ($386 million), and also announced late last year that it is building an 8.5 GW solar cell plant in China at a cost of RMB3 billion ($459.4 million).[168] Again, this is nearly three times the investment it made into its Thai facility, even though that Thai facility was ostensibly meant to produce the same merchandise. Earlier this year, Canadian Solar announced

---

165 Canadian Solar 2020 Annual Report at 68, excerpts attached at **Exhibit 12**.

166 Astroenergy/Chint Solar Website Excerpts, attached at **Exhibit 5**.

167 Anu Bhambhani, *Suzhou Talesun Solar Technologies Is Constructing High Efficiency Monocrystalline Solar Module Factory With 5 GW Annual Capacity In Shandong Province, China*, Taiyang News (Apr. 2, 2020), attached at **Exhibit 53**.

168 Mark Osborne, *Trina Solar plans 10GW module assembly plant in Yancheng*, PV Tech (Mar. 2, 2021), attached at **Exhibit 54**.

its single largest solar cell and module assembly plant complex. The 10 GW Chinese cell and module assembly project is expected to require a total investment of RMB3.6 billion ($557 million).[169] According to industry publication [ ], [

].[170] [

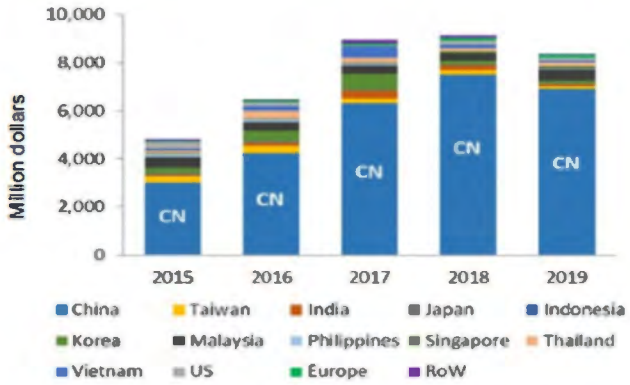
]. Clearly, the Chinese companies have made a minimal investment in the third country, demonstrating that the companies intended for the completion of the subject merchandise in the third country to be minor and insignificant, further showing that these companies are engaging in circumvention of the Orders as contemplated by section 781(b) of the Act. An assessment of global capital expenditures for ingots, wafers, CSPV cells, and modules as a whole is telling and shows that China's share of global capital expenditures dwarfs the rest of the world.

---

169 Mark Osborne, *CHINA ROUND-UP: Solar manufacturing capacity announcements continue from SMSL members*, PV Tech (Jan. 4, 2021), attached at **Exhibit 44**.

170 [ ], excerpts attached at **Exhibit 8**.

CSPV products: Global capital expenditures for ingots, wafers, CSPV cells, and CSPV modules, 2015-19



Notes: 2019 data are projections. Given declining costs for building plants, decreases in spending do not necessarily translate to lower capacity additions in GW terms.

Source: Colville, Finlay, "Solar PV Capex Trending at US$9 billion Annually as New GW Fabs in China Slash Investments Required," *PV Tech*, December 10, 2019, https://www.pv-tech.org/editors-blog/solar-pv-capex-trending-at-us9-billion-annually-as-new-gw-fabs-in-china-sla, retrieved December 18, 2019.

Source: USITC Pub. 5021 at F-26 – F-27, excerpts attached at **Exhibit 7**.

2. The Level of Research and Development in Thailand is Minimal

The level of research and development in Thailand to complete the production of CSPV cells and assemble into modules with Chinese-origin components is minimal. Rather than researching and developing their own technology, these companies are predominantly importing technology from China. Indeed, the CPIA Report for 2019 states that "the key equipment of PERC cell production equipment has basically completed domestication," which indicates that most of the equipment is from Chinese suppliers.[171] This follows a trend from many other industries, where China-based companies take over not only the market for the end product (PV modules), but also the capital equipment used to manufacture the same.[172] From a manufacturing perspective, it is a best practice to use the same manufacturing equipment regardless of where the factory is located. Thus, it is highly likely that most new cell processing facilities built outside of China also use

171 Expert Report at 11, attached at **Exhibit 1**.

172 *Id.*

production equipment sourced from China.[173] The CPIA also stated that "all domestic component production equipment has been localized," indicating that all of the module production equipment is available from local Chinese suppliers.[174] Given that the companies in the third country here are subsidiaries of large vertically integrated CSPV producers, the third country companies undoubtedly relied on the parent companies' R&D in building the production facilities in the third country and implementing production processes. For instance, when Trina Solar first launched operations in Thailand, the company explained that the facility in Rayong, Thailand entered production using Trina Solar's "Honey" state of the art high-efficiency assembly line method, which would have been developed at its Chinese facilities.[175]

A-SMACC was unable to find any evidence that these companies are engaging in R&D in their Thai facilities. In contrast to the little to no research and development activities taking place in Thailand, the research and development expenditures within China of Chinese integrated producers of CSPV cells/modules that engage in the upstream production processes generally are extensive. Notably, Canadian Solar Thailand is not listed as having a principal activity of R&D in the parent company's financial statements, unlike some of Canadian Solar's subsidiaries in China.[176] In total, R&D expenses for Canadian Solar's consolidated operations amounted to approximately $45.2 million in 2020.[177] Canadian Solar Thailand's 2019 financial statements do not separately list R&D expenses.[178] Similarly, the nature of Trina Solar Thailand's business does

---

173 *Id.*

174 *Id.* at 13.

175 *Trina Solar Launches Operations at Thailand Manufacturing Facility and Signs a US$143 million Syndicated Financing Facilities Agreement*, Trina Solar (Mar. 28, 2016), attached at **Exhibit 23**.

176 Canadian Solar 2020 Annual Report at F-73, excerpts attached at **Exhibit 12**.

177 *Id.* at 64.

178 Canadian Solar Thailand 2019 Financial Statements, attached at **Exhibit 55**.

not include R&D in the parent company's financial statements, unlike some of the Chinese operations.[179] In total, Trina Solar reported R&D expenses of over RMB363 million (approximately $55.6 million)[180] for is consolidated operations for 2020.[181] Trina Solar Thailand's 2019 financial statements similarly do not separately list R&D expenses.[182] Talesun emphasizes on its website that it is a "real R&D power," noting that its R&D center has cooperated with the Chinese "Academy of Sciences (CAS), Shanghai Jiaotong University, Sichuan University, the Netherlands Energy Research Institute (ECN), SERIES, Southeast University, Nanjing University of Aeronautics and Astronautics," and that it has built an internationally advanced R&D laboratory.[183] The company further explains that its R&D center consists of more than 5,000 square meters equipped with state-of-the-art automated equipment, with more than 350 R&D team members, $300 million R&D investment, and more than 340 patents applied.[184] Talesun Thailand's 2019 financial statements do not appear to separately list R&D expenses.[185] Information regarding Astroenergy/Chint Solar's R&D expenses is not reasonably available to A-SMACC. However, sources indicate that Astroenergy specializes in research and development, in addition to production, of solar modules, and that Astroenergy has become a global total solutions provider for photovoltaic systems with support from its parent company Chint Group.[186] Given

---

179 Trina Solar 2020 Auditor's Report at 131-133, excerpts attached at **Exhibit 2**.

180 Using an exchange rate of 6.5250 RMB per U.S. dollar from December 31, 2020. Federal Reserve Exchange Rates, attached at **Exhibit 50**.

181 Trina Solar 2020 Auditor's Report at 7, excerpts attached at **Exhibit 2**.

182 Trina Solar Thailand 2019 Financial Statements, attached at **Exhibit 56**.

183 Talesun Website Excerpts, attached at **Exhibit 3**.

184 *Id.*

185 Talesun Thailand 2019 Financial Statements, attached at **Exhibit 26**.

186 *China's Chint/Astroenergy Completes 50 MW Solar PV Power Plant in Bulgaria*, Renewables Now (June 12, 2012), attached at **Exhibit 57**.

that CSPV production is primarily based in China for these companies, it is likely that all or most of the companies' R&D occurs in China, as opposed to Thailand.

3. The Production Process in Thailand Involves Minimal Additional Processing

Again, in evaluating the production process in Thailand, the Department should compare that process to the production operations of an integrated Chinese CSPV producer up through the stage at which the wafers or cells are sent to Thailand for further minor processing. As detailed above, there are five main stages in the production process for CSPV products.[187] For inquiry merchandise, A-SMACC understands that all of the manufacturing process up through the production of the wafers is taking place in China. Again, to the extent that the wafers are also undergoing some of the cell conversion steps in China before being exported to the third country to be completed into cells and assembled into modules,[188] the production process in the third country would be even more minimal.

As can be seen in the description of the manufacturing process above, the production process up through the wafers, starting from the initial raw polysilicon stage, is much more substantial than the process of converting the wafers to cells and assembling modules. While the process of converting wafers to CSPV cells is not trivial – either in terms of capital or workforce – the production process up through the wafers is much more substantial in terms of production activities, investment, research, and expense, and is technologically complex.

---

187 USITC Pub. 4874 at I-43, excerpts attached at **Exhibit 11**.

188 Again, A-SMACC submits that wafers from China that have already been doped and contain a p/n junction, which are then shipped to Thailand for finishing prior to export to the United States, are already in-scope merchandise and should be subject to duties, consistent with the Department's recent scope rulings. *See* ET Solar Scope Ruling, attached at **Exhibit 13**; Solaria Scope Ruling, attached at **Exhibit 14**. To the extent such merchandise is not already considered subject, and to the extent that Chinese wafers that do not yet contain a p/n junction and/or other Chinese inputs are being used in the production processes described herein, such merchandise is circumventing the Orders.

Again, the available evidence indicates that these companies obtain the upstream components to be completed into CSPV cells and modules in Thailand, *i.e.*, the circumventing merchandise, from Chinese suppliers. In other words, the production process for polysilicon, ingots, and wafers nonetheless takes place in China, after which such merchandise undergoes the final cell and module finishing stages in Thailand. Accordingly, the Department should compare the production process for the first three stages of production for cells/modules in China to the production process for the last two stages in Thailand.

Furthermore, as detailed below, the final steps of the production process that occur in Thailand accounts for a relatively small proportion of the cost of production.

4. The Production Facilities in Thailand are Limited

The facilities completing the CSPV cells and assembling the modules in Thailand are limited compared to the integrated production facilities in China that also engage in the upstream production processes. Indeed, the companies subject to this request appear to have much more production space in their Chinese facilities than their facilities in the third country. For instance, Canadian Solar Thailand's cell manufacturing facilities are 18,100 square meters and 19,139 square meters, respectively, and its module manufacturing facilities are 15,460 square meters and 29,723 square meters, respectively.[189] In contrast, Canadian Solar Manufacturing (Luoyang) Inc., another subsidiary of Canadian Solar which is based in China and is engaged in the manufacture of solar modules, ingots, and wafers, has manufacturing facilities with a total area of 75,527 square meters.[190] And Canadian Solar has at least nine subsidiaries based in China involved in the

[189] Canadian Solar 2020 Annual Report at 53, excerpts attached at **Exhibit 12**.

[190] *Id.* at F-73, 51-53.

production of solar cells, modules, ingots, and/or wafers.[191] Overall, Canadian Solar appears to have had at least [ ] wafer capacity, [ ] cell capacity, and [ ] module capacity in China compared to [ ] cell capacity and [ ] module capacity in Thailand, as of 2020.[192]

Similarly, while the sizes of Trina Solar's facilities are not reasonably available to A-SMACC, Trina Solar appears to have had at least [ ] wafer capacity, [ ] cell capacity, and [ ] module capacity in China overall, compared to [ ] cell capacity and [ ] module capacity in Thailand as of 2020.[193] For Talesun, while the sizes of the company's facilities are not reasonably available to A-SMACC, the company states that it has three manufacturing facilities in China, with an annual production capacity of 10.7 GW for PV cells and 11 GW for modules, compared to 1.3 GW for PV cells and 2 GW for modules in Thailand.[194] An industry report also indicates that Talesun has wafer production in China, with annual capacity of [ ] as of 2020.[195] Similarly, the sizes of Astroenergy/Chint's facilities are not reasonably available to A-SMACC. However, the company states on its website that it has a 600 MW solar cell factory in Thailand, while an industry publication indicates that as of the end of 2020,[196] Astroenergy/Chint had a total cell production capacity of [ ] and a total module production capacity of [ ] in China.[197]

---

191 *Id.* at F-73.

192 [ ], excerpts attached at **Exhibit 8**.

193 *Id.*

194 Talesun Company Brochure, excerpts attached at **Exhibit 4**.

195 [ ], excerpts attached at **Exhibit 8**.

196 Astroenergy/Chint Solar Website Excerpts, attached at **Exhibit 5**.

197 [ ], excerpts attached at **Exhibit 8**.

In addition, industry publications confirm that "{t}echnical hurdles are highest for plants that make polysilicon and wafers. These plants are also costly to build and take longest to construct. Cell and module factories can be built faster and can respond quicker to technological trends and policy developments like import tariffs,"[198] and that "{w}afer factories require high upfront capital expenditure and bear many technical hurdles, which makes it difficult for new factories to be built outside of China."[199] In contrast, "{c}ell manufacturing is more versatile compared to wafers and polysilicon and has lower technical hurdles."[200] Similarly, "{b}uilding a new module factory has low technical hurdles compared to wafer and polysilicon."[201] In fact, due to the "low technical and financial barriers, it is also easier for module companies to open shop in other countries in response to tariffs or other policy developments."[202]

The sizes of other Chinese producers' facilities for polysilicon, ingot, and wafer production further demonstrate that the facilities completing the CSPV cells and assembling the modules in Thailand are limited compared to the integrated production facilities in China that also engage in the upstream production processes. For instance, JinkoSolar Holding Co., Ltd. has one silicon ingot and wafer facility in China with a plant size of 68,397 square meters, and another silicon ingot facility in China with a plant size of 165,333 square meters.[203] The production facilities needed for the initial raw polysilicon stage are also very sophisticated. For instance, the modified

---

198 *Solar PV Trade and Manufacturing: A Deep Dive*, BloombergNEF (Feb. 2021) at 4, excerpts attached at **Exhibit 9**.

199 *Id.* at 11.

200 *Id.* at 13.

201 *Id.* at 19.

202 *Id.*

203 JinkoSolar Holding Co., Ltd., United States Securities and Exchange Commission, Form 20-F (for the fiscal year ended December 31, 2020) at 67, excerpts attached at **Exhibit 58**.

Siemens method of production of polysilicon, which most of China-based polysilicon production is based on, is a mature, large-scale, chemical manufacturing process.[204] Most new production facilities have been constructed in China, with new factories on the scale of 100,000 tons per year planned for the near future.[205] This equates to almost 275 tons per day at full capacity – a very large-scale operation.[206]

5. The Value of the Processing Performed in Thailand Represents a Small Proportion of the Value of the Merchandise Imported into the United States

For CSPV products, the production of the wafers, from the initial raw polysilicon stage, is the most critical component with respect to PV module performance and represents the highest percentage of the bill of materials ("BOMs").[207] Canadian Solar itself reports that "{s}olar wafers are the most important material for making solar cells," and that "{s}olar ingots are the most important material for making solar wafers."[208] Even for the cost of converting wafers to cells and the cost of assembling modules from CSPV cells, the cost of the materials is the most substantial proportion of the cost. Again, A-SMACC believes that all, or most, of those materials are also obtained from China.

This general cost breakdown is confirmed by industry publications. For instance, according to BloombergNEF, with the imposition of tariffs on Chinese equipment, the majority of CSPV products imported into the United States arrive from Southeast Asia (which should include Thailand) post-assembly, but "70% of the actual value of that equipment accrues to China where

---

204 Expert Report at 4, attached at **Exhibit 1**.

205 *Id.*

206 *Id.*

207 *Id.* at 7.

208 Canadian Solar 2020 Annual Report at 54, excerpts attached at **Exhibit 12**.

key, pre-assembly steps in the making of the equipment take place, including production of solar-grade silicon, ingots, wafers and cells."[209] For this reason, generally, production costs in "Southeast Asian nations account for just 27% of the value of a typical PV module exported to the U.S., despite those nations being most likely to be the last port of call before final, assembled equipment arrives in the U.S.," reiterating that most of the plants assembling modules in Southeast Asia are owned by Chinese firms.[210] BloombergNEF further reports that generally, as of year-end 2019, that "{o}ver half of the cost of making monocrystalline silicon wafers into cells comes from the purchase of materials such as silver (Ag) and aluminum (Al) pastes {}. Front silver paste alone is the single largest cost component and accounted for 33% of total cost."[211] Similarly, for the "{b}est-in-class cash cost for cell-to-module for mono c-Si modules made by large firms as of year-end 2019" the cost of the materials (aluminum frame, glass, EVA, backsheet, junction box, and other materials) constituted 83 percent of the total cost.[212] BloombergNEF also notes that "{w}hether a silicon-based module is assembled on U.S. soil or abroad, about half its total value is accounted for by non-silicon raw materials such as silver paste, glass and back sheets," with the "vast majority of suppliers of these materials {being} concentrated in China.[213] As a result, the publication notes that despite the U.S. tariffs on Chinese-made PV cells and modules, China continues to accrue the largest share of value from modules installed in the United States – regardless of where the equipment is assembled.[214] While A-SMACC does not have

---

209 *Solar PV Trade and Manufacturing: A Deep Dive*, BloombergNEF (Feb. 2021) at 22, excerpts attached at **Exhibit 9**.

210 *Id.*

211 *Id.* at 14.

212 *Id.* at 18.

213 *Id.* at 23.

214 *Id.*

access to the specific production costs of the companies subject to this petition, A-SMACC believes that the general cost breakdowns discussed above are typical in the industry and would apply to the merchandise completed in Thailand subject to this petition.

A-SMACC also provides a value-added analysis that demonstrates that the value of the processing in the third country represents a small proportion of the value of the CSPV modules imported into the United States. The Commission has previously found that for both CSPV cells and modules, the most substantial component of the total cost of goods sold is the total raw material cost.[215] For cells, while the total raw material cost reflects a combination of polysilicon, wafers, and all other raw material costs, the main underlying raw material input is wafers made from polysilicon.[216] A BOM cost breakdown for a [ ] cell manufactured in [ ] demonstrates that the [ ] wafer, sourced from China, represents the largest cost portion at [ ] percent.[217] A BOM cost breakdown for a [ ] module manufactured in [ ] shows that the BOM cost is dominated by the cell cost, which is primarily comprised of the wafer cost.[218] A BOM breakdown if the cells are excluded from the calculation shows that the glass, frame, EVA, and junction box account for [ ] percent of the module cost.[219] It is understood that due to the extensive supply chain in China, many Chinese module suppliers use materials sourced from China for module production, even if the factory is in a different country.[220] These calculations are discussed in further detail in the expert report attached to this

---

215 USITC Pub. 4874 at I-11 n.45, excerpts attached at **Exhibit 11**.

216 *Id.*

217 Expert Report at 11, attached at **Exhibit 1**.

218 *Id.* at 14.

219 *Id.*

220 *Id.*

submission. To the extent that some of the production steps to convert the wafers to CSPV cells occur in China, prior to being exported to the third country for finishing, the value of processing in the third country would constitute an even smaller proportion.

These calculations are corroborated by LONGi's overall module production costs in its annual reports.[221] LONGi is vertically integrated from ingot/wafer through module production, such that these costs are representative of the overall industry.[222] LONGi breaks down its production costs across six categories: (1) raw materials; (2) manufacturing overhead; (3) direct labor; (4) energy or power; (5) depreciation; and (6) contract costs.[223] The last category, contract costs, was introduced in 2020 and represents contract performance costs and contract acquisition costs.[224] An analysis of the production cost breakdown over the past three years (2018 through 2020) for LONGi's PV products (encompassing all of the production steps from ingot/wafer production through modules) is provided in the expert report attached to this submission.[225] This breakdown shows that the most significant cost category is raw materials at an average of 73 percent of the overall production cost, which encompasses ingot, wafer, cell, and module production.[226] LONGi reported the production of 26,602 MW of modules in 2020, 8,365 MW in 2019, and 7,276 in 2018.[227] The percentages of the various cost categories are consistent despite the differences in production volume.[228] In particular, the raw material cost is very consistent at

---

221 *Id.* at 14-15.

222 *Id.*

223 *Id.*

224 *Id.*

225 *Id.*

226 *Id.*

227 *Id.*

228 *Id.*

roughly 73 percent of overall production costs over this period.[229] Considering the BOM analysis for cells and modules, that the material costs related to silicon wafers and cells dominate the overall module production costs.[230] Further, considering the significant capital investment required for polysilicon, ingot, and wafer production, it is clear that overall module production costs are strongly impacted by the dominance of raw materials produced in China, even if the cell and module factories are located in other Southeast Asia countries.[231]

In evaluating this factor, the Department has emphasized in recent circumvention proceedings that Congress has redirected the agency's focus away from a rigid numerical calculation towards a more qualitative focus on the nature of the production process.[232] For instance, in *Corrosion-Resistant Steel Products from China*, the Department noted that a qualitative analysis, which indicated that the primary direct material inputs (*i.e.*, hot-rolled steel or cold-rolled steel) used by producers in the third country to produce the merchandise subject to the anti-circumvention inquiry (*i.e.*, corrosion-resistant steel) was manufactured and supplied by producers in the country subject to an existing AD/CVD order on corrosion-resistant steel (China), and that significant costs in addition to the direct material inputs were not incurred, would be sufficient to determine that the value of processing in the third country constitutes a small portion

---

229 *Id.*

230 *Id.*

231 *Id.*

232 *See* Preliminary Decision Memorandum accompanying *Certain Corrosion-Resistant Steel Products From the People's Republic of China*, 82 Fed. Reg. 58,170 (Dep't Commerce Dec. 11, 2017) (affirm. prelim. deter. of anti-circ. inquiries on the antidumping duty and countervailing duty orders) ("CORE Circumvention Prelim Decision Memo") at 21; *see also* Preliminary Decision Memorandum accompanying *Diamond Sawblades and Parts Thereof From the People's Republic of China*, 83 Fed. Reg. 57,425 (Dep't Commerce Nov. 15, 2018) (prelim. affirm. deter. of circ.) ("DSB Circumvention Prelim Decision Memo") at 11.

of the value of the merchandise exported to the United States.[233] Similarly, in *Diamond Sawblades from China*, with respect to diamond sawblades that were being assembled or completed in a third country with Chinese cores and Chinese segments, *i.e.*, where all the direct material inputs were of Chinese origin, and the processing performed in the third country involved only laser-welding and finishing, which the Department found to be less complex, intensive, or multi-step processes than the production of the cores and segments, the Department found that a qualitative analysis supported its finding that the proportion of the processing value added in the third country is small.[234]

Like these prior proceedings, here, reasonably available evidence indicates that the primary direct material inputs used to complete CSPV cells in Thailand, *i.e.*, wafers, silane, phosphorus oxychloride (POCI3), aluminum and/or silver paste, and the additional components used to assemble the CSPV cells into modules, *i.e.*, solar glass, EVA, backsheet, aluminum frames, and junction boxes, were sourced from China, the country subject to the Orders. Accordingly, a qualitative analysis itself would also be sufficient to conclude that the value of processing in Thailand represents a small proportion of the value of the merchandise imported to the United States.

---

233 *See* CORE Circumvention Prelim Decision Memo at 22. The Department had also obtained the information necessary to evaluate the value added by the processing in the third country and concluded that the quantitative finding supported the Department's qualitative finding. *See id.*

234 *See* DSB Circumvention Prelim Decision Memo at 11. There was also information on the record regarding the cost of production of diamond sawblades manufactured in the third country and the value of diamond sawblades sold to the United States and the Department also calculated the value of processing performed in the third country to preliminarily find that the value of processing performed in the third country as a proportion of the value of the merchandise imported into the United States is small for the products at issue in the inquiry. *See id.* at 13.

D. The Value of the Merchandise Produced in China is a Significant Portion of the Total Value of the Merchandise Exported to the United States

As discussed above, the value of the processing in Thailand represents a minority of the value of the merchandise imported into the United States, for both cells and modules. In contrast, the overwhelming majority of the production and costs are accounted for by the Chinese components that are completed and assembled in Thailand. Again, the Commission has also previously found that for both CSPV cells and modules, the most substantial component of the total cost of goods sold is the total raw material cost.[235] For cells, while the total raw material cost reflects a combination of polysilicon, wafers, and all other raw material costs, the main underlying raw material input is wafers made from polysilicon.[236] This demonstrates that the value of the merchandise produced in China accounts for a significant portion of the total value of the merchandise ultimately exported to the United States.

E. The Department Should Include CSPV Cells and Modules from Thailand in the Scope of the Orders to Prevent Evasion and Further Supply Chain Destruction

Given the facts and evidence presented above, there is a reasonable basis to conclude that CSPV cells and modules are being completed in Thailand by Canadian Solar, Trina Solar, Talesun, and Astroenergy/Chint within the meaning of 19 U.S.C. § 1677j(b) such that they should be included in the scope of the Orders to prevent evasion and further supply chain destruction. Chinese producers have developed a circumvention scheme that involves moving the very end of the production process for CSPV products, which entails minor processing, to a third country for

---

235 USITC Pub. 4874 at I-11 n.45, excerpts attached at **Exhibit 11**.

236 *Id.*

the express purpose of avoiding AD/CVD duties while retaining as much of the subsidized supply chain and labor as possible in China.

In fact, it is widely recognized in the industry that following the imposition of AD/CVD duties on Chinese-made solar cells, Chinese integrated producers started building cell and module assembly plants across Southeast Asia, while continuing to rely heavily on Chinese inputs.[237] Industry publications report that most U.S. solar installations today use modules from plants located in Vietnam, Malaysia, and Thailand, and most module-assembly plants that ship from Southeast Asia to the United States are Chinese-owned.[238] The circumventing companies have indicated as much themselves. For instance, Talesun Thailand has indicated that while AD/CVD duties as well as Section 201 and Section 301 tariffs limit exports of solar modules from China to the U.S. market, it is targeting the U.S. market through its Thailand facility.[239] Similarly, the CEO of Talesun stated in an interview that "{d}espite the adverse effects of the trade dispute between China and {the United States}, Talesun is planning to double {its} {U.S.} employees for more local business in next year with {its} Thailand factory capacity."[240] When it first launched its Thailand operations, the Chairman and CEO of Trina Solar similarly stated that "{t}he investment in Thailand fits our strategy of prudent capacity expansion in select overseas markets to deliver industry leading products to customers in the {U.S.} and Europe in particular as we strive to

---

237 *Solar PV Trade and Manufacturing: A Deep Dive*, BloombergNEF (Feb. 2021) at 19, excerpts attached at **Exhibit 9**.

238 *Id.* at 21.

239 *US order demand Soaring, Talesun's capacity in Thailand accelerated to 2 GW*, PV Magazine International (Dec. 9, 2019), attached at **Exhibit 59** ("{I}t is almost impossible for Made-in-China modules to be imported to the U.S. market, due to the high price with the added cost of anti-dumping, anti-countervailing, 201 tariff and 301 tariff. Confronted with the opportunity in the United States, Talesun Solar seized the chance to break through the U.S. market through Thai production capacity.").

240 Interview with William Sheng, President of Talesun Solar, attached at **Exhibit 60**.

increase the profitability of the company."[241] Similarly, on announcing Canadian Solar's new manufacturing facility in Thailand, the President and CEO stated that "{t}he plant, located at Rojana Industrial Park in the eastern province of Chonburi, will facilitate exports to North America and in the region . . . ."[242]

It is imperative that the Department confirm that the completion of CSPV cells and modules in a third country using components manufactured in China will not take the finished product outside the scope of the Orders. An affirmative determination here is critical to put an end to these blatant attempts to avoid paying the requisite AD/CVD duties on CSPV cells and modules from China and to provide the domestic industry with the full extent of trade relief that it deserves.

F. Additional Factors Considered by the Department

An assessment of the additional statutory factors that the Department considers in determining whether to include merchandise assembled or completed in a third country within the scope of an existing order further supports an affirmative determination of circumvention.

1. The Pattern of Trade Demonstrates Circumvention of the Orders

As discussed above, the import trends paint a clear picture of the circumvention taking place. Since the underlying investigations and imposition of the Orders, U.S. imports of CSPV cells and modules from China have decreased substantially.[243] At the same time, U.S. imports of CSPV cells and modules from Thailand have skyrocketed, increasing from $336,806 in 2011 (the year of petition filing in the underlying investigations) to over $1.4 billion in 2020.[244] These import

---

241 *Trina Solar Launches Operations at Thailand Manufacturing Facility and Signs a US$143 million Syndicated Financing Facilities Agreement*, Trina Solar (Mar. 28, 2016), attached at **Exhibit 23**.

242 *Thai SCB, China Minsheng to lend $210 mln to Canadian Solar*, Reuters (Jan. 16, 2017), attached at **Exhibit 61**.

243 Official Import Statistics, attached at **Exhibit 10**.

244 *Id.*

trends are a strong indication that Chinese producers are circumventing the Orders by shipping Chinese-origin components to Thailand for completion into CSPV cells or modules to be sold at dumped and subsidized prices in the United States.

2. The Chinese Manufacturers/Exporters Subject to the Orders Are Affiliated with the Companies that Complete the CSPV Cells and Modules in Thailand

As discussed above, reasonably available evidence indicates that the companies in Thailand are sourcing from their Chinese affiliates or parent companies, which are subject to the AD/CVD orders, at least some of the components used to complete the production of CSPV cells/modules in Thailand, to circumvent the Orders. Specifically, Canadian Solar Thailand is a subsidiary of Canadian Solar Inc., which has many subsidiaries involved in CSPV production in China.[245] Trina Solar Thailand is a subsidiary of Trina Solar Co., Ltd.[246] Talesun Thailand is the Thai base of Talesun Solar, a wholly owned subsidiary of Zhongli Group.[247] Astroenergy Thailand is the Thai base of Astroenergy/Chint Solar, which is a subsidiary of the CHINT group.[248]

3. Imports of Chinese-Origin Components for CSPV Cells and Modules into Thailand from China Have Increased Significantly After the Initiation of the Underlying Investigations

Imports of Chinese-origin components for CSPV cells and modules into Thailand have increased significantly after the initiation of the underlying investigations. Canadian Solar, Trina Solar, Talesun, and Astroenergy/Chint Solar all established cell and module facilities in Thailand

---

245 Canadian Solar 2020 Annual Report at F-73, excerpts attached at **Exhibit 12**.

246 Trina Solar 2020 Auditor's Report at 131-133, excerpts attached at **Exhibit 2**.

247 Talesun Company Brochure, excerpts attached at **Exhibit 4**.

248 Astroenergy/Chint Solar Website Excerpts, attached at **Exhibit 5**.

after the imposition of the Orders in 2012.[249] As discussed above, A-SMACC reasonably believes that these companies are importing most, if not all, of the components for converting wafers to CSPV cells and module assembly from China, in addition to obtaining Chinese-origin wafers or cells. Thus, by definition, there has been an increase in imports of Chinese-origin components into Thailand since the underlying investigations.

This is supported by official import statistics. Specifically, the data indicate that there has been an increase in imports of Thai imports of Chinese wafers, cells, and inputs including silver and aluminum paste, junction boxes, and screen frames into Thailand from China since 2011, the year of filing of the petitions in the underlying investigations.[250] This upward trend of imports of Chinese-origin components into Thailand, which is consistent with the other evidence demonstrating that these companies are sourcing these components from China, is further evidence of circumvention of the Orders.

* * *

REQUEST FOR PROPRIETARY TREATMENT

Pursuant to 19 C.F.R. § 351.304(a)(1)(i) of the Department's regulations, we request business proprietary treatment for the bracketed information in the narrative of this submission and exhibits as detailed below. Disclosure of this information, which is not otherwise publicly

---

[249] *Id.*; Talesun Company Presentation (May 2019), excerpts attached at **Exhibit 27**; Mark Hutchins, *Canadian Solar secures US$210 million loan for Thailand facility*, PV Magazine (Jan. 16, 2017), attached at **Exhibit 62**; *Trina Solar Launches Operations at Thailand Manufacturing Facility and Signs a US$143 million Syndicated Financing Facilities Agreement*, Trina Solar (Mar. 28, 2016), attached at **Exhibit 23**.

[250] Global Trade Information Services Thailand Import Data, attached at **Exhibit 36**. Some of the HS codes are basket categories and may include other goods. Nonetheless, that imports of merchandise under these HS codes from China increased substantially following the imposition of the Orders further corroborates other information discussed in this petition demonstrating that the subject companies are importing Chinese materials to complete the production of cells/modules in Thailand. These HS codes are examples and may not be the best or only appropriate codes for these goods.

available, would cause substantial harm to the competitive position of the submitter and would impair the ability of the Department to obtain information in the future necessary to fulfill its statutory functions. In particular, A-SMACC requests business proprietary treatment for the identities of the companies that are part of A-SMACC, as disclosure of this information could lead to retribution against these companies and cause substantial harm.

Pursuant to section 351.304(b)(1) of the Department's regulations, A-SMACC agrees in principle to permit disclosure of business proprietary information contained in these petitions under an appropriately drawn administrative protective order ("APO"). A-SMACC respectfully reserves the right, however, to comment on all APO applications prior to disclosure. A public version of this submission has been prepared and is being filed pursuant to the Department's regulations at 19 C.F.R. § 351.304(c)(1).

(1) **Page 50 and Exhibit 1**: *Business or trade secrets concerning the nature of a product or production process* (19 C.F.R. § 351.105(c)(1)) and/or *Production costs (but not the identity of the production components unless a particular component is a trade secret*) (19 C.F.R. § 351.105(c)(2)).

(2) **Exhibit 1**: *The names of particular persons from whom business proprietary information was obtained* (19 C.F.R. § 351.105(c)(9)).

(3) **Pages 1, 2, 4, 20, 23-27, 40, 46, EL-1, EL-2, Client Certifications, and Exhibits 8 and 15**: *Any other specific business information the release of which to the public would cause substantial harm to the competitive position of the submitter* (19 C.F.R. § 351.105(c)(11)).

* * *

If you have any questions regarding this submission, please do not hesitate to contact us.

Respectfully submitted,

/s/ Timothy C. Brightbill
Timothy C. Brightbill, Esq.
Laura El-Sabaawi, Esq.
Elizabeth S. Lee, Esq.

Counsel to American Solar Manufacturers Against Chinese Circumvention