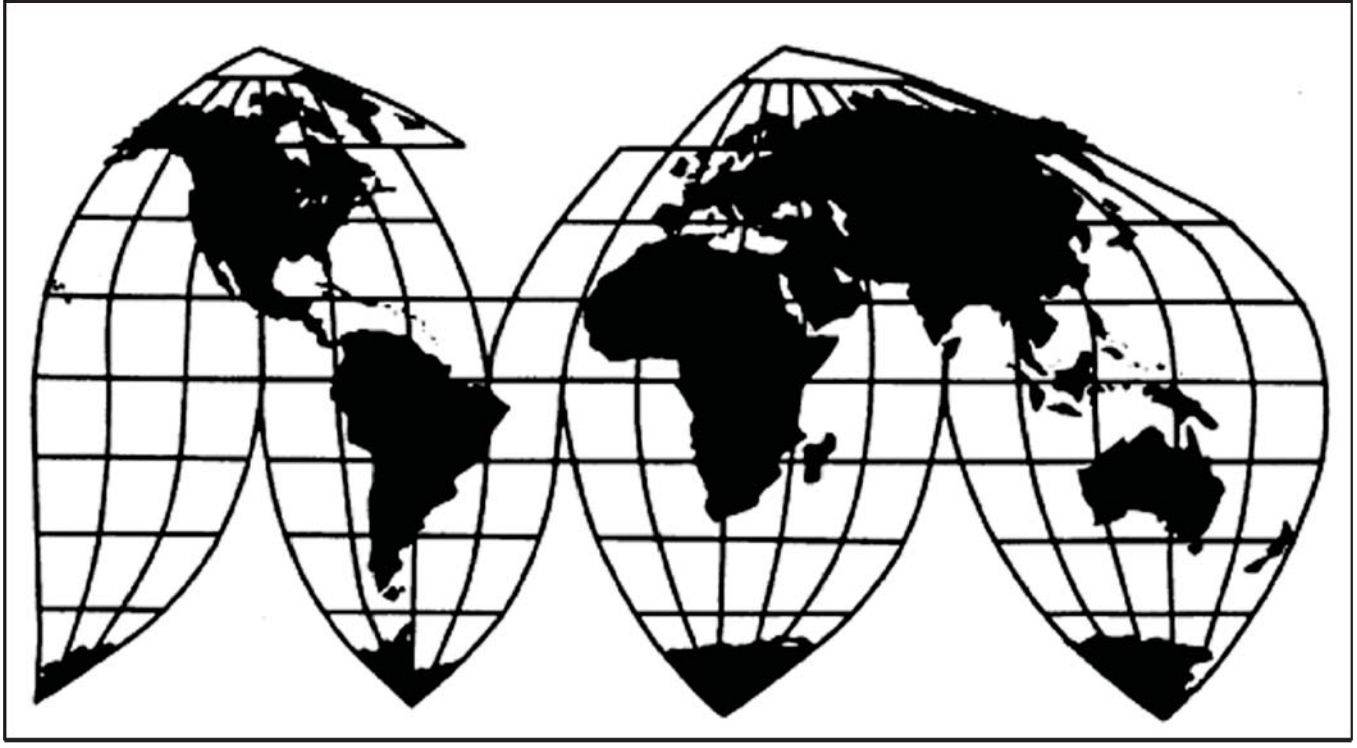
Crystalline Silicon Photovoltaic Cells (Whether or not Partially or Fully Assembled into Other Products)

Investigation No. TA-201-75

VOLUME I: DETERMINATION AND VIEWS OF COMMISSIONERS

Publication 4739 **November 2017**

U.S. International Trade Commission



Washington, DC 20436

U.S. International Trade Commission

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Note.—Information that would reveal confidential operations of individual concerns may not be published and therefore has been deleted.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

UNITED STATES INTERNATIONAL TRADE COMMISSION

Investigation No. TA-201-75

Crystalline Silicon Photovoltaic Cells
(Whether or Not Partially or Fully Assembled into Other Products)

DETERMINATION

On the basis of information developed in the subject investigation, the Commission determined pursuant to section 202(b) of the Trade Act of 1974 that crystalline silicon photovoltaic cells (whether or not partially or fully assembled into other products) ("CSPV products") are being imported into the United States in such increased quantities as to be a substantial cause of serious injury to the domestic industry producing an article like or directly competitive with the imported article.

Having made an affirmative injury determination pursuant to section 202(b) of the Trade Act of 1974, the Commission was required to make certain additional findings under the implementing statutes of certain free trade agreements ("FTAs") or under statutory provisions related to certain preferential trade programs. Under section 311(a) of the NAFTA Implementation Act (19 U.S.C. § 3371(a)), the Commission found that imports of CSPV products from Mexico account for a substantial share of total imports and contribute importantly to the serious injury caused by imports. Under 19 U.S.C. § 3371(a), the Commission also found, with Chairman Rhonda K. Schmidtlein dissenting, that imports of CSPV products from Canada do not account for a substantial share of total imports and do not contribute importantly to the serious injury caused by imports. The Commission further found that imports of CSPV products from Korea are a substantial cause of threat of serious injury, but that imports of CSPV products from Australia, the U.S.-Dominican Republic – Central America Free Trade Agreement ("CAFTA-DR") countries, Colombia, Jordan, Panama, Peru, and Singapore, individually, are not a substantial cause of serious injury or threat thereof, under the respective implementing legislation for the FTAs with these countries. *See* 19 U.S.C. § 2112 note (Jordan); 19 U.S.C. § 3805 note (Australia, Colombia, Korea, Panama, Peru, Singapore); 19 U.S.C. § 4101 (CAFTA-DR). The Commission also found that the serious injury substantially caused by imports to the domestic industry producing a like or directly competitive article does not result from the reduction or elimination of any duty provided for under the U.S.-Israel Free Trade Agreement or from duty-free treatment provided for under the Caribbean Basin Economic Recovery Act ("CBERA") provisions of the Caribbean Basin Initiative Trade Program or the Generalized System of Preferences ("GSP") program. 19 U.S.C. § 2112 note (Israel); 19 U.S.C. § 2703(e) (CBERA); 19 U.S.C. § 2253(e)(6) (GSP).

REMEDY RECOMMENDATIONS

In order to address the serious injury to the domestic industry producing CSPV products and be most effective in facilitating the efforts of the domestic industry to make a positive adjustment to import competition, the Commission recommended a series of actions.

With regard to CSPV cells, Chairman Schmidtlein recommends a tariff-rate quota with an in-quota tariff rate of 10 percent ad valorem and an in-quota volume level of 0.5 gigawatts. For U.S. imports of cells that exceed the 0.5 gigawatts volume level, she recommends a tariff rate of 30 percent ad valorem. Chairman Schmidtlein recommends that this tariff-rate quota be implemented for four years and that the in-quota level be incrementally raised and the tariff rate be incrementally reduced during the remedy period. With regard to CSPV modules, she recommends an ad valorem tariff rate of 35 percent to be incrementally reduced during the 4-year remedy period. Chairman Schmidtlein also recommends that the President initiate international negotiations to address the underlying cause of the increase in imports of CSPV products and alleviate the serious injury thereof. Having made findings that U.S. imports from Australia, the CAFTA-DR countries, Colombia, Israel, Jordan, Panama, Peru, Singapore, and the beneficiary countries under CBERA were not a substantial cause of the serious injury experienced by the domestic industry, Chairman Schmidtlein recommends to the President that U.S. imports from these countries be excluded from the remedy.

Chairman Schmidtlein's Recommended Remedy				
	Year 1	Year 2	Year 3	Year 4
Cells: Tariff rate Quota				
In-Quota Tariff Rate	10%	9.5%	9.0%	8.5%
In-Quota Volume Level	0.5 gigawatts	0.6 gigawatts	0.7 gigawatts	0.8 gigawatts
Out-of-Quota Tariff Rate	30%	29%	28%	27%
Modules: Tariff (Ad Valorem)	35%	34%	33%	32%

Vice Chairman David S. Johanson and Commissioner Irving A. Williamson recommend that for a 4-year period the President impose (1) a tariff-rate quota on imports of CSPV products in cell form, and (2) increased rates of duty on imports of CSPV products in module form. For imports of CSPV products in cell form, they recommend an additional 30 percent ad valorem tariff on imports in excess of 1 gigawatt. In each subsequent year, they recommend that this tariff rate decrease by five percentage points and that the in-quota amount increase by 0.2 gigawatts. The rate of duty on in-quota CSPV products in cell form will remain unchanged. For imports of CSPV products in module form, Vice Chairman Johanson and Commissioner Williamson recommend an additional 30 percent ad valorem tariff, to be phased down by five percentage points per year in each of the subsequent years. Having made a negative finding with respect to imports from Canada under section 311(a) of the North American Free Trade Agreement Implementation Act, they recommend that such imports be excluded from the above tariff-rate quota and increased rates of duty. Further, Vice Chairman Johanson and Commissioner Williamson recommend that the above tariff-rate quota and

increased rates of duty not apply to imports from the following countries with which the United States has FTAs: Australia, Colombia, Costa Rica, the Dominican Republic, El Salvador, Guatemala, Honduras, Israel, Jordan, Nicaragua, Panama, Peru, and Singapore. They also recommend that the tariff-rate quota and increased rates of duty not apply to imports from the CBERA beneficiary countries. Vice Chairman Johanson and Commissioner Williamson recommend that the President direct the United States Department of Labor and the United States Department of Commerce to provide expedited consideration of any application for trade adjustment assistance for workers and/or firms that are affected by subject imports. They recommend the President's consideration of the product exclusions requested by Respondents to which Petitioners have not objected and have indicated they would work to draft appropriate product-specific exclusions. Finally, they recommend that the President also consider any appropriate funding mechanisms that may facilitate a positive adjustment to import competition.

Commissioner Meredith M. Broadbent recommends that the President impose a quantitative restriction on imports of CSPV products into the United States, including cells and modules, for a four-year period, administered on a global basis. She recommends that the quantitative restriction be set at 8.9 gigawatts in the first year and increase by 1.4 gigawatts each subsequent year. In accordance with section 1102 of the Trade Agreements Act of 1979 (19 U.S.C. § 2581) and the President's authority in section 203(a)(3)(F) of the Trade Act of 1974 (19 U.S.C. § 2253(a)(3)(F)), she also recommends that the President administer these quantitative restrictions by selling import licenses at public auction at a minimum price of one cent per watt. She recommends that the President, to the extent permitted by law, authorize the use of funds equal to the amount generated by import license auctions to provide development assistance to domestic CSPV product manufacturers for the duration of the remedy period, such as through authorized programs at the United States Department of Energy (DOE). Commissioner Broadbent also recommends that the President implement other appropriate adjustment measures, including the provision of trade adjustment assistance by the United States Department of Labor and the United States Department of Commerce to workers and firms affected by import competition. Having made an affirmative finding with respect to imports from Mexico under section 311(a) of the NAFTA Implementation Act, she recommends that the President allocate no less than 720 megawatts to Mexico during the first year within the global quantitative restriction, which would expand by 115 megawatts each year. Having made a negative finding with respect to imports from Canada under section 311(a) of the NAFTA Implementation Act, Commissioner Broadbent recommends that such imports be excluded from the quantitative restriction. Furthermore, she recommends that this quantitative restriction not apply to imports from Australia, the CAFTA-DR countries, Colombia, Israel, Jordan, Panama, Peru, Singapore, and the CBERA beneficiary countries.

Commission's Views on Injury

Based on the facts in this investigation, we determine pursuant to section 202(b) of the Trade Act of 1974 ("Trade Act")[1] that crystalline silicon photovoltaic cells (whether or not partially or fully assembled into other products) ("CSPV products") are being imported into the United States in such increased quantities as to be a substantial cause of serious injury to the domestic industry producing an article like or directly competitive with the imported article.[2] Having made an affirmative determination in this global safeguard investigation, we are required to make certain additional findings under the implementing statutes of certain free trade agreements ("FTAs") or under statutory provisions related to certain preferential trade programs.[3] We find that imports of CSPV products from Mexico account for a substantial share of total imports and contribute importantly to the serious injury caused by imports.[4] We also find that imports of CSPV products from Canada do not account for a substantial share of total imports and do not contribute importantly to the serious injury caused by imports.[5] We find

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[1] 19 U.S.C. § 2252(b).

[2] The Commission's affirmative serious injury determination is unanimous, reflecting the views of Chairman Rhonda K. Schmidtlein, Vice Chairman David S. Johanson, and Commissioners Irving A. Williamson and Meredith M. Broadbent.

[3] Specifically, the Commission is required to make certain additional findings under the implementing statutes for the North American Free Trade Agreement ("NAFTA") (Canada and Mexico), the U.S.-Dominican Republic – Central America Free Trade Agreement ("CAFTA-DR") (Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and the Dominican Republic), the U.S.-Australia Free Trade Agreement, the U.S.-Korea Free Trade Agreement ("KORUS"), the U.S.-Colombia Trade Promotion Agreement, the Agreement between the United States of America and the Hashemite Kingdom of Jordan on the Establishment of a Free Trade Area, the U.S.-Panama Trade Promotion Agreement, the U.S.-Peru Free Trade Agreement, the U.S.-Singapore Free Trade Agreement, and the U.S./Israel Free Trade Agreement or under statutory provisions related to preferential trade programs (Caribbean Basin Economic Recovery Act ("CBERA") and Generalized System of Preferences ("GSP")). *See* 19 U.S.C. § 2112 note (Jordan, Israel); 19 U.S.C. § 2253(e)(6) (GSP); 19 U.S.C. § 2703(e) (CBERA); 19 U.S.C. § 3371 (NAFTA); 19 U.S.C. § 3805 note (Australia, Colombia, KORUS, Panama, Peru, Singapore); 19 U.S.C. § 4101 (CAFTA-DR).

[4] The Commission's finding regarding imports of CSPV products from Mexico under section 311(a) of the NAFTA Implementation Act (19 U.S.C. § 3371(a)) reflects the views of Chairman Schmidtlein, Vice Chairman Johanson, and Commissioners Williamson and Broadbent. As discussed in more detail in section III below, in this investigation, we measured U.S. imports from Canada and Mexico using questionnaire data based on the module assembly location and measured imports from all other sources based on adjusted U.S. importer questionnaire data that are based on the manufacturing location of the CSPV cell.

[5] The Commission's finding regarding imports of CSPV products from Canada under section 311(a) of the NAFTA Implementing Act (19 U.S.C. § 3371(a)) reflects the views of Vice Chairman Johanson and Commissioners Williamson and Broadbent. As explained below, Chairman Schmidtlein does not join section V.A.1 of these Views. She finds under section 311(a) of the NAFTA Implementation (Continued…)

that imports of CSPV products from Korea are a substantial cause of threat of serious injury, but that imports of CSPV products from Australia, CAFTA-DR countries, Colombia, Jordan, Panama, Peru, and Singapore, individually, are not a substantial cause of serious injury or threat thereof, under the respective implementing legislation.[6] We also find that the serious injury substantially caused by imports to the domestic industry producing a like or directly competitive article does not result from the reduction or elimination of any duty provided for under the U.S.-Israel Free Trade Agreement[7] or from duty-free treatment provided for under the Caribbean Basin Economic Recovery Act provisions of the Caribbean Basin Initiative Trade Program or the GSP program.[8]

I. Background

Effective May 17, 2017, the Commission instituted this investigation, Inv. No. 201-TA-75, in response to a petition, as amended and properly filed on May 17, 2017 by Suniva, Inc. ("Suniva"), a producer of crystalline silicon photovoltaic ("CSPV") cells and CSPV modules in the United States.[9] On May 25, 2017, SolarWorld publicly stated its support for the petition as a co-petitioner.[10]

(…Continued)
Act (19 U.S.C. § 3371(a)) that imports of CSPV products from Canada account for a substantial share of total imports and contribute importantly to the serious injury caused by imports.

[6] The Commission's findings regarding imports of CSPV products from Australia, CAFTA-DR countries, Colombia, Jordan, Korea, Panama, Peru, and Singapore reflect the views of Chairman Schmidtlein, Vice Chairman Johanson, and Commissioners Williamson and Broadbent.

[7] 19 U.S.C. § 2112 note, U.S./Israel FTA Implementing Act §§ 403(b), 403(d).

[8] 19 U.S.C. §§ 2253(e)(6), 2703e(2), 2703e(4). The Commission's findings regarding imports from Israel, CBERA countries, and GSP trade preference countries reflect the views of Chairman Schmidtlein, Vice Chairman Johanson, and Commissioners Williamson and Broadbent.

[9] 82 Fed. Reg. 25331 (June 1, 2017). Suniva initially submitted a petition on April 26, 2017. On May 1, 2017, Commission staff issued a letter requesting that Suniva clarify its description of the imported articles intended to be covered by the petition, provide more details concerning whether Suniva was "representative of an industry" within the meaning of 19 U.S.C. § 2252(a)(1), and supply additional data on the performance indicators for the industry producing an article like or directly competitive with the imported article. On May 12, 2017, Suniva provided additional information to support its allegations (including an affidavit indicating that *** supported the petition). Suniva's May 12, 2017 response at Exhibit 6. On May 17, 2017, Suniva further amended its petition and provided a revised description of the imported articles. The Commission determined that the petition, as amended, was properly filed as of May 17, 2017.

[10] Confidential Report, Memorandum INV-PP-119 (Sept. 11, 2017), as corrected by Memorandum INV-PP-139 (Oct. 31, 2017) ("CR") at I-1; Public Report, *Crystalline Silicon Photovoltaic Cells (Whether or Not Partially or Fully Assembled into Other Products)*, Inv. No. 201-TA-75, USITC Pub. 4739 (Nov. 2017) ("PR") at I-1. Together the two petitioners accounted for the vast majority (*** percent of U.S. CSPV cell production by kW in 2016, and for a large majority (*** percent) of module assembly during the January 1, 2012 to December 31, 2016 period of investigation ("POI"). CR at III-22, III-23; PR at III-11; CR/PR at Table III-5, Table III-7, Table III-8.

Pursuant to the scheduling notice published in the *Federal Register* on June 1, 2017, the Commission held a public hearing on injury issues on August 15, 2017,[11] and voted with respect to injury issues on September 22, 2017.[12] The Commission held a public hearing on remedy issues on October 3, 2017, voted with respect to remedy issues on October 31, 2017, and transmitted its report to the President on November 13, 2017.

Parties and Non-Parties to the Investigation. Representatives of co-petitioners Suniva and SolarWorld appeared at the hearings on injury and remedy issues accompanied by counsel, and they submitted prehearing and posthearing briefs on injury and remedy.

Several respondent interested parties also participated in the investigation. The five sets of interested parties that appeared at the injury and remedy hearings with counsel and submitted prehearing and posthearing briefs on injury and remedy issues included the following: Canadian Solar Solutions, Inc. ("Canadian Solar"), Silfab Solar Inc. ("Silfab Solar"), and Heliene Inc. ("Heliene") (collectively "Canadian respondents");[13] the Solar Energy and Photovoltaic Products Branch of the China Chamber of Commerce for Import and Export of Machinery and Electronic Products ("CCCME");[14] the Korea Photovoltaic Industry Association ("KOPIA");[15] REC Solar Pte. Ltd. and REC Americas, LLC ("REC Americas") (collectively "REC Solar");[16] and SunPower Corp., SunPower Corporation Systems, SunPower North America, LLC, SunPower Corp. Mexico, S. de R.L. de C.V., SunPower Philippines Manufacturing Ltd., and SunPower Solar Malaysia Sdn. Bhd. (collectively "SunPower").[17] A sixth group of interested

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[11] *See* Transcript of Commission's August 15, 2017 Hearing on Injury Issues ("Injury Hearing Tr.").

[12] 82 Fed. Reg. 25331 (June 1, 2017).

[13] Canadian Solar, Silfab Solar, and Heliene are producers and exporters of CSPV cells and CSPV modules from Canada. Canadian respondents' Prehearing Injury Brief at 4.

[14] CCCME members produce CSPV cells and CSPV modules in China. CCCCME's Prehearing Injury Brief at 1, Exhibit 1.

[15] Hanwha Q CELLS America, Inc. ("Hanwha America") submitted prehearing and posthearing briefs on injury issues. Hanwha America is an importer with affiliates that manufacture CSPV cells and/or CSPV modules in Canada, China (including Hong Kong), Germany, Korea, and Malaysia. CR/PR at Tables IV-18 to IV-19; Hanwha America's Prehearing Injury Brief at 9-10.

[16] REC Solar and REC Americas are a foreign producer/exporter and an importer of CSPV products from Singapore. REC Solar's Prehearing Injury Brief at 8.

[17] SunPower reports that it invests in U.S. research and development to support the manufacture of CSPV cells and CSPV modules, manufactures CSPV cells in Malaysia and the Philippines, assembles CSPV cells into modules in Mexico, and at the beginning of the POI assembled modules in the Philippines from a Chinese toll producer (***). SunPower's Prehearing Injury Brief at 2-3. SunPower recently entered into a CSPV cell and CSPV module manufacturing joint venture in China that it reports will be entirely dedicated to non-U.S. markets. SunPower's Posthearing Injury Brief at 11, Appendix at vii. Additionally, SunPower invested $25 million in a U.S. CSPV cell and CSPV module facility in San Jose, CA where it began production in May 2017 with the stated intention to serve residential and commercial applications. SunPower's Posthearing Injury Brief, Appendix at i. It previously partnered with Flextronics to manufacture CSPV modules in Milpitas, CA, but that facility was not adequately scaled, so SunPower determined it was more cost advantageous to integrate the knowledge developed at the Milpitas facility into its other manufacturing locations. *Id*. at ii.

parties (Vina Solar Technology Co. Ltd. ("Vina Solar"); Boviet Solar USA Ltd. ("Boviet USA"); and Boviet Solar Technology Co., Ltd. ("Boviet") (collectively "Vietnamese Respondents")) submitted joint prehearing briefs on injury and prehearing and posthearing briefs on remedy.[18] Seven interested parties submitted prehearing and posthearing briefs on remedy (Auxin Solar,[19] Changzhou Trina,[20] Goal Zero LLC,[21] Mission Solar,[22] NextEra Energy Inc.,[23] Solatube International Inc.,[24] and the Taiwan Photovoltaic Industry Association ("TPVIA")),[25] and two other interested parties (Sunrun and Tesla) submitted posthearing briefs on remedy.[26]

Except as otherwise indicated, the following eleven foreign governments filed prehearing injury and remedy submissions and delivered oral statements at the Commission's hearings on injury and remedy: Brazil, Canada (also filed posthearing submissions on injury and remedy); China (only filed posthearing injury and remedy submissions); European Commission; Indonesia (also filed a posthearing injury submission); Korea (also filed a posthearing remedy submission); Mexico (also filed a posthearing injury submission); Singapore (only filed a prehearing injury submission); Thailand (only filed a prehearing injury submission and a posthearing remedy submission); Taiwan (also filed a posthearing remedy submission); and Vietnam (only filed a posthearing remedy submission).

Forty-nine firms, industry groups, or other organizations that are not interested parties and/or are not parties to the investigation also filed submissions on injury and/or remedy issues.[27] One of them, SEIA, which is not an interested party association,[28] filed joint

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[18] Vina Solar, Boviet USA, and Boviet are foreign producers or importers of merchandise from Vietnam. CR/PR at Table I-3, Table IV-68.

[19] Auxin Solar is a U.S. producer of CSPV products. CR/PR at Table III-3.

[20] Changzhou Trina Solar is a foreign producer of CSPV products.

[21] Goal Zero is an importer of CSPV products. CR/PR at Table II-3.

[22] Mission Solar is a U.S. producer and importer of CSPV products. CR/PR at Table I-2, Table I-3.

[23] NextEra Energy is an importer of CSPV products. CR/PR at Table II-3.

[24] Solatube is an importer of CSPV products. CR/PR at Table II-3.

[25] TPIA is an association, a majority of which are producers and exporters from Taiwan.

[26] Sunrun is an importer of CSPV products, and Tesla is an importer, producer, and purchaser.

[27] Each of the following firms, groups, or other organizations submitted statements on injury and/or remedy: Advanced Energy Buyers Group (coalition of large energy buyers); Alliance for American Manufacturing (domestic labor/business partnership); Almond Alliance of California; American Council on Renewable Energy (non-profit organization representing renewable energy developers, manufacturers, financial institutions, corporate end users, utilities, and grid technology providers); Arcadia Power (renewable energy software and technology company); Blue Green Energy LLC Carolina Solar Energy (developer of utility solar projects in North Carolina and Virginia); California Citrus Mutual; California Cotton Ginners and Growers Association; California Fresh Fruit Association; California Poultry Association; Center for Biological Diversity; Coalition for Prosperous America (coalition of manufacturers, agricultural, worker, consumer and citizen interests); Colorado Cleantech Industries Association; Complete Solar (designer and installer); Duke Energy (energy provider); DuPont Photovoltaic and Advanced Materials (manufacturer of paste and film raw materials and photovoltaic system owner and user); Electrical Reliability Coordinating Council (coalition of power-generating companies); David Ellis; Energy Trade Action Coalition; Enerparc Inc. (engineering services provider); (Continued…)

submissions on injury issues with one of its importer/foreign producer members (SunPower); many respondent interested parties expressly support most, if not all, of SEIA's arguments, so its arguments may be referred to herein as "respondents' arguments."

Data Coverage. U.S. industry data are based on questionnaire responses from 16 firms that are estimated to have accounted for all known U.S. production of CSPV cells and 63.9 percent of U.S. production of CSPV modules in 2015.[29] U.S. import data are based on questionnaire responses of 56 firms that are estimated to have accounted for 82.6 percent of U.S. imports of CSPV cells and CSPV modules in 2016.[30] The Commission also received questionnaire responses from 100 foreign producers/exporters of CSPV products.[31]

(…Continued)
Enphase Energy, Inc. (U.S. producer of solar microinverters); First Solar (former producer of CSPV products, thin film producer, project developer, engineering, procurement, construction, operation, and management services provider); Georgia Chamber of Commerce; Gigawatt (developer, distributor, installer); Henry Hielsmair (consultant); Heritage Foundation (non-profit research institution); Hunter Humphrey (solar developer); Inovateus Solar (project developer); Mounting System Manufacturers; National Electrical Contractors Association; National Grid (energy provider); Onyx Solar Energy (developer, manufacturer of architectural photovoltaic glass); PG&E Corp. and Edison International (utilities); PT Sky Energy Indonesia (foreign producer/exporter from Indonesia); R Street (think tank); RECOM AG (module manufacturer in Europe, power distributor); Dan Reicher; Seminole Financial Services; Sigora Solar (designer and installer); SKC (manufacturer of ethyl vinyl acetate sheets); Solar Energy Industries Association ("SEIA") (non-profit trade association of installers, project developers, contractors, and financers); Shanghai BYD Co. and BYD (Shanghai) Industrial Co. Ltd. (foreign producer); Steel Manufacturers Association; Sunfolio & One Planet Infrastructure (developer); SunTegra (developer and seller of smaller, low-wattage solar products); Technet (network of technology chief executive officers and senior executives); U.S. polysilicon industry (Hemlock Semiconductor Operations LLC, Wacker Polysilicon North America LLC, and REC Silicon Inc.); Western Agricultural Processors Association; and 8minutenergy Renewables ("8minutenergy") (project developer) (supported by non-party utility solar developers 174 Power Global Corporation, Cypress Creek Renewables, and Intersect Power).

[28] Interested parties include, among others, foreign manufacturers, producers, exporters, or U.S. importers of an article which is the subject of an investigation, foreign governments, U.S. manufacturers, producers, or wholesalers, and certified unions or recognized unions or groups of workers that are representative of a domestic industry. Certain associations are also interested parties, if a majority of their members is composed of interested parties. 19 C.F.R. § 206.17(a)(3)(iii). A majority of SEIA's members, however, is not composed of interested parties, so it is not an interested party. EDIS Doc. 612890.

[29] CR at I-4; PR at I-3.

[30] CR at I-5; PR at I-3. Respondents state that importer questionnaire data represent "the vast bulk of imports of subject merchandise into the U.S. market." SEIA's Posthearing Injury Brief, Appendix A at 107-108 (attributing at least a portion of the differential between importer questionnaire data and official import statistics to out-of-scope thin film).

[31] Foreign producer responses and the estimated coverage for each country are as follows: Brazil (1 firm accounting for less than *** percent of module production capacity); Canada (5 firms accounting for approximately 89 percent of 2016 module capacity); China (35 firms accounting for approximately 57 percent of CSPV cell production and 67 percent of module production in 2016); (Continued…)

II. Domestic Industry Producing a Product that is Like or Directly Competitive with the Imported Article

A. Like or Directly Competitive Domestic Product

In making determinations in global safeguard investigations, the Commission examines three statutory criteria. Specifically, to make an affirmative determination, the Commission must find –

> (1) an article is being imported into the United States in increased quantities;
> (2) the domestic industry producing an article that is like or directly competitive with the imported article is seriously injured or threatened with serious injury; and
> (3) the article is being imported in such increased quantities as to be a substantial cause of serious injury or threat of serious injury to the domestic industry.[32]

Before considering whether the three statutory criteria are satisfied, the Commission first defines the domestic industry. The statute defines the term "domestic industry" as "the producers as a whole of the like or directly competitive article or those producers whose collective production of the like or directly competitive article constitutes a major proportion of the total domestic production of such article."[33] The Commission defines the domestic industry

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(…Continued)
Germany (6 firms accounting for all known CSPV cell capacity and 51 percent of module production capacity in 2016); India (5 firms accounting for approximately *** percent of CSPV cell production capacity and *** percent of module production capacity); Indonesia (3 firms accounting for approximately *** percent of module production capacity); Japan (1 firm accounting for approximately *** percent of CSPV cell production and *** percent of module production in 2016); Korea (4 firms accounting for approximately *** percent of CSPV cell production capacity and *** percent of module production capacity in 2016); Malaysia (10 firms accounting for all known CSPV cell capacity and 93 percent of module capacity in 2015); Mexico (3 firms accounting for approximately *** percent of CSPV cell capacity and approximately *** percent of module capacity in 2016); Netherlands (1 firm accounting for all known production); Philippines (1 firm accounting for all known production); Singapore (1 firm accounting for all known production); Taiwan (15 firms accounting for approximately 82 percent of CSPV cell capacity and 31 percent of module capacity in 2016); Thailand (4 firms accounting for approximately 52 percent of CSPV cell production capacity in 2016 and 44 percent of module capacity in 2016); Vietnam (5 firms accounting for approximately *** percent of CSPV cell capacity and *** percent of module capacity in 2016). CR at I-5 to I-7; PR at I-3 to I-5. Respondents state that to the extent that data from any major CSPV exporting country were missing, the Commission's Prehearing Report provided adequate coverage of such countries using alternative data sources. SEIA's Posthearing Injury Brief, Appendix 1 at 107-108.

[32] *See* 19 U.S.C. § 2252(b)(1)(A).

[33] 19 U.S.C. § 2252(c)(6)(A)(1).

in terms of each like or directly competitive product and evaluates the impact of the pertinent imports on the facilities and workers producing each article.[34]

The legislative history distinguishes between products that are "like" and products that are "directly competitive" with the imported articles, explaining that "like" articles are those which are "substantially identical in inherent or intrinsic characteristics (*i.e.*, materials from which made, appearance, quality, texture, etc.)," whereas "directly competitive" articles are those which, "are substantially equivalent for commercial purposes, that is, are adapted to the same uses and are essentially interchangeable therefor."[35]

In determining what constitutes the like or directly competitive product, the Commission has considered a number of factors. The list of factors considered is not fixed, and the weight given to any one factor may vary from case to case depending upon the facts.[36] The list, which derives from Commission practice, has included the physical properties of the article, its customs treatment, its manufacturing process (where and how it is made, *e.g.*, in a separate facility, using certain machines and labor skills), the product's uses, and the marketing channels through which the product is sold.[37] The statute does not prescribe these specific factors nor does it limit the factors that the Commission may consider in making its determination. Thus, in conducting its analysis, the Commission (1) considers the list of factors, (2) evaluates the factors in terms of the facts in the investigation, and (3) looks for clear dividing lines between products, disregarding minor variations.[38]

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[34] *See, e.g.*, *Steel*, Inv. No. 201-TA-73, USITC Pub. 3479 at 29 n.25 (Dec. 2001); *Extruded Rubber Thread*, Inv. No. 201-TA-72, USITC Pub. 3375 at I-8 (Dec. 2000); *Crabmeat from Swimming Crabs*, Inv. No. 201-TA-71, USITC Pub. 3349 at I-8 to I-9 (Aug. 2000); *Circular Welded Carbon Quality Pipe*, Inv. No. 201-TA-70, USITC Pub. 3261 at I-12 to I-13 (Dec. 1999); *Certain Steel Wire Rod*, Inv. No. 201-TA-69, USITC Pub. 3207 at I-10, I-36 (Jul. 1997).

[35] H.R. Rep. No. 571, 93rd Cong., 1st Sess. 45 (1973); Senate Finance Committee, Report on Trade Reform Act of 1974 H.R. 10710, S. Rep. No. 1298, 93rd Cong., 2d Sess. at 121-22 (1974). *See, e.g.*, *Mushrooms*, Inv. No. 201-TA-43, USITC Pub. 1089 at 8, 11-12 (Aug. 1980) ("the intent of the drafting committees was that 'like' has to do with the physical identity of the articles themselves, while 'directly competitive' relates more to the notion of commercial interchangeableness"); *see also United Shoe Workers of Am. v. Bedell*, 506 F.2d 174, 185-86, 190-91 (D.C. Cir. 1974) (discussing meaning of "like" and "directly competitive" in the context of a request for adjustment assistance under the Trade Expansion Act).

[36] *See, e.g.*, *Certain Steel Wire Rod*, Inv. No. 201-TA-69, USITC Pub. 3207 at I-8 (Jul. 1999); *Lamb Meat*, Inv. No. 201-TA-68, USITC Pub. 3176 at I-10 (Apr. 1999); *Wheat Gluten*, Inv. No. 201-TA-67, USITC Pub. 3088 at I-9 (Mar. 1998).

[37] *See, e.g.*, *Extruded Rubber Thread*, Inv. No. 201-TA-72, USITC Pub. 3375 at I-5 to I-6 (Dec. 2000); *Circular Welded Carbon Quality Line Pipe*, Inv. No. 201-TA-70, USITC Pub. 3261 at I-10 (Dec. 1999); *Apple Juice*, Inv. No. 201-TA-69, USITC Pub. 1861 at 3-10 (June 1986); *Fresh Winter Tomatoes*, Inv. No. 201-TA-64 (Provisional Relief Phase), USITC Pub. 2881 at I-7 (Apr. 1995) (Views of Watson, Crawford, and Bragg); *Broom Corn Brooms*, Inv. No. 302-NAFTA-1 (Provisional Relief Phase), USITC Pub. 2963 at I-14 (May 1996).

[38] *See, e.g.*, *Stainless Steel Table Flatware*, Inv. No. 201-TA-49, USITC Pub. 1536 at 3-4 (June 1984).

The notice of institution described the imported articles under investigation as follows: CSPV cells, whether or not partially or fully assembled into other products, including, but not limited to modules, laminates, panels, and building-integrated materials. The investigation covers crystalline silicon photovoltaic cells of a thickness equal to or greater than 20 micrometers, having a p/n junction (or variant thereof) formed by any means, whether or not the cell 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.

Included in the scope of the investigation are photovoltaic cells that contain crystalline silicon in addition to other photovoltaic materials. This incudes, but is not limited to passivated emitter rear contact ("PERC") cells, heterojunction with intrinsic thin-layer ("HIT") cells, and other so-called "hybrid" cells.

Articles under consideration also may be described at the time of importation as components for final finished products that are assembled after after importation, including, but not limited to, modules, laminates, panels, and panels, and building-integrated materials.[39]

[39] CSPV cells, whether or not partially or fully assembled into other products, are excluded from the scope of the investigation if the CSPV cells were manufactured in the United States. Also excluded from the investigation are thin film photovoltaic products produced from amorphous silicon ("a-Si"), cadmium telluride ("CdTe"), or copper indium gallium selenide ("CIGS"). Also excluded from the scope of the investigation are crystalline silicon photovoltaic cells, not exceeding 10,000 mm^2 in surface area, that are permanently integrated into a consumer good whose function is other than power generation and that consumes the electricity generated by the integrated crystalline silicon photovoltaic cell. Where more than one cell is permanently integrated into a consumer good, the surface area for purposes of this exclusion shall be the total combined surface area of all cells that are integrated into the consumer good. 82 Fed. Reg. 25332 (June 1, 2017). The Commission noted that for Customs purposes, the CSPV cells covered by the investigation are provided for under Harmonized Tariff Schedule of the United States ("HTSUS") subheading 8541.40.60. Within that 8-digit subheading, CSPV cells that are assembled into modules or panels are imported under HTSUS statistical reporting number 8541.40.6020, while CSPV cells that are not assembled into modules and are presented separately are imported under statistical reporting number 8541.40.6030. Inverters or batteries with CSPV cells attached are provided for under HTSUS subheadings 8501.61.00 and 8507.20.80, respectively. In addition, CSPV cells covered by the investigation may also be classifiable as DC generators of subheading 8501.31.80, when such generators are imported with CSPV cells attached. While HTSUS provisions are provided for convenience, the written scope is dispositive. *Id*.

The investigation's scope covers the non-cell portion of a finished CSPV module (such as the aluminum frame), assuming that the CSPV cells are covered.[40]

We find that domestically manufactured CSPV cells, whether or not partially or fully assembled into other products, are like imported CSPV cells, whether or not partially or fully assembled into other products. Specifically, domestically produced CSPV cells are "like" the imported CSPV cells and domestically produced CSPV modules are "like" imported CSPV modules within the scope of the investigation.

During the POI, both U.S. producers and importers supplied a wide variety of overlapping CSPV products to the U.S. market, including mono- and multicrystalline products, passivated emitter rear contact ("PERC") products, heterojunction with intrinsic thin-layer ("HIT") products, and hybrid products.[41] These imported and domestic CSPV products were available in similar forms, including cells, laminates, and modules (also called panels), with most in the form of modules.[42] Imported and U.S.-manufactured CSPV products were sold in a range of wattages and conversion efficiencies, and modules were sold in 60-cell and 72-cell forms.[43] Imported and U.S.-manufactured CSPV products also were sold in similar channels of distribution to overlapping segments of the market, primarily for use as part of solar power systems that convert sunlight into electricity.[44] The foreign and U.S. producers utilized similar manufacturing facilities and processes to manufacture CSPV products.[45] Additionally, most U.S. producers, importers, and purchasers reported that U.S.-produced CSPV products were interchangeable with imported CSPV products.[46] For all of these reasons, we find that domestically produced CSPV products are "like" the imported CSPV products.

We further find a single domestic product consisting of all forms of CSPV cells, whether or not partially or fully assembled into other products. The vast majority of imports and domestic production involved CSPV cells or CSPV modules.[47] Although CSPV modules are not "like" CSPV cells, the facts in this investigation indicate that they are "directly competitive"

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[40] According to petitioners, since the scope does not contain an explicit exclusion for the non-cell portions of the module (such as aluminum frames), they are covered by the scope. Petitioners explain that the overwhelming majority of CSPV cells are imported as permanently integrated parts of CSPV modules, which cannot be removed from the modules; they argue that the non-cell portions of the module are integral parts of the module without which it would not function. Moreover, they argue, separating the value of the components from that of the cells for remedy assessment purposes would be extremely difficult and would give rise to serious enforcement issues. SolarWorld's Posthearing Injury Brief at Exhibit 1, section XV at 89-90; Suniva's Posthearing Injury Brief at Exhibit 9 at Question 10. Respondents agree. *See, e.g.*, SunPower's Posthearing Injury Brief at 3 at n.2; SEIA's Posthearing Injury Brief at Appendix A at 14-15.

[41] CR/PR at Table II-5 (imported technologies), Table III-6 (U.S.-manufactured technologies).

[42] CR/PR at Table II-4 (imported forms), Table III-11 (U.S.-manufactured forms).

[43] CR/PR at Table V-11; CR at I-19 to I-21; PR at I-14.

[44] CR/PR at Table I-1; CR at I-15; PR at I-11.

[45] CR at I-24 to I-32; PR at I-18 to I-24.

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

[47] CR/PR at Table II-4 (imported forms), Table III-11 (U.S.-manufactured forms).

within the meaning of the safeguard statute and that there are no clear lines differentiating them.[48] As indicated above, the imported articles are provided for in subheading 8541.40.60 (statistical reporting numbers 8541.40.6020 ("solar cells assembled into modules or made up into panels") and 8541.40.6030 ("solar cells, other")) of the HTSUS.[49] Since CSPV cells are the basic element of a CSPV module, both cells and modules share the same primary physical

[48] In the antidumping and countervailing duty investigations conducted previously, the Commission defined a single domestic like product corresponding to the scope that included CSPV cells and CSPV modules. *Crystalline Silicon Photovoltaic Cells and Modules from China*, Inv. Nos. 701-TA-481 and 731-TA-1190 (Final), USITC Pub. 4360 at 4-12 (Nov. 2012) ("*CSPV I*"); *Crystalline Silicon Photovoltaic Products from China and Taiwan*, Inv. Nos. 701-TA-511 and 731-TA-1246 to 1247 (Final), USITC Pub. 4519 at 8-15 (Feb. 2015) ("*CSPV II*"). The Commission's domestic like product determinations in those antidumping and countervailing duty investigations are not dispositive or binding on the determination of the like or directly competitive product in this safeguard investigation for several reasons. *See, e.g.*, *Steel*, Inv. 201-TA-75, USITC Pub. 3479 at 27-32 (Dec. 2001); *Fresh Tomatoes and Bell Peppers*, Inv. No. 201-TA-66, USITC Pub. 2985 at I-7 (Aug. 1996). For example, the two statutory schemes have different purposes, with antidumping and countervailing duty investigations narrowly aimed at remedying unfairly traded imports and global safeguard investigations preventing or remedying serious injury to domestic productive resources from all imports. *Steel*, Inv. No. 201-TA-075, USITC Pub. 3479 at 30 (quoting *Stainless Steel and Alloy Tool Steel*, 201-TA-048, USITC Pub. 1377 at 16 n.21 (May 1983)). Global safeguard investigations are concerned with serious injury "to the productive resources (*e.g.*, employees, physical facilities, and capital) employed in the divisions or plants in which the article in question is produced." H.R. Rep. 93-71 at 46 (1973); *see also* H.R. Rep. 100-576 at 661-62 (1988); S. Rep. 100-71 at 46-47 (1987); H.R. Rep. 100-40 at 86-96 (1987). The statutory schemes define "domestic industry" differently. *Compare* 19 U.S.C. § 2252(c)(6)(A)(1) ("domestic producers as a whole of the like or directly competitive article …") *with* 19 U.S.C. §§ 1677(4)(A), 1677(10) (producers as a whole of a domestic like product, which is defined as "a product which is like, or in the absence of like, most similar in characteristics and uses" with the imports subject to investigation). Additionally, the scopes of the respective antidumping and countervailing duty and safeguard investigations may be broader or narrower, and/or the factual records differ due to the global versus country-specific nature of the investigations, the time periods involved, and the particular issues that parties choose to dispute in a given proceeding. Furthermore, the Commission considers different factors to analyze domestic like product questions in antidumping and countervailing duty investigations than the factors discussed above for global safeguard investigations. *See, e.g.*, *Nippon Steel Corp. v. United States*, 19 CIT 450, 455 n.4 (Apr. 3, 1995) (physical characteristics and uses; interchangeability; channels of distribution; customer and producer perceptions; common manufacturing facilities, processes, and employees; and where appropriate price); *CSPV II*, USITC Pub. 4519 at 13-15 (whether the upstream product is dedicated for use in the downstream product; whether they are sold in separate markets; differences in physical characteristics and functions; differences in value; extent of processes used to transform upstream into downstream articles).

[49] The articles also may be imported as parts or subassemblies of goods provided for in subheadings 8501.31.80, 8501.61.00 and 8507.20.80. Inverters or batteries with CSPV cells attached are provided for under HTSUS subheadings 8501.61.00 and 8507.20.80, respectively. In addition, CSPV cells covered by the investigation may also be classifiable as DC generators of subheading 8501.31.80, when such generators are imported with CSPV cells attached. CR at I-52; PR at I-38.

properties.[50] The characteristics of CSPV cells that enable them to convert sunlight into electricity are not affected by the module assembly process but are an essential function of the module in CSPV solar systems; likewise, CSPV modules cannot serve their intended function of converting sunlight into electricity without the inclusion of CSPV cells.[51] The processes used to manufacture CSPV modules from CSPV cells are technologically sophisticated, more labor intensive than manufacturing CSPV cells,[52] and add value to the product, but they enhance rather than change the basic function of the CSPV cells, which is to convert sunlight into electricity.[53] Although a number of firms are independent module assemblers with no U.S. cell

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[50] CSPV cells use mono- or multicrystalline silicon cells to convert sunlight into electricity. CR at I-15; PR at I-11. These cells are strung together, sealed, laminated, and usually framed to make CSPV modules (also known as solar panels). CR at I-15 to I-18; PR at I-11 to I-13.

[51] CR at I-15 to I-21; PR at I-11 to I-16.

[52] There are some differences in how the two main types of cells (monocrystalline and multicrystalline silicon) are manufactured, although both are manufactured from silicon that is refined typically using the Siemens method or fluidized bed reactor technology and then manufactured into a wafer. CR at I-19, I-25 to I-26; PR at I-14, I-19. To produce a monocrystalline wafer, manufacturers melt polysilicon rocks and a small amount of boron in a 2,500-degree Czochralski furnace, lower a rotating seed crystal into the furnace, and slowly raise the crystal out of the melt while growing a single long crystal. After cooling the crystal, manufacturers cut off its top and tail, cut the crystal into equal-length ingots, square the ingot (leaving rounded corners), and slice the ingots into wafers (typically using a diamond wire saw). CR at I-26 to I-27; PR at I-19 to I-21. To produce multicrystalline wafers, manufacturers load polysilicon into a crucible, load the crucible into a directional solidification systems furnace, and cast the polysilicon into ingots. They cut the ingots into blocks and slice them into square wafers using a wire saw. CR at I-28; PR at I-21. Manufacturers manufacture CSPV cells using a capital-intensive manufacturing process that requires a skilled workforce and generally involves at least seven major steps: cleaning and texturing the wafers to reduce sunlight reflection and increase light absorption; diffusing phosphorus into a thin layer of the wafer's surface at a high heat to give the wafer a negative potential electrical orientation; isolating a thin layer of silicon from the edge of the cell to separate the positive and negative layers; coating the cells with a silicon nitride antireflective coating to increase sunlight absorption; using silver paste to print thin metal fingers in strips onto the cell that will connect to the rest of the module via busbars or/and printing a thin layer (typically aluminum) on the other side of the cell; co-firing the cells in a high temperature furnace to imbed the silver paste in the surface of the silicon layer and forma reliable electrical contact; and testing and sorting the cells according to their characteristics and efficiency. CR at I-28 to I-30; PR at I-21 to I-23.

[53] To assemble CSPV cells into modules, manufacturers use automated and sophisticated yet relatively more labor-intensive processes in which they assemble into a laminate soldered strings of CSPV cells on a rectangular matrix sealed with ethyl vinyl acetate and a back sheet (commonly a plastic film composite or glass for some applications such as bifacial modules) and then attach a frame and junction box. The essential characteristic of CSPV cells to convert sunlight into electricity is enhanced when multiple CSPV cells are strung together, laminated, framed, and connected to an inverter as CSPV modules. A CSPV module generates more power than an individual CSPV cell used to make the module, the junction box permits modules to be connected to an inverter that converts the systems' direct current into alternating current for additional transmission, and lamination permits the CSPV cells to withstand the elements in order to convert sunlight into electricity over a longer useful life. The (Continued…)

manufacturing operations,[54] most production of CSPV cells and CSPV modules during the POI was performed in the United States by integrated producers that manufacture and internally consume CSPV cells for their CSPV module operations.[55] CSPV cells are dedicated for use in the production of CSPV modules.[56] Only a fraction of U.S.-manufactured CSPV cells are sold in the commercial market, and even then, CSPV cells are used to manufacture CSPV modules.[57] Both CSPV cells and CSPV modules are integrated into photovoltaic solar systems that convert sunlight into electricity for use in residential, commercial, and utility applications.[58] Finally, CSPV cells represent a substantial portion of the total cost of finished CSPV modules,[59] and prices of cells generally correlated with module prices during the POI.[60] For these reasons, we define a single domestic product corresponding to the imported products within the scope of the investigation that includes CSPV cells and CSPV modules.[61]

B. Domestic Industry

The term "domestic industry" is defined in section 202(c)(6)(A)(i) of the Trade Act to mean

> with respect to an article, the domestic producers as whole of the like or directly competitive article or those producers whose collective production of the like or

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(…Continued)
assembly process does not change the essential characteristics of the CSPV cells. CR at I-16 to I-18, I-31 to I-32; PR at I-13, I-24.

[54] The *** domestic CSPV cell producers during the POI were SolarWorld and Suniva, which together accounted for the vast majority (*** percent) of U.S. CSPV cell production by kW in 2016. *** were the largest U.S. assemblers of CSPV modules, accounting for *** percent (***), *** percent (***), and *** percent (***) of U.S. module assembly during the POI. CR at III-22, III-23; PR at III-11; CR/PR at Table III-5, Table III-7, Table III-8.

[55] CR at I-37 to I-38, III-27, III-31; PR at I-28, III-15, III-17; CR/PR at Table I-1, Table II-4, Table III-9, Table III-11.

[56] CSPV cells are sometimes used to make non-standard size modules for the very small building-integrated photovoltaic market. Building integrated photovoltaic products, such as solar shingles or solar windows, incorporate solar cells (often thin film and sometimes CSPV cells); they are integrated into the building envelope, such as the façade or roof, taking over the function of roof shingles or glass while also producing electricity. CR at I-21; PR at I-16; CR/PR at Table II-4 (imported forms), Table III-11 (U.S.-manufactured forms) (questionnaire respondents reported *** U.S. imports and *** domestic production of building integrated products).

[57] CR at I-37 to I-38, III-27, III-31; PR at I-28, III-15, III-17; CR/PR at Table I-1, Table II-4, Table III-9, Table III-11.

[58] CR at I-15, I-17, I-22 to I-23, I-33 to I-37; PR at I-11, I-12, I-17, I-28.

[59] CR at III-50; PR at III-26; CR/PR at Table III-22.

[60] CR/PR at Figure V-13.

[61] This is the definition advocated by petitioners. Moreover, in their comments on the draft questionnaires for this investigation, no party asked the Commission to collect data concerning any possible alternative definition. CR at I-14 to I-15 & n.48; PR at I-10 & n.48.

> directly competitive article constitutes a major proportion of the total domestic production of such article.[62]

This definition was added by the Uruguay Round Agreements Act ("URAA") and codified existing Commission practice.[63]

The Commission has broad discretion to determine what constitutes the domestic industry producing a like or directly competitive article in global safeguard investigations, generally adhering to the principal that "{t}he industry should be defined in a manner which allows for a meaningful analysis of the statutory criteria in light of the legislative history of section 201."[64] The concept of industry employed in section 201 of the Trade Act is not the same as that used in the antidumping and countervailing duty provisions of Title VII.[65] As the Commission has stated,

> Title VII is narrowly aimed at remedying the specific advantages imports may be receiving from unfair trade practices. The purpose of section 201 either is to prevent or remedy serious injury to domestic productive resources from all imports. In light of the purpose of section 201 and in contrast to Title VII, the sharing of productive processes and facilities is a fundamental concern in defining the scope of the domestic industry under section 201.[66]

The legislative history to the Trade Act indicates that the concern in a safeguard investigation is "the question of serious injury to the productive resources (*e.g.*, employees, physical facilities, and capital) employed in the divisions or plants in which the article in question is produced."[67]

Consistent with our definition of the like or directly competitive domestic product, we define the domestic industry as all U.S. producers of CSPV cells, whether or not partially or fully

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[62] 19 U.S.C. § 2252(c)(6)(A)(i).

[63] Uruguay Round Agreements Act Statement of Administrative Action ("URAA SAA"), H. Doc. 103-316, vol. I (103rd Cong. 2nd Sess.) at 961.

[64] *Steel*, Inv. No. 201-TA-075, USITC Pub. 3479 at 30 (quoting *Stainless Steel and Alloy Tool Steel*, 201-TA-048, USITC Pub. 1377 at 12 (May 1983)).

[65] The statutory definitions of "domestic industry" are different. *Compare* 19 U.S.C. § 2252(c)(6)(A)(1) (defining the term for purposes of global safeguard investigations as "domestic producers as a whole of the like or directly competitive article …") *with* 19 U.S.C. §§ 1677(4)(A), 1677(10) (defining "domestic industry" in antidumping and countervailing duty investigations as "the producers as a whole of a domestic like product …," and in turn is defining "domestic like product" as "a product which is like, or in the absence of like, most similar in characteristics and uses" with the imports subject to investigation).

[66] *Steel*, Inv. No. 201-TA-075, USITC Pub. 3479 at 30 (quoting *Stainless Steel and Alloy Tool Steel*, 201-TA-048, USITC Pub. 1377 at 16 n.21 (May 1983)).

[67] H.R. Rep. 93-71 at 46 (1973); *see also* H.R. Rep. 100-576 at 661-62 (1988); S. Rep. 100-71 at 46-47 (1987); H.R. Rep. 100-40 at 86-96 (1987).

assembled into other products. *** of the responding firms were integrated U.S. producers of CSPV cells and CSPV modules during the POI, and a number of firms were independent module producers without integrated cell-producing operations.[68] Many of these firms, both integrated producers and independent module producers, imported CSPV cells or laminates that they then consumed in their module assembly operations, and some also imported finished CSPV modules.[69]

Petitioners advocate including independent module producers in the domestic industry, even when those firms rely entirely on imported CSPV cells for their U.S. module operations, and respondents do not disagree.[70] Had we determined not to include in the domestic industry independent module producers that relied on only imported and not U.S.-manufactured CSPV cells, the remaining producers would still account for a major proportion of total domestic production of CSPV products.[71] Nevertheless, exclusion of such independent module producers would arguably run counter to the legislative intent of considering serious injury to the productive resources in which the article is produced in the United States.[72] Such an approach also would ignore the fact that *** of the *** responding integrated U.S. producers relied on a mixture of imported and U.S.-manufactured cells for their own module operations,[73] and there was inadequate U.S. CSPV cell capacity or production to meet U.S. CSPV module capacity or production during the POI.[74] Consequently, for our analysis in this investigation, we define the domestic industry as all U.S. producers of CSPV cells (whether or not partially or fully assembled into other products), including integrated producers of CSPV cells and modules and independent module producers.[75]

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[68] CR at III-22, III-23; PR at III-11; CR/PR at Table III-5, Table III-7, Table III-8. As indicated earlier, most of the CSPV products manufactured in the United States consisted of CSPV cells or CSPV modules. Modules accounted for *** to *** percent of U.S. producers' U.S. shipments during the POI, compared to *** to *** percent for cells, *** to *** percent for laminates (mostly in 2012), and *** and *** percent for integrated building materials and off-grid portable consumer goods, respectively. CR/PR at Table III-11.

[69] CR/PR at Table II-7, Table III-8; CR at II-20; PR at II-17. A module is a joined group of CSPV cells, regardless of the number of cells or the shape of the joined group, that are capable of generating electricity. The term "module" is frequently used interchangeably with the term "panel" and for the remainder of our analysis also includes a CSPV cell that has undergone any processing, assembly, or interconnection (including, but not limited to, assembly into a laminate).

[70] Injury Hearing Tr. at 315 (Nicely) ("it doesn't matter one way or the other").

[71] *Compare* CR/PR at Table II-7 *with* CR/PR at Table III-4 and Table III-7.

[72] H.R. Rep. 93-71 at 46 (1973); *see also* H.R. Rep. 100-576 at 661-62 (1988); S. Rep. 100-71 at 46-47 (1987); H.R. Rep. 100-40 at 86-96 (1987).

[73] CR/PR at Table II-7 (imports by domestic producers), Table III-8 (domestic producers' module assembly by source of CSPV cell).

[74] *Compare* CR/PR at Table III-4 (domestic industry's production, capacity, and capacity utilization for CSPV cells) *with* CR/PR at Table C-1(b) (apparent U.S. consumption of CSPV products during the POI).

[75] As a result, we rely primarily on data in CR/PR at Table C-1(b) that include the productive resources of all U.S. producers for purposes of capacity, capacity utilization, production, and (Continued…)

III. Increased Imports

After defining the domestic industry that manufactures a product that is like or directly competitive with the imported article, the Commission next examines whether imports are entering in "increased quantities." Under section 202 of the Trade Act, imports have increased when the increase is "either actual or relative to domestic production."[76] Consistent with its usual past practice,[77] the Commission in this safeguard investigation considered import trends over the most recent five-year period as the framework for its analysis, but it may consider longer or shorter periods and may focus on the most recent period, as it deems appropriate.[78]

As a threshold matter, this investigation includes several possible data sources for measuring imports and any increase in imports, including (1) official import statistics from the Commission's DataWeb;[79] (2) questionnaire responses from importers that reported U.S. imports on the basis of the manufacturing location of the CSPV cell; and (3) alternate questionnaire data on U.S. imports from Canada and Mexico that are based on the module

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(…Continued)
employment indicators and CR/PR at Table III-2 and Table III-3 for related closures/openings. The domestic industry's U.S. shipments, by quantity, and its U.S. shipments as a share of apparent U.S. consumption include (1) modules that contain U.S.-manufactured CSPV cells, (2) U.S.-manufactured CSPV cells that are not otherwise reported by module assemblers, and (3) re-imports of U.S.-origin CSPV cells; this quantity measure excludes any CSPV modules manufactured in the United States from imported CSPV cells, as those are reported for purposes of apparent U.S. consumption as imports. The domestic industry's U.S. shipments, by value, and its U.S. shipments as a share of apparent U.S. consumption, by value, include the incremental value added in the United States to assemble imported CSPV cells into modules. CR at III-33; PR at III-17. The Commission did not ask questionnaire respondents to allocate financial data on their module operations based on the share of production assembled from U.S.-manufactured cells, because a breakout of financial information at this level of detail is not consistent with the manner in which most U.S. producers track their financial results and requesting the data on this basis would yield unreliable information. Moreover, the Commission's questionnaire sought supplemental information on the firms' reported raw material costs that would reflect whether their cells were internally produced or purchased from related or unrelated firms. This allowed the Commission to evaluate the financial data using a consistent allocation methodology for all U.S. producers. CR at III-50; PR at III-26.

[76] 19 U.S.C. § 2252(b)(1)(A) (requiring the Commission to determine whether an article is being imported into the United States in such increased quantities as to be a substantial cause of serious injury, or the threat thereof); *see also* 19 U.S.C. § 2252(c)(1)(C) (in turn requiring with respect to substantial cause, that the Commission take into account an increase in imports (either actual or relative to domestic production)).

[77] *See, e.g.*, *Steel*, Inv. No. 201-TA-73, USITC Pub. 3479 at 32-33 (Dec. 2001); *Extruded Rubber Thread*, Inv. No. 201-TA-72, USITC Pub. 3375 at I-8 (Dec. 2000).

[78] The POI in the instant global safeguard investigation (January 2012 to December 2016) overlaps with most of the time period in the *CSPV II* antidumping and countervailing duty investigations (January 2011 to June 2014) and six months of the time period in the *CSPV I* antidumping and countervailing duty investigations (January 2009 to June 2012).

[79] *See, e.g.*, CR/PR at Table C-7.

assembly location and adjusted U.S. importer questionnaire data on imports from all other sources that are based on the manufacturing location of the CSPV cell. In this investigation, we relied primarily on the third source.

Official import statistics in CR/PR at Table C-7 may be overstated to the extent that they include products that are outside the scope of this investigation, such as thin film, and they may be over- or understated to the extent that they do not necessarily define country of origin consistently with the arguments presented in this case.[80] Table C-7 does not present official import statistics by quantity as these data are collected on a less reliable basis of "units" (a term that may encompass, *e.g.*, a single cell of a given wattage, a single cell of a different wattage, a 60-cell module, and a 72-cell module). For this reason, the Commission's questionnaires instead sought consistent quantity data in terms of kilowatts ("kW").[81]

The Commission's importer questionnaires in this investigation primarily collected U.S. import data based on the location where the CSPV cell was manufactured, even if the CSPV cell was assembled into a CSPV module in a different country.[82] The Commission also collected separate data on U.S. imports of CSPV modules that were assembled in Canada and Mexico, regardless of where the CSPV cells were manufactured, consistent with arguments presented by certain respondents.[83] Under their proposal, the country of origin for U.S. imports of CSPV modules assembled in NAFTA countries would be the location where the CSPV module was assembled, regardless of where the CSPV cell was manufactured, and information on all other U.S. imports would be sourced from importer questionnaire data based on the CSPV cell manufacturing location, except that any CSPV cells used to assemble U.S. imports of modules from NAFTA countries would be subtracted from the U.S. import data for the countries where the CSPV cells were manufactured to avoid double counting.[84]

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[80] CR at II-1 at n.1; PR at II-1 at n.1. Official import statistics presented in CR/PR at Table C-7 on imports under HTSUS statistical reporting numbers 8541.40.6020 ("solar cells assembled into modules or made up into panels") and 8541.40.6030 ("solar cells, other") also may be understated, if imports enter under a different provision as parts or subassemblies of goods provided for in subheadings 8501.31.80, 8501.61.00 and 8507.20.80. *See* CR at I-52; PR at I-38.

[81] The electricity power output of CSPV cells and modules is measured in terms of wattage. A kW equals 1,000 watts, whereas one megawatt ("MW") equals 1,000 kW, and a gigawatt ("GW") equals 1,000 MW. CR at I-15, I-21; PR at I-11, I-14.

[82] *See, e.g.*, CR/PR at Table II-1, Table IV-1.

[83] *See, e.g.*, Government of Canada's Prehearing Injury Brief at 7-13; Government of Canada's Posthearing Injury Brief at 7-8; Canadian Respondents' Prehearing Injury Brief at 5, 27-35; Canadian Respondents' Posthearing Injury Brief at 12-15; Sunpower's Posthearing Injury Brief at 3-8, Exhibits 1-4; SunPower's Prehearing Injury Brief at 10-13, Exhibit 3; Government of Mexico's Prehearing Injury Brief at 4-5 (urging the Commission to consider the arguments presented by exporters from Mexico); Injury Hearing Tr. at 66-67. In addition, the Commission collected separate data on U.S. imports of CSPV modules that were assembled in China, regardless of where the CSPV cells were manufactured. CR/PR at Table II-3.

[84] As Canadian respondents explain, a headquarters ruling by U.S. Customs and Border Protection confirms that, under NAFTA rules of origin and marking rules, U.S. imports of finished (Continued…)

Although petitioners did not overtly adopt respondents' approach to country of origin for U.S. imports of modules assembled in NAFTA countries, they did not identify any flaws in the legal reasoning underpinning Canadian respondents' arguments.[85] We find the Canadian respondents' arguments persuasive, and accordingly the import data we primarily relied on for our analysis uses the country-of-origin methodology that they proposed (*i.e.*, the NAFTA rules of origin for imports from Canada and Mexico and for imports from all other countries, the country where the cell was manufactured, as adjusted to reflect cells assembled into modules in a NAFTA country).[86]

Based on these data, we find that the statutory criterion of increased imports is met. Imports of CSPV products increased by 492.4 percent between 2012 and 2016.[87] They increased each year, from 2.1 million kW in 2012 to 3.1 million kW in 2013, 4.6 million kW in 2014, 8.4 million kW in 2015, and 12.8 million kW in 2016.[88] Imports as a ratio to domestic production also increased overall and in each year, from 733.9 percent in 2012 to 948.4 percent in 2013, 1,141.0 percent in 2014, 1,593.5 percent in 2015, and 2,276.2 percent in 2016.[89]

(…Continued)
CSPV modules assembled in a NAFTA country, even from CSPV cells originating in non-NAFTA countries, qualify as products from the NAFTA country, where the goods originate under General Note 12(b) and are accompanied by a signed and completed NAFTA certificate of origin, because the final assembly operations in the NAFTA country involve more than minor processing and require substantial investment and value added. *See, e.g.*, Canadian Respondents' Posthearing Injury Brief at 12-15; Canadian Respondents' Prehearing Injury Brief 5, 27-35 (citing HQ H266527 (Apr. 11, 2016); HTSUS, General Note 12 (NAFTA rules of origin); 19 C.F.R. § 102 (NAFTA marking rules); and 19 C.F.R. § 102.19 (NAFTA preference override rule)), Exhibit G (HQ H266527 (Apr. 11, 2016)). Moreover, Canadian respondents contend that the provision of NAFTA Article 201 defining "goods of a Party" as including "originating goods of that Party" applies to safeguard measures because NAFTA Article 309.2 creates an exception for antidumping duty and countervailing duty measures (related to enforcement of antidumping and countervailing duty orders and undertakings), but no such exception exists for safeguard measures. Canadian Respondents' Prehearing Injury Brief at 27-35, Exhibit I; Government of Canada's Prehearing Injury Brief at 12.

[85] *See, e.g.*, SolarWorld's Prehearing Injury Brief at 57-58 ("… the Commission properly included alternative data, based on module origin …"); Petition at 19 n.61 (Apr. 26, 2017).

[86] *See, e.g.*, CR/PR at Table II-2 , Table IV-3, Table C-1b (implementing the methodology and reducing U.S. imports from non-NAFTA sources to reflect reported information indicating that the CSPV cells were assembled into modules in Canada or Mexico). Because this methodology changes only the country of origin of imports, there is little difference in the total volume of imports from all countries regardless of the methodology used. *Compare* CR/PR Table C-1a and Table C-1b; CR at Table II-2 at Note, Table IV-3 at Note; CR at IV-6; PR at IV-4.

[87] CR/PR at Table II-2, Table IV-3, Table C-1b.

[88] CR/PR at Table II-2, Table IV-3, Table C-1b. The value of imports also increased over this period and from one year to the next. Imports increased from $1.9 billion in 2012 to $2.2 billion in 2013, $3.0 billion in 2014, $5.0 billion in 2015, and $7.1 billion in 2016. CR/PR at Table II-2, Table IV-3, Table C-1b.

[89] CR/PR at Table II-2, Table IV-3, Table C-1b.

Consequently, we find that imports increased both actually and relative to domestic production.

IV. Substantial Cause of Serious Injury or Threat of Serious Injury

A. Legal Standards and Statutory Requirements

The second of the three statutory criteria concerns whether the domestic industry is seriously injured or threatened with serious injury. Section 202(c)(6)(C) of the Trade Act defines the term "serious injury" as "a significant overall impairment in the position of a domestic industry," and section 202(c)(6)(D) defines the term "threat of serious injury" as "serious injury that is clearly imminent."[90]

In determining whether serious injury or threat of serious injury exists, the Commission considers "all economic factors which it considers relevant, including (but not limited to)" the following enumerated factors –

> (A) with respect to serious injury –
> (i) the significant idling of productive facilities in the domestic industry,[91]
> (ii) the inability of a significant number of firms to carry out domestic production operations at a reasonable level of profit, and
> (iii) significant unemployment or underemployment within the domestic industry … ;[92]
> (B) with respect to threat of serious injury –
> (i) a decline in sales or market share, a higher and growing inventory (whether maintained by domestic producers, importers, wholesalers, or retailers), and a downward trend in production, profits, wages, productivity, or employment (or increasing underemployment) in the domestic industry,
> (ii) the extent to which firms in the domestic industry are unable to generate adequate capital to finance the modernization of their domestic plants and equipment, or are unable to maintain existing levels of expenditures for research and development, and
> (iii) the extent to which the United States market is the focal point for the diversion of exports of the article concerned by reason of restraints on exports of such article to, or on imports of such article into, third country markets.[93]

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[90] 19 U.S.C. §§ 2252(c)(6)(C), 2252(c)(6)(D).

[91] The statute further provides that the term "significant idling of productive facilities" includes the closing of plants or the underutilization of production capacity. 19 U.S.C. § 2252(c)(3).

[92] 19 U.S.C. § 2252(c)(1)(A).

[93] 19 U.S.C. § 2252(c)(1)(B).

The presence or absence of any of these factors is not "necessarily dispositive" of whether increased imports are a substantial cause of serious injury, or threat of serious injury, to the industry.[94] As part of its analysis, the Commission must "consider the condition of the domestic industry over the course of the relevant business cycle."[95]

The third statutory criterion also requires a finding that the article is being imported in such increased quantities as to be a "substantial cause" of serious injury or threat of serious injury. Section 202(b)(1)(B) defines "substantial cause" as "a cause which is important and not less than any other cause."[96] Thus, the increased imports must be both an important cause of the serious injury or threat and a cause that is equal to or greater than any other cause.

In determining whether increased imports are a substantial cause of serious injury or threat of serious injury, the statute directs the Commission to take into account all economic factors that it finds relevant, including but not limited to – "… an increase in imports (either actual or relative to domestic production) and a decline in the proportion of the domestic market supplied by domestic producers."[97] The statute directs the Commission to consider "the condition of the domestic industry over the course of the relevant business cycle," but it provides that the Commission "may not aggregate the causes of declining demand associated with a recession or economic downturn in the United States economy into a single cause of serious injury or threat of injury."[98] The legislative history states that the provision is meant to clarify that import relief should be available during a recession or economic downturn.[99]

The statute also directs the Commission to "examine factors other than imports" that may be a cause of serious injury or threat to the domestic industry and include the results of its examination in its report.[100] Thus, the Commission is required to (1) examine factors other than increased imports and (2) make findings with respect to these other factors. The legislative history states that the purpose of this provision "is to assure that all factors injuring the domestic industry are identified."[101]

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[94] 19 U.S.C. § 2252(c)(3).

[95] 19 U.S.C. § 2252(c)(2)(A).

[96] 19 U.S.C. § 2252(b)(1)(B).

[97] 19 U.S.C. § 2252(c)(1)(C).

[98] 19 U.S.C. § 2252(c)(2)(A).

[99] Senate Finance Committee, Omnibus Trade and Competitiveness Act of 1987: Report on S. 490, Rept. 100-71, 100th Cong., 1st Sess. at 50 (1987).

[100] 19 U.S.C. § 2252(c)(2)(B).

[101] Senate Finance Committee, Omnibus Trade and Competitiveness Act of 1987: Report on S. 490, Rept. 100-71, 100th Cong., 1st Sess. at 50 (1987). The legislative history of the Trade Act includes examples of other causes "such as changes in technology or consumer tastes, domestic competition from substitute products, plant obsolescence, or poor management," which, if found to be more important causes of injury than increased imports, would require a negative determination. Senate Finance Committee, Trade Reform Act of 1974 Report on H.R. 10710, S. Rept. 1298, 93rd Cong., 2nd Sess. at 121 (1974).

B. Existing Antidumping and Countervailing Duty Orders

The United States imposed antidumping and countervailing duty orders on imports from China in December 2012 and February 2015 and an antidumping duty order on imports from Taiwan in February 2015.[102] Several past Commission global safeguard investigations have included articles covered by one or more antidumping or countervailing duty orders in the scope of the investigation, and the inclusion of such articles in the scope of existing orders, alone, did not dictate any particular outcome for the Commission's serious injury analysis.[103]

C. Conditions of Competition and the Business Cycle

The following conditions of competition inform our analysis of whether CSPV products are being imported into the United States in such increased quantities as to be a substantial cause of serious injury to the domestic industry producing an article like or directly competitive with the imported article.[104]

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[102] On October 19, 2011, SolarWorld filed antidumping and countervailing duty petitions regarding imports of CSPV cells and modules from China, and after the U.S. Department of Commerce and the Commission each reached affirmative determinations, the United States imposed orders on those imports effective December 7, 2012. *CSPV I*, USITC Pub. 4360; 77 Fed. Reg. 73017 (Dec. 7, 2012); 77 Fed. Reg. 73018 (Dec. 7, 2012). On December 31, 2013, SolarWorld filed countervailing and/or antidumping duty petitions regarding imports of certain crystalline silicon photovoltaic products from China and Taiwan, and after both agencies reached affirmative determinations, the United States imposed orders on those imports effective February 18, 2015. *CSPV II*, USITC Pub. 4519; 80 Fed. Reg. 8597 (Feb. 18, 2015); 80 Fed. Reg. 8596 (Feb. 18, 2015); 80 Fed. Reg. 8592 (Feb. 18, 2015). These orders collectively include imports of CSPV cells and modules from China, regardless of whether the cell or module originated in China (or both). In addition, the antidumping duty order on Taiwan covers imports of cells from Taiwan as well as imports of modules from Taiwan or any non-Chinese country that are assembled from cells originating in Taiwan.

[103] For example, the Commission's investigation in *Steel* included various types of carbon flat-rolled steel subject to existing orders. The Commission took the orders into account in its injury analysis and in fashioning its remedy proposal, including the fact that some of these measures already provided some degree of protection to the domestic industry. *Steel*, Inv. No. 201-TA-73, USITC Pub. 3479 at 364 n.59 (Dec. 2001); *Carbon and Certain Steel Alloy Products*, Inv. No. 201-TA-51, USITC Pub. 1553 at a-24 (Jul. 1984) (noting that antidumping and countervailing duty orders were already in effect on several of the products subject to the investigation and that other covered products were the subject of suspension agreements); *see also Nucor Corp. v. United States*, 318 F. Supp. 2d 1207, 1236 (Ct. Int'l Trade 2004), *aff'd*, 414 F.3d 1331 (Fed. Cir. 2005) and *Wheatland Tube Co. v. United States*, 495 F.3d 1355, 1363-67 (Fed. Cir. 2007) (recognizing in the context of antidumping and countervailing duty investigations that safeguard measures may be imposed on imports that are subject to antidumping or countervailing duty orders).

[104] We also take these conditions of competition into consideration in our analysis of imports from individual countries in section V below.

1. Demand Conditions

CSPV products are used in solar power systems that generate electricity from sunlight.[105] CSPV products account for a meaningful share of the cost of the end-use products in which they are used.[106] Demand for CSPV products is derived from the demand for solar electricity, which is influenced by factors such as cost competitiveness with traditional energy sources, environmental concerns, a desire for national energy independence, total energy consumption, and the availability of Federal, state, and local incentives.[107]

a. Conventional and Renewable Sources of Energy

Electricity providers using renewable energy sources[108] seek to achieve "grid parity" (the point at which the levelized cost of electricity ("LCOE") generated from renewable sources

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[105] CR at I-15; PR at I-11.

[106] CR at V-12 to V-16; PR at V-8 to V-10; CR/PR at Table V-2; CR/PR at Figures V-4 to V-6. In addition to the module cost, the price of an installed photovoltaic system includes non-module "balance of system" costs such as inverters, mounting hardware, labor, site assessment and design, permitting, financing, system installation, overhead, and profit margin. CR at I-33, V-13; PR at I-24 to I-25, V-8. For on-grid installations, the cost share of CSPV cells generally increases as the installation project's size increases, with questionnaire respondents reporting that CSPV cells accounted for 19 to 26 percent of the cost for residential systems, 18 to 27 percent for commercial installations, and 29 to 31 percent for utility systems. CR at V-12 to V-13; PR at V-8 to V-9; CR/PR at Table V-2. According to SEIA, the cost share of a photovoltaic module (includes thin film) ranged from 15 to 19 percent for residential systems, 26-32 percent for non-residential systems, and 36-49 percent for utility systems. CR at V-15 at n.30; PR at V-9 at n.30; CR/PR at Figure V-6. Moreover, these cost shares are far reduced from earlier in the POI, when the price of CSPV modules was higher.

[107] CR at V-10; PR at V-6. The majority of U.S. producers (8 of 10), importers (30 of 48), and purchasers (55 of 101) reported that the U.S. market for CSPV products was subject to business cycles, such as seasonally higher demand in warmer months and at calendar year end to finish projects to qualify for various incentive programs for tax accounting purposes. Most U.S. producers (6 of 10) and nearly half of responding importers (23 of 48) and purchasers (23 of 48) reported distinct conditions of competition for the U.S. CSPV market, with most identifying government incentive programs and changes in global supply and demand conditions. The majority of U.S. producers (6 of 9), importers (22 of 38), and purchasers (56 of 89) reported that there had been changes to the business cycle and conditions in the U.S. market since 2012, and they identified increased competition, market saturation, increased efficiency of CSPV cells, introduction and extension of various solar incentive programs (such as the Investment Tax Credit), lower interest rates, and declining global prices of CSPV cells and systems. CR at V-16 to V-17; PR at V-11.

[108] Renewable sources of solar energy include photovoltaic products (CSPV products and thin film) as well as non-photovoltaic products (solar water heat and concentrated solar power ("CSP")). Thin film uses a several micron thick layer of a photosensitive semiconductor material such as a-Si, CdTe, CIS, or CIGS to convert sunlight to electricity. CR at I-15 at n.53; PR at I-11 at n.53. Solar water heat uses sunlight to heat water, and CSP uses reflected sunlight to generate steam or a vapor that turns a turbine to generate electricity. CR at I-17 at n.57; PR at I-12 n.57. Other renewable energy sources include (Continued…)

equals the cost from the grid of electricity generated by conventional sources).[109] The LCOE varies by region, time of the day, and availability of other electricity sources,[110] and even the LCOE for a given energy source can vary widely.[111] During periods of non-peak electricity demand in the United States, only lowest-cost "baseload" generators (traditionally coal and nuclear plants) would be able to sell electricity to the grid, whereas during periods of peak electricity demand, even generators with somewhat higher costs may be able to sell electricity into the transmission or distribution grid.[112] For peak periods, natural-gas generated electricity generally sets the LCOE that CSPV and other renewable energy systems seek to meet, especially for utility sales.[113]

b. Apparent U.S. consumption trends

The vast majority of firms reported that U.S. demand for CSPV products has increased since 2012.[114] According to most of these firms, the increased demand resulted from a reduction in CSPV system prices and installation costs as well as the existence of Federal, state, and local incentive programs.[115] They also tied the increased demand to the public's increased knowledge of and general interest in renewable energy, increased technology improvements, including module efficiency, and increased military use of solar energy.[116] The increase in demand described by responding firms is reflected in the data, which show that apparent U.S.

(…Continued)
wind, geothermal, and biomass. CR/PR at Figure V-2. Conventional sources of electricity include natural gas, coal, and oil as well as nuclear and hydroelectric. CR/PR at Figure V-2.

[109] The LCOE represents the per-kW hour cost of building and operating a generating plant over an assumed financial life. Key inputs to calculate the LCOE include capital costs (all hardware, such as CSPV products), fuel costs, fixed and variable operations and maintenance costs, financing costs, and an assumed utilization rate for each plant type. The availability of Federal, state, and local incentives can also impact the calculation of the LCOE for various energy sources. Plant owners or investors that finance plants may also value portfolio diversification due to the uncertainty of future fuel prices and future policies. CR at V-58 to V-59 & n.74; PR at V-37 to V-38 & n.74.

[110] CR at V-59; PR at V-37 to V-38.

[111] CR at V-59 to V-61; PR at V-38 to V-40; *see also* CR at V-13 to V-14; PR at V-8 to V-9 (indicating that installed photovoltaic system prices vary greatly from state to state and project to project, with a considerable spread among the prices in each market segment); National Renewable Energy Lab ("NREL"), U.S. Solar Photovoltaic System Cost Benchmark: Q1 2017 at Appendix B, EDIS Doc. 623277, file ID 1226486 at 654, 724-26; EDIS Doc. 622844.

[112] CR at V-10 to V-11, V-59; PR at V-6, V-38; CR/PR at Figure V-2, Figure V-14; *CSPV I*, USITC Pub. 4360 at 21-22; *CSPV II*, USITC Pub. 4519 at 32.

[113] CR at V-59; PR at V-37 to V-38; CR/PR at Figure V-14 (indicating that in 2016, combined-cycle natural gas had the lowest LCOE in 2016, followed by onshore wind and coal). The LCOE of coal-generated electricity has been increasing. CR at V-59 at n.78; PR at V-38 at n.78.

[114] CR/PR at Table V-3.

[115] CR at V-17; PR at V-11.

[116] CR at V-17; PR at V-11.

consumption grew substantially during the POI, increasing by *** percent between 2012 and 2016 and by at least *** percent in each of the intervening years.[117]

c. Market Segments

The vast majority of CSPV modules sold in the U.S. market are connected to the electricity grid,[118] although some CSPV products are sold for off-grid applications.[119] There are three grid-connected market segments – residential, non-residential/commercial, and utility – although the segments overlap somewhat.[120] Installation sizes vary by segment, but the size of installations generally has grown over time in each segment due to a combination of greater cell efficiency (more kW/cell) and/or larger installations (more modules/installation).[121]

Annual U.S. installations of on-grid photovoltaic systems increased from 3,373 MW in 2012 to 14,762 MW in 2016, an increase of 338 percent.[122] All three on-grid segments experienced considerable growth in both the number of installations and the total wattage of installation projects during the POI.[123] By December 2016, more than 19,770 MW of utility

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[117] According to questionnaire data, apparent U.S. consumption increased from *** kW in 2012 to *** kW in 2013, *** kW in 2014, *** kW in 2015, and *** kW in 2016. By value, apparent U.S. consumption increased from $*** in 2012 to $*** in 2013, $*** in 2014, $*** in 2015, and $*** in 2016. CR/PR at Table IV-3. Industry reports indicate that U.S. installations of on-grid photovoltaic systems (including thin film) increased from 3,373 MW in 2012 to 14,762 MW in 2016, or by 338 percent. CR at V-1; PR at V-1.

[118] CR at V-1; PR at V-1; Injury Hearing Tr. at 185-86 (Card, Messer).

[119] CSPV modules that are typically used in on-grid applications may be used in off-grid applications, but some off-grid applications may require different modules with specific power, portability, or power outputs; off-grid systems often include additional balance of system components such as a battery and charge controller, although they do not necessarily require an inverter. Off-grid applications include a range of uses, from homes not connected to the grid to power generation in remote locations, mobile power solutions, telecommunications power and lighting systems, and portable consumer goods (such as systems to recharge consumer electronics like tablets and phones). CR at I-22 to I-23, I-36 to I-37; PR at I-17, I-28. The off-grid market is diverse, with some CSPV off-grid products, such as solar chargers and solar generators, sold directly to consumers or through retail channels and other products, such as solar street lighting and off-grid power systems, sold either directly or through entities such as installers and contractors, to users such as industrial, commercial, and government entities. CR at I-42; PR at I-31.

[120] For example, many nonresidential installers also install residential CSPV systems, and what some consider as a large commercial installation might qualify as a utility installation to others. *See, e.g.*, CR at I-34, I-39; PR at I-26, I-29.

[121] CR at I-33 to I-35, V-2 at n.7, V-3 at n.10; PR at I-24 to I-27, V-1 at n.7, V-2 at n.10.

[122] CR at V-1; PR at V-1.

[123] Residential installations increased by 423 percent between 2012 and 2016, and utility installations increased by 488 percent. CR at V-1 to V-2; PR at V-1 to V-2; CR/PR at Figure V-1.

photovoltaic generating capacity was in operation across the United States, representing 60 percent of total U.S. solar photovoltaic installations (including thin film).[124]

Since 2009 – the first year of the period examined in the *CSPV I* antidumping and countervailing duty investigations – there has been a shift in the distribution of sales among the three market segments. In 2009, the commercial segment accounted for the largest share of the market, followed by the residential and utilities segments,[125] whereas throughout the 2012 to 2016 POI in the instant safeguard investigation, utilities were the largest segment of the U.S. market,[126] followed by the residential and commercial segments.[127] During the POI, the domestic industry and importers each sold CSPV products in the U.S. market to distributors,[128] residential and commercial installers, and utility customers.[129] The vast majority of the domestic industry's shipments served residential and commercial installers in 2016, whereas a majority of imports were shipped to the utility segment.[130]

2. Supply Conditions

During the POI, the U.S. market was supplied primarily by imports and to a continuously lesser degree by the domestic industry.[131]

Domestic industry: Four firms (SolarWorld, Suniva, Mission Solar, and Tesla) submitted data on their U.S. CSPV cell production operations.[132] In addition to Suniva and Mission Solar,

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[124] CR at V-3; PR at V-2 to V-3.

[125] *CSPV I*, USITC Pub. 4360 at 29 n.258, Figure II-1 (identifying shipments to the commercial segment of 241,520 MW in 2009 compared to 195,391 MW for the residential segment, and 30,407 MW for the utility segment).

[126] In 2016, 10.6 GW of photovoltaic products was installed in the utility segment (including thin film), compared to 2.6 GW in the residential segment, and 1.6 GW in the commercial segment. CR at I-39; PR at I-29; CR/PR at Figure V-1.

[127] CR/PR at Figure V-1.

[128] Distributors typically sell CSPV products into the residential and commercial market, including to installers, although Suniva reported that some of its sales to distributors served the utility segment. CR at I-37 at nn.99, 100; PR at I-28 at nn.99, 100.

[129] CR at I-37 to I-38; PR at I-28; CR/PR at Table I-1. Domestically produced CSPV cells are typically internally consumed to produce solar modules by U.S. producers, although a minor amount were sold to firms that fabricate modules or panels. CR/PR at Table I-1.

[130] CR/PR at Table I-1.

[131] CR/PR at Table IV-3, Table C-1b.

[132] Suniva expanded its CSPV cell production operations in 2009, 2010, and July 2016, but suspended its CSPV cell operations in April 2017 as part of its chapter 11 bankruptcy filing. SolarWorld produced CSPV cells throughout the POI; it ***, expanded its cell capacity in 2014, ***. As part of a series of cost-cutting measures, SolarWorld ***. Mission Solar opened its n-type monocrystalline photovoltaic cell production line in 2014, ***, and closed the CSPV cell production line in September 2016 *** due to the costliness of keeping up with technological advancement necessary to compete. Tesla produced *** of CSPV cells in 2016 that was solely for ***. CR at III-9 to III-17; PR at III-5 to III-9; Injury Hearing Tr. at 36, 84-85, 99.

several other firms closed their CSPV cell operations during or immediately following the POI.[133] The *** CSPV cell producers, Suniva and SolarWorld, together accounted for the overwhelming majority (*** percent) of U.S. CSPV cell production by kW in 2016.[134]

Fifteen firms reported data on their U.S. CSPV module manufacturing operations. The largest U.S. producers of CSPV modules are ***, accounting for *** percent, *** percent, and *** percent of U.S. module assembly during the POI, respectively.[135] A number of firms closed their U.S. CSPV module operations during the POI.[136]

The domestic industry's share of the U.S. market for CSPV products fell from a peak of *** percent of the market in 2012 to *** percent by 2016.[137] The domestic industry's capacity to produce CSPV cells and CSPV modules was substantially lower than apparent U.S. consumption throughout the POI.[138]

Imports: Imports as a whole accounted for the vast majority of the market, and their share of apparent U.S. consumption increased from *** percent in 2012 to *** percent in 2016.[139] With the exception of 2013, following the first antidumping and countervailing duty investigation on CSPV cells and modules, imports from China have consistently been the largest or one of the largest sources of imports. Other large sources included Taiwan (particularly from 2012 to 2014), Korea and Malaysia (2016), and Mexico (each year).[140]

3. Substitutability

Throughout the POI, U.S. producers and importers made commercial shipments of a wide variety of CSPV products, predominantly in the form of modules.[141] Imported and U.S.-manufactured CSPV products were sold in a range of wattages and conversion efficiencies, and modules were sold in both 60-cell and 72-cell forms.[142] Imported and U.S.-manufactured CSPV products also were sold to overlapping market segments through overlapping channels of distribution, particularly to residential and commercial installers.[143] In the U.S. market for CSPV products, purchasers consider a variety of factors in their purchasing decisions, but price

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[133] CR/PR at Table III-2, Table III-3.

[134] CR at III-22; PR at III-11.

[135] CR at III-23; PR at III-11.

[136] CR/PR at Table III-2, Table III-3.

[137] CR/PR at Table IV-4.

[138] *Compare* CR/PR at Table III-4 (CSPV cell capacity) and Table III-7 (CSPV module capacity) *with* CR/PR at Table IV-4 (apparent U.S. consumption).

[139] CR/PR at Table IV-4.

[140] CR/PR at Table IV-4.

[141] CR/PR at Table II-5 (imported technologies), Table III-6 (U.S.-manufactured technologies), Table II-4 (imported forms), Table III-11 (U.S.-manufactured forms).

[142] CR/PR at Table V-11; CR at I-19 to I-21; PR at I-14.

[143] CR/PR at Table I-1; CR at I-15; PR at I-11.

continues to be an important factor.[144] Additionally, most U.S. producers, importers, and purchasers reported that U.S.-produced CSPV products were interchangeable with imported CSPV products.[145] Accordingly, we find that imported CSPV products are highly substitutable for U.S.-manufactured CSPV products and price is an important consideration in purchasing decisions.[146]

4. Other Conditions of Competition

Raw materials account for the largest component of the total cost of goods sold for both CSPV cells and CSPV modules.[147] Raw material costs for CSPV modules, much of which is the cost of the CSPV cell, accounted for 84.9 percent of U.S. CSPV module producers' total cost of goods sold in 2016, up from 58.2 percent in 2012.[148] Raw material costs for CSPV cells accounted for *** percent of U.S. CSPV cell producers' total cost of goods sold in 2016, up from *** percent in 2012.[149] Polysilicon is a key raw material used in the production of the wafers that are used to manufacture CSPV cells and other high-tech products.[150] Historically,

[144] CR/PR at Table V-4 (indicating that the most-often cited top three factors that firms consider in their purchasing decisions for CSPV products were price (81 firms), quality/performance (77 firms), and availability (42 firms)). Purchasers identified the following factors that they considered in determining the quality of CSPV products: output, efficiency, longevity and long-term performance degradation, output tolerances, warranty (suppliers' ability to back the warranty), historical failure rates, appearance (matching cell colors and frame structure), sales support, bankability, financial strength of manufacturer, third-party testing, and UL certification). CR at V-21; PR at V-14; CR/PR at Table V-4. Seven purchasers reported that they did not purchase domestic product because U.S. manufacturers failed bankability requirements, did not meet quality requirements, had limited availability, and did not sell stand-alone CSPV products. CR at V-23; PR at V-16.

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

[146] CR at V-19; PR at V-13; CR/PR at Table V-4; Injury Hearing Tr. at 97-98 (citing SEIA's comment in a *New York Times* article that "We are competing on price and price alone. If you change the underpinnings of that, it undermines what we're doing."), 112; Suniva's Posthearing Injury Brief at Attachment N (Diane Cardwell, Solar Trade Case, with Trump as Arbiter Could Upend Market, *New York Times* (June 30, 2017)).

[147] CR at V-27; PR at V-18.

[148] CR/PR at V-27 to V-28; PR at V-18 to V-19.

[149] CR/PR at V-27 to V-28; PR at V-18 to V-19.

[150] CR at V-27; PR at V-18.

polysilicon costs have been volatile.[151] During the POI, the price of polysilicon ingots and wafers fluctuated but declined overall by 52.6 percent for ingots and by 54.5 percent for wafers.[152]

During the POI, domestic producers and importers reported selling CSPV products using primarily transaction-by-transaction negotiations and also contracts.[153] In 2016, domestic producers sold the majority of their CSPV products through short-term contracts and the remainder on a spot basis, whereas importers sold most of their CSPV products through a mix of short-term, annual, and long-term contracts.[154]

D. The Domestic Industry is Seriously Injured

1. Significant Idling of Productive Facilities

In assessing whether the domestic industry is seriously injured, we first examined whether there has been a significant idling of U.S. productive facilities in terms of plant closures and/or underutilization of productive capacity to manufacture CSPV products. Thirty-three CSPV cell or CSPV module facilities operated in the United States as of January 1, 2012, but only 13 of those facilities remained open by December 31, 2016.[155] Of the 16 additional facilities that opened during the POI, five closed.[156] Two firms announced plans for new facilities, but

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[151] In 2003, global supplies of polysilicon were inadequate to meet global demand by the semiconductor industry and particularly the CSPV industry, so spot prices of polysilicon rose from $35/kg in 2003 to a high of $500/kg in 2008 (and contract prices rose from $25/kg to $85/kg in this period). By 2008, global supply exceeded global demand, and polysilicon spot and contract prices then fell substantially to an estimated $35/kg by 2012. *CSPV I*, USITC Pub. 4360 at 28.

[152] CR/PR at Figure V-7. The majority of domestic producers (9 of 11) and importers (32 of 44) reported that prices of raw materials for CSPV products have declined since 2012. CR at V-28; PR at V-19.

[153] CR/PR at Table V-9.

[154] CR/PR at Table V-10. All five responding U.S. producers and most importers reported that short-term contracts did not allow for price renegotiations, had fixed prices and quantities, and did not have meet-or-release provisions. Two of four U.S. producers reported that their annual contracts did not allow for price renegotiations, had fixed prices and quantities, and did not have meet-or-release provisions, whereas the majority of U.S. importers reported that their annual contracts allowed for price renegotiations, had fixed prices and quantities, and did not have meet-or-release provisions. CR at V-31; PR at V-20 to V-21.

[155] CR/PR at Table III-3; SolarWorld's Posthearing Injury Brief at 4, 6, Exhibit 1, section IX at 68-76, Exhibit 35-1 to 35-24, Exhibit 36; Injury Hearing Tr. at 113 (Shea), 409-410 (Werner), 333; SolarWorld's Prehearing Injury Brief at 2, 11-14, 28 29, 43; Suniva's Posthearing Injury Brief at 2, Exhibit 9 at Question 9, Attachment K; Suniva's Prehearing Injury Brief at 26-28.

[156] CR/PR at Table III-3. Due to the many facility closures, the information on the domestic industry does not include data for all U.S. producers of CSPV cells and CSPV modules that operated during the POI, and for some firms only a portion of their data was available. For example, the Commission's report included available information for three firms that responded to questionnaires in (Continued…)

those facilities were not commercially operational by July 2017.[157] Most of the producers that went out of business were independent module producers without integrated cell production operations.[158]

U.S. cell capacity increased irregularly by *** percent over the POI, increasing from *** kW in 2012 to *** kW in 2013, declining to *** kW in 2014,[159] increasing to *** kW in 2015, and reaching a period high of *** in 2016.[160] Production increased *** percent overall, but from a low level of *** kW in 2012 to *** kW in 2013, *** kW in 2014, *** kW in 2015, and *** kW in 2016.[161] For the domestic industry as a whole, capacity utilization for CSPV cells increased irregularly but remained below full capacity, with capacity utilization increasing from *** percent in 2012 to *** percent in 2013 and a period high of *** percent in 2014 before declining to *** percent in 2015 and *** percent in 2016.[162]

U.S. module capacity increased irregularly by 34.0 percent over the POI, declining from 929,827 kW in 2012 to 913,452 kW in 2013 and 716,900 kW in 2014, increasing to 871,603 kW in 2015, and reaching a period high of 1,245,807 kW in 2016.[163] Production decreased from 538,633 kW in 2012 to 447,129 kW in 2013, 440,259 kW in 2014, 552,968 kW in 2015, and 669,089 kW in 2016, for an overall increase of 24.2 percent.[164] Capacity utilization for CSPV modules remained well below full capacity, with capacity utilization decreasing from 57.9 percent in 2012 to 48.9 percent in 2013, increasing to 61.4 percent in 2014 and a period high of 63.4 percent in 2015 and declining to 53.7 percent in 2016.[165] During this period, the domestic industry increased the share of CSPV modules it assembled in the United States from U.S.-origin CSPV cells. This trend resulted from the closure of a number of independent module producers.[166]

(…Continued)
the *CSPV II* proceedings but have since ceased operations. *See, e.g.*, CR at III-23 at n.44; PR at III-11 at n.44.

[157] CR/PR at Table III-3.

[158] CR/PR at Table III-3.

[159] CR at III-17; PR at III-10.

[160] CR/PR at Table III-4. The increases in CSPV cell capacity between 2014 and 2016 reflected Mission Solar's ***, SolarWorld's ***, Suniva's ***, and Tesla's ***. CR at III-17 to III-18; PR at III-10.

[161] CR/PR at Table III-4.

[162] CR/PR at Table III-4. In 2016, Mission Solar was in the process of shutting down its CSPV cell line while Tesla was in the process of starting up its own cell production in that year but was primarily engaged in research and development. CR at III-10, III-15 to III-16; PR at III-5, III-8 to III-9.

[163] CR/PR at Table III-7.

[164] CR/PR at Table III-7.

[165] CR/PR at Table III-7.

[166] Each year from 2012 to 2015, the domestic industry increased the share of its CSPV modules that were assembled from U.S.-manufactured CSPV cells with the share increasing from *** percent in 2012 to *** percent in 2013, *** percent in 2014, and a period high of *** percent in 2015; the share declined to *** percent in 2016, a lower share than in 2014 and 2015. CR/PR at Table III-8. The share of modules assembled by firms without integrated cell operations declined from *** percent in 2012 to *** percent in 2016. CR/PR at Table III-7.

The domestic industry increased CSPV cell and CSPV module capacity, and it increased production of both CSPV cells and CSPV modules during the POI. Neither of these increases, however, approached the magnitude of the explosive growth in apparent U.S. consumption during this period. Instead, dozens of U.S. facilities closed their operations during this period as imports captured most of the growth in demand. Those producers remaining in the market continued to operate at below full capacity, particularly for CSPV module assembly operations. Based on this evidence, on balance, we find a significant idling of domestic productive facilities during the POI.

2. Significant Unemployment or Underemployment

We next examined whether there has been significant unemployment or underemployment in the domestic industry. The substantial number of facility closures described above resulted in extensive layoffs and the award of U.S. Trade Adjustment Assistance Act benefits to many workers during the POI; in addition, workers at some facilities experienced temporary shutdowns or production slowdowns, which led to layoffs and underemployment.[167] Solar manufacturing involves highly trained, skilled workers.[168]

According to questionnaire data, the overall number of production and related workers ("PRWs") engaged in U.S. CSPV cell operations declined from *** PRWs in 2012 to *** PRWs in 2013 and *** PRWs in 2014, and increased to *** PRWs in 2015 and *** PRWs in 2016, an overall increase of *** percent.[169] Although the overall increase in employment over the POI appears consistent with the *** percent increase in U.S. production of CSPV cells, the increase at the end of the POI is primarily explained by ***.[170]

For U.S. CSPV module operations, overall employment declined from 1,293 PRWs in 2012 to 1,080 PRWs in 2013 and 956 PRWs in 2014, and increased to 1,038 PRWs in 2015 and 1,253 PRWs in 2016, an overall decrease of 3.1 percent despite dramatic growth in apparent U.S. consumption of CSPV products.[171] These employment data do not reflect post-POI

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[167] CR/PR at Table III-2; Suniva's Prehearing Injury Brief at 45, Exhibit 55. As indicated earlier, the many facility closures have impacted the available data in this investigation, so questionnaire data may understate employment for 2012-2016.

[168] *CSPV II*, USITC Pub. 4519 at 16, I-28 to I-29; Suniva's Prehearing Injury Brief at 44-45; *see also, e.g.*, EDIS Doc. 625303.

[169] CR/PR at Table III-16. The total number of hours worked by and wages paid to CSPV cell employees followed similar trends to PRWs, declining between 2012 and 2014 and increasing thereafter. For U.S. CSPV cell manufacturers, hourly wages, unit labor costs, and productivity (watts/hour) were higher in 2016 than in 2012 by *** percent, *** percent, and *** percent, respectively, whereas the number of hours worked per employee was *** percent lower. CR/PR at Table III-16.

[170] CR at III-38; PR at III-19.

[171] CR/PR at Table III-17. The total number of hours worked and wages paid to CSPV module employees followed similar trends to PRWs, declining between 2012 and 2014 and increasing thereafter. For U.S. CSPV module manufacturers, hourly wages fluctuated upward throughout the POI, (Continued…)

developments, such as Suniva's April 2017 suspension of operations for its cell and module factories as part of its chapter 11 bankruptcy filing or SolarWorld's June 2017 issuance of WARN Act notifications to ***, layoff of 360 employees in mid-July 2017, and ***.[172]

Based on the evidence, we find significant unemployment and underemployment in the domestic industry during the POI.

3. Inability of a Significant Number of Firms to Carry Out Domestic Production Operations at a Reasonable Level of Profit

We next examined the domestic industry's profitability. The value of the domestic industry's net sales declined over the POI, declining from $*** in 2012 to $*** in 2013, increasing to $*** in 2014 and $*** in 2015 and declining to $*** in 2016, for an overall decline of 2.9 percent.[173] Its cost of goods sold to net sales ratio was high, near or exceeding 100 percent, decreasing from *** percent in 2012 to *** percent in 2013, *** percent in 2014, and *** percent in 2015, and increasing to *** percent in 2016.[174] Consistent with overall declines in its net sales value and high cost of goods sold to net sales ratio, the domestic industry experienced operating losses throughout this time, with its operating loss improving from $*** in 2012 to operating losses of $*** in 2013, $*** in 2014, and $*** in 2015 before deteriorating to an operating loss of $*** in 2016.[175] Despite extremely favorable demand conditions, the domestic industry also experienced net losses throughout this period, with trends in net losses following those for operating losses, improving from a net loss of $*** in 2012 to net losses of $*** in 2013, $*** in 2014, and $*** in 2015 and deteriorating to a net

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(…Continued)
while unit labor costs fluctuated downward. Productivity increased continually from *** watts/hour in 2012 to *** watts/hour in 2016. CR/PR at Table III-17.

[172] CR/PR at Table III-2; Injury Hearing Tr. at 36, 85, 91-92, 95-96, 99, 236-38; EDIS Doc. 620012.

[173] CR/PR at Table C-1b. The domestic industry's net sales value of CSPV cells decreased from a period high of $*** in 2012 to $*** in 2013, $*** in 2014, and $*** in 2015 then improved somewhat to $*** in 2016. CR/PR at Table III-18. For CSPV modules, its net sales value declined from a period high of $607.6 million in 2012 to $410.6 million in 2013, increased to $420.7 million in 2014, $476.9 million in 2015, and $484.4 million in 2016. CR/PR at Table III-21.

[174] CR/PR at Table C-1b. For CSPV cells, the domestic industry's cost of goods sold to net sales ratio decreased from *** percent in 2012 to *** percent in 2013, *** percent in 2014, and *** percent in 2015, and increased to *** percent in 2016. CR/PR at Table III-18. For CSPV modules, the domestic industry's cost of goods sold to net sales ratio decreased from 141.3 percent in 2012 to 132.9 percent in 2013, 100.5 percent in 2014, and 90.8 percent in 2015, and increased to 100.9 percent in 2016. CR/PR at Table III-21.

[175] CR/PR at Table C-1b. For CSPV cells, the domestic industry's operating loss improved from $*** in 2012 to operating losses of $*** in 2013 and $*** in 2014, and deteriorated to operating losses of $*** in 2015 and $*** in 2016. CR/PR at Table III-18. For CSPV modules, the domestic industry's operating loss improved from $377.1 million in 2012 to $204.0 million in 2013, $58.6 million in 2014, and $10.5 million in 2015, and deteriorated to $215.0 million in 2016. CR/PR at Table III-21.

loss of $*** in 2016.[176] The domestic industry's net income margin improved from a loss of *** percent in 2012 to losses of *** percent in 2013, *** percent in 2014, and *** percent in 2015, but deteriorated to a loss of *** percent in 2016.[177] *** of the firms that submitted financial data on their CSPV cell operations reported operating losses and net losses in each year between 2012 and 2016 (except for ***), and the majority of firms submitting financial data on their CSPV module operations reported operating losses and net losses throughout the 2012 to 2016 period, with losses worsening in 2016.[178] In addition to the hundreds of millions of dollars in losses throughout the POI, the domestic industry's dismal and declining overall financial performance is further illustrated by the closures and bankruptcies identified above.[179] Based on this information, we find that a significant number of firms were unable to carry out domestic production operations at a reasonable level of profit during the POI.

4. Inability of Domestic Producers to Generate Adequate Capital to Finance the Modernization of Their Domestic Plants and Equipment or Inability to Maintain Existing Levels of Expenditures for Research and Development

The domestic industry's capital expenditures increased overall between 2012 and 2016, reaching their highest level in 2015, but the largest share of these expenditures was related to expenditures by one firm (***) on new CSPV cell operations that have not yet become commercially operational.[180] The domestic industry's research and development expenses

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[176] CR/PR at Table C-1b. For CSPV cells, the domestic industry's net loss improved from $*** in 2012 to net losses of $*** in 2013 and $*** in 2014, and deteriorated to net losses of $*** in 2015 and $*** in 2016. CR/PR at Table III-18. For CSPV modules, the domestic industry's net loss improved from $551.2 million in 2012 to $217.1 million in 2013, $54.5 million in 2014, and $21.1 million in 2015, and deteriorated to $224.9 million in 2016. CR/PR at Table III-21.

[177] CR/PR at Table C-1b. For CSPV cells, the domestic industry's net loss ratio improved from *** percent in 2012 to *** percent in 2013, and *** percent in 2014, but declined to *** percent in 2015 and improved somewhat to a net loss of *** percent in 2016. CR/PR at Table III-18. For CSPV modules, the domestic industry's net loss ratio improved from a loss of 90.7 percent in 2012 to losses of 52.9 percent in 2013, 13.0 percent in 2014, and 4.4 percent in 2015, and deteriorated to a net loss of 46.4 percent in 2016. CR/PR at Table III-21.

[178] CR/PR at Table III-18 (indicating that *** of *** responding firms reported operating losses on their CSPV cell operations in *** and *** of *** responding firms reported an operating loss in ***, and that *** of *** responding firms reported net losses on their CSPV cell operations in *** and *** of *** responding firms reported an operating loss in ***), Table III-21 (indicating that 8 of 11 responding firms reported operating losses on their CSPV module operations in 2012, compared to 9 of 12 in 2013, 10 of 11 in 2014, 4 of 7 in 2015, and 7 of 8 firms in 2016, and that 8 of 11 responding firms reported net losses on their CSPV module operations in 2012, compared to 10 of 12 in 2013, 9 of 11 in 2014, 4 of 7 in 2015, and 6 of 8 firms in 2016).

[179] *See, e.g.*, CR/PR at Table III-2, Table III-3.

[180] The domestic industry's total capital expenditures increased from $*** in 2012 to $*** in 2013, declined to $*** in 2014, increased to $*** in 2015, and declined to $*** in 2016. Its capital (Continued…)

generally declined between 2012 and 2015, but increased in 2016, largely due to ***.[181] The value of the domestic industry's production assets increased overall, again largely due to ***.[182] Other domestic producers recognized asset impairments,[183] reserved or wrote off production equipment,[184] ***,[185] ***,[186] and otherwise slowed or shut down production.[187]

Domestic producers also identified a series of actual negative effects on their investment, growth, and development due to imports. These included tabling, postponing, and deferring projects; rejection of investment proposals; reduction in the size of capital investments; negative returns on investments; inability to generate adequate capital to finance modernization of domestic plants and equipment; increased costs for debt financing; inability to maintain existing levels of research and development expenditures; rejection of bank loans; lowering of credit ratings; inability to issue stocks or bonds; inability to service debt; lowered bankability;[188] and other such difficulties.[189] Domestic producers also anticipated additional negative effects from imports.[190] Based on this evidence, we find that a significant number of domestic producers were unable to generate adequate capital to finance the modernization of their domestic plants and equipment, and a significant number of domestic producers were

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(…Continued)
expenditures on CSPV cells increased from $*** in 2012 to $*** in 2013, declined to $*** in 2014, increased to $*** in 2015, and declined to $*** in 2016. The domestic industry's capital expenditures related to CSPV modules increased from $*** in 2012 to $*** in 2013, and $*** in 2014, declined to $*** in 2015, and increased to $*** in 2016. CR/PR at Table III-24; CR at III-56; PR at III-28.

[181] The domestic industry's research and development expenses declined from $*** in 2012 to $*** in 2013, and $*** in 2014 and increased to $*** in 2015 and $*** in 2016. For CSPV cells, its research and development expenses declined overall, decreasing from $*** in 2012 to $*** in 2013 and $*** in 2014, increasing to $*** in 2015 and declining to $*** in 2016. Its research and development expenses for CSPV modules increased overall, declining from $*** in 2012 to $*** in 2013 and $*** in 2014 and 2015, and increasing to $*** in 2016. CR/PR at Table III-24; CR at III-58; PR at III-29.

[182] The domestic industry's production assets increased from $*** in 2012 to $*** in 2013, $*** in 2014, $*** in 2015, and $*** in 2016. Its CSPV cell assets increased from $*** in 2012 to $*** in 2013, $*** in 2014, and $*** in 2015, and declined to $*** in 2016. CSPV module assets decreased from $*** in 2012 to $*** in 2013, and increased to $*** in 2014, $*** in 2015, and $*** in 2016. CR/PR at Table III-24; CR at III-59; PR at III-29.

[183] *See, e.g.*, CR at III-55 (***), III-59 (***); PR at III-28 (***), III-29 (***).

[184] *See, e.g.*, CR at III-57 at n.78 (***); PR at III-29 at n.78 (***).

[185] *See, e.g.*, CR/PR at Table III-2 (***).

[186] *See, e.g.*, CR/PR at Table III-2 (***).

[187] See, e.g., CR/PR at Table III-2 (***).

[188] At a minimum, bankability encompasses both the financial viability of a supplier and the product's performance reliability, especially in the CSPV industry where manufacturers provide warranties of 25 years or longer on their products; bankability also allows installing firms to apply for non-recourse loans for their solar development projects. *See, e.g.*, *CSPV I*, USITC Pub. 4360 at 11 n.84, 27-28.

[189] CR/PR at Table III-25, Table E-1.

[190] CR/PR at Table III-25, Table E-1.

unable to maintain existing levels of expenditures for research and development, despite explosive demand growth during the POI.

5. Decline in Sales or Market Share, Higher and Growing Inventories, Downward Trends in Production, Profits, Wages, Productivity, or Employment in the Domestic Industry

The domestic industry's U.S. shipments decreased from *** kW in 2012 to *** kW in 2013, increased to *** kW in 2014 and *** kW in 2015, and decreased to *** kW in 2016, for an overall increase of *** percent.[191] Because this overall increase was dwarfed by the *** percent growth in apparent U.S. consumption during this period, the domestic industry's market share fell from a period high of *** percent in 2012 to *** percent in 2013, increased somewhat to *** percent in 2014, and decreased to *** percent in 2015 and a period low of *** percent in 2016.[192]

The domestic industry's end-of-period inventories increased overall by *** percent between 2012 and 2016,[193] whereas U.S. importers' end-of-period inventories more than ***, with most of the increase occurring in 2015 and 2016.[194] Moreover, as of the deadline for submitting questionnaire data (June 29, 2017), U.S. importers reported that they already had arranged for the importation of an additional 10.2 million kW in CSPV products for calendar year 2017.[195] According to petitioners, additional imports of CSPV products surged into the U.S. market in advance of any global safeguard measure, leading to further increases in inventories and manufacturer shortages.[196] Respondents dispute that such a surge occurred in 2017, and

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[191] Its U.S. shipment values decreased from $*** in 2012 to $*** in 2013, increased to $*** in 2014 and $*** in 2015, and $*** in 2016, for an overall increase of *** percent. CR/PR at Table C-1b.

[192] By value, the domestic industry's market share fell from a period high of *** percent in 2012 to *** percent in 2013, increased marginally to *** percent in 2014, and decreased to *** percent in 2015 and a period low of *** percent in 2016. CR/PR at Table C-1b.

[193] The domestic industry's end-of-period inventories declined from *** kW in 2012 to *** kW in 2013, and *** kW in 2014 and increased to *** kW in 2015 and *** kW in 2016. CR/PR at Table C-1b.

[194] U.S. importers' end-of-period inventories increased from *** kW in 2012 to *** kW in 2013, *** kW in 2014, *** kW in 2015, and *** kW in 2016, an overall increase of *** percent. CR/PR at Table C-1b.

[195] At that time, U.S. importers reported that they had arranged to import 1.7 million kW in the first quarter of 2017, 2.7 million kW in the second quarter of 2017, 3.5 million kW in the third quarter of 2017, and 2.3 million kW in the fourth quarter of 2017. CR/PR at Table II-6.

[196] *See, e.g.*, Suniva's Posthearing Injury Brief at Exhibit 9 at 41; *Sunpreme bags deal to supply 150 MW of heterojunction solar modules to TGCM* in pv magazine (Sept. 12, 2017), EDIS Doc. 623538 ("Analysts and solar developers have told pv magazine that most tier 1 PV makers have sold out of product through the end of the year, as installers and construction contractors hoard PV modules in anticipation of trade action by the Trump Administration."); *see also* Remedy Hearing Tr. at 65, 69-70, 109, 380. Petitioners emphasize that improvements in cell and module efficiencies each year can quickly make inventories obsolete, increasing the incentive to offload inventories at low prices. SolarWorld's Posthearing Injury Brief at 12; SolarWorld's Prehearing Injury Brief at 88.

state that importer inventories have not increased relative to changes in apparent U.S. consumption even if they have increased absolutely.[197]

As indicated above, the domestic industry's capacity and production levels did not increase along with demand growth, and its capacity utilization for CSPV cells and CSPV modules remained low and dropped at the end of the POI. The significant idling of productive facilities continued into 2017, and two additional U.S. production facilities had closed by July 2017.[198] The domestic industry's unemployment and underemployment worsened after the petition in the instant investigation was filed, particularly after Suniva's bankruptcy filing and SolarWorld's issuance of WARN Act notices. At the end of the POI, the domestic industry's net sales value declined and its COGS to net sales ratio increased to above 100 percent, leading to deterioration in its operating and net losses, as indicated above. These financial difficulties persisted into 2017, as additional firms shut down their operations and/or declared bankruptcy.

6. Extent to Which the U.S. Market is a Focal Point for Diversion of Exports

As reported in response to the foreign producer questionnaires, the foreign industries have substantial and increasing capacity to manufacture CSPV cells and CSPV modules.[199] Their collective capacity consistently exceeded their combined production levels.[200] The foreign industries' excess capacity, which grew between 2014 and 2016, consistently exceeded the size of the entire U.S. market.[201] Their combined end-of-period inventories also increased each year from 2012 to 2016.[202] Thus, the foreign industries collectively have the ability to export significant volumes of CSPV products to the United States.

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[197] SEIA Posthearing Injury Brief, Appendix A at 89.

[198] CR/PR at Table III-3.

[199] The foreign industries' collective CSPV cell capacity increased from 27.3 million kW in 2012 to 31.2 million kW in 2013, 36.4 million kW in 2014, 43.3 million kW in 2015, and 56.9 million kW in 2016. CR/PR at Table IV-89. Their collective CSPV module capacity increased from 25.2 million kW in 2012 to 29.2 million kW in 2013, 36.4 million kW in 2014, 47.9 million kW in 2015, and 66.6 million kW in 2016. CR/PR at Table IV-90.

[200] The foreign industries collectively produced 18.4 million kW of CSPV cells in 2012, 24.0 million kW in 2013, 31.2 million kW in 2014, 38.0 million kW in 2015, and 48.0 million kW in 2016, whereas they collectively produced 15.8 million kW of CSPV modules in 2012, 20.8 million kW in 2013, 28.6 million kW in 2014, 38.4 million kW in 2015, and 51.4 million kW in 2016. They reported further increases in their CSPV cell and CSPV module capacity for 2017 and 2018 that would exceed their projected production levels of CSPV cells and CSPV modules. CR/PR at Table IV-89, Table IV-90.

[201] For example, the foreign industry's excess CSPV module capacity was 9.4 million kW in 2012, 8.3 million kW in 2013, and increased from 7.8 million kW in 2014 to 9.4 million kW in 2015 and 15.2 million kW in 2016. Derived from CR/PR at Table IV-90. These levels consistently exceeded apparent U.S. consumption of *** kW in 2012, *** kW in 2013, *** kW in 2014, *** kW in 2015, and *** kW in 2016. CR/PR at Table C-1b.

[202] The foreign industries' collective end-of-period inventories of CSPV cells rose annually from 664,204 kW in 2012 to 858,421 kW in 2013, 1.4 million kW in 2014, 1.5 million kW in 2015, and 2.4 million kW in 2016, and they projected substantial CSPV cell inventories in 2017 and 2018. The (Continued…)

The foreign industries also possess the incentive to export significant volumes to the United States. Although the foreign industries collectively consume the majority of the CSPV cells that they manufacture in their home market CSPV module assembly operations,[203] their CSPV module operations are export oriented.[204] Their combined exports of CSPV modules increased from 2012 to 2016.[205] Several foreign industries face antidumping and/or countervailing duty orders on their exports to one or more non-U.S. markets, including the European Union (CSPV cells and modules from China, Malaysia, and Taiwan), Canada (CSPV modules from China), and Turkey (CSPV modules from China).[206] The foreign industries have demonstrated an ability to redirect exports from one market to another and to increase exports substantially to individual markets from one year to the next.[207] The large U.S. market has been and will remain a likely target for their exports.[208] Although the parties disagreed about demand for CSPV products in other markets,[209] questionnaire data indicate that the

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(…Continued)
foreign industries' collective end-of-period inventories of CSPV modules rose annually from 1.5 million kW in 2012 to 1.6 million kW in 2013, 2.8 million kW in 2014, 3.1 million kW in 2015, and 4.0 million kW in 2016, and they projected substantial increases in CSPV module inventories in 2017 and 2018. CR/PR at Table IV-89. At the same time, the vast majority of foreign producers reported that they could not produce other products with the same equipment and workers used to produce CSPV products. CR at V-8; PR at V-5.

[203] The foreign industries collectively reported consuming between 69.1 and 79.0 percent of the CSPV cells that they manufacture in their home markets, primarily for internal consumption. CR/PR at Table IV-89.

[204] Exports accounted for between 55.9 percent and 77.7 percent of the foreign industries' collective shipments during the POI. CR/PR at Table IV-90.

[205] The foreign industries' collective exports of CSPV modules increased from 12.0 million kW in 2012 to 13.5 million kW in 2013, 18.2 million kW in 2014, 23.4 million kW in 2015, and 28.0 million kW in 2016. CR/PR at Table IV-90.

[206] In addition, the government of India is currently conducting an antidumping duty investigation on "Solar Cells whether or not assembled partially or fully in Modules or Panels or on glass or some other suitable substrates" originating in or exported from China, Malaysia, and Taiwan, and the government of China imposed measures on a raw material used in the production of CSPV products (solar-grade polysilicon) from Korea, the European Union, and the United States. CR/PR at Table I-4; CR at I-61 to I-67; PR at I-46 to I-50.

[207] *See, e.g.*, CR/PR at Table IV-90 (changes from one year to the next for exports of CSPV modules). Industries in individual foreign countries have also demonstrated a similar ability and willingness to shift export markets from year to the next.

[208] The U.S. market was the fifth largest global market in 2012, accounting for 11.0 percent of photovoltaic system installations (including thin film). By 2015, the United States was the second largest market, accounting for 14.7 GW of photovoltaic system installations, or approximately 20 percent of the global market. CR at IV-9; PR at IV-5.

[209] There was a large increase in demand in China between 2012 and 2016. Outside of China and the United States, demand also increased during this period, though at a slower pace (as declining demand in Europe was offset by growth elsewhere). Global demand excluding China and the United States either slightly increased or slightly decreased from 2015 to 2016, depending on the source. CR at (Continued…)

foreign industries collectively increased their exports of CSPV modules to the United States throughout 2012 to 2016,[210] and the U.S. market accounted for an increasing share of their total shipments of CSPV modules during this period.[211] As discussed above, the volume of U.S. imports rose overall between January 2012 and December 2016, and U.S. importers reported arranging for additional imports throughout 2017.

As further evidence of the attractiveness of the U.S. market, after the imposition of the antidumping and countervailing duty orders on imports from China in December 2012 and on imports from China and Taiwan in February 2015,[212] imports from other countries substantially increased their presence in the U.S. market.[213] By the end of 2015, imports had almost *** their level from 2014, and they continued to grow into 2016.[214] Indeed, without closing any of their existing capacity in China, the six largest firms producing CSPV cells and CSPV modules in China increased their global capacity to produce CSPV cells by *** percent between 2012 and 2016, with four of the six firms adding CSPV cell manufacturing capacity in one or more of the following five countries during that time: Korea, Malaysia, the Netherlands, Thailand, and Vietnam.[215] These same six firms also increased their global capacity to produce CSPV modules by *** percent between 2012 and 2016, without closing any of their existing capacity in China, with four of the six firms adding CSPV module capacity in one or more of the following six countries: Canada, Indonesia, Korea, Malaysia, Thailand, and Vietnam.[216] Notably, imports from the four countries where Chinese affiliates added both CSPV cell and CSPV module capacity (Korea, Malaysia, Thailand, and Vietnam) increased their share of apparent U.S. consumption from *** percent in 2012 to *** percent in 2016, and much of this increase occurred between 2015 and 2016, as their collective share of the U.S. market more than ***

(…Continued)
IV-9 to IV-10; PR at IV-5 to IV-7; SolarWorld's Prehearing Injury Brief, Exhibit 12; Petitioners' Injury Hearing Economic Slides at Slide 21 (Aug. 15, 2017), EDIS Doc. 620615.

[210] The foreign industries' collective exports of CSPV modules to the United States increased from 2.3 million kW in 2012 to 3.2 million kW in 2013, 4.7 million kW in 2014, 7.8 million kW in 2015, and 11.8 million kW in 2016. CR/PR at Table IV-90.

[211] CR/PR at Table IV-90 (indicating that U.S. exports accounted for 15.0 percent of the foreign industries' total shipments of CSPV modules in 2012, 15.5 percent in 2013, 17.1 percent in 2014, 20.6 percent in 2015, and 23.6 percent in 2016).

[212] The antidumping and countervailing duty orders on imports from China and Taiwan had a restraining effect on imports from those countries, which maintained a presence in the U.S. market, but at lower levels. *See, e.g.*, CR/PR at Table IV-3 (indicating that combined imports from China and Taiwan declined from *** kW in 2015 to *** kW in 2016). Indeed, as the Commission noted, before the imports subject to the *CSPV I* orders had receded from the U.S. market, imports from China and Taiwan that were within the scope of the *CSPV II* investigations increased their presence in the U.S. market. *CSPV II*, USITC Pub. 4519 at 34.

[213] CR/PR at Table IV-3, Table C-1b.

[214] CR/PR at Table IV-3, Table C-1b.

[215] CR at IV-39 at n.38; PR at IV-26 at n.38; CR/PR at Table IV-17 (referring to Canadian Solar (China), Hanwha Qidong (China), Shanghai JA Solar, Jinko Solar (China), Changzhou Trina (China), and Yingli Green).

[216] CR/PR at Table IV-18; CR at IV-39 at n.38; PR at IV-26 at n.38.

from *** percent in 2015 to *** percent in 2016 just after the second round of antidumping and countervailing duty orders went into effect in February 2015.[217] Consistent with these shifts, a substantial number of U.S. importers and purchasers reported that the origin of their purchases had shifted, as they purchased CSPV products imported from other countries.[218]

Accordingly, based on the substantial production capacity and available unused capacity in the foreign industries, their export orientation, their willingness to shift substantial volumes among export markets from one period to the next, and the demonstrated attractiveness of the U.S. market to the foreign industries, we find that the U.S. market is a focal point for the diversion of exports.

7. Price Effects

We also examined prices of CSPV products during the POI. As discussed above, imported CSPV products are highly substitutable with U.S.-manufactured products, and price is an important consideration in purchasing decisions in this industry.

In this investigation, two U.S. producers and 31 importers provided usable quarterly net U.S. f.o.b. selling price data for five CSPV products for the period January 2012 through December 2016, although not all firms reported pricing data for all products for all quarters.[219] The Commission asked questionnaire respondents to report separate pricing data for monocrystalline and multicrystalline products and to report pricing data on 60-cell modules as well as 72-cell modules.[220] The pricing data obtained in this investigation accounted for approximately 83.3 percent of the domestic industry's U.S. shipments of CSPV products and 74.1 percent of U.S. importers' U.S. shipments of CSPV products in 2016.[221]

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[217] CR/PR at Table IV-3, Table C-1b; *see also* Petitioners' Injury Hearing Economic Slides at Slide 31 to Slide 34 (Aug. 15, 2017), EDIS Doc. 620615.

[218] CR at F-12, F-22; PR at F-4 to F-6; CR/PR at Table F-5 (U.S. importers); Table F-6 (identifying U.S. importers that discontinued or reduced imports from China because of the orders, identifying U.S. importers that discontinued or reduced imports from Taiwan because of the orders, and identifying U.S. importers that began or increased imports from sources other than China and Taiwan), Table F-7 (identifying U.S. importers that reported that the existence of the antidumping and countervailing duty orders on imports from China and Taiwan had a significant impact), Table F-8 (U.S. purchasers), Table F-9 (identifying purchasers that discontinued or reduced purchases from China because of the orders, identifying U.S. purchasers that discontinued or reduced purchases from Taiwan because of the orders, and purchasers that began or increased purchases from China and Taiwan), Table F-10 (indicating the significance of the orders according to foreign producers).

[219] The pricing products included the following: (1) monocrystalline cells with an efficiency between 17.0 percent and 22.0 percent; (2) 60-cell multicrystalline silicon module, with a peak power wattage of 240 to 250, inclusive, P-max or Wp; (3) 60-cell monocrystalline silicon module, with a peak power wattage of 250 to 300, inclusive, P-max or Wp; (4) 72-cell multicrystalline silicon module, with a peak power wattage of 290 to 340, inclusive, P-max or Wp; and (5) 72-cell monocrystalline silicon module, with a peak power wattage of 300 to 350, inclusive, P-max or Wp. CR at V-32; PR at V-21.

[220] *See, e.g.*, CR/PR at Table V-12 to Table V-16; Figure V-10 to Figure V-12.

[221] CR at V-32 to V-33; PR at V-21 to V-22.

Based on these data, imported CSPV products were priced lower than U.S.-manufactured products in 33 of 52 instances involving approximately two-thirds of the total volume in the pricing data (*** kW), and were priced higher in 19 instances (*** kW).[222] Seven domestic producers reported that they had lost sales to imported CSPV products since 2012.[223] The majority of purchasers reported that they had increased their purchases of imported CSPV products, and they identified lower price most often as the reason for increasing their purchases of imported CSPV products.[224] Purchasers reported that imported CSPV modules as a share of their total purchases of CSPV products increased by 15.6 percentage points from 75.6 percent of total CSPV purchases in 2012 to 91.2 percent of total CSPV purchases in 2016.[225]

We also considered movements in the prices of products 1 to 5 during the POI. Quarterly prices for all five pricing products declined between January 2012 and December 2016, with prices of U.S.-manufactured products declining between 48.5 and 73.2 percent and imported CSPV products declining between 45.7 and 51.0 percent during this period.[226] According to industry reports, prices of CSPV cells and CSPV modules fell by 60.4 percent and 58.5 percent, respectively from 2012 to 2016.[227] Eight of 12 responding domestic producers reported that they had to reduce prices, and three reported having to roll back announced price increases in order to avoid losing sales to competitors selling imported CSPV products during the POI.[228] Of the 103 responding purchasers, 38 reported that U.S. producers had reduced prices of their CSPV products in order to compete with lower-priced imports, and 44 of them reported that they did not know whether U.S. producers had reduced their prices to compete with lower-priced imports.[229] Several purchasers reported steeper price reductions in 2016.[230]

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[222] CR/PR at Table V-12 to Table V-16; Figure V-10 to V-12; CR at V-45; PR at V-26.

[223] CR at V-47; PR at V-28 (noting that four domestic producers estimated total lost sales of approximately 950,000 kW since 2012).

[224] CR at V-23; PR at V-15 to V-16. Of the 104 responding purchasers, 91 reported that since 2012 they had purchased imported CSPV products instead of U.S.-manufactured CSPV products. Seventy-three of these purchasers reported that import prices were lower than U.S.-manufactured CSPV products, and 33 reported that price was a primary reason for their decision to purchase imported CSPV products over products manufactured in the United States. Purchasers estimated that the quantity of imported CSPV products that they purchased instead of domestic CSPV products ranged from 54 kW to 1.7 million kW, and totaled 3.4 million kW. CR at V-50; PR at V-30; CR/PR at Table V-19, Table V-20.

[225] CR/PR at Table V-19.

[226] CR/PR at Table V-17.

[227] CR at V-46; PR at V-27 to V-28; CR/PR at Figure V-13.

[228] CR at V-46; PR at V-27 to V-28 (noting that three domestic producers estimated total lost revenues of approximately $140 million since 2012).

[229] CR at V-51; PR at V-31 (noting that purchasers estimated that domestic producers reduced prices anywhere from 3 to 70 percent, averaging 31 percent).

[230] CR at V-51; PR at V-31. The decline in prices between the fourth quarter of 2015 and the fourth quarter of 2016 were usually twice as large as the price declines between the first quarter of 2015 and the first quarter of 2016 according to the pricing data submitted in this investigation, as discussed below. Derived from CR/PR at Table V-11 to Table V-16.

Although the domestic industry's net sales values fell overall between 2012 and 2016,[231] its cost of goods sold declined by a greater amount.[232] As a result, although the domestic industry's cost of goods sold to net sales ratio was high, near or exceeding *** percent throughout this period, it decreased from *** percent in 2012 to *** percent in 2013, *** percent in 2014, and *** percent in 2015, and increased to *** percent in 2016, as indicated above.[233]

We find that the domestic industry experienced adverse price conditions, given that imports were lower priced than U.S.-manufactured CSPV products, prices of the domestic industry's CSPV products fell between 2012 and 2016 despite very strong demand growth, and the domestic industry's costs remained near or above its net sales values throughout the POI.

8. Conclusion

Thus, we find a significant idling of domestic productive facilities for CSPV products between 2012 and 2016 and significant unemployment and underemployment within the domestic industry. A significant number of firms were unable to carry out domestic production operations at a reasonable level of profit, and a significant number of domestic producers were unable to generate adequate capital to finance the modernization of their domestic plants and equipment or to maintain existing levels of expenditures for research and development. The domestic industry's sales and market share declined significantly, and inventories were high and growing during this period of adverse price conditions. The domestic industry's performance indicators particularly declined between 2015 and 2016 and continued to deteriorate into 2017 despite explosive demand growth. Based on this evidence and the status of the U.S. market as a focal point for exports, we find a significant overall impairment in the domestic industry's position. Consequently, we find that the domestic industry is seriously injured.

E. Increased Imports are a Substantial Cause of Serious Injury to the Domestic Industry Manufacturing CSPV Products

In determining whether increased imports are a substantial cause of serious injury, we considered the impact of imports as well as the impact of other possible causes. As discussed

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[231] The domestic industry's net sales value declined from *** in 2012 to $*** in 2013, increased to $*** in 2014 and $*** in 2015 and declined to $*** in 2016. CR/PR at Table C-1b.

[232] The domestic industry's cost of goods sold fell from a period high of $*** in 2012 to a period low of $*** in 2013, increased to $*** in 2014 and $*** in 2015, and fell to $*** in 2016. Its unit cost of goods sold followed similar trends until 2015, declining from $***/kW in 2012 to $***/kW in 2013, increasing to $***/kW in 2014 but declining to $***/kW in 2015 and $***/kW in 2016. CR/PR at Table C-1b.

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

above, the statute defines "substantial cause" as a cause "which is important and not less than any other cause."[234]

We find that increased imports are a substantial cause of serious injury to the domestic industry manufacturing CSPV products. In 2009, the beginning of the period of investigation in the *CSPV I* investigations, the domestic industry held the largest share of apparent U.S. consumption (*** percent), followed by imports from China corresponding to the scope of those investigations (*** percent), and imports from all other sources (*** percent).[235] Imports from China overtook the domestic industry's U.S. shipments by 2010,[236] and by the end of 2011, imports from China had nearly doubled from their 2009 level.[237]

After the Commission determined that the dumped and subsidized imports from China were materially injuring the domestic industry in the *CSPV I* investigations, U.S. imports of CSPV cells produced in China, CSPV modules assembled in China from CSPV cells made in China, and CSPV modules assembled in a third country from CSPV cells made in China became subject to orders effective December 7, 2012.[238] Before those imports began to recede from the U.S. market, imports from China and Taiwan corresponding to the scope of the *CSPV II* antidumping and countervailing duty investigations increased their presence in the U.S. market.[239] Those imports from China and Taiwan almost completely replaced the substantial market share previously held by the *CSPV I* imports from China and took additional market share from the domestic industry.[240] Before the *CSPV II* orders became effective in February 2015, imports from additional countries entered the U.S. market.[241] By the end of 2015, imports had almost doubled their level from 2014, and imports continued to grow into 2016.[242]

As discussed earlier, the six largest firms producing CSPV cells and CSPV modules in China increased their global CSPV cell and CSPV module capacity without closing their capacity in China.[243] Imports from the four countries where Chinese affiliates added both CSPV cell and CSPV module capacity (Korea, Malaysia, Thailand, and Vietnam) increased their share of

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[234] 19 U.S.C. § 2252(b)(1)(B).

[235] *CSPV II*, USITC Pub. 4519 at 33; *CSPV I*, USITC Pub. 4360 at 25-26, 28-29; Confidential *CSPV I* Views, EDIS Doc. 618919, file 1215365 at 36-37, 43.

[236] *CSPV I*, USITC Pub. 4360 at 28-29.

[237] *CSPV I*, USITC Pub. 4360 at 29; Confidential *CSPV I* Views, EDIS Doc. 618919, file 1215365 at 43.

[238] 77 Fed Reg. 73107 (Dec. 7, 2012); 77 Fed. Reg. 73018 (Dec. 7, 2012).

[239] *CSPV II*, USITC Pub. 4519 at 34.

[240] *CSPV II*, USITC Pub. 4519 at 38-39 & nn.22-23; Confidential *CSPV II* Views, EDIS Doc. 618909, file 1215370 at 54-55 & nn.22-23 (indicating that those imports from China and Taiwan increased their share of the U.S. market from *** percent in 2011 to *** percent in 2012 and *** percent in 2013 whereas imports from other sources, which the Commission noted were primarily of products from China that became subject to the *CSPV I* orders, fell from *** percent in 2011 to *** percent in 2012 and *** percent in 2013).

[241] CR/PR at Table IV-3, Table C-1b.

[242] CR/PR at Table IV-3, Table C-1b.

[243] CR/PR at Table IV-17, Table IV-18.

apparent U.S. consumption from *** percent in 2012 to *** percent in 2016. Much of this increase occurred between 2015 and 2016, as their collective share of the U.S. market more than doubled from *** percent in 2015 to *** percent in 2016 just after the *CSPV II* orders went into effect in February 2015.[244]

Although the composition of imports changed between 2012 and 2016, imports from China maintained a substantial presence in the U.S. market throughout the POI, despite the existence of two sets of antidumping and countervailing duty orders.[245] Consistent with the large and attractive nature of the U.S. market and the large and growing size of the export-oriented collective foreign industries, imports of CSPV products increased both absolutely and relative to domestic production in each year since 2012, reaching record highs in 2016.[246] As indicated above, these imports were highly substitutable for U.S.-manufactured CSPV products and generally were lower priced.[247]

During this period of substantial and growing volumes of low-priced imports, prices for all five pricing products declined between January 2012 and December 2016, with prices of imported CSPV products declining 45.7 to 51.0 percent and prices of U.S.-manufactured products declining 48.5 to 73.2 percent.[248] According to industry reports, prices of CSPV cells and CSPV modules fell by 60.4 percent and 58.5 percent, respectively from 2012 to 2016.[249] The domestic industry reported having to reduce prices and/or roll back announced price increases to compete with imported CSPV products.[250] Of the 103 responding purchasers, 38 reported that U.S. producers had reduced prices of their CSPV products to compete with

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[244] CR/PR at Table IV-3, Table C-1b.

[245] CR/PR at Table IV-4. Some respondents focused on trends in imports from individual countries, arguing, for example, that that imports from China were not a substantial cause of serious injury because imports from China declined at the end of the POI. *See, e.g.*, Government of China's Posthearing Injury Statement at 6; CCCME's Prehearing Injury Brief at 2, 7-17, 32-33; Government of Taiwan's Prehearing Injury Brief at 8-10; Vietnamese Respondents' Prehearing Injury Brief at 3-11. By focusing separately on their own exports to the United States, these respondents overlook the global nature of safeguard investigations. Moreover, unlike a number of other respondent countries, China, Taiwan, and Vietnam do not have an FTA with the United States with a safeguard exclusion provision, and therefore there is no basis for the Commission to look at imports from any of these countries separately.

[246] Imports increased absolutely from 2.2 million kW in 2012 to 3.1 million kW in 2013, 4.6 million kW in 2014, 8.4 million kW in 2015, and 12.8 million kW in 2016. CR/PR at Table II-2, Table IV-3, Table C-1b. As a ratio to domestic production, imports increased from 733.9 percent in 2012 to 948.4 percent in 2013, 1,141.0 percent in 2014, 1,593.5 percent in 2015, and 2,276.2 percent in 2016. CR/PR at Table II-2, Table IV-3, Table C-1b.

[247] CR/PR at Table V-12 to Table V-16; CR/PR at Figure V-10 to Figure V-12; CR at V-45; PR at V-26.

[248] CR/PR at Table V-17.

[249] CR at V-46; PR at V-27; CR/PR at Figure V-13.

[250] CR at V-46; PR at V-28 (noting that three domestic producers estimated total lost revenues of approximately $140 million since 2012).

lower-priced imports, and 44 of them did not know whether U.S. producers had reduced their prices to compete with lower-priced imports.[251]

Prices declined substantially in 2012, but stabilized somewhat after imports from China became subject to antidumping and countervailing duty orders in December 2012, additional investigations on imports from China and Taiwan were commenced at the end of 2013, and imports grew at a slower pace than apparent U.S. consumption between 2013 and 2014. As imports from additional sources entered the U.S. market and rapidly increased to higher volumes, however, the domestic industry's prices steadily fell throughout 2016.[252] Several purchasers also reported steeper price reductions in 2016, [253] as the domestic industry's share of the market fell to its lowest level.[254]

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[251] CR at V-51 (noting that purchasers estimated that domestic producers reduced prices anywhere from 3 to 70 percent, averaging 31 percent).

[252] CR at V-46; PR at V-27. The decline in prices between the fourth quarter of 2015 and the fourth quarter of 2016 were usually twice as large as the price declines between the first quarter of 2015 and the first quarter of 2016 according to the pricing data submitted in this investigation. Derived from CR/PR at Table V-11 to Table V-16 (indicating price declines from the first quarter of 2015 to the first quarter of 2016 of 10.1 percent for imported pricing product 2, 9.2 percent for U.S.-manufactured pricing product 3, 14.7 percent for imported pricing product 3, 12.6 percent for imported product 4, 11.0 percent for U.S.-manufactured pricing product 5, and 11.6 percent for imported pricing product 5 compared to price declines from the fourth quarter of 2016 to the fourth quarter of 2016 of 19.8 percent for imported pricing product 2, 18.3 percent for U.S.-manufactured pricing product 3, 30.6 percent for imported pricing product 3, 26.4 percent for imported product 4, 31.7 percent for U.S.-manufactured pricing product 5, and 22.1 percent for imported pricing product 5). According to industry reports, prices of cells and modules declined by 34.4 percent and 38.1 percent respectively, from the first quarter of 2016 to the fourth quarter of 2016. CR at V-46 at n.50; PR at V-27 at n.50; CR/PR at Figure V-13.

[253] CR/PR at Tables V-12 to V-16, V-18; Figure V-10 to Figure V-12. According to several industry sources, average installed prices for photovoltaic system installations declined steadily in all three on-grid market segments during the POI. According to one industry report, the median installed price of a photovoltaic system (including thin film) fell between 24.1 percent (residential system) and 43.6 percent (non-residential system greater than 500 kW) from 2012 to 2015. CR/PR at Figure V-4. According to another industry report, U.S. photovoltaic system pricing fell by almost 20 percent from the fourth quarter of 2015 to the fourth quarter of 2016. This report attributed the steep decline in photovoltaic system prices during 2016 to large decreases in module prices combined with substantial declines in hardware costs. CR at V-13; PR at V-8. For most of the POI, declining system prices largely reflected falling non-module costs as module prices remained relatively stable from 2013 to 2015. In residential photovoltaic systems, module costs fell 9 percent while non-module costs fell 27 percent from 2012 to 2015. CR/PR at Figure V-5. In 2016, however, declining system prices largely reflected falling module prices. Between the fourth quarter of 2015 and the fourth quarter of 2016, module prices fell by 35.4 percent. Declines in non-module costs (*e.g.*, inverters, mounting hardware, labor, design/engineering, permitting fees, overhead, and profit margin) ranged from 6 percent for fixed-tilt utility systems, 13 percent for residential and non-residential systems, and 15 percent for single axis tracking utility systems. CR at V-14 to V-15; PR at V-9 to V-10; CR/PR at Figures V-4 to V-6.

[254] CR/PR at Table IV-4, Table C-1b.

The domestic industry's net sales fell overall between 2012 and 2016, and its cost of goods sold declined by a greater amount.[255] The domestic industry's cost of goods sold to net sales ratio was high, near or exceeding *** percent throughout this period, decreasing from *** percent in 2012 to *** percent in 2013, *** percent in 2014, and *** percent in 2015, and increasing to *** percent in 2016.[256] Accordingly, the domestic industry's financial condition, which was at its worst at the beginning of the POI before the antidumping and countervailing duty orders were imposed on imports from China in December 2012, improved marginally after imposition of the orders and the filing of new antidumping and countervailing duty cases, but remained poor and deteriorated further in 2016, as imports peaked in terms of volume and market share and prices dropped anew.[257]

Consistent with the hundreds of millions of dollars in net and operating losses throughout the POI, a significant number of domestic producers were unable to generate adequate capital to finance the modernization of their domestic plants and equipment, and a significant number of them were unable to maintain existing research and development expenditure levels.[258] This inability to generate adequate capital for investments and research and development impaired the domestic industry's ability to develop next-generation products in this highly capital-intensive and technologically sophisticated market.[259]

Additionally, despite the need in this industry to increase capacity in order to achieve economies of scale, the domestic industry's capacity and production levels did not increase commensurately with demand growth,[260] and its capacity utilization levels remained low and dropped at the end of the POI,[261] as imports reached their summit.[262] A substantial number of

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[255] The domestic industry's cost of goods sold fell from a period high of $*** in 2012 to a period low of $*** in 2013, increased to $*** in 2014 and $*** in 2015, and fell to $*** in 2016. Its unit cost of goods sold followed similar trends until 2015, declining from $***/kW in 2012 to $***/kW in 2013, increasing to $***/kW in 2014 but declining to $***/kW in 2015 and $***/kW in 2016. CR/PR at Table C-1b. The domestic industry's net sales values declined at a somewhat slower rate, falling from $*** in 2012 to $*** in 2013, increasing to $*** in 2014 and $*** in 2015 and declining to $*** in 2016. CR/PR at Table C-1b.

[256] CR/PR at Table C-1b.

[257] The domestic industry's operating loss improved from $*** in 2012 to operating losses of $*** in 2013, $*** in 2014, and $*** in 2015 but deteriorated to an operating loss of $*** in 2016. The domestic industry's net losses improved from a net loss of $*** in 2012 to net losses of $*** in 2013, $*** in 2014, and $*** in 2015 and deteriorated to a net loss of $*** in 2016. The domestic industry's net income margin improved from a loss of *** percent in 2012 to losses of *** percent in 2013, *** percent in 2014, and *** percent in 2015, but deteriorated to a loss of *** percent in 2016. CR/PR at Table C-1b.

[258] *See, e.g.*, CR/PR at Table III-2, Table III-25, Table E-1; CR at III-55, III-57 at n.78, III-59; PR at III-27 to III-28, III-29 at n.78.

[259] SolarWorld's Posthearing Injury Brief at 12; SolarWorld's Prehearing Injury Brief at 90-92; Suniva's Prehearing Injury Brief at 68-69.

[260] CR/PR at Table III-4 (CSPV cells), Table III-7 (CSPV modules).

[261] Capacity utilization for CSPV modules declined from 57.9 percent in 2012 to 48.9 percent in 2013 and increased to 61.4 percent in 2014 and 63.4 percent in 2015, but declined to 53.7 percent in (Continued…)

domestic CSPV cell and CSPV module facilities closed during the POI,[263] resulting in numerous layoffs and the need for trade adjustment assistance for the highly trained, skilled workers affected by these closures.[264]

As imports increased rapidly and the domestic industry faced underutilization of its production assets, underinvestment, and closures, the domestic industry similarly was unable to take advantage of a market in which apparent U.S. consumption increased nearly *** in five years.[265] Imports accounted for a growing and substantial share of the U.S. market, increasing their share of apparent U.S. consumption from *** percent in 2012 to *** percent in 2016.[266] In all but one year (2013/2014) of the POI, imports increased at a greater rate than apparent U.S. consumption year over year, ensuring their dominant position in the U.S. market as demand surged forward.[267] Although many U.S. producers entered the U.S. market seeking to take advantage of this demand growth, the consistent inability of the domestic industry to

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(…Continued)
2016 (the second lowest level over the POI). Capacity utilization for CSPV cells increased from a low of *** percent in 2012 to *** percent in 2013 and *** percent in 2014, while prices stabilized somewhat and imports temporarily grew at a lower rate than apparent U.S. consumption, but capacity utilization declined to *** percent in 2015 and *** percent in 2016 as additional foreign suppliers entered the U.S. market in large volumes. CR/PR at Table III-4, Table III-7.

[262] While respondents argue that the domestic industry was unable to supply adequate levels of CSPV cells to sustain U.S. CSPV module assembly operations or demand in the U.S. market, which is accurate, *compare* CR/PR at Table III-4 (CSPV cell capacity) *with* Table III-7 (CSPV module capacity) and Table IV-3 (apparent U.S. consumption), the vast majority of imports of CSPV products during the POI consisted of finished CSPV modules and not CSPV cells. CR/PR at Table II-4 (indicating that cells accounted for a declining share of total CSPV imports, declining from *** percent in 2012 to *** percent in 2016 and CSPV modules increased their share of total CSPV imports from *** percent in 2012 to *** percent in 2016). Certain domestic producers attempted to increase CSPV cell capacity during the POI, but at no point was the domestic industry able to operate at full capacity utilization for CSPV cells. CR/PR at Table III-4.

[263] Respondents repeatedly point to opponents of the case, but many of these firms are not part of the domestic industry manufacturing CSPV products. Moreover, some firms that manufactured CSPV products during the POI did not express a position on this investigation because they no longer exist. *See, e.g.*, CR/PR at Table III-2, Table III-3. Additionally, producers accounting for the vast majority of domestic production in 2016 supported this case prior to institution. CR/PR at Table I-2; Suniva's May 12, 2017 response at Exhibit 6; Injury Hearing Tr. at 81.

[264] CR/PR at Table III-2; Suniva's Prehearing Injury Brief at 44-45; *CSPV II*, USITC Pub. 4519 at 16, I-28 to I-29.

[265] Apparent U.S. consumption increased from *** kW in 2012 to *** kW in 2013, *** kW in 2014, *** kW in 2015, and *** kW in 2016. CR/PR at Table IV-4, Table C-1b.

[266] CR/PR at Table IV-4.

[267] Import volumes increased *** percent between 2012 and 2013, *** percent from 2013/2014, *** percent from 2014/2015, *** percent from 2015/2016, and *** percent from 2012/2016, whereas apparent U.S. consumption grew *** percent between 2012 and 2013, *** percent from 2013/2014, *** percent from 2014/2015, *** percent from 2015/2016, and *** percent from 2012/2016. CR/PR at Table C-1b.

compete with low-priced imports forced many of these firms, as well as others, to shut down their facilities.

Although the domestic industry increased its U.S. shipments over the POI,[268] this overall increase was dwarfed by the *** percent growth in apparent U.S. consumption during this period,[269] meaning that the domestic industry lost market share to the consistently growing low-priced imports. The domestic industry's share of apparent U.S. consumption fell from *** percent in 2012 to *** percent in 2013, and increased to *** percent in 2014, as prices stabilized somewhat while imports temporarily grew at a slower pace than apparent U.S. consumption. The domestic industry's market share declined anew to *** percent in 2015 and *** percent in 2016, as imports peaked.[270] Domestic producers reported losing sales to low-priced imports of CSPV products,[271] and the majority of purchasers reported that they had increased their purchases of imported CSPV products, most often identifying lower price as the reason for increasing their purchases of imported CSPV products.[272]

Consistent with declines in many of the domestic industry's trade and financial indicators between 2015 and 2016, as imports reached their POI pinnacle, available information suggests that the domestic industry's condition continued to deteriorate into 2017, beyond the POI for which data were collected in this investigation. Two additional U.S. production facilities closed by July 2017.[273] The domestic industry's unemployment and underemployment also worsened in 2017, with Suniva's bankruptcy filing and SolarWorld's issuance of WARN Act notices and additional layoffs.[274] Importers reported that they had already arranged for substantial volumes of imports at the time they submitted their questionnaire data. Petitioners assert that additional imports of CSPV products surged into the U.S. market in advance of any global safeguard measure, leading to further increases in inventories and manufacturer shortages,[275] although this is disputed by respondents.[276]

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[268] The domestic industry's U.S. shipments decreased from *** kW in 2012 to *** kW in 2013, increased to *** kW in 2014 and *** kW in 2015, and decreased to *** kW in 2016, for an overall increase of *** percent. CR/PR at Table C-1b.

[269] CR/PR at Table IV-4, Table C-1b.

[270] CR/PR at Table IV-4, Table C-1b.

[271] CR at V-47; PR at V-28 (noting that four domestic producers estimated total lost sales of approximately 950,000 kW since 2012).

[272] CR at V-23; PR at V-16. Of the 104 responding purchasers, 91 reported that since 2012 they had purchased imported CSPV products instead of U.S.-manufactured CSPV products. Seventy-three of these purchasers reported that import prices were lower than U.S.-manufactured CSPV products, and 33 reported that price was a primary reason for their decision to purchase imported CSPV products over products manufactured in the United States. Purchasers estimated that the quantity of imported CSPV products that they purchased instead of domestic CSPV products ranged from 54 kW to 1.7 million kW, and totaled 3.4 million kW. CR at V-50; PR at V-30; CR/PR at Table V-19, Table V-20.

[273] CR/PR at Table III-3.

[274] CR/PR at Table III-2; Injury Hearing Tr. at 36, 85, 91-92, 95-96, 99, 236-38; EDIS Doc. 620012.

[275] *See, e.g.*, Suniva's Posthearing Injury Brief at Exhibit 9 at 41; *Sunpreme bags deal to supply 150 MW of heterojunction solar modules to TGCM* in pv magazine (Sept. 12, 2017), EDIS Doc. 623538 (Continued…)

Consequently, we find that increased imports are a substantial cause of serious injury to the domestic industry manufacturing CSPV products based on a clear causal link between them.

F. Imports are an Important Cause Not Less Than Any Other Cause

Respondents assert that causes other than imports are more important and explain any injury to the domestic industry.[277] They identify two such causes: (1) alleged missteps by the domestic industry and (2) factors other than imports that led to declines in domestic prices.[278] We have examined these factors but find that respondents' arguments are not supported by the facts.

1. Alleged Missteps by the Domestic Industry

Respondents point to alleged missteps by the domestic industry in terms of the quality and types of products they manufacture, the market segments they serve, and alleged delivery and service issues.

Turning first to their product-related arguments, respondents argue that technological change is a key characteristic of the solar industry, meaning that producers need to manufacture products that convert sunlight into electricity more efficiently over time and continuously become more efficient at the industrial production level.[279] By 2016, most CSPV cells were 156.0 mm^2 (6.14 $inches^2$) or 156.75 mm^2 (6.17 $inches^2$), and by 2017, power wattages for CSPV cells ranged from 4 watts to more than 5 watts/cell.[280] Typical on-grid modules have 60,[281] 72,[282] or 96 CSPV cells, although manufacturers sometimes cut the CSPV cells in half to yield 120 or 144 half-cut CSPV cells.[283] On-grid modules typically have a power

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("Analysts and solar developers have told pv magazine that most tier 1 PV makers have sold out of product through the end of the year, as installers and construction contractors hoard PV modules in anticipation of trade action by the Trump Administration."; *see also* Remedy Hearing Tr. at 65, 69-70, 109, 380.

[276] SEIA Posthearing Injury Brief, Appendix A at 89.

[277] Respondents do not allege that demand conditions are responsible for any injury to the domestic industry. As indicated earlier, demand for CSPV products flourished during the POI, as evidenced by the tremendous growth in apparent U.S. consumption over the POI and from one year to the next throughout 2012 to 2016. CR/PR at Table IV-4, Table C-1b. Thus, demand conditions were favorable and not injurious.

[278] *See, e.g*., SEIA's Prehearing Injury Brief at 70-120.

[279] *See, e.g.*, SEIA's Prehearing Injury Brief at 18; SEIA's Posthearing Brief, Appendix A, Question 36.

[280] CR at I-15; PR at I-11.

[281] On average, 60-cell CSPV modules weigh between 33 and 51 pounds and measure 65 inches long by 39 inches wide and 1.5 to 2 inches thick. CR at I-18; PR at I-13.

[282] On average, 72-cell CSPV modules weigh between 45 and 61 pounds and measure 78 inches long by 39 inches wide and 1.5 to 2 inches thick. CR at I-18; PR at I-13.

[283] CR at I-17 to I-18; PR at I-13.

output of between 240 watts and 340 watts.[284] The two main types of CSPV products are monocrystalline and multicrystalline silicon products; monocrystalline CSPV products, grown from a single crystal, tend to convert sunlight into electricity more efficiently than multicrystalline CSPV products with random crystal structures.[285] Monocrystalline and multicrystalline modules are manufactured in a range of ever-increasing conversion efficiencies[286] and nominal power outputs.[287]

Both imported and domestic CSPV products were available in cell, laminate, and module forms, with most in the form of modules.[288] During the POI, imported and U.S.-manufactured CSPV products were sold across a range of wattages and conversion efficiencies, and modules were sold in 60- and 72-cell forms.[289] Domestic producers pioneered certain CSPV technologies,[290] and they have continued to innovate, develop, and manufacture leading-edge products.[291]

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[284] CR at V-1; PR at V-1.

[285] Conversion efficiency is the percent of sunlight that is converted into electricity. CR at I-19; PR at I-14.

[286] For example, SolarPro's 2017 module specifications identified multicrystalline modules with 72 or more cells with efficiencies of 15.2 to 17.8 percent compared to efficiencies of 15.5 to 21.5 percent for monocrystalline modules. CR/PR at Figure I-5; CR at I-19; PR at I-14; *see also* CR/PR at Figure I-4 (indicating that the median efficiency of modules installed in U.S. residential systems increased from 15.3 percent in 2012 to 16.7 percent in 2015, and that the median efficiency of multicrystalline modules (the only type for which separate data were available) installed in residential systems increased from 14.5 percent in 2012 to 16.0 percent in 2015).

[287] Power output for 60-cell multicrystalline modules commonly ranges from 240 to 290 watts, whereas output for 60-cell monocrystalline modules commonly ranges from 260 to 320 watts; SolarPro's 2017 module specifications identified an average of power output of 319 watts for 72-cell multicrystalline modules and 340 watts for 72-cell monocrystalline modules. CR at I-21; PR at I-14.

[288] CR/PR at Table II-4 (imported forms), Table III-11 (U.S.-manufactured forms).

[289] CR/PR at Table V-11; CR at I-19 to I-21; PR at I-13 to I-16. The same was true during the periods examined during the antidumping and countervailing duty investigations which overlapped with the POI here. Products of particular wattages or cell counts were not limited to a single segment of the U.S. market. *CSPV I*, USITC Pub. 4360 at 27-28, 31-32; *CSPV II*, USITC Pub. 4519 at 35-37, 41-42, 47.

[290] *See, e.g.*, Injury Hearing Tr. at 89-90, 94-98, 103, 108-109, 114-116, 143, 220-223.

[291] *See, e.g*., CR/PR at Table III-2, Table III-6; CR at III-9 to III-17, III-22; PR at III-5 to III-10; SolarWorld's Posthearing Injury Brief at 10-11; Injury Hearing Tr. at 88, 90 (Stein); SolarWorld's Prehearing Injury Brief at 52-55; Suniva's Posthearing Injury Brief at 7-8, Exhibit 9 at 4. For example, SolarWorld was one of the earliest producers of monocrystalline products and the first producer of monocrystalline PERC products, and petitioners observe that the market now is strongly moving to monocrystalline PERC products, where SolarWorld is a recognized leader. SolarWorld's Posthearing Injury Brief at 9, 10, Exhibit 1, section I at 1, section II at 9, Exhibit 9; Injury Hearing Tr. at 220-21 (Stein), 222 (Card). SolarWorld also developed the p-type PERC bifacial cell in 2015, the next level of innovation that increases energy yield at the system level and has a greater impact on the cost of the delivered energy. SolarWorld increased the power of its 60-cell modules by approximately 10 watts per year from 240 watts in 2011 to 300 watts currently. SolarWorld also developed or patented several cell

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In an attempt to differentiate itself from large volumes of low-priced imports, SolarWorld reports that it shifted from producing multicrystalline products to higher-end, more efficient monocrystalline products. SolarWorld quickly encountered competition from lower-priced imported monocrystalline products as well.[292] Petitioners report that U.S. importers not only quickly moved up the value chain from multicrystalline to monocrystalline products but also now offer bifacial and hybrid products as well.[293]

Some respondents argued that certain CSPV products were only available from foreign suppliers, such as monocrystalline n-type interdigitated back contact ("IBC") products (Sunpower), n-type technology with back-contact solar cells with double-side cell structure (LGE), or commercial-scale multicrystalline modules with rear-side passivated cells (Hanwha Q), and did not compete with products manufactured by the domestic industry.[294] While certain foreign producers may produce CSPV products that are unique or unavailable from other sources,[295] available evidence indicates that these products accounted for only a small share of the U.S. market for CSPV products and that there was more overlap between U.S. and imported specialized CSPV products than acknowledged by respondents. As of 2016, n-type

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innovations to increase module power using the same materials, resulting in substantial cost reductions, including ***. SolarWorld was among the first manufacturers to implement statistical process control to ensure higher product quality and improve production yields, thereby reducing costs. SolarWorld's Posthearing Injury Brief at Exhibit 1, section I at 1-2. SolarWorld reports that it also was the first to market with a number of other innovations intended to enhance product reliability. SolarWorld's Posthearing Injury Brief at Exhibit 1, section I at 3-4, Exhibit 10; Injury Hearing Tr. at 106. Suniva also identified a number of innovations that the firm made throughout its history and the technology changes it implemented during the POI to remain competitive. Suniva's Posthearing Injury Brief at Exhibit 9 at Question 6.

[292] SolarWorld's Prehearing Injury Brief at 53. SolarWorld reported that low-priced imports compelled it to ***. *See, e.g.*, CR/PR at Table III-2.

[293] SolarWorld's Prehearing Injury Brief at 54-55. Bifacial cells convert sunlight that hits both the front and back of the CSPV cell into electricity. Whereas most CSPV cells have a metalized back layer, bifacial cells allow light through to the back side of the CSPV cell. They often incorporate either PERC or heterojunction technologies. When incorporated into modules, they use a transparent back sheet or rear glass layer to allow sunlight to pass through to the rear of the CSPV cell. Hybrid (heterojunction) cells include thin layers of photosensitive semiconductor materials (typically amorphous silicon) on top of a monocrystalline wafer. CR/PR at Figure I-16; CR at I-46 to I-49; PR at I-34 to I-37.

[294] *See, e.g.*, Sunpower's Prehearing Injury Brief at 3-5, 19-20; Hanwha America's Prehearing Injury Brief at 10-15, 18-19; KOPIA's Injury Prehearing Brief at 19-23.

[295] Several purchasers and one importer reported that certain types of products were only or primarily available from non-U.S. sources. For example, several purchasers stated that the higher efficiency modules are manufactured primarily in Asia and are not available from any U.S. producers. Six purchasers reported that multicrystalline PERC CSPV products are primarily only available in Taiwan, Korea, Japan, China, and Malaysia. Two purchasers stated that n-type monocrystalline CSPV products are only available from LG Electronics in Korea. CR at V-21; PR at V-15. Three importers and one purchaser reported that interdigitated back contact solar CSPV products are not manufactured in the United States and are not interchangeable with front-contact CSPV products. CR at V-24; PR at V-16.

monocrystalline cells accounted for less than 5 percent of global CSPV cell production,[296] and there were a relatively small number of manufacturers of these products, including LG, Panasonic, SunPower, and Yingli.[297] Moreover, contrary to respondents' assertion, there was domestic production of n-type monocrystalline CSPV products in the United States during the POI.[298] Indeed, despite the closures of numerous domestic producers and the inability of a number of domestic producers to generate adequate capital to finance facility expansions or upgrades or research and development efforts discussed earlier, the domestic industry supplied a wide variety of monocrystalline and multicrystalline products that overlapped with imported CSPV products, including CSPV products with 2, 3, 4, and 5 busbars,[299] PERC products (including ***),[300] frameless (glass-glass) modules,[301] heterojunction cells,[302] bifacial products,[303] and

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[296] Whereas most monocrystalline CSPV wafers are p-type wafers where the silicon is doped with boron, n-type wafers are manufactured by doping the silicon with phosphorous to create a negative electrical orientation. In the cell production process, a positive layer is added to create the p/n junction. These n-type cells can be more expensive to manufacture, but they benefit from higher conversion efficiencies and no light-induced degradation, and they can be manufactured from wafers that are less pure. CR at I-29, I-43 to I-44; PR at I-21, I-32 to I-33.

[297] CR at I-44; PR at I-32; CR/PR at Figure I-16.

[298] Mission Solar opened its n-type monocrystalline photovoltaic cell production line in 2014, ***, and closed the CSPV cell production line in September 2016 ***. CR at III-9 to III-10; PR at III-5 to III-6.

[299] Many manufacturers are increasing the number of the busbars (the wider metal strips that carry electricity from the thin metal strips on the solar cells to the junction box) in CSPV cells to yield higher efficiencies and greater power output. Three-busbar cells accounted for slightly more than half the global market in 2016, down from more than 80 percent in 2014. Four or more busbar cells accounted for more than 40 percent of the market in 2016 and are forecast to account for close to 60 percent of the global market in 2017. Five busbar cells accounted for less than 10 percent of the global market in 2016, but are also forecast to gain market share in 2017. CR at I-49 to I-50; PR at I-36.

[300] PERC cells incorporate an additional rear dielectric layer that reflects light that did not generate electricity as it initially passed through the CSPV cell back into the CSPV cell, providing an additional opportunity for the CSPV cell to absorb this light. PERC cells have a higher efficiency and improved performance compared to other CSPV cells in certain conditions, such as low-light and high-heat conditions. PERC and related technologies accounted for more than 10 percent of the global market in 2016, and their production (particularly of monocrystalline PERC) is expected to significantly increase in the next few years, with one estimate projecting more than 15 GW of global PERC production in 2017. SolarWorld was the first company to commercialize PERC production, with Sunrise Global, Hanwha QCells, and REC also starting commercial production relatively early. Among module suppliers listed by Taiyang News, SolarWorld has the highest monocrystalline PERC production efficiency (at 21.6 percent), followed by Trina (21.12 percent) and Tainergy and Talesun (21.1 percent), though a number of suppliers have only slightly lower efficiencies. Trina has the highest multicrystalline production efficiency among module suppliers listed by Taiyang News (19.86 percent), followed by HT-SAAE (19.8 percent), and Astronergy and Suntech (19.7 percent). CR at I-44 to I-46; PR at I-33 to I-34.

[301] Some photovoltaic modules do not use a frame, which reduces costs. These typically use a glass as the rear layer to ensure mechanical stability. Frameless modules account for less than 5 percent of the global market. CR at I-51; PR at I-38.

hybrid CSPV products.[304] Even Hanwha Q concedes that its multicrystalline modules with rear-side passivated cells are "similar to PERC technology."[305] Additionally, the pricing data reflect that the domestic industry and importers of CSPV products generally reported sales of CSPV products within similar efficiency and wattage ranges.[306] Moreover, despite the existence of some variations in product offerings between imports and U.S.-manufactured CSPV products,

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[302] Heterojunction cells, which include heterojunction with intrinsic thin layer ("HIT"), add thin layers of photosensitive semiconductor materials (typically amorphous silicon) on top of a monocrystalline wafer. These additional layers increase the absorption of sunlight, and the overall efficiencies of the CSPV cells. They also perform better in hot climates than typical monocrystalline cells. They are more expensive to produce and are difficult to scale up to commercial production, however, so only a few companies currently manufacture this technology. Panasonic was the first large-scale producer of heterojunction cells globally and held many of the key patents related to heterojunction technology until they expired in 2010. Other companies with production of heterojunction cells include BenQ Solar, Ecosollifer, Hevel, Kaneka, Sunpreme, and Tesla. Solartech Universal assembles modules from heterojunction cells. Meyer Burger also offers a turnkey production line for heterojunction cells. Heterojunction cells account for less than 5 percent of the global market. CR at I-47 to I-48; PR at I-35.

[303] As indicated earlier, bifacial cells convert sunlight that hits both the front and back of the CSPV cell into electricity, and they often incorporate either the PERC or heterojunction technologies discussed above. Bifacial cells increase energy production, but are also more expensive to manufacture. The extent to which energy production increases depends in part on the characteristics of the surface below the installed modules. As of early 2017, bifacial modules were commercially available in the U.S. market from about eight companies, including LG, Lumos Solar, Mission Solar, Prism Solar, Silfab, SolarWorld, Sunpreme, and Yingli Solar. Despite the relatively limited number of current suppliers, ***. Globally, bifacial modules accounted for 1 to 2 percent of the global module market in 2015 but the market share was projected to grow in the next five years. CR/PR at Figure I-16; CR at I-47 to I-49; PR at I-35 to I-36.

[304] *See, e.g.*, CR at III-9 to III-17, III-22; PR at III-5 to III-11; CR/PR at Table II-5 (imported technologies), Table III-2, Table III-6 (U.S.-manufactured technologies). Among the larger U.S. importers, ***, which accounted for *** percent of total CSPV product imports, respectively, reported imports of monocrystalline and multicrystalline CSPV products. ***, which accounted for *** percent of total U.S. CSPV product imports also reported monocrystalline and multicrystalline CSPV products as well as hybrid CSPV products. ***, which accounted for *** percent of total CSPV product imports, reported imports of monocrystalline and multicrystalline as well as PERC CSPV products. CR at II-16; PR at II-14.

[305] Hanwha America's Prehearing Injury Brief at 10-11.

[306] CR/PR at Table V-11; CR at V-33; PR at V-22. On May 1, 2014, the U.S. Department of Justice indicted members of China's People's Liberation Army for unauthorized access to SolarWorld's computer network. The indictment included allegations of corporate espionage and theft of intellectual property. Injury Hearing Tr. at 234-35 (Brightbill); *see also, e.g.*, Suniva's Posthearing Remedy Brief at 25-27, Exhibit 12; SolarWorld's Posthearing Remedy Brief at 3, 4, Exhibit 51, Section XVII; https://www.justice.gov/iso/opa/resources/5122014519132358461949.pdf.

all CSPV products convert sunlight into electricity, and CSPV products made from different technologies compete with each other on the basis of electrical output and cost.[307]

As further evidence that the domestic industry supplied quality products during the POI, SolarWorld reported that it was the first to offer a 25-year warranty, a 30-year warranty, and a 20-year workmanship warranty, which it was able to do given that its warranty rate was far lower than many other producers.[308] Most U.S. producers, importers, and purchasers reported that U.S.-produced CSPV products were interchangeable with imported CSPV products.[309] Additionally, independent research firm EuPD Research ranked SolarWorld as the most purchased brand by U.S. installers and the *** recommended brand by U.S. installers.[310] Furthermore, most purchasers reported that no domestic or foreign supplier had failed in its attempt to qualify product or had lost its approved status since 2012.[311]

Respondents also argue that domestic producers were not "bankable" for large-scale commercial and utility purchases and lacked "Tier 1" status on the Bloomberg BNEF Tier 1 list.[312] Although they acknowledge that the industry has no standard definition of bankability,[313] respondents contend that it includes factors such as "creditworthiness" and performance of the product over time and may vary from project to project or customer to customer.[314] In their

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[307] Respondents' arguments are inconsistent with their statements, discussed below, that competition occurs between CSPV products and other conventional or renewable sources of electricity (such as natural gas and thin film).

[308] SolarWorld's Posthearing Injury Brief at 6-7, Exhibit 1, section I at 2-3, section II Suniva's Posthearing Injury Brief at Exhibit 9 at 5; Injury Hearing Tr. at 106-107. Suniva reported that its warranty claim rate was below 0.05 percent. Injury Hearing Tr. at 103.

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

[310] SolarWorld's Posthearing Injury Brief at Exhibit 1, section II at 5-8; Injury Hearing Tr. at 107.

[311] Nineteen of 95 responding purchasers reported that a domestic or foreign supplier had failed in its attempt to qualify product or had lost its approved status since 2012 for reasons such as customer service, financial strength, broken commitments, cell cracks, use of thinner frame, quality control, bankability, failed audit, efficiency, delivery rates, and prefer local manufacturer. Three purchasers stated that both SolarWorld and Yingli had lost their approved status due to financial distress. CR at V-22; PR at V-15.

[312] SunPower's Posthearing Injury Brief at Appendix at vii-viii; SEIA's Posthearing Injury Brief, Appendix A, Question 30; SEIA's Prehearing Injury Brief at 72; Hanwha America's Prehearing Injury Brief at 39-41; CCCME's Posthearing Injury Brief at 10.

[313] At a minimum, bankability encompasses both the financial viability of a supplier and the product's performance reliability, especially in the CSPV industry where manufacturers provide warranties of 25 years or longer on their products; bankability also allows installing firms to apply for non-recourse loans for their solar development projects. In the *CSPV I* investigations, one U.S. producer reported that producers in China were seen as more "bankable" because of ease of access to credit from "state-owned" banks, low risk of bankruptcy, and ability to fulfill warranties. *See, e.g.*, *CSPV I*, USITC Pub. 4360 at 11 n.84, 27-28.

[314] More specifically, respondents argue that Suniva failed to qualify as a Tier 1 supplier, which precluded the firm from supplying major utility projects, and a $676 million judgment against SolarWorld's German parent for breach of its contract with Hemlock Semiconductor under four take-or-

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questionnaire responses, however, purchasers did not identify "bankability" as one of their "top three" purchasing factors,[315] and only three of 56 responding importers indicated that developers, installers, and project owners chose module suppliers with high bankability that are listed as Tier 1 suppliers.[316] Even Bloomberg cautions banks and module producers against relying heavily on its list.[317] Moreover, SolarWorld (***) qualified as a Bloomberg Tier 1 supplier in 2014, 2015, all of 2016, and through February 2017;[318] its subsequent loss of bankability provides added confirmation of the serious injury substantially caused by increased imports.[319]

Respondents also allege that domestic producers focused their business models on the higher-profit residential and commercial segments of the U.S. market and until recently did not seek to compete for lower-margin, higher-volume utility sales (the bulk of which were greater than 20 MW projects in 2016), even though utilities were the fastest-growing segment that accounted for the largest share of the market.[320] Respondents also report being unaware of any domestic producer that is able "to provide the required combination of product type and

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pay long-term supply agreements for polysilicon harms SolarWorld's financial reputation and bankability among potential purchasers. SunPower's Posthearing Injury Brief at Appendix at vii-viii; SEIA's Posthearing Injury Brief, Appendix A, Question 30, Question 43; SEIA's Prehearing Injury Brief at 72, 91-92, Exhibit 86; Hanwha America's Prehearing Injury Brief at 3, 39-41, 44-47; CCCME's Posthearing Injury Brief at 10 (citing Injury Hearing Tr. at 263 (Lamon)); 8minutenergy Renewable's Prehearing Injury Submission at 20-21.

[315] Purchasers reported price (81 firms), quality/performance (77 firms), and availability (42 firms) as important purchasing factors, with bankability a distant fourth (15 firms). CR/PR at Table V-4.

[316] CR at V-25; PR at V-17.

[317] SolarWorld's Posthearing Injury Brief at 8; Suniva's Posthearing Injury Brief at 6, Exhibit 9 at Question 15.

[318] Indeed, during *CSPV I*, respondents even acknowledged that the major U.S. producers were bankable. *CSPV I*, USITC Pub. 4360 at 28.

[319] SolarWorld's Posthearing Injury Brief at 2, 7-8, Exhibit 1 section II at 9-10; Injury Hearing Tr. at 144 (Stein) (also explaining that the Hemlock Semiconductor judgment involves a subsidiary of SolarWorld's parent and has "nothing to do with SolarWorld Americas."). According to Suniva, to qualify for Tier 1 status, a producer would need to demonstrate that it had supplied modules to at least six different projects that were financed by non-recourse debt from six different banks in the preceding two years. Suniva reported that "the unrelenting pressure of low-priced imports" forced it out of the utility segment and necessitated that the firm shift its focus to projects that did not rely on such non-recourse loan funding, which implicated the firm's ability to achieve Tier 1 status. Suniva's Posthearing Injury Brief at Exhibit 9 at Question 15.

[320] SEIA's Prehearing Injury Brief at 19-23; Hanwha America's Prehearing Injury Brief at 7-8, 33-41 and Exhibit 26; SEIA's Posthearing Injury Brief at 6-7 (citing Injury Hearing Tr. at 163-64 (Card), 325 (Grace), Appendix A at 126-127, Question 13; 8minutenergy Renewables' Posthearing Submission at 2-7.

demonstrated product performance" demanded by utilities.[321] The vast majority of CSPV modules sold in the U.S. market are connected to the electricity grid.[322] As discussed earlier in these Views, there are three broadly defined grid-connected market segments – residential,[323] commercial,[324] and utility[325] – although the segments overlap somewhat.[326] Since 2009 – the first year of the period examined in the *CSPV I* antidumping and countervailing duty investigations – there has been a shift in the distribution of sales among the three market segments. In 2009, the commercial segment accounted for the largest share of the market, followed by the residential and utilities segments,[327] whereas throughout the 2012 to 2016 POI

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[321] SunPower's Posthearing Injury Brief at Appendix at xviii-xix; KOPIA's Posthearing Injury Brief at Exhibit 2; 8minutenergy Renewables' Posthearing Injury Submission at 12-13, Exhibit 17; Injury Hearing Tr. at 325.

[322] CR at V-1; PR at V-1; Injury Hearing Tr. at 185-86 (Card, Messer).

[323] In the residential segment, CSPV systems are installed at individual homes, typically on the roof or sometimes mounted on the ground. These systems may use a central inverter that connects to multiple modules or a microinverter attached to each module to convert direct current to the alternating current used in the grid. Homeowners use energy from the grid when solar electricity generated by their residential system is insufficient to meet demand and often feed energy back into the grid when the system generates more than the home uses. CR at I-33; PR at I-25. Many installers of residential systems offer financing options to the customers, and some also offer customers the option to lease or purchase the power from the system (known as third-party ownership) instead of buying the system. CR at I-39 to I-40; PR at I-29 to I-30.

[324] Nonresidential systems are installed at commercial, industrial, government, and similar buildings and sites. They function similarly to residential installations, providing electricity to meet on-site needs, pulling additional electricity from the grid when needed, and feeding excess electricity back into the grid when not needed. CR at I-34 to I-35; PR at I-26. Many commercial installers offer financing and third-party ownership options to customers. CR at I-40; PR at I-30.

[325] Utility systems provide electricity directly to the grid instead of using the electricity on-site. These systems are generally ground-mounted and tend to use central inverters rather than microinverters. These systems may utilize fixed-tilt, single-axis tracking (panels rotate to follow the east-west movement of the sun) or dual-axis tracking that also rotates to follow the north-south movement of the sun during the year). Between 2012 and 2015, 72 percent of installed systems larger than 5 MW used tracking, with most using single-axis tracking. Prior to 2012, most U.S. utility installations involved 600 volts, but higher-voltage (1,000-volt) systems became increasingly common between 2012 and 2016, and by the end of this period, 1,500-volt systems were introduced in the U.S. market. These higher-voltage systems use fewer balance of system components, require less installation time, reduce electricity losses, and lead to higher inverter efficiencies, resulting in lower energy costs. CR at I-35 to I-36; PR at I-27.

[326] For example, many nonresidential installers also install residential CSPV systems, and what some consider to be a large commercial installation might qualify as a utility installation to others. *See, e.g.*, CR at I-34, I-39; PR at I-24, I-29.

[327] *CSPV I*, USITC Pub. 4360 at 29 n.258, Figure II-1 (identifying shipments to the commercial segment of 241,520 GW in 2009 compared to 195,391 GW for the residential segment, and 30,407 GW for the utility segment).

in the instant safeguard investigation, utilities were the largest segment of the U.S. market,[328] followed by the residential and commercial segments.[329] All three on-grid segments experienced considerable growth in both the number of installations and the total wattage of installation projects during the POI.[330]

During the POI, the domestic industry and importers each sold CSPV products in the U.S. market to distributors,[331] residential and commercial installers, and the utility segment.[332] Imported and U.S.-manufactured CSPV products also were sold in similar channels of distribution to overlapping segments of the market.[333] Installation size varies by segment, but the size of installations generally has grown over time in each segment.[334] The installers in the residential[335] and commercial segments[336] are more fragmented than the project developers

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[328] In 2016, 10.6 GW of photovoltaic products was installed in the utility segment (including thin film), compared to 2.6 GW in the residential segment, and 1.6 GW in the commercial segment. CR at I-39; PR at I-29; CR/PR at Figure V-1.

[329] CR/PR at Figure V-1.

[330] Residential installations increased by 423 percent between 2012 and 2016, and utility installations increased by 488 percent. CR at V-1 to V-2; PR at V-1 to V-2; CR/PR at Figure V-1.

[331] Distributors typically sell CSPV products into the residential and commercial market, including to installers, although Suniva reported that some of its sales to distributors served the utility segment. CR at I-37 at nn.99, 100; PR at I-29 at nn.99, 100.

[332] CR at I-37 to I-38; CR/PR at Table I-1; PR at I-28. Domestically produced CSPV cells are typically consumed to produce solar modules by U.S. producers, although a minor amount were sold to firms that fabricate modules or panels. CR/PR at Table I-1.

[333] CR/PR at Table I-1; CR at I-15; PR at I-11.

[334] According to the U.S. Energy Information Administration ("U.S. EIA"), the average size of a residential photovoltaic system (including thin film) is 5 kW, whereas commercial installations average 200 kW, and utility projects are defined as those having a capacity of 1 MW and above. CR at V-2 n.7; PR at V-1 n.7. According to NREL, the median size of residential installations increased from 5.5 kW in 2012 to 6.1 kW in 2015; the median size of non-residential installations 500 kW or less was 31 kW in 2015 but may be substantially larger, with NREL (which uses a different definition of utility systems than the U.S. EIA) reporting a median size of 1.1 GW for systems 500 kW or greater. Between 2012 and 2016, the median size of utility projects was 4.9 MW and the mean size was 17.15 MW. CR at I-33 to I-35; PR at I-24 to I-27. According to the U.S. EIA, the average utility project increased from 10 MW in 2014 to more than 17 MW in 2016, and according to respondent SEIA, 82 percent of utility installations in 2016 were greater than 20 MW, and 13 percent were less than 10 MW. CR at V-3 at n.10; PR at V-2 at n.10.

[335] According to one survey, the median volume installed by a residential installer in 2016 was 500 kW. In 2015, there were several thousand residential solar installers, most of which were relatively small firms, but several larger firms operated in multiple states, with the top three installers accounting for 48 percent of U.S. residential installations in the second quarter of 2016. CR at I-39; PR at I-29. By comparison, in 2012, there were more than 2,000 active residential installers in the U.S. market, with the top six firms collectively accounting for less than one-third of the U.S. market. *CSPV II*, USITC Pub. 4519 at II-5.

[336] In 2015, there were over 1,000 commercial installers, many of which also installed residential systems. The majority of them were small, with one survey reporting median installations of 285 kW for commercial installers in 2016. The top three commercial installers accounted for about 26 percent of (Continued…)

and the engineering, procurement, and construction ("EPC") firms in the utility segment.[337] The utility segment is acutely price sensitive, often involving a bidding process by which project developers or EPC firms submit bids, and once the contract has been awarded, the project developer or EPC enters into a supply agreement with a manufacturer to source the CSPV modules.[338] Utility bids often involve price renegotiations throughout the project.[339]

Although the vast majority of the domestic industry's shipments went to residential and commercial installers throughout the POI,[340] SolarWorld and Suniva each provided information indicating that they competed for and shipped to the utility segment of the market. SolarWorld reported that it currently is capable of supplying modules for projects up to ***, and that it has sold up to *** of modules for a single project during the POI.[341] Suniva reported servicing the "small utility market" during the POI.[342] SolarWorld provided a list of *** projects for the utility segment totaling *** that it bid on during the period, of which it won *** projects totaling ***. SolarWorld also supplied an additional *** of modules to customers for utility projects through supply agreements with various companies.[343] Suniva provided a list of *** winning bids in the utility segment, which totaled *** during the POI.[344] Thus, the domestic industry sold or tried to sell CSPV products to utilities throughout the POI in addition to the residential and commercial segments, but was frequently unable to win large bids in this segment. Moreover, the domestic industry lost market share to imports regardless of the segment.[345]

(…Continued)
the U.S. commercial market in 2015, whereas the top five firms accounted for less than 25 percent of installations by wattage in 2012. CR at I-40 to I-41; PR at I-29 to I-31; *CSPV II*, USITC Pub. 4519 at II-5.

[337] Developers of utility projects include firms whose primary business is project development; firms that produce equipment (*e.g.*, modules) and develop projects; unregulated entities related to major utility companies; other independent power producers that primarily produce electricity for sale in the wholesale market; utilities; and other firms. Project developers may perform EPC services, or large contractors often handle these services. The top nine utility project developers in 2016 accounted for a combined 70 percent of the utility market in 2016, and the top nine EPC firms accounted for 69 percent of the market. CR at I-41; PR at I-30. By comparison, the top five utility project developers accounted for 59 percent of U.S. projects completed in 2012. *CSPV II*, USITC Pub. 4519 at II-5 to II-6.

[338] CR at V-3 to V-4; PR at V-2 to V-3.

[339] For example, NRG, one of the largest independent power producers in the United States whose projects can reach 200 MW in size, reported that it specifies the design of a module required for a utility project three years in advance of construction, solicits requests for proposals approximately 12 months from construction, and makes its final module selection no later than 6 months prior to the start of construction. CR at V-4 at n.15; PR at V-4 at n.15.

[340] CR/PR at Table I-1.

[341] SolarWorld's Posthearing Injury Brief, Exhibit 1 at 23-26.

[342] Injury Hearing Tr. at 100-101, 165 (Card); Suniva's Posthearing Injury Brief, at Exhibit 9 at 1-2, Attachment A.

[343] SolarWorld has supply agreements with EPCs such as DEPCOM and Borrego, and therefore has limited information on specific bid proposals for which its modules were used. SolarWorld's Posthearing Injury Brief at Exhibit 1 at 22-23.

[344] Suniva's Posthearing Injury Brief, Exhibit 9 at 1-2, Attachment A.

[345] CR/PR at Table I-1, Table C-4.

Respondents also allege that the domestic industry was either unable to produce or lacked sufficient capacity to produce 72-cell modules, which, along with thin film, they contend became the standard for utility installations by 2013-2014.[346] Residential and smaller commercial installations typically use 60-cell modules due to their higher conversion efficiency and smaller size, whereas the majority of utility projects now use 72-cell modules that are typically less expensive to install due to lower labor and balance of system costs per kW installed.[347] Utilities previously also purchased 60-cell modules, including 60-cell monocrystalline modules.[348] Contrary to respondents' arguments, the record showed that the domestic industry sold both 60-cell and 72-cell modules throughout the POI and lost market share to imports for both types of modules, accounting for *** percent of U.S. shipments of 60-cell modules and *** percent of U.S. shipments of 72-cell modules in 2016.[349] SolarWorld reported that *** it added a 72-cell module assembly line to its U.S. facilities in 2016 due to increasing demand in the utility market.[350] Suniva devoted 45 percent of its cell manufacturing capacity to 72-cell modules to serve the commercial and "small utility" market during the POI.[351] Moreover, the domestic industry consistently supplied monocrystalline modules, which as noted above convert sunlight more efficiently than multicrystalline products.[352] Purchasers do not generally specify whether they want monocrystalline or multicrystalline CSPV products, and since both technologies were sold in all segments of the U.S. market, prices of multicrystalline CSPV products affected prices of monocrystalline products and *vice versa*.[353]

Thus, the evidence indicates that the domestic industry clearly sought to compete in the large, concentrated, and price-sensitive utility market, but the large volume of imports at low and declining prices adversely impacted the domestic industry's financial performance, making it difficult for the domestic industry to increase capacity to a scale that made it more

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[346] SEIA's Posthearing Injury Brief, Appendix A, Question 13, Question 14 (acknowledging that Suniva manufactured 72-cell modules early but lacked large-scale capacity and arguing that SolarWorld was very late to manufacture them and instead imported them from its affiliates). SEIA argues that SolarWorld delivered 72-cell modules made in Thailand for a utility project in Oregon that specifically requested U.S.-manufactured modules. SEIA's Posthearing Injury Brief at 7, Exhibit 88.

[347] CR at V-1; PR at V-1.

[348] Respondents acknowledge that, at the beginning of the POI, 60-cell modules predominated in all three segments, but they argue that the utility segment shifted to 72-cell modules to reduce balance of system costs. *See, e.g.*, 8minutenergy Renewable's Prehearing Injury Brief at 5, 10-14; *CSPV I*, USITC Pub. 4360 at 38.

[349] CR/PR at Table C-5 (market share); CR/PR at Table V-11 (pricing data).

[350] SolarWorld's Posthearing Injury Brief at 10; Injury Hearing Tr. at 108.

[351] Injury Hearing Transcript at 100-101, 164 (Card).

[352] CR/PR at Table V-11. Indeed, the market is moving towards monocrystalline and PERC products. *See, e.g.*, Injury Hearing Tr. at 109.

[353] *See, e.g.*, *CSPV II*, USITC Pub. 4519 at 36, 41; SolarWorld's Posthearing Injury Brief at 4-5; Suniva's Prehearing Injury Brief at 47-51; Suniva's Posthearing Injury Brief at 4, Exhibit 9 at Question 4; Injury Hearing Tr. at 108-109.

competitive in this segment, even if it managed to develop and even pioneer innovative products that utilities and others sought.

Respondents also argued that the domestic industry had delivery and service issues or failed to compete for certain sales.[354] Petitioners responded to these allegations, often with detailed explanations.[355] The evidence simply does not support the sort of widespread problems alleged by respondents.[356]

Thus, the record does not support respondents' contentions that the domestic industry was unable to provide quality products, failed to serve certain segments of the market, or suffered widespread delivery and service issues.

2. Factors Other Than Imports That Allegedly Led to Price Declines

Respondents argued that factors other than imports, such as declining government incentive programs, declining polysilicon raw material costs, and the need to meet grid parity with other sources of electricity, explain any declines in prices of CSPV products and the condition of the domestic industry.

We do not find that changes in incentive programs explain the domestic industry's condition, although we recognize that changes in the availability and scope of Federal, state, and local government incentives and regulations continue to affect the price of and demand for

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[354] SEIA's Posthearing Injury Brief, Appendix A at 114-120, Question 30, Question 31, Question 33. SEIA's Prehearing Injury Brief at 72, 82-90 (alleging quality issues with Suniva's products and delivery delays). Respondents argue that SolarWorld ***, and they cite instances where SolarWorld supplied imported instead of U.S. products, supplied ***, ***, or recalled over 1.5 million solar panel systems. SEIA's Prehearing Injury Brief at 91-95; SEIA's Posthearing Injury Brief at 9-10.

[355] For example, SolarWorld reports that much of the delivery delays discussed by NEXTracker at the hearing resulted from NEXTracker's ***, any alleged product specification issues with NEXTracker resulted from NEXTracker's ***, and contrary to NEXTracker's testimony, NEXTracker never notified SolarWorld that it had removed SolarWorld as an approved vendor, NEXTracker's website still lists SolarWorld as an approved vendor, and SolarWorld continues to supply NEXTracker projects. SolarWorld's Posthearing Injury Brief at Exhibit 1, section II at 8, 10-13, Exhibits 12-16. SolarWorld also provided documentation responding to allegations regarding transactions with DEPCOM, California Solar System, Borrego, and SunRun. SolarWorld's Posthearing Injury Brief, Exhibit 1, section II at 14-20, Exhibits 17-25; *see also* Suniva's Posthearing Injury Brief at 5-6; Injury Hearing Tr. at 107.

[356] For example, Sunrun reported that both SolarWorld and Suniva refused to participate in the Sunrun Vendor Quality Management Program, thereby preventing Sunrun from approving them for systems financed by investors. SolarWorld reported that it chose not to participate in the program because Sunrun required SolarWorld to release its bill of material, which is SolarWorld's intellectual property. Suniva stated that it participated in preliminary stages of negotiation with Sunrun but determined that the two firms were too far apart on price and therefore it did not make sense for Suniva to spend the money to go through the qualification process. CR at V-22 to V-23; PR at V-15; Injury Hearing Tr. at 239-40 (Messer), 241 (Card), 269-72 (Fenster).

CSPV products.[357] These incentives offset the cost of generating solar or other renewable energy, mandate its use, or otherwise influence its price, thereby stimulating demand for renewable energy-generated electricity and assisting developers of solar power and other renewable energy sources to achieve sufficient economies of scale to become more competitive with conventional sources of electricity.[358] These mechanisms benefit systems owners, and typically are not directed at any particular domestic or foreign manufacturer of CSPV products.[359] These incentives and their benefits were designed to decline over time, with the expectation that the cost to generate solar-powered electricity would also fall.[360]

Although some programs have expired, others continue. Most questionnaire respondents reported that the level or availability of Federal incentives has changed since 2012. Between 2015 and 2016, U.S. installations of on-grid photovoltaic systems (which include thin film) increased 97 percent. This growth, primarily in the utility segment, was driven by the anticipated December 2016 expiration of the 30 percent Federal Investment Tax Credit;[361]

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[357] CR at V-10, V-50; PR at V-6. Government incentives designed to lower the cost of solar project development include various tax credits, revenues from the sale of solar renewable energy certificates, cash grants in lieu of credit, accelerated depreciation, and loan guarantees, of which tax credits were the most common form of Federal incentives. In some states, the Public Utility Regulatory Policies Act of 1978, which requires utilities to purchase electricity from qualifying facilities (renewable projects that meet size requirements) at the utility's avoided cost, has led to the development of more solar projects for the utility segment. Renewable portfolio standards, a widespread state regulatory measure, mandate that entities supplying electricity, such as utilities, generate or buy a portion of their retail electricity sales from renewable energy sources, including solar electricity, thereby increasing demand for CSPV products. States and utilities also encourage the installation of solar projects through renewable energy rebates, feed-in-tariffs, or net metering incentives. Renewable energy rebates refund a portion of the system installation costs to customers that install photovoltaic systems, whereas feed-in-tariffs pay solar electric generators a known rate for electricity fed into the grid over a period of 15 to 20 years. Under net metering, residential and commercial customers that generate their own solar electricity receive credit for excess electricity that they feed back to the grid, but utilities have lobbied against net metering policies on the basis that they reduce the number of ratepayers that are needed to cover the large costs of traditional power generation and grid maintenance. CR at V-51 to V-56; PR at V-31 to V-36.

[358] CR at V-51 to V-56; PR at V-31 to V-36; CR/PR at Table V-21; *CSPV II*, USITC Pub. 4519 at II-24 to II-28.

[359] CR at V-51; PR at V-31. The Advanced Energy Manufacturing Tax credit and the U.S. Department of Energy's section 1705 Loan Guarantee program were designed to provide direct financial assistance to U.S. manufacturers of U.S. CSPV products and other renewable energy sources, but have expired. The U.S. Department of Energy's SunShot Initiative continues to assist manufacturers of solar energy, including CSPV manufacturers, primarily in research and development initiatives. CR/PR at Table V-21.

[360] CR at V-52; PR at V-31 to V-33.

[361] CR at V-2; PR at V-2; CR/PR at Figure V-1. The Federal Investment Tax Credit provided a 30 percent tax credit on capital expenditures for new solar photovoltaic systems for the residential, commercial, and utility segments. CR/PR at Table V-21. The program was initially scheduled to expire (Continued…)

instead of allowing the program to expire, Congress extended it for several more years.[362] When asked how changes in the level of Federal incentives had changed demand for CSPV products since 2012, most firms reported that changes to Federal incentives had not changed demand for CSPV products; those that reported an increase in demand for CSPV products identified the level of Federal incentives as the reason for the increase, noting the extension of the Federal Investment Tax Credit.[363] Questionnaire respondents also reported that the U.S. Treasury Department's cash grant program under section 1603 of the Recovery and Reinvestment Tax Act expired in 2016.[364] Questionnaire respondents were divided on whether the level or availability of state and local incentives had changed since 2012,[365] but a plurality of them reported an increase in the demand for CSPV products due to the availability of state and local incentives.[366] Most questionnaire respondents reported that the availability of these incentives has led to a decrease in the price of solar-generated electricity, and several attributed the decline in the price of solar-generated electricity to the increase in supply of solar-generated electricity in the market place.[367] We find that the existence of these incentive programs has made CSPV products more cost-competitive with other sources of electricity. Moreover, any decline in incentives has not led to declines in apparent U.S. consumption. Instead, demand continued to experience robust growth throughout the POI, including in states most affected by changes in incentive programs, such as California.[368] Indeed, in 2016, solar power was the largest source of new electric generating capacity, accounting for 39 percent of all new electric generating capacity installed in the United States.[369]

(…Continued)
on December 31, 2007, but was repeatedly extended. *See, e.g.*, USITC Pub. 4360 at Table II-4 (noting possible expirations of December 31, 2007 and December 31, 2008); USITC Pub. 4519 at Table II-10 (noting that projects must be commissioned by end of 2015 for 30 percent tax credit); CR/PR at Table V-21 (noting that projects must be commissioned by the end of 2019 for 30 percent tax credit, 26 percent tax credit in 2020, 22 percent in 2021, and after 2021 residential drops to zero while commercial and utility drop to a permanent 10 percent and that projects commenced before December 2021 may still qualify for the Investment Tax Credit if they are placed in service before December 31, 2023).

[362] CR/PR at Table V-21.

[363] The largest share of responding producers, importers, and purchasers reported "no change" in how the availability of Federal government incentives affected demand for CSPV products, with the next largest share reporting that the availability of Federal government incentives "increased" demand for CSPV products since 2012. CR/PR at Table V-23; CR at V-57; PR at V-36.

[364] In lieu of the Federal Investment Tax Credit, the Treasury Department's section 1603 program provided cash grants of up to 30 percent of eligible capital expenditures for commercial solar projects. To qualify, the project needed to be under construction by the end of 2011 and completed by the end of 2016. CR at V-56; PR at V-35; CR/PR at Table V-21, Table V-22.

[365] CR/PR at Table V-22; CR at V-56 to V-57; PR at V-35 to V-36.

[366] CR/PR at Table V-23; CR at V-57; PR at V-36 (noting that U.S. producers, importers, and purchasers most often described state renewable portfolio standard mandates as a mechanism that increased demand for CSPV product installations).

[367] CR at V-57 to V-58; PR at V-35 to V-37.

[368] *See, e.g.*, CR at V-54 to V-60; PR at V-34 to V-38.

[369] CR/PR at Figure V-2; CR at V-11; PR at V-6.

We also considered the role of raw material costs in the price declines experienced during the POI. As we found above, raw materials account for the largest component of the total cost of goods sold for both CSPV cells and CSPV modules.[370] Raw material costs for CSPV modules, much of which is the cost of the CSPV cell, accounted for 84.9 percent of U.S. CSPV module producers' total cost of goods sold in 2016, up from 58.2 percent in 2012.[371] Raw material costs for CSPV cells accounted for *** percent of U.S. CSPV cell producers' total cost of goods sold in 2016, up from *** percent in 2012.[372] Polysilicon is a key raw material used in the production of the wafers that are used to manufacture CSPV cells and other high-tech products.[373] Historically, polysilicon costs have been volatile.[374] During the POI, the price of polysilicon ingots and wafers fluctuated but declined overall by 52.6 percent for ingots and by 54.5 percent for wafers.[375] Despite declining polysilicon costs, which would help make CSPV products more cost-competitive with other sources of electricity, declines in the domestic industry's net sales values kept pace with declines in its costs, leading to substantial losses throughout the POI.

Respondents also point to the need for CSPV products to attain grid parity to compete with electricity generated from other sources such as natural gas to explain declines in the price of CSPV products and the domestic industry's condition. A plurality of importers and purchasers reported that changes in the price of conventional energy have decreased the price of solar-generated electricity.[376] In addition, firms reporting that changes in the price of U.S. conventional energy have increased demand cited a positive relationship between electricity rates and the demand for PV systems and modules.[377] While conventional energy prices may account for some of the decrease in the prices of CSPV products in some years, they do not explain the consistent observed price declines over the 2012-2016 period.[378] The price of natural gas for electricity generation increased in the latter half of 2012 and 2013, peaked in February 2014, and declined to its lowest level in March 2016 after which it rose and is

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[370] CR at V-27; PR at V-18.

[371] CR/PR at V-27 to V-28; PR at V-18.

[372] CR/PR at V-27 to V-28; PR at V-18.

[373] CR at V-27; PR at V-18.

[374] In 2003, global supplies of polysilicon were inadequate to meet global demand by the semiconductor industry and particularly the CSPV industry, so spot prices of polysilicon rose from $35/kg in 2003 to a high of $500/kg in 2008 (and contract prices rose from $25/kg to $85/kg in this period). By 2008, global supply exceeded global demand, and polysilicon spot and contract prices then fell substantially to an estimated $35/kg by 2012. *CSPV I*, USITC Pub. 4360 at 28.

[375] CR/PR at Figure V-7. The majority of domestic producers (9 of 11) and importers (32 of 44) reported that prices of raw materials for CSPV products have declined since 2012. CR at V-28; PR at V-19.

[376] In contrast, most U.S. producers reported that changes in the price of U.S. conventional energy have not affected the price of solar-generated electricity since 2012. CR/PR at Table V-27.

[377] CR at V-62; PR at V-41 to V-42.

[378] As noted above, grid parity is based on the levelized cost of energy which during peak periods of demand is set by natural-gas generated electricity.

projected to increase. The domestic prices of CSPV products, on the other hand, decreased throughout the POI. As discussed above, questionnaire respondents point to large volumes of low-priced imports as the reason for price declines. Indeed, rather than changes in availability of incentive programs, changes in raw material costs, or the need to meet grid parity, foreign producers' own financial disclosures attribute the decline in prices of CSPV products to global excess capacity.[379]

We consequently conclude that the alternative causes cannot individually or collectively explain the serious injury to the domestic industry, particularly the declining market share, low capacity utilization levels, facility closures, and abysmal financial performance. Accordingly, we find that increased imports are a substantial cause of serious injury to the domestic industry manufacturing crystalline silicon photovoltaic cells (whether or not partially or fully assembled into other products) that is not less than any other cause.

V. Findings Regarding Possible Exclusion of Certain Imports

If the Commission makes an affirmative determination of serious injury or threat thereof (or is equally divided on the issue), the statute requires the Commission to make a number of additional findings. The requirement for many of these findings originates in the implementing statutes for various FTAs that the United States has negotiated in the last two decades or under statutory provisions related to certain preferential trade programs.[380]

A. Findings Regarding NAFTA Imports

Under section 311(a) of the NAFTA Implementation Act, which implements article 802 of the NAFTA, if the Commission makes an affirmative determination or is equally divided on the question of injury, the Commission also must find whether

> (i) imports of the article from a NAFTA country, considered individually, account for a substantial share of total imports; and
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> (ii) imports of the article from a NAFTA country, considered individually or, in exceptional circumstances, imports from NAFTA countries considered

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[379] Suniva's Posthearing Injury Brief at 5, Exhibit 2, Exhibit 9 at 10-11, Question 12; SolarWorld's Posthearing Injury Brief at Exhibit 32.

[380] Specifically, the Commission is required to make certain additional findings under the implementing statutes for NAFTA (Canada and Mexico), CAFTA-DR (Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and the Dominican Republic), the U.S.-Australia Free Trade Agreement, KORUS, the U.S.-Colombia Trade Promotion Agreement, the Agreement between the United States of America and the Hashemite Kingdom of Jordan on the Establishment of a Free Trade Area, the U.S.-Panama Trade Promotion Agreement, the U.S.-Peru Free Trade Agreement, the U.S.-Singapore Free Trade Agreement, and the U.S./Israel Free Trade Agreement or under statutory provisions related to preferential trade programs (CBERA and GSP). *See* 19 U.S.C. § 2112 note (Jordan, Israel); 19 U.S.C. § 2253(e)(6) (GSP); 19 U.S.C. § 2703(e) (CBERA); 19 U.S.C. § 3371 (NAFTA); 19 U.S.C. § 3805 note (Australia, Colombia, KORUS, Panama, Peru, Singapore); 19 U.S.C. § 4101 (CAFTA-DR).

> collectively, contribute importantly to the serious injury, or threat thereof, caused by imports.[381]

With respect to the first prong, the statute states that imports from a NAFTA country "normally shall not be considered to account for a substantial share of total imports if that country is not among the top 5 suppliers of the article subject to the investigation, measured in terms of import share during the most recent three-year period."[382]

With respect to the second prong (whether imports from NAFTA countries individually or in exceptional circumstances, collectively, contribute importantly to the serious injury or threat of serious injury), the statute defines "contribute importantly" as an important cause, but not necessarily the most important cause.[383] In determining whether imports have contributed importantly to the serious injury or threat thereof caused by imports, the Commission is directed to

> consider such factors as the change in the import share of the NAFTA country or countries, and the level and change in the level of imports from such country or countries. Imports from a NAFTA country or countries normally shall not be considered to contribute importantly to serious injury, or the threat thereof, if the growth rate of imports from such country or countries during the period in which an injurious increase in imports occurred is appreciably lower than the growth rate of total imports from all sources over the same period.[384]

In exceptional circumstances, imports from NAFTA countries may be considered collectively in determining whether NAFTA imports have contributed importantly to the serious injury or threat. According to Statement of Administrative Action accompanying the NAFTA Implementation Act ("NAFTA SAA"), the Commission is likely to consider imports from NAFTA countries collectively when imports from individual NAFTA countries are each small in terms of import penetration, but collectively are found to contribute importantly to the serious injury or threat of serious injury.[385]

As discussed in section III above, this investigation includes several possible data sources for measuring imports and any increase in imports. For the reasons explained in section III, which we incorporate into this discussion, we relied primarily on the country-of-origin methodology that Canadian respondents proposed (the NAFTA rules of origin for imports from Canada and Mexico and for imports from all other countries, the country where the cell was

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[381] 19 U.S.C. § 3371(a); NAFTA Implementation Act § 311.
[382] 19 U.S.C. § 3371(b)(1).
[383] 19 U.S.C. § 3371(c).
[384] Section 311(b)(2) of the NAFTA Implementation Act, 19 U.S.C. § 3371(b)(2).
[385] NAFTA SAA, H. Doc. 103-159, 103rd Cong., 1st Sess. at 565 (1993).

manufactured, as adjusted to reflect U.S. cells assembled into modules in a NAFTA country) as the source for import data in this investigation.[386]

1. Finding With Respect to Imports from Canada[387]

We find that imports of crystalline silicon photovoltaic cells (whether or not partially or fully assembled into other products) from Canada do not account for a substantial share of total imports and do not contribute importantly to the serious injury caused by the imports. Accordingly, we make a negative finding with respect to imports from Canada.

According to adjusted importer questionnaire data, the industry in Canada was not among the top five suppliers of imports of CSPV products during the three most recent years.[388]

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[386] *See, e.g.*, Table II-2 , Table IV-3, Table C-1b (implementing the methodology and reducing U.S. imports from non-NAFTA sources to reflect reported information indicating that the CSPV cells were assembled into modules in Canada or Mexico).

[387] Chairman Schmidtlein does not join section V.A.1 of these Views. She finds that under section 311(a) of the NAFTA Implementation Act (19 U.S.C. § 3371(a)), U.S. imports of CSPV products from Canada account for a substantial share of total imports and contribute importantly to the serious injury caused by imports. Accordingly, she makes an affirmative finding with respect to U.S. imports from Canada.

Under section 311(a) of the NAFTA Implementation Act, a country normally will not be considered to account for a substantial share of total imports if it was not among the top five suppliers of the subject good. The Statement of Administrative Action accompanying the NAFTA Implementation Act, however, states that the use of the word "normally" in the statutory language recognizes the need for some flexibility in exercising this rule and that there may be instances in which a country not meeting this guideline should be included in the safeguards action. Although U.S. imports from Canada were not among the top five sources of imports, they were among the top ten sources during the POI. Moreover, the absolute volume of U.S. imports from Canada increased in all but one period of the POI and increased at very large rates of growth (U.S. imports from Canada increased from ***). CR/PR at Table II-2. These rates of growth exceed the corresponding rates for global U.S. imports between 2012 and 2015. Therefore, Chairman Schmidtlein finds that because these very large rates of increase warrant the use of the flexibility envisioned in the SAA, U.S. imports from Canada do account for a substantial share of total U.S. imports.

As to whether the imports from the NAFTA country "contribute importantly" to the serious injury, Chairman Schmidtlein finds that because of the large increase in the absolute volume of U.S. imports from Canada, their increasing U.S. market share from virtually zero at the beginning of the POI to *** percent in 2015, and the larger rate of growth of these U.S. imports relative to global U.S. imports, U.S. imports from Canada, considered individually, do contribute importantly to the serious injury caused by U.S. imports. CR/PR at Table C-1b.

Finally, Chairman Schmidtlein joins Commissioners Broadbent, Johanson, and Williamson in acknowledging that excluding U.S. imports from Canada from any safeguard measure may result in unrestrained imports from Canada imminently increasing to harmful levels because of the factors outlined in footnote 400, *infra*.

[388] Neither of the scenarios contemplated by the NAFTA SAA as possible reasons why the Commission might find that imports from a NAFTA country account for a substantial share of total (Continued…)

It was the tenth largest source in 2012 and 2013, the ninth largest source in 2014, the seventh largest source in 2015, and the tenth largest source in 2016.[389] Consequently, we find that imports of crystalline silicon photovoltaic cells (whether or not partially or fully assembled into other products) from Canada, considered individually, do not account for a substantial share of total imports.

We also examined whether imports of CSPV products from Canada considered individually contribute importantly to the serious injury caused by imports.[390] Imports from Canada increased from *** kW in 2012 to *** kW in 2013, *** kW in 2014, and *** kW in 2015, and declined to *** kW in 2016.[391] As a share of total imports, imports from Canada accounted for *** percent in 2012, *** percent in 2013, *** percent in 2014, *** percent in 2015, and *** percent in 2016.[392] Imports from Canada generally were even smaller as a share of apparent U.S. consumption, accounting for *** percent in 2012, *** percent in 2013, *** percent in 2014, *** percent in 2015, and *** percent in 2016.[393] Their rate of increase was *** percent from 2012-2013, *** percent from 2013-2014, *** percent from 2014-2015, and

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(…Continued)
imports even though the NAFTA country is not one of the top five suppliers is present in this investigation. *See* NAFTA SAA, H. Doc. 103-159, 103rd Cong., 1st Sess. at 565 (1993) (indicating that it might be appropriate to do so where there is little difference between the share of a fifth-place supplier and those that follow fifth place, or there are many suppliers, each accounting for a substantial share). The NAFTA SAA further provides that, "Section 312 includes a 'surge' provision … that allows the President to include the previously excluded imports in the action if he later determines that a surge in imports of the product from the excluded country or countries is undermining the effectiveness of the action." *Id*.; 19 U.S.C. § 3372(c).

[389] CR/PR at Table II-2. Based on official import statistics, by value, imports from Canada ranked eleventh in 2014 and 2015 and twelfth in 2016. CR/PR at Table C-7. Based on unadjusted importer questionnaire data, there were *** imports from Canada. CR/PR at Table II-1. According to foreign producer questionnaire responses, there was no reported production of CSPV cells in Canada during the POI. CR at IV-19; PR at IV-13.

[390] The statute refers to "the serious injury, or threat thereof, caused by imports." 19 U.S.C. § 3371(a)(2)). Having found under section 202 of the Trade Act (19 U.S.C. § 2252(b)) that crystalline silicon photovoltaic cells (whether or not partially or fully assembled into other products) are being imported into the United States in such increased quantities as to be a substantial cause of serious injury to the domestic industry producing crystalline silicon photovoltaic cells (whether or not partially or fully assembled into other products), we limit our findings for NAFTA countries to whether imports of the article from each NAFTA country contribute importantly to the serious injury caused by imports consistent with the Commission's approach in prior investigations. *See, e.g.*, *Circular Welded Carbon Quality Line Pipe*, Inv. No. 201-TA-70, USITC Pub. 3261 at I-32 to I-33 (Dec. 1999).

[391] In terms of value, imports from Canada increased from $*** in 2012 to $*** in 2013, $*** in 2014, and $*** in 2015, and declined to $*** in 2016. CR/PR at Table II-2.

[392] As a share of domestic production, imports from Canada accounted for *** percent in 2012, *** percent in 2013, *** percent in 2014, *** percent in 2015, and *** percent in 2016. CR/PR at Table II-2.

[393] CR/PR at Table IV-4.

*** percent from 2015-2016, for an overall increase of *** percent.[394] Although these rates exceed the corresponding rates for global imports between 2012 and 2015 and the overall increase between 2012 and 2016,[395] Canada's rate of increase is a function of the very low level of imports from Canada in 2012.[396] Moreover, imports from Canada declined between 2015 and 2016 while global imports continued to increase.[397]

Under the second prong for imports from NAFTA countries, the statutory standard is whether the imports from the NAFTA country "contribute importantly to the serious injury … caused by imports," which is a lower standard than whether global imports are a substantial cause of serious injury.[398] Despite the larger growth rate for imports from Canada relative to global imports, given the relatively small share of total imports accounted for by imports from Canada, the relatively small change in the Canadian industry's import share over the POI, and the more modest level and change in the level of imports from Canada, particularly relative to total imports from all sources over the POI, we find that imports from Canada considered individually do not contribute importantly to the serious injury caused by imports.[399]

Given that imports from Canada started the POI at a smaller baseline than other foreign suppliers and increased overall during the POI at a rate that exceeded the growth rate for global imports, we recognize that if the President were to determine to exclude imports from Canada from any safeguard measure, unrestrained imports from Canada might increase to harmful levels.[400] In those circumstances, however, if any such increase were to occur, the

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[394] CR/PR at Table C-1b.

[395] The rate of increase for global imports was *** percent from 2012-2013, *** percent from 2013-2014, *** percent from 2014-2015, and *** percent from 2015-2016, for an overall increase of *** percent. CR/PR at Table C-1b.

[396] Global imports, in contrast, increased from 2.2 million kW in 2012 to 3.1 million kW in 2013, 4.6 million kW in 2014, 8.4 million kW in 2015, and 12.8 million kW in 2016. CR/PR at Table II-2.

[397] CR/PR at Table IV-4.

[398] The statute defines substantial cause as "a cause which is important *and* not less than any other cause." 19 U.S.C. § 2252(b)(1)(B) (emphasis added).

[399] We do not find exceptional circumstances that would warrant considering whether imports from Canada and Mexico collectively contribute importantly to the serious injury caused by imports. For example, although imports from Canada were relatively small in terms of import penetration, imports from Mexico were not small in terms of import penetration. CR/PR at Table IV-4 (indicating that imports from Mexico accounted for *** percent of apparent U.S. consumption in 2012, *** percent in 2013, *** percent in 2014, *** percent in 2015, and *** percent in 2016). CR/PR at Table IV-4.

[400] Factors increasing the likelihood of a surge of imports into the U.S. market from Canada include the following: the CSPV module industry in Canada increased capacity and production between 2012 and 2016; the Canadian industry shipped an irregularly increasing share of its total shipments to the United States (increasing nearly four-fold from *** percent of its total shipments in 2012 to *** percent by 2016); the Canadian industry had available capacity throughout the POI, with its capacity utilization ranging from a low of *** percent in 2012 to a high of *** percent in 2015, and a near lowest level of *** percent at the end of the POI in 2016); producers in Canada (including the *** foreign producer (Canadian Solar)) maintain corporate and other arm's length supply chain relationships with firms in several other countries; Canadian producers and their related firms exported growing volumes (Continued…)

domestic industry would have other options to consider, including the import-surge mechanism of 19 U.S.C. § 3372(c) and the antidumping and/or countervailing duty laws (19 U.S.C. § 1671, 19 U.S.C. § 1673).

2. Findings With Respect to Imports from Mexico

We find that imports of crystalline silicon photovoltaic cells (whether or not partially or fully assembled into other products) from Mexico account for a substantial share of total imports and contribute importantly to the serious injury caused by the imports. Accordingly, we make an affirmative finding with respect to imports of CSPV products from Mexico.

As discussed in section III above, for purposes of this analysis, we applied the NAFTA rules of origin for imports from Canada and Mexico. According to adjusted importer questionnaire data, the industry in Mexico was among the top five import suppliers of CSPV products during the three most recent years and accounted for significant and rapidly increasing volumes of imports, both by quantity and volume.[401] It was the third largest source in 2012, the second largest source in 2013, the third largest source in 2014 and 2015, and the fourth largest source in 2016.[402] Consequently, we find that imports of crystalline silicon photovoltaic cells (whether or not partially or fully assembled into other products) from Mexico, considered individually, account for a substantial share of total imports.

We also examined whether imports of CSPV products from Mexico considered individually contribute importantly to the serious injury caused by imports.[403] Imports from Mexico progressively increased each year from *** kW in 2012 to *** kW in 2013, *** kW in 2014, *** kW in 2015, and *** kW in 2016.[404] Their rate of increase was *** percent from 2012-2013, *** percent from 2013-2014, *** percent from 2014-2015, and *** percent from 2015-2016, for an overall increase of *** percent,[405] whereas the rate of increase for global imports was *** percent from 2012-2013, *** percent from 2013-2014, *** percent from

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(…Continued)
of CSPV products to the United States over the POI; if the CSPV products manufactured by Canadian producers' affiliates are subject to a global safeguard measure, the industry in Canada will have an incentive to supply the U.S. market from its Canadian operations instead. CR/PR at Table IV-10, Table IV-11, Table IV-17, Table IV-18.

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

[402] CR/PR at Table II-2. Based on official import statistics, by value, imports from Mexico ranked fourth in 2014, third in 2015, and fourth in 2016. CR/PR at Table C-7. Based on unadjusted importer questionnaire data, there were *** imports from Mexico. CR/PR at Table II-1. The three responding foreign producers/exporters of CSPV modules in Mexico did not report any production of CSPV cells, but publicly available information indicates that i3 Group, a holding company, is the only manufacturer of CSPV cells in Mexico, which are produced through its subsidiaries. CR at IV-27; PR at IV-17.

[403] As explained above, we do not find exceptional circumstances that warrant considering whether imports from Canada and Mexico collectively contribute importantly to the serious injury caused by imports.

[404] In terms of value, imports from Mexico increased from $*** in 2012 to $*** in 2013, $*** in 2014, and $*** in 2015, and $*** in 2016. CR/PR at Table II-2.

[405] CR/PR at Table C-1b.

2014-2015, and *** percent from 2015-2016, for an overall increase of *** percent.[406] Thus, imports from Mexico and global imports both increased throughout the POI, with imports from Mexico sometimes increasing at a greater rate than global imports, and sometimes increasing at a lower rate than global imports.[407] As a share of total imports, imports from Mexico accounted for *** percent in 2012, *** percent in 2013, *** percent in 2014, *** percent in 2015, and *** percent in 2016.[408] As a share of apparent U.S. consumption, imports from Mexico accounted for *** percent in 2012, *** percent in 2013, *** percent in 2014, *** percent in 2015, and *** percent in 2016.[409] Imports from Mexico exceeded the domestic industry's production of CSPV products throughout the POI; as a ratio to domestic production, they accounted for *** percent in 2012, *** percent in 2013, *** percent in 2014, *** percent in 2015, and *** percent in 2016.[410] Given the substantial level of imports from Mexico, substantial increases in the level of imports from Mexico over the POI, the sizable share of total imports accounted for by imports from Mexico, and the level of imports from Mexico relative to domestic production of CSPV products, we find that imports from Mexico considered individually contribute importantly to the serious injury caused by imports.

B. Findings With Respect to Imports from Korea, Singapore, Australia, CAFTA-DR countries, Colombia, Jordan, Panama, and Peru

Several of the United States' FTAs contain similar language providing the President with discretion to exclude imports from FTA partners from any global safeguard measure. Despite the permissive nature of the exclusions in the FTAs, the corresponding U.S. implementing statutes mandate that the Commission make a finding whether imports of the article from the FTA partner are a substantial cause of serious injury or threat thereof and report its finding to the President at the same time that it submits its report.[411] For imports from each of these countries, we thus consider whether CSPV products are being imported in increased quantities (either actual or relative to production); whether the domestic industry producing an article that is like or directly competitive with the imported article is seriously injured or threatened

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[406] CR/PR at Table C-1b. Global imports increased from 2.2 million kW in 2012 to 3.1 million kW in 2013, 4.6 million kW in 2014, 8.4 million kW in 2015, and 12.8 million kW in 2016. CR/PR at Table II-2.

[407] CR/PR at Table IV-4.

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

[409] CR/PR at Table IV-4.

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

[411] *See, e.g.*, CAFTA-DR Article 8.6(2) (Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and the Dominican Republic); the U.S.-Australia Free Trade Agreement Article 9.5; KORUS Article 10.5(1); the U.S.-Colombia Trade Promotion Agreement Article 8.6(2); U.S./Jordan Agreement on the Establishment of a Free Trade Area Article 10.8; U.S./Panama Trade Promotion Agreement Article 8.2(2); the U.S.-Peru Free Trade Agreement Article 8.6(2); and the U.S./Singapore Free Trade Agreement Article 7.5. *See* 19 U.S.C. § 2112 note (Jordan); 19 U.S.C. § 3371 (NAFTA); 19 U.S.C. § 3805 note (Australia, Colombia, KORUS, Panama, Peru, Singapore); 19 U.S.C. § 4101 (CAFTA-DR).

with serious injury; and whether the article is being imported in such increased quantities as to be a substantial cause of serious injury or threat of serious injury to the domestic industry.[412]

1. Findings With Respect to Imports from Korea

For the reasons discussed below, we find that imports of crystalline silicon photovoltaic cells (whether or not partially or fully assembled into other products) from Korea are a substantial cause of threat of serious injury.[413] Accordingly, we make an affirmative finding with respect to imports of CSPV products from Korea.

With respect to whether imports of CSPV products from Korea increased, the evidence shows that imports from Korea progressively increased each year from *** kW in 2012 to *** kW in 2013, *** kW in 2014, and *** kW in 2015, and reached a period high of *** kW in 2016 that was more than *** the level in 2015.[414] Their annual growth rate was *** percent from 2012-2013, *** percent from 2013-2014, *** percent from 2014-2015, and *** percent from 2015-2016, for an overall increase of *** percent,[415] whereas global imports grew by *** percent from 2012-2013, *** percent from 2013-2014, *** percent from 2014-2015, and *** percent from 2015-2016, for an overall increase of *** percent.[416] Thus, imports from Korea grew even faster than global imports in every period, except for 2012-2013.[417] As a ratio to domestic production, imports from Korea irregularly increased over the POI, declining from *** percent in 2012 to *** percent in 2013, and increasing to *** percent in 2014, *** percent in 2015, and a period high of *** percent in 2016, well above *** percent.[418] Based on this information, we find increased imports from Korea.

As discussed in more detail in section IV.D above, the domestic industry's performance indicators declined over the POI, particularly between 2015 and 2016 and continued to deteriorate into 2017 despite explosive demand growth. Given the overall impairment in the domestic industry's position, we next considered whether imports from Korea are a substantial cause of serious injury or threat.[419] Imports from Korea progressively increased each year from

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[412] *See* 19 U.S.C. § 2252(b)(1)(A).

[413] We recall that the statute defines "substantial cause" as a cause "which is important and not less than any other cause." 19 U.S.C. § 2252(b)(1)(B).

[414] In terms of value, imports from Korea decreased from $*** in 2012 to $*** in 2013 and increased to $*** in 2014, $*** in 2015, and a period high of $*** in 2016. CR/PR at Table II-2.

[415] CR/PR at Table C-1b.

[416] CR/PR at Table C-1b. Global imports increased from 2.2 million kW in 2012 to 3.1 million kW in 2013, 4.6 million kW in 2014, 8.4 million kW in 2015, and 12.8 million kW in 2016. CR/PR at Table II-2.

[417] CR/PR at Table IV-4.

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

[419] The required analysis of imports from Korea differs in important respects from the analysis with respect to imports from NAFTA countries. For instance, the injury standards differ, with a two-pronged test for imports from NAFTA countries (imports "account for a substantial share of total imports" and "*contribute importantly to* the serious injury, or threat thereof, caused by imports") and a single test for imports from Korea (whether imports are "a *substantial cause of* serious injury or threat"). (Continued…)

*** kW in 2012 to a period high of *** kW in 2016 (that was more than *** the level in 2015).[420] Imports from Korea grew even faster than global imports, increasing over the entire POI by *** percent and by *** percent from 2015-2016 alone,[421] whereas global imports increased over the entire POI by *** percent and by *** percent from 2015-2016.[422] Imports from Korea also increased substantially as a ratio to domestic production, increasing overall from *** percent in 2012 to a period high of *** percent in 2016, well above *** percent.[423] As a share of total imports, imports from Korea accounted for *** percent in 2012, *** percent in 2013, *** percent in 2014, *** percent in 2015, and *** percent in 2016.[424] As a share of apparent U.S. consumption, market share for imports from Korea was *** percent in 2012, *** percent in 2013, *** percent in 2014, *** percent in 2015, and *** percent in 2016.[425]

(…Continued)

Moreover, the context for our analysis differs. Our analysis of imports from NAFTA countries is intertwined with our analysis of global imports. If we determine under section 201 of the Trade Act (19 U.S.C. § 2252(b)) that an article is being imported in such increased quantities as to be a substantial cause of *serious* injury to the domestic industry producing an article like or directly competitive with the imported article, then the statute limits our analysis of imports from NAFTA countries to the basis for that determination (*i.e.*, *serious* injury), as we have found in prior safeguard proceedings. *See, e.g.*, *Circular Welded Carbon Quality Line Pipe*, Inv. No. 201-TA-70, USITC Pub. 3261 at I-32 to I-33 (Dec. 1999). The operative language is the requirement that imports from the NAFTA country "contribute importantly to *the* serious injury, or threat thereof, *caused by imports*." 19 U.S.C. § 3371(a)(2) (emphasis added). Thus, the Commission analyzes imports from the NAFTA country against the backdrop of its determination of serious injury caused by imports. No such language exists for purposes of analyzing imports from Korea, so if, as here, the Commission based its determination with respect to global imports on *serious* injury, the statute *does not limit* the analysis of imports from Korea to the *serious* injury context (as distinguished from the *threat of serious injury* context). 19 U.S.C. § 3805 note at section 341.

The Commission's point of reference also changes. To analyze imports from the NAFTA country, the Commission focuses on whether they "contribute importantly to *the* serious injury, or threat thereof, *caused by imports*." 19 U.S.C. § 3371(a)(2) (emphasis added). That is, the statute contemplates that the Commission will analyze the imports from the NAFTA country against the imports that the Commission determined caused the serious injury (or threat thereof) – global imports. For imports from Korea, however, the statute does not direct the Commission to examine imports from Korea with global imports that caused the serious injury (or threat thereof) as a reference point. The statute simply directs the Commission to find whether imports of the Korean article "are a substantial cause of serious injury or threat thereof." 19 U.S.C. § 3805 note at section 341(a).

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

[421] CR/PR at Table C-1b.

[422] CR/PR at Table C-1b. Global imports increased from 2.2 million kW in 2012 to 3.1 million kW in 2013, 4.6 million kW in 2014, 8.4 million kW in 2015, and 12.8 million kW in 2016. CR/PR at Table II-2.

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

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

[425] CR/PR at Table IV-4.

Thus, by 2016, imports from Korea were among the largest suppliers of CSPV products to the U.S. market, ranking third behind only Malaysia[426] and China.[427] Imports from China had declined from 2015 to 2016, as had their market share, whereas imports from Korea were considerably higher both absolutely and relative to apparent U.S. consumption and domestic production between those years.[428] In recent years, there has been significant investment in Korea in productive facilities for CSPV cells and CSPV modules by ***.[429]

Based on this evidence, we find that imports from Korea are a substantial cause of clearly imminent threat of serious injury that is important and not less than any other cause, including imports from Malaysia.[430]

2. Findings With Respect to Imports from Singapore

For the reasons discussed below, we find that imports of crystalline silicon photovoltaic cells (whether or not partially or fully assembled into other products) from Singapore are not a substantial cause of serious injury or threat thereof. Accordingly, we make a negative finding with respect to imports from Singapore.

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[426] Imports from Malaysia were larger than imports from Korea by 2016, as they had been throughout the POI. CR/PR at Table II-2. We note that while the CSPV module capacity and production reported for the industry in Malaysia exceeded that reported for the industry in Korea in 2016, the data reported for Korea are significantly understated and represent *** percent of CSPV cell production capacity and only *** percent of CSPV module production capacity in Korea. The data reported for firms in Malaysia, by contrast, accounted for all known CSPV cell capacity in Malaysia and 93 percent of CSPV module production. *Compare, e.g.*, CR/PR at Table IV-43 (CSPV cell capacity in Korea of *** kW in 2016 and production of *** kW), Table IV-44 (CSPV module capacity in Korea of *** kW in 2016 and production of *** kW) with Table IV-49 (CSPV cell capacity in Malaysia of *** kW in 2016 and production of *** kW), Table IV-50 (CSPV module capacity in Malaysia of *** kW in 2016 and production of *** kW); CR at IV-84, IV-93; PR at IV-48, IV-52. This indicates that productive capacity in Korea is considerably higher than productive capacity in Malaysia and that capacity for the industry in Korea is projected to be even higher than capacity for the industry in Malaysia in the imminent future. CR/PR at Table IV-43, Table IV-44, Table IV-49, Table IV-50. Imports from Korea grew at a faster rate between 2015 and 2016 than imports from Malaysia, demonstrating the attractiveness of the U.S. market to imports from Korea. CR/PR at Table C-1b (indicating that imports from Korea increased by *** percent between 2015 and 2016 whereas imports from Malaysia increased by *** percent). Moreover, in 2016, the pricing data indicate that imports from Korea generally were lower priced than the domestic industry's U.S. shipments and imports from Korea also generally were lower priced than imports from Malaysia, the largest source of imports. CR/PR at Appendix G.

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

[428] CR/PR at Table II-2, Table IV-4.

[429] CR/PR at Table IV-17, Table IV-18.

[430] In arriving at this finding, we also took into consideration our findings in section IV above about the other alleged causes of any injury, including the lack of evidence supporting respondents' arguments.

With respect to whether imports of CSPV products from Singapore increased, the evidence shows that imports from Singapore increased overall during the POI but fell between 2015 and 2016, decreasing from *** kW in 2012 to *** kW in 2013, increasing to *** kW in 2014, *** kW in 2015, and declining to *** kW in 2016.[431] Their annual growth rate was *** percent from 2012-2013, *** percent from 2013-2014, *** percent from 2014-2015, and *** percent from 2015-2016, for an overall increase of *** percent,[432] whereas global imports grew by *** percent from 2012-2013, *** percent from 2013-2014, *** percent from 2014-2015, and *** percent from 2015-2016, for an overall increase of *** percent.[433] Although the overall growth rate for imports from Singapore was *** to the growth rate for global imports, imports from Singapore started from a considerably smaller base.[434] As a ratio to domestic production, imports from Singapore irregularly increased over the POI, declining from *** percent in 2012 to *** percent in 2013, and increasing to *** percent in 2014, a period high of *** percent in 2015, and declined to *** percent in 2016.[435]

Even assuming *arguendo* that imports from Singapore "increased in such quantities," given the significant overall impairment in the domestic industry's position discussed in more detail in section IV.D above, we considered whether imports from Singapore are a substantial cause of serious injury or threat. Imports from Singapore increased overall from *** kW in 2012 to *** kW in 2016.[436] Their overall growth rate *** the growth rate for global imports, ***.[437] As a share of total imports, imports from Singapore were at the same level at the end of the POI as at the beginning of the POI, accounting for *** percent in 2012, *** percent in 2013, *** percent in 2014, *** percent in 2015, and *** percent in 2016.[438] As a share of apparent U.S. consumption, imports from Singapore also were at the same level at the end of the POI as at the beginning of the POI, with a market share of *** percent in 2012, *** percent in 2013, *** percent in 2014, *** percent in 2015, and *** percent in 2016.[439]

Although there were some fluctuations in the volume of imports from Singapore over the POI, we do not find that imports from Singapore are a substantial cause of serious injury or threat thereof. They did not increase their share of total imports or their share of the U.S. market over the POI. The decline in the volume of imports from Singapore between 2015 and 2016 absolutely and relative to domestic production and apparent U.S. consumption also undermines any claim of a threat of serious injury. Based on this evidence, we find that imports from Singapore are not a substantial cause of serious injury or threat thereof.

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

[432] CR/PR at Table C-1b.

[433] CR/PR at Table C-1b. Global imports increased from 2.2 million kW in 2012 to 3.1 million kW in 2013, 4.6 million kW in 2014, 8.4 million kW in 2015, and 12.8 million kW in 2016. CR/PR at Table II-2.

[434] CR/PR at Table IV-4.

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

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

[437] CR/PR at Table C-1b.

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

[439] CR/PR at Table IV-4.

3. Findings With Respect to Imports from Australia, CAFTA-DR countries, Colombia, Jordan, Panama, and Peru

We find that imports of crystalline silicon photovoltaic cells (whether or not partially or fully assembled into other products) from Australia, CAFTA-DR countries, Colombia, Jordan, Panama, and Peru, individually, are not a substantial cause of serious injury or threat thereof. Accordingly, we make a negative finding with respect to imports of CSPV products from each of these FTA partners.

The Commission's questionnaires in this investigation requested separate U.S. import data on imports from Australia, CAFTA-DR countries, Colombia, Jordan, Panama, and Peru, but no importer reported any imports from any of these sources during the POI.[440] The responses to these questionnaires and other available industry information indicate that there is only one known producer of CSPV products in each of the following countries: Australia, the Dominican Republic, El Salvador, Jordan, and Panama.[441] It is not known whether there are any producers of CSPV products in Colombia, Peru, or other CAFTA-DR countries.[442] Based on this information, particularly the absence of any reported imports from any of these FTA partners, we find that imports of CSPV products from Australia, CAFTA-DR countries, Colombia, Jordan, Panama, and Peru, individually, are not a substantial cause of serious injury or threat thereof.

4. Findings With Respect to Other Imports

In certain circumstances, the statute provides the President with discretion to suspend the reduction or elimination of duties on certain imports of articles subject to an affirmative global safeguard action. The President, however, can only suspend the reduction or elimination of the duties if the Commission finds that the serious injury (or threat thereof) substantially caused by imports results from the reduction or elimination of any duty provided under that provision. Thus, these sorts of provisions involve two components: (1) serious injury or threat thereof by the imports and (2) a linkage between the serious injury or threat thereof and the reduction or elimination of any duty provided to those imports.

For imports from Israel, the implementing statute for the U.S./Israel FTA permits the President to suspend the reduction or elimination of any duty provided under any trade agreement provision entered into with Israel under section 102(b)(1) of the Trade Act with respect to any article and permits the President to proclaim a duty rate for such article if such

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[440] CR at I-56; PR at I-41. The Commission also sought data for a "catch-all" category of all other imports, which may have included imports from these countries. Reported imports for all other countries were consistently very small during the POI. *See, e.g.*, CR/PR at Table C-1b (indicating no imports from "all other sources" in 2012 and 2013, and that these imports were *** kW in 2014, *** kW in 2015, and *** kW in 2016, equivalent to less than *** percent of apparent U.S. consumption throughout this period).

[441] CR at IV-141 to IV-143; PR at IV-73 to IV-74.

[442] CR at IV-144; PR at IV-74 to IV-75.

safeguard action is proclaimed,[443] but it precludes the President from suspending the reduction or elimination of any duty provided for under any trade agreement with Israel –

> unless the Commission in addition to making an affirmative determination with respect to such article … determines in the course of its investigation … that the serious injury (or threat thereof) substantially caused by imports to the domestic industry producing a like or directly competitive article results from the reduction or elimination of any duty provided under any trade agreement provision entered into with Israel under section 102(b)(1) of the Trade Act of 1974 … .[444]

In order to provide information necessary for the President to make this determination, the statute requires the Commission, in the event of an affirmative determination of serious injury or threat thereof (or an equally divided Commission), to state in its report to the President "whether and to what extent its findings and recommendations apply to such an article when imported from Israel."[445]

Legislation authorizing certain U.S. preferential trade programs for developing countries also requires the Commission to address the extent to which its findings and recommendations apply to beneficiary countries under those programs. The CBERA provisions of the Caribbean Basin Initiative trade program[446] provide that "in any report by {the Commission} to the President under section 202(f) of the {the Trade Act} regarding any article for which duty-free treatment has been proclaimed by the President pursuant to this chapter, the Commission shall state whether and to what extent its findings and recommendations apply to such article when

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[443] The U.S./Israel FTA provides the President with discretion whether to exclude imports from Israel from any global safeguard measure. Under the U.S./Israel FTA, "When, in the view of the importing Party, the importation of a product from the other Party is not a substantial cause of the serious injury or threat thereof referred to in paragraph 1, the importing party may except the product of the other Party from any import relief that may be imposed with respect to imports of that product from third countries, taking into account the objective of achieving bilateral free trade as embodied in the Agreement, the domestic laws and international obligations of the Parties." Agreement on the Establishment of a Free Trade Area between the Government of Israel and the Government of the United States of America, Article 5(3) (emphasis added).

[444] 19 U.S.C. § 2112 note U.S./Israel FTA Implementing Act § 403(d).

[445] 19 U.S.C. § 2112 note U.S./Israel FTA Implementing Act § 403(b).

[446] The list of CBERA beneficiary countries has declined over time as some individual countries have entered into bilateral free trade agreements with the United States and are no longer eligible for CBERA benefits. Current beneficiaries include Antigua and Barbuda, Aruba, The Bahamas, Barbados, Belize, Curaçao, Dominica, Grenada, Guyana, Haiti, Jamaica, Montserrat, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Trinidad and Tobago, and the British Virgin Islands. 19 U.S.C. § 2702; https://ustr.gov/issue-areas/trade-development/preference-programs/caribbean-basin-initiative-cbi.

imported from beneficiary countries."[447] In order to assist the President's decision whether to suspend duty-free treatment for CBERA imports, in cases where the Commission makes an affirmative determination in a global safeguard investigation under section 202(b) of the Trade Act, the Commission determines whether "the serious injury (or threat thereof) substantially caused by imports to the domestic industry producing a like or directly competitive article results from the duty-free treatment provided by this chapter."[448]

In this investigation, the evidence indicates that there has been no reduction or elimination of duties on eligible imports. Imported articles that are provided for in subheading 8541.40.60 of the HTSUS have been free of duty under the general duty rate since at least 1987.[449] Moreover, although the Commission's questionnaires in this investigation sought separate data for Israel and CBERA beneficiaries on imports and foreign production of CSPV products, we note that no U.S. importer submitted any data on imports of CSPV products from these sources, and no corresponding foreign producers submitted any data on production operations in these locations.[450] Consequently, the serious injury substantially caused by imports to the domestic industry producing a like or directly competitive article does not result from the reduction or elimination of any duty provided for under the U.S.-Israel Free Trade

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[447] 19 U.S.C. § 2703(e)(2). A similar provision required the Commission to report whether the serious injury (or threat thereof) substantially caused by imports to the domestic industry producing a like or directly competitive article resulted from the duty-free treatment provided by the Andean Trade Preference Act. 19 U.S.C. § 3203(c)(4). In the absence of any preferences due to the expiration of the President's authority to provide such duty-free treatment to eligible goods under the Andean Trade Preference Act program, the Commission is not making any such determination in this investigation.

[448] 19 U.S.C. § 2703(e)(4). The statute also requires the Commission to find whether, as a result of the designation of certain articles as eligible for duty-free treatment under the GSP program, the domestic industry is injured or threatened with serious injury as a result of increases in such imports. Section 203(e)(6)(B) of the Trade Act; 19 U.S.C. § 2253(e)(6)(B) ("No proclamation providing for a suspension {of duty-free treatment under the GSP program} may be made by the President, nor may any such suspension be recommended by the Commission under section 2252(e) of this title, unless the Commission, in addition to making an affirmative determination under section 2252(b)(1) of this title, determines in the course of its investigation under section 2252(b) of this title that the serious injury, or threat thereof, substantially caused by imports to the domestic industry producing a like or directly competitive article results from, as the case may be – (i) the application of subheading 9802.00.60 or subheading 9802.00.80 of the Harmonized Tariff Schedule of the United States; or (ii) the designation of the article as an eligible article for the purposes of subchapter V of this chapter.")

[449] CR at I-52; PR at I-38.

[450] CR at I-56, IV-141; PR at I-41, IV-73. As discussed above, reported imports for countries other than Canada, China, Germany, Indonesia, Japan, Korea, Malaysia, Mexico, Philippines, Singapore, Taiwan, Thailand, and Vietnam were consistently very small during the POI. *See, e.g.*, CR/PR at Table C-1b (indicating *** imports from such "all other sources" in 2012 and 2013, and that these imports were *** kW in 2014, *** kW in 2015, and *** kW in 2016, equivalent to less than *** percent of apparent U.S. consumption throughout this period).

Agreement or from duty-free treatment provided for under the CBERA provisions of the Caribbean Basin Initiative Trade Program.[451]

VI. Conclusion

For the foregoing reasons, we determine that crystalline silicon photovoltaic cells (whether or not partially or fully assembled into other products) are being imported into the United States in such increased quantities as to be a substantial cause of serious injury to the domestic industry producing an article like or directly competitive with the imported article. We find that imports of CSPV products from Mexico account for a substantial share of total imports and contribute importantly to the serious injury caused by imports. We find that imports of CSPV products from Canada do not account for a substantial share of total imports and do not contribute importantly to the serious injury caused by imports.[452] We find that imports of CSPV products from Korea are a substantial cause of threat of serious injury, but that imports of CSPV products from Australia, CAFTA-DR countries, Colombia, Jordan, Panama, Peru, and Singapore, individually, are not a substantial cause of serious injury or threat thereof.[453]

[451] For the same reasons, the serious injury substantially caused by imports to the domestic industry producing a like or directly competitive article does not result from any reduction or elimination of any duty under the GSP program.

[452] As indicated above, Chairman Schmidtlein does not join section V.A.1 of these Views. She finds under section 311(a) of the NAFTA Implementation Act (19 U.S.C. § 3371(a)) that imports of CSPV products from Canada account for a substantial share of total imports and contribute importantly to the serious injury caused by imports.

[453] We also determine that the serious injury substantially caused by imports to the domestic industry producing a like or directly competitive article does not result from the reduction or elimination of any duty provided for under the U.S.-Israel Free Trade Agreement or from duty-free treatment provided for under the CBERA provisions of the Caribbean Basin Initiative Trade Program or any reduction or elimination of any duty under the GSP program.

VIEWS ON REMEDY OF CHAIRMAN RHONDA K. SCHMIDTLEIN

I. Findings and Recommendations

For the reasons set forth below, I recommend the following actions, which I find will address the serious injury to the domestic industry producing crystalline silicon photovoltaic cells (whether or not partially or fully assembled into other products) ("CSPV products") and be most effective in facilitating the efforts of the domestic industry to make a positive adjustment to import competition:

1. That the President impose a tariff-rate quota on imports of CSPV products in cell form for a four-year period, as follows:

    a. *Year 1*: a tariff of 10.0 percent *ad valorem* on imports of up to 0.5 gigawatts and a tariff of 30.0 percent *ad valorem* on imports in excess of 0.5 gigawatts
    b. *Year 2*: a tariff of 9.5 percent *ad valorem* on imports of up to 0.6 gigawatts and a tariff of 29.0 percent *ad valorem* on imports in excess of 0.6 gigawatts
    c. *Year 3*: a tariff of 9.0 percent *ad valorem* on imports of up to 0.7 gigawatts and a tariff of 28.0 percent ad valorem on imports in excess of 0.7 gigawatts
    d. *Year 4*: a tariff of 8.5 percent *ad valorem* on imports of up to 0.8 gigawatts and a tariff of 27.0 percent *ad valorem* on imports in excess of 0.8 gigawatts

2. That the President impose a tariff on imports of CSPV products in module form for a four-year period. The tariff would be at the rate of 35.0 percent *ad valorem* in the first year of relief, 34.0 percent *ad valorem* in the second year of relief, 33.0 percent *ad valorem* in the third year of relief, and 32.0 percent *ad valorem* in the fourth year of relief;

3. Having made an affirmative finding with respect to imports of CSPV products from Canada and Mexico under section 311 of the NAFTA Implementation Act,[1] that such imports be subject to the tariff-rate quotas and additional tariffs described above;

4. That the tariff-rate quotas and tariffs described above not apply to imports of CSPV products from the following countries with which the United States has free trade agreements: Australia, Colombia, Costa Rica, the Dominican Republic, El Salvador, Guatemala, Honduras, Israel, Jordan, Nicaragua, Panama, Peru, and Singapore; or to imports

[1] 19 U.S.C. § 3371(a).

of CSPV products from the beneficiary countries under the Caribbean Basin Economic Recovery Act;

5. That the President initiate international negotiations to address the underlying cause of the increase in imports of CSPV products and alleviate the serious injury thereof.

II. Introduction

Having found that increased imports are a substantial cause of serious injury to the domestic industry, I must now recommend to the President action that will address the serious injury and be most effective in facilitating the efforts of the domestic industry to make a positive adjustment to import competition. In deciding what relief to recommend, I have taken into account the considerations set forth in section 202(e)(5)(B) of the Trade Act of 1974,[2] including (1) the form and amount of action that will, in my view, remedy the serious injury that the Commission unanimously found to exist; (2) commitments submitted by firms in the domestic industry during the course of the investigation; (3) information available to the Commission concerning the conditions of competition in domestic and world markets; and (4) likely developments affecting such conditions during the period for which action is being requested. I join Vice Chairman Johanson and Commissioner Williamson in recommending a tariff-rate quota on CSPV cells and a tariff on CSPV modules for four years and join their plurality views in a number of sections, as noted below. I, however, do not join Vice Chairman Johanson and Commissioner Williamson in their recommended tariff rates and tariff-rate quota volume levels because I believe higher tariff rates and a lower starting tariff-rate quota level will provide the domestic industry more protection from increasing volumes of low-priced imports of CSPV products and provide a better opportunity to realize greater operating income during the remedy period which the domestic industry could use to increase capacity and achieve economies of scale.

III. Conditions of Competition

I adopt and incorporate section III of the plurality views of Vice Chairman Johanson and Commissioner Williamson which sets forth the demand and supply conditions of competition in the CSPV products industry.

IV. Commitments Submitted By Firms in the Domestic Industry

I adopt and incorporate section IV of the plurality views of Vice Chairman Johanson and Commissioner Williamson which discusses the commitments submitted by individual firms in the domestic CSPV industry.

[2] 19 U.S.C. § 2252(e)(5)(B).

V. Recommended Relief

I agree with much of my colleagues' views in the plurality recommendation regarding the nature and duration of the recommended remedy. As stated above, I also recommend a four-year tariff-rate quota on CSPV cells[3] and a four-year tariff on CSPV modules, and therefore adopt and incorporate the plurality's rationale for using this specific remedy form, which is explained in section V of the plurality views of Vice Chairman Johanson and Commissioner Williamson. I differ from my colleagues as to only the appropriate magnitude of the specific tariff rates and tariff-rate quota levels.

With regard to determining the appropriate tariff rates and quota levels for any tariff-rate quota, like my colleagues, I have considered all of the information obtained in this investigation, including questionnaire responses, hearing testimony, and the briefs of interested parties, as well as the results of an industry-specific partial equilibrium economic model that distinguished between CSPV cell production and CSPV module production. I used this model to estimate changes in the domestic market for CSPV products and the financial impact of my remedy recommendation on the domestic producers of cells and modules. Similar to my colleagues in the plurality, when formulating my remedy recommendation, I strived to balance the interests of both integrated and non-integrated domestic producers as well as any effects my recommended remedy may have on upstream and downstream domestic industries.

Based on the results of the industry-specific partial-equilibrium model, my recommended remedy will restrict import volume of CSPV modules and increase prices sufficiently for the domestic industry to increase its operating income, allowing it to invest in new capacity and achieve the economies of scale necessary to compete with imports. In my view, the model results show that a tariff rate on modules that is moderately higher than that recommended by the plurality is necessary for these purposes. The model results show that an increase in the price of imports of CSPV modules will benefit both U.S. module producers that use imported cells and U.S. module producers that use cells produced in the United States.[4]

With regard to my recommended tariff-rate quota for CSPV cells, the model results show that U.S. imports of CSPV cells will increase, which will benefit non-integrated U.S. module producers that presently require imported cells to manufacture CSPV modules in the United States. Any increase in imports of CSPV cells, however, will be constrained by the tariff-rate quota level of 0.5 gigawatts in the first year of the remedy period. However, this level is greater than the imported CSPV cell volume in any year of the period of investigation, including 2016, the year in which imported cells surged into the U.S. market. Hence, my recommended

[3] I note that the President may find it more effective to administer any tariff-rate quota with either a time allocation for the quota, a country allocation for the quota, or both.

[4] *See Memorandum EC-PP-023 (October 23, 2017)* and *Estimated Economic Effects of the Remedy Recommendation of Chairman Schmidtlein*, Email correspondence, November 6, 2017.

I also considered the existing antidumping and countervailing duty orders on CSPV products from China and Taiwan and that these measures already provide some degree of protection to the domestic industry.

tariff-rate quota level is designed to allow non-integrated module producers to obtain imported cells as well as allow for some growth for these producers, especially given that overall demand for CPSV products is expected to decline in 2018 from 2016 levels. The in-quota tariff rate I recommend is designed to work in conjunction with the tariffs on modules to raise prices in the U.S. market to the overall benefit of both integrated and non-integrated module producers. The results of the model show that the small increase in cell prices should not have any significant detrimental effect on non-integrated module producers given the expected increase in module prices.

I recommend that the safeguard measure be imposed for four years in order to afford the domestic industry sufficient time to make a positive adjustment to import competition. I recognize that relief of more than three years in duration will require the Commission to conduct a mid-course review under 19 U.S.C. § 2254(a)(2). Such an investigation would provide the Commission with an opportunity to review the progress of firms in the domestic industry in the implementation of the commitments which they submitted to the Commission. It also would provide the President, after receiving the Commission's report, with the opportunity to reduce or terminate relief if the industry has not made adequate efforts to make a positive adjustment to import competition.

VI. Country Exclusions

I recommend that the above tariff-rate quota and increased rates of duty not apply to imports from the following countries with which the United States has free trade agreements: Australia, Colombia, Costa Rica, the Dominican Republic, El Salvador, Guatemala, Honduras, Israel, Jordan, Nicaragua, Panama, Peru, and Singapore. I also recommend that the tariff-rate quota and increased rates of duty not apply to imports from the beneficiary countries under the Caribbean Basin Economic Recovery Act.

VII. Requests for Product Exclusions

During the remedy phase of this investigation, the Commission was presented with a number of requests to exclude from any remedy particular products included in the scope of the investigation as to which the Commission made an affirmative determination in the injury phase of the proceedings. The parties making these requests generally contended that the products for which they were requesting exclusions were niche or specialty products either not produced by the domestic industry or produced in insufficient quantities to satisfy U.S. demand.[5] However, petitioners argue that most of the products covered by these exclusion requests compete directly with products produced by the domestic industry, and that to

[5] *See* KOPIA's Prehearing Remedy Brief at 22-29; Prehearing Remedy Brief of the Government of Korea at 5-6; BYD's Prehearing Remedy Brief at 2-4; SunPower's Prehearing Remedy Brief at 13-16; SunPower's Posthearing Remedy Brief at 10-15; Solatube's Prehearing Remedy Brief at 1-15; Solatube's Posthearing Remedy Brief at 2-6; Goal Zero's Prehearing Remedy Brief at 2-21; Goal Zero's Posthearing Remedy Brief at 1-9; Enphase's September 27, 2017 Comments on Remedies at 1-4.

exclude them will undermine any safeguard remedy and discourage U.S. investment in these technologies.[6] Because certain product exclusions may undermine any imposed remedy, I decline to recommend the exclusion of any specific products from my remedy recommendation. In order to deal with product exclusion requests that all parties agree would not undermine any imposed remedy, I recommend that a procedure be established at the Office of the U.S. Trade Representative to allow parties to request specific product exclusions.

VIII. Short- and Long-Term Effects of the Recommended Remedy

I agree with my colleagues, as explained in the plurality's recommendation, that given the precarious current position of the domestic industry as a result of the serious injury caused by increased imports, the survival of the domestic industry requires the immediate imposition of strong import relief that enables domestic firms to commence adjustment efforts very quickly. In the short term, the remedy that I have recommended will provide the domestic industry some protection from imports, and allow a modest increase in U.S. prices. Accordingly, U.S. producers' cash flow and operating income will increase, giving them funds necessary for investments in increased capacity and production, as well as in R&D and innovation. The survival of the domestic industry depends on its ability to innovate and improve both its products and its production processes, and to expand production and capacity to achieve economies of scale, so as to enable it to compete with imports of CSPV cells and modules.

SolarWorld's company-specific commitments indicate that if import relief is granted, it intends to ramp up its CSPV cell production to full capacity at its existing facilities by May 2018, with module production to follow suit. SolarWorld also intends to make longer-term plans for investments to increase capacity, capacity utilization, and cost-savings; spur innovation and technology upgrades; enter into R&D partnerships; and solidify and expand its customer base.[7] Suniva's prospective action plan -- which depends on agreement to a reorganization plan in its Chapter 11 bankruptcy proceeding -- envisions that, if granted, import relief would enable it to emerge from the Chapter 11 proceeding and, shortly thereafter, reactivate its production capacity. At the same time, the plan envisions that Suniva would move towards full capacity, profitability, and the resumption of its R&D efforts, while in the longer term seeking to ***.[8]

The import relief I have recommended will also encourage additional private investment and new entrants in the domestic industry, including both integrated producers and non-integrated module producers. As noted by the plurality, information obtained during the investigation shows that a number of domestic producers are planning or considering opening U.S. CPSV production facilities in anticipation of import relief, including ***, ***, ***, ***, and ***.[9]

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[6] *See S*olarWorld's Posthearing Remedy Brief, Exhibit 2, at 67-69; Suniva's Posthearing Remedy Brief, Exhibit 5, Attachment D.

[7] SolarWorld's Posthearing Remedy Brief, Exhibit 1, at pages 5-13.

[8] Suniva's Posthearing Remedy Brief at Exhibit 5, Attachment B.

[9] *See e.g.*, SolarWorld's Posthearing Remedy Brief at 8 and Exhibit 11; CR/PR at Table D-2.

Petitioners and respondents agree that the most relevant and reliable projections show a decline in demand for CSPV products from 2016 levels in 2017 and 2018, but a resumption in growth in 2019 and afterwards, even in the event of an imposed remedy which results in higher U.S. prices.[10] Thus, any short-term adverse effect on U.S. downstream demand from higher U.S. prices as a result of import restrictions is unlikely to have a significant effect on the recovery of the U.S. industry from the serious injury, or its positive adjustment to import competition.

In the longer term, by the conclusion of the remedy period, the increased capacity and production of domestic producers, their strengthened financial and working capital position, and their improved products and production processes, should give them the ability to achieve the economies of scale necessary for them compete in all sectors of the industry, including the large projects in the utility sector. For all these reasons, I believe that my recommended remedy will enable the domestic industry to make a positive adjustment to import competition during the remedy period, and emerge in a greatly strengthened competitive position over the long term.

IX. Short- and Long-Term Effects of Not Taking the Recommended Action

I again agree with my colleagues in the plurality recommendation and find that in the absence of relief, the injurious surge of imports would likely continue, given the large and growing excess capacity of foreign producers and the attractiveness of the U.S. market to those producers. As a result, the domestic industry, including both CSPV cell and module producers, would likely cease to exist in the short term. The domestic industry suffered operating losses throughout the period of investigation, and those losses would likely continue and worsen in the absence of relief, leaving the domestic industry unable to invest in the innovation and R&D necessary for its long-term survival. This industry requires continual technological advances and efficiency increases, necessitating constant innovation aimed at both improving the product and the production process, all of which require substantial investments in R&D. The current CSPV cell and module technology is to a substantial degree a product of R&D and innovation in the United States, including by the petitioners.[11] The disappearance of the U.S.

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[10] *See* SolarWorld's Prehearing Remedy Brief at 23; SolarWorld's Posthearing Remedy Brief at 13; Transcript of Remedy Hearing at 215 (Prusa).

[11] *See, e.g.*, CR/PR at Table III-2, Table III-6; CR at III-9 to III-17, III-22; PR at III-5 to III-9, III-11; SolarWorld's Posthearing Injury Brief at 10; Hearing Tr. at 88, 90 (Stein); SolarWorld's Prehearing Injury Brief at 52; Suniva's Posthearing Injury Brief at 7-8, Exhibit 9 at 4. For example, SolarWorld was one of the earliest producers of monocrystalline products and the first producer of monocrystalline PERC products, and petitioners observe that the market now is strongly moving to monocrystalline PERC products, where SolarWorld is a recognized leader. SolarWorld's Posthearing Injury Brief at 9, 10, Exhibit 1, section I at 1, section II at 9, Exhibit 9; Transcript of Injury Hearing at 220-21 (Stein), 222 (Card). SolarWorld also developed the p-type PERC bifacial cell in 2015, the next level of innovation that increases energy yield at the system level and has a greater impact on the cost of the delivered energy. SolarWorld's Posthearing Injury Brief at Exhibit 1, section I at 1-2. Suniva also identified a number of innovations that the firm made throughout its history and the technology changes it implemented *(continued…)*

industry producing CSPV cells and modules would lead to a decline in U.S. R&D and innovation in the solar energy field, which has economic and social benefits in the United States far beyond the benefits to the specific firms conducting the R&D.[12] Indeed, the loss of the domestic industry, and the resulting reliance of downstream industries on foreign producers of CSPV products, could have significant long-term consequences for U.S. economic and national security interests.[13]

X. Other Steps to Facilitate the Industry's Positive Adjustment to Import Competition

In addition to their proposals for import relief, petitioners proposed that the President: (1) issue an executive order directing all U.S. government agencies to require use of U.S. origin solar cells,[14] (2) conduct a study of the cyber, electrical grid, and national security risks of using solar panels of foreign origin in the United States,[15] (3) propose that the Investment Tax Credit and other Federal tax incentives be amended to stimulate U.S. solar demand and in particular for projects using domestically produced cells and panels,[16] (4) pursue settlement negotiations with respect to the U.S. AD/CVD orders on solar cells and modules from China and Taiwan and the duty deposits collected under those orders currently under suspension, (5) direct the Department of Energy ("DOE") to fund the full cost of DOE SunShot Initiative research grants.[17]

I make no recommendation with respect to petitioners' additional proposals summarized above. I do recommend, however, that the President initiate international negotiations to address the underlying cause of the increase in imports of CSPV products. Further, given the extent of the serious injury to the domestic industry and the need for a comprehensive solution, the President may wish to consider the additional proposals to the extent that they are consistent with U.S. law and would facilitate the domestic industry's positive adjustment to import competition.

(…continued)
during the period of investigation to remain competitive. Suniva's Posthearing Injury Brief at Exhibit 9 at Question 6.

[12] *See* Suniva's Prehearing Remedy Brief at 25-27 and Exhibit 6.

[13] *See* Suniva's Prehearing Remedy Brief at 23-28 and Exhs. 12-13; Transcript of Injury Hearing at 96-97 (Card); SolarWorld's Posthearing Remedy Brief, Exhibit 2, at 81-84.

[14] SolarWorld's Prehearing Remedy Brief at 21-23; SolarWorld's Posthearing Remedy Brief, Exhibit 1, at 60-64; Suniva's Prehearing Remedy Brief at 13-15.

[15] Suniva's Prehearing Remedy Brief at 15-16.

[16] SolarWorld's Prehearing Remedy Brief at 23-24.

[17] SolarWorld's Prehearing Remedy Brief at 29.

VIEWS ON REMEDY OF VICE CHAIRMAN DAVID S. JOHANSON AND COMMISSIONER IRVING A. WILLIAMSON

I. Findings and Recommendations

For the reasons set forth below, we recommend the following actions, which we find will address the serious injury to the domestic industry producing crystalline silicon photovoltaic cells (whether or not partially or fully assembled into other products) ("CSPV products") and be most effective in facilitating the efforts of the domestic industry to make a positive adjustment to import competition:

1. That the President impose a tariff-rate quota on imports of CSPV products in cell form for a four-year period, as follows: an additional tariff of 30.0 percent *ad valorem* on imports in excess of 1.0 gigawatts in the first year of relief, 25.0 percent *ad valorem* on imports in excess of 1.2 gigawatts in the second year of relief, 20.0 percent *ad valorem* on imports in excess of 1.4 gigawatts in the third year of relief, and 15.0 percent *ad valorem* on imports in excess of 1.6 gigawatts in the fourth year of relief. The rate of duty on in-quota CSPV products in cell form would remain unchanged throughout the four-year period;

2. That the President impose an additional tariff on imports of CSPV products in module form for a four-year period. The additional tariff would be at the rate of 30.0 percent *ad valorem* in the first year of relief, 25.0 percent *ad valorem* in the second year of relief, 20.0 percent *ad valorem* in the third year of relief, and 15.0 percent *ad valorem* in the fourth year of relief;

3. Having made a negative finding with respect to imports of CSPV products from Canada under section 311 of the NAFTA Implementation Act,[1] that such imports not be subject to the tariff-rate quotas and additional tariffs described above;

4. Having made an affirmative finding with respect to imports of CSPV products from Mexico under section 311 of the NAFTA Implementation Act,[2] that such imports be subject to the tariff-rate quotas and additional tariffs described above;

5. That the tariff-rate quotas and tariffs described above not apply to imports of CSPV products from the following countries with which the

[1] 19 U.S.C. § 3371(a).
[2] 19 U.S.C. § 3371(a).

United States has free trade agreements: Australia, Colombia, Costa Rica, the Dominican Republic, El Salvador, Guatemala, Honduras, Israel, Jordan, Nicaragua, Panama, Peru, and Singapore; or to imports of CSPV products from the beneficiary countries under the Caribbean Basin Economic Recovery Act;

6. That the President consider excluding from the tariff-rate quotas and tariffs described above certain CSPV products proposed by respondents and to which petitioners have not objected.

We find that the actions described above will not exceed the amount necessary to remedy the serious injury we find to exist. In addition, we recommend that the President take other appropriate actions to facilitate the efforts of the domestic industry to make a positive adjustment to import competition, including directing the U.S. Department of Labor and the U.S. Department of Commerce to provide expedited consideration of any application for trade adjustment assistance for workers and firms that have been affected by imports of CSPV products. We also recommend that the President consider appropriate funding mechanisms for the U.S. CSPV products industry that may facilitate a positive adjustment to import competition.

II. Introduction

Having found that increased imports are a substantial cause of serious injury to the domestic industry, we must now recommend to the President action that will address the serious injury and be most effective in facilitating the efforts of the domestic industry to make a positive adjustment to import competition. In deciding what relief to recommend, we have taken into account the considerations set forth in section 202(e)(5)(B) of the Trade Act of 1974 (the "Trade Act"),[3] including the form and amount of action that will, in our view, remedy the serious injury we have found to exist; commitments submitted by firms in the domestic industry during the course of the investigation; information available to the Commission concerning the conditions of competition in domestic and world markets; and likely developments affecting such conditions during the period for which action is being requested.

III. Conditions of Competition

A. Demand Conditions

Demand for CSPV products is derived from the demand for solar electricity, which is influenced by factors such as cost competitiveness with traditional energy sources, environmental concerns, a desire for national energy independence, total energy consumption,

[3] 19 U.S.C. § 2252(e)(5)(B).

and the availability of federal, state, and local incentives.[4] In addition to solar electricity, purchasers can use energy and electricity from a wide variety of sources, including traditional fossil fuels such as coal and natural gas, and various other forms of renewable energy, including wind, geothermal, and biomass. The availability of these alternative sources of energy affects demand for CSPV products.[5] The principal market segments for CSPV products are residential, non-residential/commercial, and utility, all of which are connected to the electrical grid. There is also an off-grid market segment.[6]

The vast majority of firms reported that U.S. demand for CSPV products has increased since 2012,[7] and the data show that apparent U.S. consumption grew substantially during the period of investigation, increasing by *** percent between 2012 and 2016.[8] [9] Information obtained in the investigation indicates that there was a spike in demand in 2016, primarily in the utility segment, driven by the anticipated expiration of the Federal Investment Tax Credit in December 2016,[10] although the program was subsequently extended for several more years.[11]

Both petitioners and respondents agree that the most relevant and reliable projections anticipate that in 2017 and 2018 demand for CSPV products will dip below 2016 levels, but growth will resume in 2019 and afterwards.[12] Although the available data on imports of CSPV products that have been arranged for delivery after December 31, 2016, suggest that the total quantity of arranged U.S. imports for calendar year 2017 will be over 20 percent lower than the volume of U.S. imports in 2016,[13] press reports indicated that imports increased in recent months in anticipation of any global safeguard relief. [14]

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[4] Confidential Report ("CR") at V-10; Public Report ("PR") at V-6.

[5] CR at V-58; PR at V-37.

[6] *See* CR at I-33 to I-42; PR at I-24 to I-31.

[7] CR/PR at Table V-3.

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

[9] We note that for purposes of our views on remedy, in our analysis of CSPV imports from Canada and Mexico, we have primarily relied on the country-of-origin methodology that Canadian respondents proposed (the North American Free Trade Agreement (NAFTA) rules of origin for imports from Canada and Mexico, and for imports from all other countries, the country where the cell was manufactured, as adjusted to reflect U.S. cells assembled into modules in a NAFTA country) , as the source for import data in this investigation. *See, e.g.,* Views on Injury at Section III.

[10] CR at V-2; PR at V-2; CR/PR at Figure V-1. The Federal Investment Tax Credit provided a 30 percent tax credit on capital expenditures for new solar photovoltaic systems on residential, nonresidential/commercial, and utility systems. CR/PR at Table V-21.

[11] CR/PR at Table V-21.

[12] *See* SolarWorld's Prehearing Remedy Brief at 23; SolarWorld's Posthearing Remedy Brief at 13; Transcript of Remedy Hearing at 215 (Prusa).

[13] CR/PR at Table II-6.

[14] *See, e.g.*, Suniva's Posthearing Injury Brief, Exh. 9, at 41; *Sunpreme bags deal to supply 150 MW of heterojunction solar modules to TGCM* in pv magazine (Sept. 12, 2017) (EDIS Document No. 623538) ("Analysts and solar developers have told pv magazine that most tier 1 PV makers have sold out of product through the end of the year, as installers and construction contractors hoard PV modules in anticipation of trade action by the Trump Administration."); *see also* Transcript of Remedy Hearing at

(continued…)

B. Supply Conditions

The domestic CSPV products industry includes integrated producers, who produce both CSPV cells and modules, and non-integrated producers, who produce only CSPV modules. Non-integrated U.S. module producers relied largely on imports of CSPV cells during the period of investigation, as most U.S. production of CSPV cells is internally consumed by integrated producers for their CSPV module operations, and only a fraction of U.S.-manufactured CSPV cells are sold in the commercial market.[15] Nevertheless, during the period of investigation, the vast majority of U.S. imports of CSPV products were in module form; U.S. imports of CSPV modules as a share of total U.S. imports of CSPV products increased from *** percent in 2012 to *** percent in 2016, while the share of U.S. imports of cells correspondingly declined from *** percent in 2012 to *** percent in 2016.[16]

The *** domestic integrated producers during the period of investigation, SolarWorld Americas, Inc. ("SolarWorld") and Suniva, Inc. ("Suniva"), were in weak financial conditions at the end of the period of investigation.[17] Although SolarWorld continues to produce CSPV cells and modules, it ***, and its parent company, SolarWorld AG, went into bankruptcy proceedings in Germany.[18] Suniva ***, but filed for Chapter 11 bankruptcy in 2017 and suspended operations at its cell and module factories.[19] Another integrated producer, Tesla, Inc. ("Tesla"), reported that it opened a facility in Fremont, California, and began producing cells and modules there and is currently ramping up production at a large new factory in Buffalo, New York, that began producing modules in 2017. Tesla expects to produce 1.0 gigawatts of CSPV cells and modules in 2019.[20] Several U.S. producers have left the industry in whole or in part during the period of investigation, including ***, which ***, and Mission Solar, which shut down its U.S. cell production operations in September 2016, while continuing to produce modules.[21]

Responding foreign producers of CSPV cells and CSPV modules reported substantial and increasing capacity and excess capacity during the period of investigation.[22] The aggregate capacity reported by responding foreign producers consistently exceeded their combined

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(…continued)

65, 69, 380 (Brightbill), 109 (Szamosszegi). Petitioners emphasize that improvements in cell and module efficiencies each year can quickly make inventories obsolete, increasing the incentive to offload inventories at low prices. SolarWorld's Posthearing Injury Brief at 12; SolarWorld's Prehearing Injury Brief at 88.

[15] CR at III-27; PR at III-15.

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

[17] CR/PR at Table III-5.

[18] CR/PR at Table III-2; CR at III-12; PR at III-7.

[19] CR/PR at Table III-2; CR at III-14 to III-15; PR at III-8.

[20] Tesla's Posthearing Remedy Brief at 4-6; CR at III-15 to III-17; PR at III-8 to III-9.

[21] CR/PR at Tables III-2, III-3; CR at III-10; PR at III-5.

[22] The responding foreign producers' collective CSPV cell capacity increased from 27.3 million kW in 2012 to 56.9 million kW in 2016. CR/PR at Table IV-89. Their collective CSPV module capacity increased from 25.2 million kW in 2012 to 66.6 million kW in 2016. CR/PR at Table IV-90.

production levels and is projected to continue to do so in 2017 and 2018.[23] The responding foreign producers' unutilized capacity grew between 2014 and 2016 and consistently exceeded the size of the entire U.S. market.[24]

The six largest firms producing CSPV cells and modules in China drove the increase in global overcapacity as they expanded their operations beyond China and Taiwan.[25] After the imposition of U.S. antidumping and countervailing duty orders on imports from China in December 2012 and on imports from China and Taiwan in February 2015,[26] CSPV imports from other countries substantially increased their presence in the U.S. market, almost doubling from 2014 to 2015 and continuing to grow in 2016.[27] Indeed, without closing any of their existing capacity in China, these six firms increased their global capacity to produce CSPV cells by *** percent between 2012 and 2016 with four of the six firms adding CSPV cell manufacturing capacity in one or more of the following five countries during that period: Korea, Malaysia, the Netherlands, Thailand, and Vietnam.[28] These same six firms also increased their global capacity to produce CSPV modules by *** percent between 2012 and 2016 without closing any of their existing capacity in China with four of the six firms adding CSPV module capacity in one or more of the following six countries: Canada, Indonesia, Korea, Malaysia, Thailand, and Vietnam.[29]

IV. Commitments Submitted By Firms in the Domestic Industry

Although the Commission received no adjustment plan from petitioners (or any other domestic producer) within the time frame specified in Section 202(a)(4) of the Trade Act,[30] each petitioner submitted commitments regarding actions it intends to take to facilitate positive adjustment to import competition. We have carefully examined the company-specific commitments by SolarWorld in its posthearing remedy brief, which outlined its plans for investing to increase capacity and capacity utilization and to improve cost-savings; its plans for innovation and technology upgrades; its plans for research and development ("R&D") partnerships; and its plans for solidifying and expanding its customer base.[31] We have also examined the "prospective forward-action plan" submitted by Suniva, which indicates that its prospective plan depends on a successful agreement of a reorganization plan in its Chapter 11 bankruptcy proceeding and may change as a result of such an agreement. Suniva's prospective plan includes such objectives as quickly reactivating its production capacity, producing at full

[23] *See* CR/PR at Tables IV-89, IV-90.

[24] *See* CR/PR at Tables IV-90, C-1b.

[25] Canadian Solar, Hanwha, JA Solar, Jinko, Trina, and Yingli Green. CR at IV-39 n.38; PR at IV-26 n.38.

[26] The antidumping and countervailing duty orders on imports from China and Taiwan had a restraining effect on imports from those countries, which maintained a presence in the U.S. market but at lower levels. *See, e.g.*, CR/PR at Table IV-3.

[27] CR/PR at Table IV-3, Table C-1b.

[28] CR/PR at Table IV-17.

[29] CR/PR at Table IV-18.

[30] 19 U.S.C. § 2252(a)(4).

[31] SolarWorld's Posthearing Remedy Brief, Exhibit 1, at pages 5-13.

capacity, becoming profitable, resuming its R&D efforts, ***.[32] We have also considered the responses of U.S. producers to the Commission's questionnaire regarding the adjustments they would make to their operations to compete more effectively with imports if import relief were to be granted.[33]

V. Recommended Relief

The statute authorizes the Commission to recommend several forms of action, including tariffs, tariff-rate quotas, quantitative restrictions, appropriate adjustment measures, as well as a combination of those remedies. In determining which of these forms would be most effective in remedying the serious injury and facilitating positive adjustment to import competition, we have examined closely the costs and benefits of each. We have determined that a tariff-rate quota remedy with respect to imports of CSPV products in cell form and a tariff remedy with respect to imports of CSPV products in module form would be the most appropriate forms of relief.[34]

A. Nature and Duration of Remedies

Petitioners Suniva and SolarWorld both proposed specific tariffs, rather than *ad valorem* tariffs, of $0.25 per watt on CSPV cells and $0.32 per watt on CSPV modules; the proposed tariffs would be in place for four years and would be phased down annually.[35] Suniva also proposed a floor price, or minimum import price, for imports of CSPV modules of $0.74 per watt; the proposed per-watt floor price would be in effect for four years and would be increased annually.[36] SolarWorld also proposed a quota on imports of CSPV cells of 0.22 GW as well as a quota on imports of CSPV modules of 5.70 GW; the proposed quotas would be in place for four years and would be increased annually.[37] [38]

By contrast, respondents generally urge that the Commission recommend no import relief and that any recommended remedy should be limited to technical, financial, and trade

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[32] Suniva's Posthearing Remedy Brief at Exh. 5, Attachment B.

[33] CR/PR at Table D-2.

[34] For purposes of these Views on Remedy, a CSPV module is a joined group of CSPV cells, regardless of the number of cells or the shape of the joined group, that are capable of generating electricity. The term "module" is frequently used interchangeably with the term "panel." A CSPV cell that has undergone any further processing, assembly, or interconnection (including, but not limited to, assembly into a laminate) is considered a module.

[35] SolarWorld's Prehearing Remedy Brief at 10-14; Suniva's Prehearing Remedy Brief at 3-6 and Exh. 1 at 1.

[36] Suniva's Prehearing Remedy Brief at 7-8 and Exh. 1 at 1.

[37] SolarWorld's Prehearing Remedy Brief at 14-19.

[38] SolarWorld also proposes that the President direct the Department of Labor to certify immediately workers from any of the U.S. solar facilities that shut down during the period of investigation for benefits and services under the Trade Adjustment Assistance program. SolarWorld's Prehearing Remedy Brief at 26-27.

adjustment assistance.[39] Respondents support the institution of an import license fee on imports of CSPV products in order to create a fund that could provide capital to the domestic industry.[40]

We find that none of the specific proposals by the parties as to import relief achieves the right balance between addressing the serious injury to the domestic industry and taking into account the interests of all members of the domestic industry. As noted, petitioners have proposed a tariff with a specific rate of duty on a per watt basis rather than an *ad valorem* tariff. While the U.S. statute contemplates that the Commission may recommend a remedy in the form of a specific rate of duty, we find that an *ad valorem* tariff would be a more appropriate remedy here, particularly given the characteristics of the CSPV products industry. Specific tariffs are less flexible in responding to fluctuations in value as a result of such factors as technology advances and improved production efficiency, factors that are characteristic of the CSPV products industry. In the event of continuing declines in CSPV prices as a result of such advances and efficiencies, a specific tariff may result in the ratio of the amount of duty collected to the price of a CSPV product increasing, which could result in the relief exceeding the amount necessary to remedy the serious injury, and could postpone the domestic industry's positive adjustment to import competition. Moreover, there may be problems of administration in applying Suniva's proposed specific duty.[41]

In addition, we find that Suniva's proposed "floor price" or minimum import price on imports of CSPV products in the form of modules is not an appropriate remedy in this case. Suniva described the price floor as a form of quantitative restriction, which under its proposal would prohibit the entry of any imports that did not meet a minimum price of $0.74 per watt in the first year and lower prices in the three following years.[42] We view this proposal as posing possible legal questions, including with respect to the limitations on quantitative restrictions in section 203(e)(4) of the Trade Act.[43] The proposal is also lacking in flexibility to ensure a sufficient supply of CSPV products in module form in the U.S. market. Specifically, Suniva's proposed "quota" on imports of CSPV products in module form may leave an insufficient supply of modules for the utility segment given respondents' contention that the domestic industry lacks sufficient capacity to produce 72-cell modules to meet domestic demand in that segment.[44] We also question whether the minimum import price requirement could be enforced and administered.[45]

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[39] *See* SEIA's Prehearing Remedy Brief at 4, 49-50; SEIA's Posthearing Remedy Brief at 12-15.

[40] *See, e.g.,* SEIA's Prehearing Remedy Brief at 56-59; SEIA's Posthearing Remedy Brief at 13-15 and Appendix A at 87-92; U.S. Polysilicon Industry's Posthearing Remedy Brief at 11-14; Tesla's Posthearing Remedy Brief at 9.

[41] Respondents argue that a specific tariff applied on a per-watt basis would be difficult to administer because imports of CSPV modules are reported on a per-unit basis at the time of entry. SEIA's Posthearing Remedy Brief, Appendix A, at 75.

[42] *See, e.g.,* Suniva's Posthearing Remedy Brief at 7.

[43] 19 U.S.C. § 2253(e)(4).

[44] SEIA's Posthearing Remedy Brief, Appendix A, at 80.

[45] Respondents assert that there may be problems in administering a per-watt minimum import price because, as previously noted, imports of CSPV modules are reported on a per-unit basis at the time *(continued…)*

We also find that SolarWorld's proposed quotas on imports of both CSPV cells and CSPV modules are too restrictive. Such quotas may create supply uncertainty and shortages in the U.S. market given the current reliance of non-integrated U.S. module producers on imported cells, the very limited supply of cells from U.S. producers, and the perceived limited capacity of U.S. producers to meet demand in the utility segment for 72-cell modules noted above.

On the other hand, we find that respondents' position that the Commission recommend only technical, financial, and trade adjustment assistance -- with no import restrictions or only minimal restrictions -- would not address the serious injury to the domestic industry that we have determined was caused by increased imports. Given the excess capacity of foreign producers of CSPV products and the demonstrated attractiveness of the U.S. market, we find it likely that injurious volumes of imports of CSPV products will continue in the absence of import relief and will cause the continued deterioration of the domestic industry and, further, that the industry will not survive for long in the absence of import relief.

We view the tariff-rate quota and *ad valorem* tariff that we are recommending as more flexible and more appropriate remedies than the specific rate of duty and the quantitative restrictions proposed by petitioners. In our analysis, we have tried to balance the needs of integrated CSPV producers with those of independent CSPV module producers, while also considering the effects of any remedy on upstream and downstream market participants.[46] As indicated in our discussion of supply considerations, Chinese producers control most global production of CSPV products, and the disappearance of domestic cell producers, domestic module producers, or both, would leave U.S. downstream market participants at the mercy of these and other foreign suppliers both in terms of price and supply.

We recommend a remedy on imports of CSPV products in module form that is more restrictive than our recommended remedy on imports of CSPV products in cell form, recognizing that the vast majority of U.S. imports of CSPV products have been in module form. Our recommended tariff with respect to imports of CSPV products in module form should lead to development of greater U.S. module production, which will benefit both integrated and non-integrated U.S. module producers. Given that current U.S. cell capacity is insufficient to supply non-integrated U.S. module producers, we have recommended a less restrictive tariff-rate quota with respect to imports of CSPV products in cell form so that those U.S. module producers will not face a supply shortage in cells.[47] In this way, our tariff-rate quota on imports of CSPV products in cell form should benefit integrated CSPV products producers without causing undue harm to independent module producers.

(…continued)

of entry and because the proposed minimum import price would be inclusive of the per-watt tariffs proposed. *See* SEIA's Posthearing Remedy Brief, Appendix A, at 79-80. Moreover, there is a question as to how effective a minimum import price on CSPV modules would be given that foreign producers might switch to focusing on shipping higher value CSPV module products to the U.S. market as a result of the minimum import price. *Id.* at 80; *cf.* Transcript of Remedy Hearing at 173 (Keeler).

[46] *See generally*, 19 U.S.C. § 2252(e)(5)(B)(iv); *see also* 19 U.S.C. § 2252(f)(2)(G)(i) and (ii).

[47] We note that the President may wish to provide further details as to any tariff-rate quota in any final remedy adopted, including a time allocation for the quota within each year as well as country allocations.

In determining the appropriate level of relief, we have considered all the information obtained in this investigation, including questionnaire responses, hearing testimony, and the briefs of parties as well as the results of an industry-specific partial equilibrium economic model that distinguished between CSPV cell production and trade and CSPV module production and trade. We used this model to estimate changes in prices and quantities of imported articles and domestic products that compete with them in the U.S. market for CSPV cells and modules and changes in the revenues and operating income of U.S. producers that would result from our remedy recommendations. By distinguishing between CSPV cell and module production, and by tracing the different international supply chains for CSPV cells and modules, the model was able to estimate the effects of the different remedies on imports of cells and imports of modules on U.S. producers of CSPV products in cell and module form.[48]

We also estimated the financial impact of each remedy on U.S. producers of CSPV cells and modules using a *pro forma* financial analysis of income statements and information on the fixed and variable shares of the domestic industry's cost of goods sold (COGS) and selling, general and administrative expenses (SG&A). The *pro forma* analysis takes the estimated changes in the volume and prices of U.S. producers from the remedy model as inputs. The financial calculations incorporate U.S. producer questionnaire data regarding the share of COGS and SG&A that are variable costs.[49]

We have used this model as a tool for analyzing the effects of various trade restrictions on import volumes, prices, and the revenue of U.S. cell and module producers; however, the model is subject to certain limitations. Key among these limitations is the fact that the model does not address the impact of our proposed remedies on upstream or downstream industries or on the rest of the U.S. economy. The model does provide an estimate of the percentage change in the deployment of modules under the various remedy scenarios, but it does not attempt to estimate the financial, employment, or any other effects of this change on any sector of the U.S. economy other than cell and module producers.[50] In considering the effect of the proposed trade remedies on other sectors of the U.S. economy, we have relied on hearing testimony, briefs, and questionnaire responses to inform our analysis.

The results of our industry-specific partial-equilibrium model indicate that our recommended remedies will restrict import volume and increase prices sufficiently for the domestic industry to increase its operating income, allowing it to invest in new capacity and achieve the economies of scale necessary to compete with imports. The results of the model show that the remedy we are recommending will allow U.S. imports of CSPV products in cell form to increase, which will benefit U.S. producers that use imported cells. Furthermore, the model shows that the remedy we are recommending will result in an increase in the price of imports of CSPV products in module form, which will benefit both U.S. module producers that

[48] *See* Memorandum EC-PP-023 (October 23, 2017). We also took into account the existing antidumping and countervailing duty orders on CSPV products from China and Taiwan. In setting the levels of our tariff rate quota and tariff recommendations, we considered the fact that these measures already provide some degree of protection to the domestic industry.

[49] *See* Memorandum EC-PP-023 (October 23, 2017).

[50] *See* Memorandum EC-PP-023 (October 23, 2017).

use imported cells and U.S. module producers that use cells produced in the United States.[51] Thus, the economic modeling results provide additional support for the safeguard remedies we are recommending.

Given the precarious condition of the domestic industry, we recommend the imposition of safeguard measures for four years to afford the industry sufficient time to make a positive adjustment to import competition. We recognize that relief of more than three years duration will require the Commission to conduct a mid-course review under 19 U.S.C. § 2254(a)(2). Such an investigation would provide the Commission with an opportunity to review formally, among other matters, the progress of firms in the domestic industry in implementing the commitments they submitted to the Commission. It would also provide the President, after receiving the Commission's report, with the opportunity to reduce or terminate relief if the industry has not made adequate efforts to make a positive adjustment to import competition.

Furthermore, in light of the many U.S. firms, workers, and communities that have been adversely affected by the injurious surge of imports of CSPV products, we recommend that the President direct the U.S. Department of Labor and the U.S. Department of Commerce to provide expedited consideration of any applications for trade adjustment assistance for workers and/or firms that have been affected by imports of CSPV products.

We note that the domestic industry's serious injury resulting from increased imports has left it with insufficient working capital and other financial resources to make the investments in capacity, R&D, and improved products and production processes necessary for the industry to compete with imports of CSPV products. We also note that domestic producers (both petitioners and non-petitioners) and SEIA and other respondents supported the need for the domestic industry to receive additional financial resources in order to adjust and compete[52] and that we took the possibility of such assistance into account in assessing the level of import relief we recommended. We accordingly recommend that the President consider any appropriate funding mechanisms that may facilitate a positive adjustment by the domestic industry to import competition.

B. Country Exclusions

Having made a negative finding with respect to imports of CSPV cells and modules from Canada under section 311 of the NAFTA Implementation Act for the reasons set out in the Commission's views on injury, we recommend that the President not include imports from Canada in any remedy action. Having made an affirmative finding with respect to such imports from Mexico, we recommend that the President include imports from Mexico within any remedy action.

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[51] *See* Attachment 1 hereto.

[52] *See* Suniva's Prehearing Remedy Brief at 16-18; SolarWorld's Posthearing Remedy Brief at 57-59; Suniva's Posthearing Remedy Brief at 9; Tesla's Posthearing Remedy Brief at 9; Auxin Solar Inc.'s Posthearing Remedy Brief at I-13 to I-14; Mission Solar's Posthearing Remedy Brief at 7; SEIA's Prehearing Remedy Brief at 56-59; SEIA's Posthearing Remedy Brief at 13-15 and Appendix A at 86-92; U.S. Polysilicon Industry's Posthearing Remedy Brief at 11-14.

Further, we recommend that the above tariff-rate quota and increased rates of duty not apply to imports from the following countries with which the United States has free trade agreements: Australia, Colombia, Costa Rica, the Dominican Republic, El Salvador, Guatemala, Honduras, Israel, Jordan, Nicaragua, Panama, Peru, and Singapore. We also recommend that the tariff-rate quotas and increased rates of duty not apply to imports from the beneficiary countries under the Caribbean Basin Economic Recovery Act.

C. Requests for Product Exclusions

During the remedy phase of this investigation, the Commission was presented with a number of requests to exclude from any remedy particular products included in the scope of the investigation as to which the Commission made an affirmative determination in the injury phase of the proceedings. The parties making these requests generally contended that the products for which they were requesting exclusions were niche or specialty products either not produced by the domestic industry or produced in insufficient quantities to satisfy U.S. demand.[53] The petitioners argue that most of the products covered by these exclusion requests compete directly with products produced by the domestic industry, and that to exclude them will undermine any safeguard remedy and discourage U.S. investment in these technologies,[54] and we decline to recommend the exclusion of such products from our remedies. However, we recommend that the President consider certain requested product exclusions as to which petitioners have stated that they do not object.[55] Our recommendation is without prejudice to consideration by the President of proposals for exclusion of other products from any remedy imposed.[56]

VI. Short- and Long-Term Effects of Our Recommended Remedy

The tariff-rate quotas and tariff remedies and other measures that we are recommending will address the serious injury to the domestic CSPV products industry and will be most effective in facilitating the efforts of the domestic industry to make a positive

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[53] *See* KOPIA's Prehearing Remedy Brief at 22-29; Prehearing Remedy Brief of the Government of Korea at 5-6; BYD's Prehearing Remedy Brief at 2-4; SunPower's Prehearing Remedy Brief at 13-16; SunPower's Posthearing Remedy Brief at 10-15; Solatube's Prehearing Remedy Brief at 1-15; Solatube's Posthearing Remedy Brief at 2-6; Goal Zero's Prehearing Remedy Brief at 2-21; Goal Zero's Posthearing Remedy Brief at 1-9; Enphase's September 27, 2017 Comments on Remedies at 1-4.

[54] *See S*olarWorld's Posthearing Remedy Brief, Exh. 2, at 67-69; Suniva's Posthearing Remedy Brief, Exh. 5, Attachment D.

[55] Petitioners indicated that they do not object to the requests by Goal Zero and Solatube for exclusion of certain low-wattage products and that they would work with these companies to draft appropriate product-specific exclusion language. SolarWorld's Posthearing Remedy Brief, Exh. 2, at 68; Suniva's Posthearing Remedy Brief, Exh. 5, Attachment D at 6-7.

[56] We note that the Office of the U.S. Trade Representative has recently issued a Federal Register notice soliciting public comments and scheduling a public hearing with respect to the Commission's remedy recommendations.

adjustment to import competition. They also do not exceed the amount necessary to remedy such serious injury.

Given the precarious position of the domestic industry as a result of the serious injury caused by increased imports, it is essential that the industry receive strong import relief in the short term and commence its adjustment efforts quickly to facilitate its survival. In the short term, the remedies we have recommended will give the domestic industry some protection from imports and allow a modest increase in U.S. prices. Accordingly, U.S. producers' cash flow and operating income will increase, giving them funds necessary for investments in increased capacity and production as well as in R&D and innovation. The survival of the domestic industry depends on its ability to innovate and improve both its products and its production processes and to expand production and capacity to achieve economies of scale so as to enable it to compete with imports of CSPV cells and modules.

SolarWorld's company-specific commitments indicate that if import relief is granted, it intends to ramp up its CSPV cell production to full capacity at its existing facilities by May 2018 with module production to follow suit. SolarWorld also intends to make longer-term plans for investments to increase capacity, capacity utilization, and cost-savings; spur innovation and technology upgrades; enter into R&D partnerships; and solidify and expand its customer base.[57] Suniva's prospective action plan -- which depends on agreement to a reorganization plan in its Chapter 11 bankruptcy proceeding -- envisions that, if granted, import relief would enable it to emerge from the Chapter 11 proceeding and, shortly thereafter, reactivate its production capacity. At the same time, the plan envisions that Suniva would move towards full capacity, profitability, and the resumption of its R&D efforts while in the longer term seeking to ***.[58]

The import relief we have recommended will also encourage additional private investment and new entrants in the domestic industry, including both integrated producers and non-integrated module producers. Information obtained during the investigation indicates that a number of domestic producers are planning or considering opening U.S. CSPV production facilities in anticipation of import relief, including ***, ***, ***, ***, and ***.[59]

As previously discussed, petitioners and respondents agree that the most relevant and reliable projections show that demand for CSPV products is expected to dip from 2016 levels in 2017 and 2018, but will resume growing in 2019 and afterwards, even in the event of somewhat higher U.S. prices.[60] Thus, any short-term adverse effect on U.S. downstream demand from higher U.S. prices as a result of import restrictions is unlikely to have a significant effect on the recovery of the U.S. industry from the serious injury or its positive adjustment to import competition.

In the longer term, by the end date of our recommended remedies, the increased capacity and production of domestic producers, their strengthened financial and working capital position, and their improved products and production processes should give them the

[57] SolarWorld's Posthearing Remedy Brief, Exhibit 1, at pages 5-13.

[58] Suniva's Posthearing Remedy Brief at Exh. 5, Attachment B.

[59] *See, e.g.,* SolarWorld's Posthearing Remedy Brief at 8 and Exh. 11; CR/PR at Table D-2.

[60] *See* SolarWorld's Prehearing Remedy Brief at 23; SolarWorld's Posthearing Remedy Brief at 13; Transcript of Remedy Hearing at 215 (Prusa).

ability to achieve the economies of scale necessary for them to bid on large utility projects. For all these reasons, we believe that our recommended remedies will enable the domestic industry to make a positive adjustment to import competition during the remedy period and emerge in a greatly strengthened competitive position over the long term.

VII. Short- and Long-Term Effects of Not Taking the Recommended Action

In the absence of relief, the injurious surge of imports would likely continue given the large and growing excess capacity of foreign producers and the attractiveness of the U.S. market to those producers. As a result, the domestic industry, including both CSPV cell and module producers, would likely cease to exist in the short term. The domestic industry suffered operating losses throughout the period of investigation, and those losses would likely continue and worsen in the absence of relief, leaving the domestic industry unable to invest in the innovation and R&D necessary for its long-term survival. This industry requires continual technological advances and efficiency increases, necessitating constant innovation aimed at both improving the product and the production process, all of which require substantial investments in R&D.

Moreover, the likely disappearance of the U.S. CSPV industry in the absence of import relief would have adverse consequences for other U.S. firms participating in the broader CSPV products market. As discussed above, downstream market participants would become more dependent on foreign suppliers of CSPV products in cell and module form, leaving them vulnerable both as to price and supply. Upstream U.S. producers that supply both U.S. CSPV cell and module producers would experience significant losses as their customers cut back or went out of business as they did during the period of investigation. We note that SKC, Inc., which had been the sole remaining U.S. supplier of ethyl vinyl acetate ("EVA") sheets to U.S. module producers, idled production of EVA sheets at its Covington, Georgia, facility in 2017 because of sharply declining orders from U.S. CSPV producers.[61] Similarly, upstream component supplier Ulbrich Specialty Wire and Solar Technologies ("Ulbrich"), a producer of engineered wires, including PV ribbon for solar panels, saw its business rapidly decline as its U.S. customers cut production, closed, or filed for bankruptcy; this in turn led Ulbrich to close its Hillsborough, Oregon, facility in August 2017.[62]

Furthermore, current CSPV cell and module technology is to a substantial degree a product of R&D and innovation in the United States, including by the petitioners.[63] The

[61] Transcript of Injury Hearing at 132-135 (Byerson); August 22, 2017 Written Statement by SKC, Inc. at 1-4.

[62] Transcript of Remedy Hearing at 95-98 (Treglia).

[63] *See, e.g.*, CR/PR at Tables III-2, III-6; CR at III-9 to III-17, III-22; PR at III-5 to III-10; SolarWorld's Posthearing Injury Brief at 10; Hearing Tr. at 88, 90 (Stein); SolarWorld's Prehearing Injury Brief at 52; Suniva's Posthearing Injury Brief at 7-8, Exhibit 9 at 4. For example, SolarWorld was one of the earliest producers of monocrystalline products and the first producer of monocrystalline PERC products, and petitioners observe that the market now is strongly moving to monocrystalline PERC products where SolarWorld is a recognized leader. SolarWorld's Posthearing Injury Brief at 9, 10, Exhibit 1, section I at 1, section II at 9, Exhibit 9; Transcript of Injury Hearing at 220-21 (Stein), 222 (Card). SolarWorld also *(continued…)*

disappearance of the U.S. industry producing CSPV cells and modules would lead to a decline in U.S. R&D and innovation in the solar energy field, which has economic and social benefits in the United States far beyond the benefits to the specific firms conducting the R&D.[64] Indeed, the loss of the domestic industry, and the resulting reliance of downstream industries on foreign producers of CSPV products, could have significant long-term consequences for U.S. economic and national security.[65]

VIII. Other Steps to Facilitate the Industry's Positive Adjustment to Import Competition

In addition to their proposals for import relief, both petitioners also propose that the President issue an executive order directing all U.S. government agencies to require use of U.S. origin solar cells[66] and that the President initiate bilateral and multilateral negotiations to address global overcapacity in solar cells and modules.[67] Suniva proposes that the President direct his Administration to conduct a study of the cyber, electrical grid, and national security risks of using solar panels of foreign origin in the United States.[68] It also proposes that the domestic industry receive funds, which may come from collected U.S. antidumping and countervailing duties on imports of solar cells and modules from China and Taiwan that are currently under suspension, from any tariffs that are imposed as a result of this Section 201 proceeding, or from other sources.[69]

SolarWorld proposes that the Investment Tax Credit and other federal tax incentives be amended to stimulate U.S. solar demand and in particular for projects using domestically produced cells and panels.[70] SolarWorld also proposes that the President pursue settlement negotiations with respect to the U.S. antidumping and countervailing duty orders on solar cells and modules from China and Taiwan and the duty deposits collected under those orders currently under suspension. SolarWorld suggests that the proposed settlement negotiations encompass the antidumping and countervailing duty orders imposed by China on imports of solar-grade polysilicon from the United States.[71] Also, SolarWorld proposes that the President

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(…continued)

developed the p-type PERC bifacial cell in 2015, the next level of innovation that increases energy yield at the system level and has a greater impact on the cost of the delivered energy. SolarWorld's Posthearing Injury Brief at Exhibit 1, section I at 1-2. Suniva identified a number of innovations that the firm made throughout its history and the technology changes it implemented during the period of investigation to remain competitive. Suniva's Posthearing Injury Brief at Exhibit 9 at Question 6.

[64] *See* Suniva's Prehearing Remedy Brief at 25-27 and Exh. 6.

[65] *See* Suniva's Prehearing Remedy Brief at 23-28 and Exhs. 12-13; Transcript of Injury Hearing at 96-97 (Card); SolarWorld's Posthearing Remedy Brief, Exh. 2, at 81-84.

[66] SolarWorld's Prehearing Remedy Brief at 21-23; SolarWorld's Posthearing Remedy Brief, Exh. 1, at 60-64; Suniva's Prehearing Remedy Brief at 13-15.

[67] SolarWorld's Prehearing Remedy Brief at 24-25; Suniva's Prehearing Remedy Brief at 16.

[68] Suniva's Prehearing Remedy Brief at 15-16.

[69] Suniva's Prehearing Remedy Brief at 16-18.

[70] SolarWorld's Prehearing Remedy Brief at 23-24.

[71] SolarWorld's Prehearing Remedy Brief at 27-28.

direct the Department of Energy ("DOE") to fund the full cost of DOE SunShot Initiative research grants.[72]

We make no recommendation with respect to petitioners' additional proposals summarized above. Nevertheless, given the extent of the serious injury to the domestic industry and the need for a comprehensive solution, the President may wish to consider the proposals to the extent that they are consistent with U.S. law and would facilitate the domestic industry's positive adjustment to import competition.

[72] SolarWorld's Prehearing Remedy Brief at 29.

Attachment 1

Remedy Recommendations of Vice Chairman David S. Johanson and Commissioner Irving A. Williamson

Table 1 summarizes the remedy recommendation for each of the four years in the remedy period.

Table 1: Summary of Remedy Recommendations

	Year 1	Year 2	Year 3	Year 4
Ad Valorem Tariff on Imported Modules	30%	25%	20%	15%
Quota Amount in TRQ on Imported Cells	1 GW	1.2 GW	1.4 GW	1.6 GW
In-Quota Rate in the TRQ on Imported Cells	0%	0%	0%	0%
Out-of-Quota Rate in the TRQ on Imported Cells	30%	25%	20%	15%

Based on these assumptions, we estimated the recommended remedy will have the effects reported in table 2:

Table 2: Estimated Economic Effects over the 4 Years of the Recommended Remedy

	Year 1	Year 2	Year 3	Year 4
% Change in the Quantity of Imported Cells*	***	***	***	***
Change in the GW of Imported Cells	***	***	***	***
% Change in the Quantity of Imported Modules	***	***	***	***
Change in the GW of Imported Modules	***	***	***	***
% Change in the Quantity of U.S. Modules Using U.S. Cells	***	***	***	***
Change in the GW of U.S. Modules Using U.S. Cells	***	***	***	***
% Change in the Price of U.S. Modules Using U.S. Cells	***	***	***	***
% Change in the Overall Price of Modules in the U.S. Market	***	***	***	***
% Change in the Deployment of Modules in the U.S. Market	***	***	***	***
Change in Revenue from U.S. Modules Using U.S. Cells (million dollars)	***	***	***	***
Change in Operating Income from U.S. Modules Using U.S. Cells (million dollars)	***	***	***	***
Change in Revenue from U.S. Cells Used in Foreign Modules Exported to the United States (million dollars)	***	***	***	***
Change in Operating Income from U.S. Cells Used in Foreign Modules Exported to the United States (million dollars)	***	***	***	***
Change in Revenue from U.S. Modules Using Foreign Cells (million dollars)	***	***	***	***
Change in Operating Income from U.S. Modules Using Foreign Cells (million dollars)	***	***	***	***
Combined Change in Revenue from U.S. Production (million dollars)	***	***	***	***
Combined Change in Operating Income from U.S. Producers (million dollars)	***	***	***	***
Change in U.S. Tariff Revenues (million dollars)	***	***	***	***

Note: These effects are rounded to 0.1.

*This is the percentage change in the quantity of imported cells used in U.S. modules.

Assumptions used in the model:

- The baseline data for each year is based on GTM Research projected growth in total CSPV deployment in the U.S. market, assuming that the first year of the remedy is 2018 and the fourth year of the remedy is 2021.
- The price elasticity of total demand in the market is -1.
- The domestic supply elasticity is 4.
- The other elasticity values in the model are at the mid-points of the ranges in the final staff report.
- The remedy does not apply to imports from Canada or Singapore.

Views of Commissioner Meredith M. Broadbent on Remedy

I. Summary of Findings and Recommendations

On September 22, 2017, I found that increased imports of crystalline silicon photovoltaic cells (whether or not partially or fully assembled into other products) (CSPV products)[1] are being imported into the United States in such increased quantities as to be a substantial cause of serious injury to the domestic industry producing such articles. Over the five-year period covered by this safeguard investigation, U.S. producers of CSPV products have suffered operating losses as a result of low market prices that have prevented the expansion of production capacity necessary to compete successfully with imports. Many U.S. producers have shut down facilities. My recommendations are intended to address the serious injury while seeking to avoid inflicting additional damage on the broader solar energy industry in the United States. The U.S. solar energy industry has been a relative success story in making progress toward grid parity with a carbon neutral source of power. The United States is recognized as a global leader in this broader sector and U.S. taxpayers and policy makers have chosen to support this success over many years.

For the reasons set forth below, I recommend that the President:

(A) Impose a quantitative restriction on imports of CSPV products into the United States, including cells and modules, for a four-year period, administered on a global basis. I recommend that the quantitative restriction be set at 8.9 gigawatts in the first year, and increase by 1.4 gigawatts each subsequent year;[2]

(B) Administer these quantitative restrictions by selling import licenses at public auction at a minimum price of $0.01 per watt;

(C) To the extent permitted by law, authorize the use of funds equal to the amount generated by import license auctions to provide development assistance to domestic

[1] Although the scope definition includes other CSPV products which contain cells, such as laminates and building-integrated materials, the vast majority of in-scope merchandise and the like or directly competitive article is comprised of CSPV cells and finished modules.

[2] Having made an affirmative finding with respect to imports from Mexico under section 311(a) of the North American Free Trade Agreement (NAFTA) Implementation Act, I recommend that the President allocate no less than 720 megawatts of the global quantitative restriction to imports of CSPV products from Mexico during the first year, which would expand by 115 megawatts each year. Having made a negative finding with respect to imports from Canada under section 311(a) of the NAFTA Implementation Act, I recommend that the quantitative restriction not apply to imports from Canada. Furthermore, I recommend that the quantitative restriction not apply to imports from Australia, the countries that are signatories to the Dominican Republic-Central America Free Trade Agreement (CAFTA-DR countries), Colombia, Israel, Jordan, Panama, Peru, Singapore, and the beneficiary countries under the Caribbean Basin Economic Recovery Act (CBERA).

CSPV product manufacturers for the duration of the remedy period, such as through authorized programs at the United States Department of Energy; and

(D) Implement other appropriate adjustment measures, including the provision of trade adjustment assistance by the United States Department of Labor and the United States Department of Commerce to workers and firms affected by import competition.

II. Remedy Recommendations

a. Competitive Conditions

I considered the following conditions of competition in the domestic and world markets in evaluating the various remedy options for the industry producing CSPV products.

i. China is driving global oversupply and price declines

The underlying factor driving the increase in U.S. imports of low-priced CSPV products has been a substantial and deliberate build-up of Chinese supply that consistently surpassed Chinese demand. CSPV cell production capacity in China increased from 40 GW in 2012 to 63 GW in 2016, whereas photovoltaic (PV) installations in China increased from 3.2 GW in 2012 to 34.5 GW in 2016.[3] In addition, CSPV module production capacity in China surpassed global PV installations in each year during the 2012-2016 period.[4] The supply-demand imbalance in China persisted throughout the period examined by the Commission, making China a substantial surplus producer and exporter of CSPV products, which flooded world markets.[5] According to the data gathered in response to foreign producer questionnaires, China's global exports of CSPV modules reached 13.9 GW in 2016, larger than apparent U.S. consumption in that year and accounting for nearly half of global exports reported by all countries.[6]

The success of Chinese CSPV manufacturers has been driven in large part by the economies of scale that they have been able to achieve, rather than by any comparative

[3] CR IV-33, IV-47–48; PR at IV-20, IV-30-31; Lv Fang, Xu Honghua, Wang Sicheng, *National Survey Report of PV Power Applications in China 2013*, IEA PVPS, September 13, 2014, pp. 14-15 (EDIS Doc. 627085 file ID 1238006); Lv Fang, Xu Honghua, Wang Sicheng, *National Survey Report of PV Power Applications in China 2016*, IEA PVPS, 2017, pp. 18-19 (EDIS Doc. 627085 file ID 1238006 at 44). In addition to CSPV products, PV installations include solar installations made from thin film, which is an out-of-scope photovoltaic product. CR at I-11, 15; PR at I-8, 11.

[4] SEIA Posthearing Remedy Brief, Exhibit 32.

[5] In each year between 2012 and 2016, annual Chinese production of PV modules was larger than annual Chinese PV installations by between *** and ***. SEIA Posthearing Remedy Brief, Exhibit 32.

[6] CR/PR at Table IV-22, Table IV-90, and Table C-1b. This data understates the size of the Chinese industry, and therefore China's global exports of CSPV modules were likely higher. CR at IV-36; PR at IV-23.

advantage inherent to the Chinese economy.[7] China's CSPV commercial production began to grow rapidly in the early 2000s, when Chinese companies began to serve the growing market in Europe, particularly Germany, which did not have sufficient capacity to meet demand.[8] After obtaining capital equipment, expertise, and R&D support from Europe, Chinese firms developed their own expertise and industrial models to supply demand growth elsewhere.[9] Chinese manufacturers are now among the largest in the world, with many of the largest cell and module producers being headquartered or having manufacturing operations in China.[10] These firms are innovative, vertically integrated companies with supply chains and investments throughout the world.[11]

However, the key driver of rapid growth and overcapacity in the Chinese industry has been a mixture of government-driven industrial policy and ad hoc provincial and local subsidies. Over four "five-year plans" covering 2001 to 2020, the Chinese government laid out priorities for the industry that initially focused on scaling up capacity, but later included improving and localizing R&D within China, reducing costs of manufacturing, and increasing both exports and domestic deployment of solar projects.[12] As determined by the United States Department of Commerce (DOC) in two separate countervailing duty (CVD) investigations, the Chinese national government and regional governments have provided an array of mechanisms for supporting the CSPV manufacturing industry, including rebates on value-added tax and corporate income tax, preferential policy lending, provision of grants, provision of inputs for less than adequate remuneration (including land, electricity, polysilicon, aluminum, and glass), and R&D support, among other incentives.[13]

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[7] Jeffrey Ball, Dan Reicher, Xiaojing Sun, Caitlin Pollock, *The New Solar System*, Stanford University, March 2017, 116-117 (EDIS Doc. 627084 file ID 1238000 at 85) ("*New Solar System*"); Hearing Tr. at 180 (Shea).

[8] Donald Chung, Kelsey Horowitz, and Parthiv Kurup, *On the Path to SunShot: Emerging Opportunities and Challenges in U.S. Solar Manufacturing*, DOE National Renewable Energy Laboratory (NREL), 11-14 (EDIS Doc. 627084 file ID 1238001 at 237) ("*On the Path to SunShot*"); *New Solar System* at 45.

[9] *Id*.

[10] CR/PR at IV-16; CR at IV-13, 16; PR at IV-9, 12.

[11] CR at IV-39-42; PR at IV-26-29; *New Solar System* at 40, 61.

[12] *New Solar System* at 86-95; *On the Path to SunShot* at 9; SolarWorld Prehearing Injury Brief at 75-76.

[13] U.S. DOC, "Issues and Decision Memorandum for the Final Determination in the Countervailing Duty Investigation on Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules, from the People's Republic of China," October 9, 2012 ("*CSPV I* I&D Memorandum"); U.S. DOC, "Issues and Decision Memorandum for the Final Determination in the Countervailing Duty Investigation on Crystalline Silicon Photovoltaic Products from the People's Republic of China," December 15, 2014 ("*CSPV II* I&D Memorandum"); *CSPV I* Confidential Staff Report ("*CSPV I* Staff Report") at I-6; *CSPV II* Confidential Staff Report ("*CSPV II* Staff Report") at I-7. *See also On the Path to SunShot* at 9-11; *New Solar System* at 122-133.

The two U.S. CVD investigations led to the imposition of duties on imports from China designed to remedy the unfair trade resulting from the subsidies discussed above.[14] Nonetheless, Chinese firms have taken deliberate steps to avoid these remedies and similar remedies in Europe, first by using cells produced in Taiwan while continuing to assemble modules in China, and then by investing heavily in production elsewhere in Asia, particularly Southeast Asia and South Korea.[15] Abrupt changes in Chinese government support for PV deployment in their domestic market also can have substantial indirect effects throughout the global market, with reductions in support leading to rapid increases in available global supply. For example, the December 2015 announcement that the Chinese feed-in-tariff would be reduced for projects completed after June 2016 caused a massive increase in Chinese PV installations in the first half of 2016 and a corresponding decline in installations in the second half of 2016, which affected global prices and exports.[16]

Respondents in this investigation have stated that Chinese PV installations will continue to increase substantially, leading to a greater orientation of the Chinese industry's shipments toward China's domestic market as opposed to export markets.[17] However, even assuming that demand in China will continue to increase, Chinese manufacturing firms are projected to substantially increase cell and module capacity in a manner that will far outstrip domestic demand.[18] Without a focused and coordinated Chinese government effort to reduce subsidization and rein in capacity growth, the global market will continue to bear the weight of Chinese oversupply.

ii. Demand for CSPV modules is price-sensitive due to the availability of low-cost alternatives to solar energy

Demand for CSPV modules is driven by new solar installations generating energy for residential, nonresidential, and utility customers. Grid-connected households, businesses, and utilities can use or produce electricity from a wide variety of alternative sources, ranging from

[14] *CSPV I* I&D Memorandum; *CSPV II* I&D Memorandum; 77 Fed. Reg. 73017 (Dec. 7, 2012); 80 Fed. Reg. 8592 (Feb. 18, 2015); *CSPV I* Staff Report at I-6; *CSPV II* Staff Report") at I-7.

[15] CR/PR at Table IV-17 and Table IV-18 (showing Chinese companies' rapid increases in cell and module production capacity, particularly in South Korea and Malaysia); SolarWorld Prehearing Injury Brief at 18, 80-85; Suniva Posthearing Injury Brief, Exhibit 1 at 40; SolarWorld Posthearing Injury Brief, Exhibit 1 at 92 and Exhibit 40; SolarWorld Posthearing Remedy brief, Exhibit 2 at 72 and Exhibit 43.

[16] CR at IV-33-35; PR at IV-20-22. A feed-in-tariff offers a guarantee of payments to solar electricity developers for the electricity they produce. Payments are based on a certain price per kW/hour at which electricity is purchased, typically as part of a long-term agreement set over a period of 15-20 years. CR at V-54; PR at V-34. Therefore, the announcement in 2015 that projects completed after June 2016 would receive a lower guaranteed rate of return led to a concentration of 2016 Chinese installations within the first half of that year. CR at IV-34-35; PR at IV-22-23. As a result, there were far fewer Chinese installations in the second half of the year, which corresponded with a decline in U.S. and global prices. CR/PR at Figure V-13; SolarWorld AG, *Annual Group Report 2016*, 31-32 (EDIS Doc. 619376).

[17] CCCME Posthearing Remedy Brief at 10-12; SEIA Posthearing Remedy Brief, Appendix A at 63-64.

[18] SEIA Posthearing Remedy Brief, Exhibit 32.

traditional fossil fuels to other forms of renewable energy such as wind power. There are segments of the market that prefer solar energy for non-economic reasons or are encouraged to use it as a result of renewable portfolio standards and other programs.[19] However, aggregate demand for solar energy, and by extension CSPV modules, is primarily and increasingly dependent on the degree to which the long-term costs of producing solar electricity are competitive with those of alternative sources.

Between 2012 and 2016, the cost of installing new PV systems fell by 25.5 percent for the residential sector and by 48.1 percent for the utility sector.[20] These costs fell for a number of reasons, particularly declining costs of modules and "balance of system" (BOS) hardware, but also falling "soft costs" such as labor and overhead, greater module efficiency due to technological improvements, and larger PV installations benefiting from economies of scale.[21] In addition to upfront installation costs, long-term operational costs have continued to decline due to improvements in module durability, higher balance of system reliability, and lower operational and maintenance expenses.[22]

The striking decline in PV system costs has made solar energy competitive with other types of energy for price-sensitive customers, particularly in the utility segment of the market. The relative costs of producing different types of energy can be measured by the levelized cost of electricity (LCOE), which is the per-kilowatt (kW) hour cost of building and operating a power-generating installation over an assumed financial life.[23] The LCOE for a new combined-cycle natural gas-fired power plant, at about 4-5 cents per kW/hour, has set the benchmark for low-cost energy within the utility segment of the market.[24] On-shore wind installations, which benefit from federal tax credits, can have an LCOE of just over 3 cents per kW/hour.[25] By comparison, the LCOE for solar PV systems (incorporating federal tax credits) was just over 5

[19] CR at V-52-56; PR at V-31-35; Injury Hearing Tr. at 253-254 (Grace).

[20] Based on median installed costs. Barbose, Galen and Naïm Darghouth, *Tracking the Sun 10: The Installed Price of Residential and Non-Residential Photovoltaic Systems in the United States*, Berkeley, CA: Lawrence Berkeley National Laboratory, 2017, Data File Figure 7 and p. 13 (EDIS Doc. 627085 file IDs 1238007 (at 73) and 1238011 (at 253)) ("*Tracking the Sun*"); Bolinger, Mark, Joachim Seel, and Kristina Hamachi LaCommare, *Utility-Scale Solar 2016: An Empirical Analysis of Project Cost, Performance, and Pricing Trends in the United States*, Berkeley, CA: Lawrence Berkeley National Laboratory, Data File, Figure 8 (EDIS Doc. 623498 file ID 1229690 at 245). Nonresidential system costs also substantially declined, though at different rates depending on the size. *Id*.

[21] Ran Fu, David Feldman, Robert Margolis, Mike Woodhouse, and Kristen Ardani, *U.S. Solar Photovoltaic System Cost Benchmark: Q1 2017*, NREL, 39-40, 44 (EDIS Doc. 627084 file ID 1238001 at 59) ("*U.S. Solar Photovoltaic System Cost Benchmark: Q1 2017*").

[22] *U.S. Solar Photovoltaic System Cost Benchmark: Q1 2017* at 41-42.

[23] CR at V-58-59; PR at V-37.

[24] CR/PR at Table V-25. A hearing witness from Bloomberg New Energy Finance stated that the operating cost of an efficient natural gas price was roughly $20-30 per MW/hour, or 2-3 cents per kW/hour. Injury Hearing Tr. at 252-253 (Grace).

[25] CR/PR at Table V-25.

cents per kW/hour, and was lower in many locations.[26] Solar energy is therefore essentially cost-competitive with other forms of electricity generation, which has supported robust growth in utility installations.[27] For the first time in 2016, solar power accounted for the largest share of new U.S. electricity generation, surpassing natural gas, coal, and wind with 39 percent of total added capacity.[28]

Similar dynamics have led to increased demand for solar energy in the residential and nonresidential segments of the market. These smaller PV systems do not benefit from the same efficiencies and economies of scale as in the utility sector, and therefore have higher levelized costs within the 6-11 cent per KW/hour range.[29] However, many of these customers are able to realize savings by offsetting the cost of using grid-provided electricity with household-generated energy.[30] According to one estimate, by 2020, residential consumers in 37 states and the District of Columbia will see net savings as a result of new rooftop solar installations.[31]

The rapid growth in demand for PV installations over the 2012 to 2016 period was driven in large part by these consistent cost declines, which increased competitiveness of solar energy with other types of electricity.[32] As a result, most solar energy demand is now driven by cost-conscious purchasers choosing between competing energy alternatives as opposed to purchasers interested in solar energy for non-economic reasons.[33] The current high level of

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[26] CR/PR at Table V-25; *U.S. Solar Photovoltaic System Cost Benchmark: Q1 2017* at 47 (showing different utility PV system LCOE across many regions, not including Investment Tax Credit) and Appendix B (showing LCOE between 2.7 and 4.0 cents per kW/hour across three different locations).

[27] Injury Hearing Tr. at 254-255 (Grace); Bloomberg New Energy Finance Injury Hearing Presentation, Slide 9 (EDIS Doc. 620615 at 99).

[28] CR/PR at Figure V-3.

[29] *U.S. Solar Photovoltaic System Cost Benchmark: Q1 2017* at Appendix B.

[30] Net metering allows residential and nonresidential customers that generate their own solar electricity to receive credit for excess electricity fed into the grid. In some states, utilities may offer net metering programs voluntarily or as a result of regulatory decisions. CR at V-55; PR at V-35.

[31] GTM Research Remedy Hearing Presentation, Slide 13 (EDIS Doc. 624718 at 145).

[32] SEIA Posthearing Remedy Brief, Exhibit 32 (GTM Research's actual and projected PV installations, by year). Between 2012 and 2016, apparent U.S. consumption of CSPV products increased by *** percent. CR/PR at Table IV-3. Apparent U.S. consumption grew substantially in each year of the period of investigation, and spiked in 2016 due to the anticipated expiration of the Federal Investment Tax Credit in December 2016, although the program was subsequently extended for several more years. CR at V-2; PR at V-2; CR/PR at Figure V-1 and Table V-21. Both petitioners and respondents agree that the most relevant and reliable projections anticipate that in 2017 and 2018 demand for CSPV products will dip below 2016 levels, but growth will resume in 2019 and afterwards. *See* SolarWorld's Prehearing Remedy Brief at 23; SolarWorld's Posthearing Remedy Brief at 13; Transcript of Remedy Hearing at 215 (Prusa).

[33] Bloomberg New Energy Finance estimates that 40 out of 52 GW of projected U.S. PV installations from 2018 to 2021 will be discretionary, and an additional 7 GW will be "agnostic" between different types of renewable energy, including wind power. GTM Research estimates that 72 percent of utility solar projects under development are driven by economic factors, with the remaining projects driven by (Continued…)

demand for solar energy remains heavily dependent on whether solar energy producers achieve and maintain "grid parity" with other renewable and conventional energy sources.

Many of the same factors contributing to the decline in PV installation and operational costs from 2012 to 2016 will continue to push solar energy costs lower in the future;[34] however, planned phase-downs and expirations of federal and state incentive programs, such as the federal Investment Tax Credit, will offset these cost declines.[35] Therefore, any shock to the market that causes the cost of solar energy to rise above cost benchmarks set by other energy sources will likely lead to a sharp reduction in demand for solar energy and the capital equipment used to produce it.

Petitioners assert that changes in the price of CSPV modules will have limited effects on demand for CSPV products because modules accounted for only a small share of the total cost of installed PV systems in 2016.[36] This assertion is not supported by evidence on the record in this investigation. CSPV modules accounted for by far the largest single hardware component of PV system costs in 2016, representing approximately 42 percent of costs for utility projects, 30 percent of nonresidential projects, and 22 percent of residential projects.[37] Therefore, any government action that causes a substantial increase in module prices would cause the largest component of installation costs to rise, which would cause demand for solar installations using these products to decline. Under the same dynamic, the decline in module prices over the

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(…Continued)
policy. Bloomberg New Energy Finance Injury Hearing Presentation, slide 9; GTM Research Remedy Hearing Presentation, Slide 12.

[34] *International Technology Roadmap for Photovoltaic ("ITRPV"), 2016 Results*, March 2017, p. 40 (EDIS Doc. 623322 file ID at 1226593); *The SunShot Initiative's 2030 Goal: 3¢ per Kilowatt Hour for Solar Electricity*, December 2016 (EDIS Doc. 627084 file ID 1238001 at 468); Remedy Hearing Tr. at 141-142 (Szamosszegi).

[35] The 30 percent investment tax credit will decline to 26 percent in 2020 and 22 percent in 2021. After 2021, residential projects receive zero tax credit while nonresidential and utility projects receive a 10 percent credit, though the start of construction clause will allow projects started prior to the end of 2021 to receive the higher credit if completed by the end of 2023. CR/PR at Table V-21. State and local government incentives have also declined over the 2012 to 2016 period, particularly for net metering programs. CR/PR at Table V-22; SEIA Posthearing Remedy Brief, Appendix A at 27-29.

[36] Remedy Hearing Tr. at 112-113 (Szamosszegi), 143-144 (McConkey), 146-147 (Kaplan); Capital Trade Remedy Hearing Presentation at 38; Suniva Posthearing Remedy Brief, Exhibit 5 at 12-14.

[37] *U.S. Solar Photovoltaic System Cost Benchmark: Q1 2017* at Appendix A. Similarly, U.S. producers reported that CSPV cells (not assembled into modules) accounted for 30 percent of costs for utility projects, 18 percent of nonresidential projects, and 19 percent of residential projects. CR/PR at Table V-2. The cost of CSPV modules as a share of PV system costs has declined substantially over time, particularly for utility PV installations where overhead costs are generally lower than in other market segments. These declines occurred as the price of CSPV modules fell to a greater extent than other costs, which also generally declined. *U.S. Solar Photovoltaic System Cost Benchmark: Q1 2017* at Appendix A.

2012 to 2016 period was a major contributor to the declining cost of and rising demand for solar energy, particularly from 2012 to 2013 and from 2015 to 2016.[38]

The extent to which future changes in CSPV module prices affect demand for solar energy will be somewhat mitigated by the availability of thin film, an alternative PV technology, as a substitute product. Large U.S. and foreign producers of thin film (particularly First Solar and Solar Frontier) supply the U.S. market. First Solar is currently adding additional capacity to supply the U.S. and global markets.[39] However, thin film capacity is likely to continue to account for a minority share of total PV installations even with capacity additions.[40] In addition, the degree to which thin film products can substitute for CSPV modules is generally dependent on the market segment, or even specific project, being supplied. Purchasers responding to the Commission's questionnaire provided mixed responses regarding the degree to which thin film can be substituted for CSPV products.[41] Thin film can be substituted for CSPV modules in many utility applications, but there is less substitutability within residential and nonresidential applications.[42]

In summary, any government action that leads to substantially higher prices for CSPV modules would likely cause cost-sensitive consumers, which now account for the majority of the market, to find alternatives for those modules. As a result, solar energy production would likely decline relative to traditional and other renewable forms of energy. Therefore, demand for CSPV modules is highly reactive to changes in price.

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[38] CR at V-14; PR at V-8. U.S. producers reported that the decrease in the price of solar generated electricity has been driven by CSPV market competition. CR at V-63; PR at V-42.

[39] Energy Acuity, *2016 Solar Report: Utility Scale*, 2017, p. 10 (EDIS Doc. 623321 file ID 1226579 at 76) ("*2016 Solar Report: Utility Scale*"); Seeking Alpha, "First Solar (FSLR) Q3 2017 Results - Earnings Call Transcript," October 26, 2017 (EDIS Doc. 627085 file ID 1238004 at 27) ("First Solar Q3 2017 Results"); Solar Frontier, "Solar Frontier Americas Enters Into 150 MW Solar Module Supply Agreement With Cypress Creek Renewables," News release, March 29, 2016 (EDIS Doc. 627084 file ID 1237995 at 57); Solar Frontier, "Solar Frontier Americas Nears Completion of 106 MW of Utility-Scale Solar Projects in Southern California," News release, December 13, 2016 (EDIS Doc. 627084 file ID 1237995 at 61).

[40] Petitioners assume that there will be 0.9 GW of thin film in 2018 in response to a restrictive trade remedy. SolarWorld Prehearing Remedy Brief at 16. Respondents estimate that there would be 3 GW of thin film in the U.S. market in 2018. Hearing Tr. at 217 (Prusa). In 2016, installations of First Solar's thin film modules in the United States totaled 1.7 GW. 8minuteenergy Posthearing Injury Brief, Exhibit 16. First Solar is projecting 2 to 3 GW of global production capacity in 2018, 3.5 GW in 2019 and 4 GW in 2020. A portion of First Solar's production during these years is booked for projects outside the United States. First Solar Q3 2017 Results. Solar Frontier's production capacity is 1.1 GW. Solar Frontier Website, http://www.solar-frontier.com/eng/company/production/index.html (accessed October 23, 2017) (EDIS Doc. 627085 file ID 1238007 at 53).

[41] CR at V-19; PR at V-12.

[42] First Solar was the largest individual PV module supplier to the utility segment in the U.S. in 2016. However, thin film accounted for less than 1 percent of installations in the residential and nonresidential segments. *2016 Solar Report: Utility Scale* at 10; *Tracking the Sun* Data File.

iii. Imports supply the U.S. market, and U.S. capacity will remain limited without substantial investment

In 2009, the first year of the period examined in *CSPV I*, the U.S. industry was the largest source of CSPV products to the U.S. market.[43] At that time, the U.S. market for CSPV products was considerably smaller than during the period covered by this investigation, and was characterized primarily by sales to the residential and nonresidential segments.[44] Most customers purchased renewable energy equipment for non-economic reasons, such as growing consumer interest in solar power and the existence of government renewable energy mandates.[45] Although sales to the utility sector were growing rapidly, these were primarily driven by state renewable portfolio standard requirements.[46]

The CSPV product market has grown substantially since that time, particularly within the past five years.[47] Although demand is still partially supported by consumer interest in renewable energy and government incentive programs, growth is now driven primarily by the increasing economic attractiveness of solar energy, as discussed above.[48] The drop in CSPV module costs was a major factor driving the increased cost-competitiveness of solar energy and the surge in demand for CSPV products. As stated in the Views of the Commission on Injury, the availability of low-priced imports of CSPV modules was the primary reason for the decline in CSPV module prices in the United States. However, declining module prices also led to consistent unprofitability, underinvestment, and substantial loss of market share for the domestic industry. In particular, domestic producers were unable to achieve levels of capacity necessary to compete for most utility projects, even as this market segment became the largest source of growth. As a result, the domestic industry accounted for a tiny portion of the market for CSPV products by 2016.[49]

As a result of the serious injury caused by imports, the existing U.S. industry will likely be able to supply only a small share of the U.S. market under current demand projections, even if imports substantially decline due to a restrictive trade remedy. In 2016, the domestic industry's reported CSPV module production was only 669 MW and its capacity was 1.25 GW, equivalent to *** percent and *** percent of apparent U.S. consumption, respectively, in that year.[50] However, even these volumes substantially overstate the industry's ability to serve the U.S. market due to the industry's comparatively small CSPV cell production capacity. The industry's CSPV cell production was *** and capacity was *** in 2016.[51] In addition, most of

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[43] *CSPV I* Confidential Views of the Commission ("*CSPV I* Views") at 37-38.

[44] *CSPV I* Staff Report at Figure II-1 (showing 195 MW of shipments to the residential sector in 2009, 241 MW to the nonresidential sector, and 30 MW to the utility sector) and Table C-7.

[45] *CSPV I* Views at 32-36.

[46] *CSPV I* Staff Report at II-3.

[47] CR/PR at Table C-1b.

[48] Bloomberg New Energy Finance Injury Hearing Presentation, slide 9; GTM Research Remedy Hearing Presentation, Slide 12.

[49] CR/PR at Table C-1b.

[50] CR/PR at Table III-7 and Table C-1b.

[51] CR/PR at Table III-4.

the industry's excess cell production capacity in 2016 was the result of Mission Solar ceasing commercial production in that year and Tesla producing only for R&D purposes.[52] Not counting these two firms' transitioning operations, the U.S. industry had minimal additional capacity to produce cells in 2016.[53]

Domestic module capacity has consistently remained underutilized due to the inability of module producers, particularly those without integrated cell production, to source sufficient volumes of cells. Domestic integrated cell producers have never made commercial quantities of cells available to independent module producers.[54] Independent module producers and even integrated producers have therefore had to rely on imported cells in order to produce modules domestically.[55] Many independent module producers responding to the Commission's questionnaire indicated that they did not support these petitions, or expressed concern regarding the degree to which any safeguard action would restrict CSPV cell imports.[56]

Petitioners project that the U.S. industry will substantially increase its CSPV cell production in 2018 and thereafter in order to supply the large majority of domestic module production, including independent module producers.[57] They project that domestic module capacity will increase from 1.25 GW in 2016 to 1.75 GW by 2018 due to an expectation that Tesla will substantially increase CSPV module production in that year.[58] In addition, petitioners estimate that domestic cell capacity will substantially increase from *** in 2016 to *** by 2018.[59] Even under these optimistic estimates, domestic producers' cell capacity would still account for only a small minority of expected U.S. PV installations in 2018 and thereafter.[60]

Petitioners' modest estimates for future CSPV cell production are also likely overstated.[61] Two of the firms included in petitioners' projections, Mission Solar and Suniva, were not, in fact, producing CSPV cells at the time of this investigation. Mission Solar ceased cell production in 2016 and has no stated plans to restart these operations.[62] Suniva ceased operations after filing for protection under Chapter 11 of the bankruptcy laws and has laid off

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[52] CR/PR at Table III-4; CR at III-10 and III-16; PR at III-5 and III-9.

[53] CR/PR at Table III-4.

[54] *CSPV I* Staff Report at Table III-6; *CSPV II* Staff Report at Table III-7; CR/PR at Table III-9.

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

[56] *See e.g.*, Mission Solar Posthearing Remedy Brief at 2-8; Tesla Posthearing Remedy Brief at 2-3, 8-9; Auxin Solar Posthearing Remedy Brief at I-8-12; CR/PR at Table I-2.

[57] SolarWorld Prehearing Remedy Brief at 17; Suniva Posthearing Remedy Brief, Exhibit 5 at 18; Remedy Hearing Tr. at 172 (Card).

[58] SolarWorld Prehearing Remedy Brief at 15, 17.

[59] SolarWorld Prehearing Remedy Brief at 17.

[60] *Compare* to CR/PR at Table C-1b (apparent U.S. consumption) and SEIA Posthearing Remedy Brief, Exhibit 32 (actual and projected PV installations, by year).

[61] For 2018, SolarWorld assumes that the domestic industry will have the same cell capacity as presented in the staff report, which contains information provided in response to the U.S. producer questionnaire, in addition to 300 MW of cell capacity added by Suniva in late 2016 and 500 MW of cell capacity for Tesla/Panasonic. SolarWorld Prehearing Remedy Brief at 17; CR/PR at Table III-4. *See also* Suniva Posthearing Remedy Brief, Exhibit 5 at 18.

[62] CR at III-10; PR at III-5; Mission Solar Posthearing Remedy Brief at 8.

its workforce.[63] Although Suniva reports that it could restart operations in a few months, this would be contingent upon the company emerging successfully from bankruptcy with sufficient financing to restart commercial operations, gaining new customers, and hiring a full new workforce.[64] Collectively, these two firms account for *** of petitioners' cell capacity projections for 2018.[65] In addition, Tesla has stated that it will likely produce *** of CSPV cells that petitioners asserted Tesla would produce that year.[66] Although Tesla has ambitious plans to increase its CSPV cell production ***.[67]

As petitioners and respondents recognize, U.S. producers would have to substantially increase capacity in order to compete successfully with imports after any safeguard actions terminate.[68] Producers with higher capacity and productive output are able to achieve lower fixed costs on a per-unit basis, obtain lower prices for raw materials, and operate more efficiently, and are therefore in a better position to compete more effectively against low-priced competitors.[69] Higher capacity also allows producers to compete for utility projects, particularly the largest installations which require substantial volumes on relatively short timetables.[70] In addition, the domestic industry would have to be able to supply sufficient quantities of the types of products demanded by utility customers, including 72-cell CSPV modules.[71]

At the Commission's hearing on remedy, the CEO of SolarWorld stated that his vision for a healthy U.S. industry would include five to six CSPV producers each with one GW or more of integrated cell and module capacity.[72] In order to achieve these capacity levels, more than *** the amount of any current U.S. producer, new and existing producers would have to attract massive amounts of additional investment.[73] Petitioners assert that several foreign firms will

[63] CR at III-15; PR at III-8; Hearing Tr. at 95-96 (Card).

[64] CR at III-14-15; PR at III-8; Suniva Posthearing Remedy Brief, Exhibit 5.

[65] SolarWorld Prehearing Remedy Brief at 17; CR/PR at Table III-4.

[66] Tesla Posthearing Remedy Brief at 16; SolarWorld Prehearing Remedy Brief at 17; CR/PR at Table III-4.

[67] Tesla Posthearing Remedy Brief at 15-16.

[68] SolarWorld Posthearing Remedy Brief, Exhibit 1 at 6; Remedy Hearing Tr. at 72, 122-123 (Stein), 140 (Brightbill), 359 (Cornelius); Suniva Posthearing Remedy Brief, Exhibit 5, Attachment B at 8; SEIA Prehearing Remedy Brief at 3, 51.

[69] Remedy Hearing Tr. at 122 (Stein), 350-351 (Fenster); *New Solar System* at 116-117.

[70] Injury Hearing Tr. at 260 (Cornelius), 334 (Shugar). According to the U.S. Energy Information Administration (EIA), the average utility project increased from 10 MW in 2014 to more than 17 MW in 2016, and according to respondent SEIA, 82 percent of utility installations in 2016 were greater than 20 MW, and 13 percent were less than 10 MW. CR at V-3 at n.10; PR at V-2 at n.10.

[71] Hearing Tr. at 174, 217 (Messer), 259 (Cornelius), 278 (Dougan). In 2016, U.S. producers accounted for *** percent of 72-cell modules sold in the United States.

[72] Remedy Hearing Tr. at 72, 122-123 (Stein).

[73] SolarWorld estimates that adding an additional ***. SolarWorld Posthearing Remedy Brief, Exhibit 1. An executive from NRG Renewables referenced that building a new manufacturing facility would require $500 million over 18 months. Hearing Tr. at 343 (Cornelius).

start producing CSPV products in the United States if a restrictive remedy is imposed.[74] However, almost all of these future investments referenced by petitioners would be in CSPV module manufacturing, which would not address the shortage of U.S.-produced CSPV cells or result in the creation of additional large integrated producers.[75] Other than current U.S. producers, no firm has made any representation before the Commission that that it would invest in or produce CSPV products here in the United States. The lack of tangible interest demonstrated by new suppliers detracts from petitioners' arguments that there will be a large domestic CSPV industry with multiple integrated manufacturers within the foreseeable future.

As ambitious as they are, current U.S. producers' investment plans would continue to leave most of the market reliant on imports, even if those firms were able to attract sufficient capital. SolarWorld and Suniva each stated that they anticipate *** additional CSPV cell and module manufacturing capacity as a result of a restrictive safeguard action, with *** over the course of their proposed four-year adjustment period.[76] However, SolarWorld plans to continue to serve primarily nonresidential and residential customers despite the utility segment being by far the largest market segment.[77] As discussed above, Suniva is currently heavily in debt and working through Chapter 11 bankruptcy proceedings, and therefore its ability to attract additional financing for ambitious expansion plans is uncertain.[78] Tesla, which opposes import restrictions, anticipates producing *** of CSPV cells, *** of solar roof tiles, and *** of CSPV modules by 2019. Tesla emphasizes, however, that it ***.[79] Likewise, all of the other current U.S. producers that identified additional investments were independent module producers that rely primarily on imported CSPV cells.[80]

In light of these considerations, it is clear that the U.S. market will rely heavily on imported CSPV modules throughout the next several years at least. Even the most optimistic U.S. production targets for CSPV modules would not lead to U.S. producers accounting for more than a small share of total sales in the market. In addition, U.S. production of CSPV modules at much higher levels will require substantial volumes of imported CSPV cells.

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[74] SolarWorld Posthearing Remedy Brief, Exhibit 2 at 6-8. SolarWorld's assertions are primarily derived from a single news article referring to several foreign CSPV cell and module makers that said that they were exploring options for U.S. production without making any concrete commitments. SolarWorld Prehearing Remedy Brief, Exhibit 1. SolarWorld also draws on several other vague sources of information, including *** as well as a foreign producer's short press release announcing an undefined investment in the United States. SolarWorld Posthearing Remedy Brief, Exhibits 11 and 25.

[75] SolarWorld Posthearing Remedy Brief, Exhibit 2 at 6-8.

[76] SolarWorld Posthearing Remedy Brief, Exhibit 1; Suniva Posthearing Remedy Brief, Exhibit 5 at Attachment B.

[77] SolarWorld Posthearing Remedy Brief, Exhibit 1 at 11-12.

[78] Suniva stated that it cannot submit a formal "adjustment plan" because it is subject to bankruptcy court supervision, and is in the process of negotiating with existing creditors regarding the terms of a potential plan of reorganization. See Suniva Posthearing Remedy Brief, Exhibit 5, Attachment B at 1; Remedy Hearing Tr. at 118-120 (Card).

[79] Tesla Posthearing Remedy Brief at 15-16.

[80] CR/PR at Table II-7 and Table D-2.

iv. The broader solar industry is a major source of new employment

Despite producing only 1.4 percent of net U.S. electricity generation in 2016, solar power accounted for the largest share of new U.S. electricity generation in 2016, with 39 percent of new generating capacity.[81] Because of this rapid growth, the broader U.S. industry has developed supply chains to support the expanding deployment of solar energy across the residential, nonresidential, and utility sectors. As a result, the solar energy sector is a vibrant source of new employment in the United States. According to the U.S. Energy Information Administration (U.S. EIA), there were 373,807 U.S. workers in January 2017 that spent "some portion of their time working to manufacture, install, distribute, or provide professional services to solar technologies across the nation."[82]

Most employment within the solar energy sector is located at the end of the value chain, specifically in installation and development of utility, residential, and nonresidential projects. There were several thousand residential and nonresidential solar installing firms in the United States in 2015. Although a few installers held substantial market shares, most installers were small businesses with ten or fewer employees.[83] The utility segment is more concentrated, but is similarly diverse, with a variety of firms engaged in project development and/or engineering, procurement, and construction (EPC).[84] Solar installers include many types of workers, but are primarily those in the building trades, such as electricians and construction laborers.[85] There were an estimated *** workers specifically in CSPV installation and project development in the residential, nonresidential, and utility sectors in 2016.[86]

The supply chain includes producers of the capital equipment used in PV installations, such as CSPV cells and modules but also many other "Balance of System" (BOS) hardware components, such as racking and mounting equipment for modules, tracking systems for use in many utility projects, and inverters for converting direct current produced from the modules into grid-usable alternating current.[87] In response to the Commission's U.S. producer questionnaires, manufacturers reported that there were *** workers in cell production operations and 1,253 workers in module assembly in 2016.[88] In addition to these workers, there were an estimated *** workers in the BOS hardware manufacturing industries supporting

[81] CR/PR at Figure V-2 and Figure V-3.

[82] U.S. EIA, *U.S. Energy and Employment Report*, January 2017 at 37 (EDIS Doc. 627084 file ID 1238001). In addition to employment in the CSPV supply chain, EIA's figure includes employment across other photovoltaic and Concentrating Solar Power (CSP) technologies. *Id*.

[83] CR at I-39-40; PR at I-29-30; SEIA Prehearing Injury Brief, Exhibit 6 ("Solar Jobs Census") at 17.

[84] CR at I-41; PR at I-30.

[85] Solar Jobs Census at 17.

[86] This estimate is based on firm-level and project-level employment information on the record of this investigation. Employment information was available for more than 80 percent of CSPV installations in 2016. The remaining employment was estimated based on the labor intensity of installations by market segment (distributed and utility) for the more than 80 percent of projects for which information was available.

[87] CR at I-17, 33; PR at I-12-13, 24-25; Solar Jobs Census at 23.

[88] CR/PR at Table III-16 and Table III-17.

CSPV installations specifically in 2016, almost *** times the number employed in cell and module production.[89]

Thousands of services workers also work to support CSPV deployment. These include employees at wholesale and retail trade establishments engaged in selling solar and other ancillary services to customers, as well as distributors that warehouse and distribute U.S. and foreign-made solar goods to installers.[90] In addition, there are a number of professional services workers engaged in R&D activities, financing projects, and training.[91]

Further upstream, there are a number of suppliers of the raw materials used to produce CSPV equipment, including polysilicon ingots and wafers used in cells as well as glass, aluminum, wire, and paste used to produce finished modules.[92] Manufacturers of these goods are reliant to a degree on CSPV product manufacturing in the United States.[93] However, many upstream producers also export materials to foreign CSPV cell and module manufacturers, including those that export CSPV products to the United States.[94] Therefore, while some upstream suppliers would be positively affected by improvements in domestic production of CSPV products as a result of import restrictions, those integrated into global supply chains would be negatively affected.

Any government action causing a sharp decline in demand for CSPV products will likely lead to proportionally fewer firms and workers engaged in manufacturing, selling, researching, and installing equipment used in support of CSPV deployment. A decline in CSPV deployment may be mitigated somewhat by an increase in thin film PV deployments, which may partially limit job displacement, particularly in the sectors supporting utility projects. However, the overall employment within the greater PV industry is likely to be negatively affected by any substantial decline in CSPV demand, given the dominant share of all PV projects which currently use CSPV products.

[89] This estimate is based on available information on the record of this investigation for employment at racking, mounting, and tracking manufacturers and their suppliers, as well as employment at U.S. inverter and combiner box manufacturers. This does not include all balance of system components. Employment was adjusted to exclude thin film-related manufacturing.

[90] Solar Jobs Census at 27.

[91] Solar Jobs Census at 33. The President and CEO of SunPower stated that although his firm produces CSPV products overseas, it employs over one thousand people in the United States, with many engaged in robust R&D innovation. Injury Hearing Tr. at 247 (Werner).

[92] CR at I-25-28, 31-32; PR at I-18-21, 24; Posthearing Remedy Brief of the U.S. Polysilicon Industry; Letter to the Commission from DuPont Photovoltaics & Advanced Materials; Injury Hearing Tr. at 131-135 (Byerson); Remedy Hearing Tr. at 95-98 (Ulbrich).

[93] Injury Hearing Tr. at 131-135 (Byerson); Remedy Hearing Tr. at 95-98 (Ulbrich).

[94] Posthearing Remedy Brief of the U.S. Polysilicon Industry at 14; Letter to the Commission from DuPont Photovoltaics & Advanced Materials.

v. U.S. government programs have played a role in the industry's development

The U.S. government has supported and encouraged adoption of solar energy as an alternative energy source for over six decades. In 1954, the first CSPV cell was created in the United States by Bell Labs,[95] and early CSPV products were used primarily in space applications by the National Aeronautics and Space Administration (NASA).[96] Beginning in the early 1970s and thereafter, U.S. government support largely was focused on reducing costs of deployment, improving solar energy technology, and demonstrating applications for solar energy.[97]

As the market for CSPV products rapidly expanded over the last fifteen years, the U.S. Congress has enacted legislation providing tax credits and other incentives designed to encourage U.S. manufacturing and deployment of CSPV products, among other renewable energy products. The Energy Policy Act of 2005 made investment in solar projects eligible for a 30 percent investment tax credit which continues to be one of the primary incentives encouraging solar energy deployment.[98] In addition, the Advanced Energy Manufacturing Tax Credit, which was included in the American Recovery and Reinvestment Act of 2009 (ARRA), provided a 30 percent tax credit to advanced energy manufacturers that invested in new, expanded, or reequipped manufacturing facilities built in the United States.[99] In 2010, multiple CSPV cell and module producers were awarded tax credits, including SolarWorld ($82 million) and Suniva ($6 million).[100]

Beyond tax incentives, government efforts to improve domestic solar technology and increase domestic production have been driven largely by programs at the U.S. Department of Energy (DOE). The Energy Policy Act of 2005 provided for loan guarantees to new or innovative energy technologies not commercially available. ARRA temporarily authorized DOE to provide loan guarantees for renewable energy projects using commercially available technologies,

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[95] State of California, California Energy Commission & California Public Utilities Commission, "History of Solar Energy in California," (EDIS Doc. 623277 file ID 1226486 at 593); Michaela D. Platzer, *U.S. Solar Photovoltaic Manufacturing: Industry Trends, Global Competition, Federal Support*, Congressional Research Service, January 27, 2015, at 26 (EDIS Doc. 627084 file ID 1238001 at 466) ("*U.S. Solar Photovoltaic Manufacturing*").

[96] *U.S. Solar Photovoltaic Manufacturing* at 26.

[97] Varadi, Peter F., "Terrestrial Photovoltaic Industry: The Beginning," in Solar Power for the World, 2014, p. 204-205 (EDIS Doc. 623463 file ID 1229643 at 18-19); EDIS Doc. 623277 file ID 1226487.

[98] Injury Hearing Tr. at 253 (Grace). The Investment Tax Credit for solar was first adopted as part of the Energy Tax Act of 1978, and has been continuously available since that time, with retroactive application of the credit during occasional lapses. However, it was the Energy Policy Act of 2005 that introduced the 30 percent credit. The current Investment Tax Credit has been extended twice since that time, as part of the Emergency Economic Stabilization Act of 2008 and under the Consolidated Appropriations Act of 2016. *U.S. Solar Photovoltaic Manufacturing* at 23; Lynn J. Cunningham, *Renewable Energy and Efficiency Incentives: A Summary of Federal Programs*, Congressional Research Service, December 14, 2016, at 22 (EDIS Doc 627084 file ID 1238001 at 404) ("*Renewable Energy and Efficiency Incentives*").

[99] *U.S. Solar Photovoltaic Manufacturing* at 22.

[100] EDIS Doc. 623277 file ID 1226486 at 371, 624, 860.

including to PV projects and manufacturers.[101] Before the program expired in September 2011, four PV product manufacturers received loan guarantees under this program with mixed results, although none of these firms were CSPV cell or module manufacturers.[102]

DOE also oversees the Solar Energy Technologies Program, which has been referred to as the Solar America Initiative (instituted in 2006) and the SunShot Initiative (instituted in 2011).[103] Under this program, DOE is required to "conduct a program of research, development, demonstration, and commercial application for solar energy, including photovoltaics" and other types of solar energy.[104] SunShot, the most recent initiative under this program, was created to help accomplish a number of goals in the solar sector, including to: 1) "increase PV solar cell efficiency, reduce production costs, and open new markets for solar energy"; 2) "shorten the amount of time it takes to move promising new solar technologies from development to commercialization"; and 3) "strengthen the U.S. supply chain for manufacturing and commercializing cutting-edge PV technologies."[105] Under this initiative, DOE has provided funds to projects led by universities, companies, and national laboratories designed to ensure American technological leadership, lower costs, and strengthen U.S. economic competitiveness.[106] SolarWorld and Suniva have been among the largest recipients of SunShot awards among PV manufacturers, with most of these projects relating to product development.[107] Between 2011 and 2016, these companies were awarded funds in the amount of $20.4 million under this program.[108]

In short, the U.S. government has a long history of providing substantial, if inconsistent, support to the CSPV industry and related industries involved in solar energy production. As government programs have sought to reduce costs for solar energy generation, they have also supported technological improvements and expanded production in the manufacturing sector. The U.S. government, and DOE in particular, has acquired substantial experience and expertise in advancing the viability and growth of this sector, which can inform focused efforts to facilitate the domestic industry's adjustment to import competition.

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[101] EDIS Doc. 623277 file ID 1226486 at 514.

[102] 1366 Technologies, a producer of crystalline silicon wafers (an upstream input into CSPV cells), received a loan of $150 million. 1366 Technologies remains an active producer. Solopower, a producer of a thin film technology product, was deobligated prior to withdrawing funds from a loan of $185 million. By contrast, two producers of thin film technology products, Solyndra and Abound Solar, received federally guaranteed loans of between $400 million and $535 million, and both firms ultimately defaulted and went bankrupt. EDIS Doc. 623277 file ID 1226486 at 500, 835.

[103] *Renewable Energy and Efficiency Incentives* at 5-6, 40; *U.S. Solar Photovoltaic Manufacturing* at 24; EDIS Doc. 623277 file ID 1226487 at 12-15, 25-29.

[104] 42 U.S. Code § 16231(2)(A).

[105] DOE, "The SunShot Initiative: Making Solar Energy Affordable for All Americans," June 2016 (EDIS Doc. 623277 file ID 1226486 at 1133).

[106] *Id*.

[107] DOE, SunShot Solar Projects Download, May 17, 2017 (EDIS Doc. 623277 file ID 1226486 at 286).

[108] *Id*. ***. SolarWorld Posthearing Remedy Brief, Exhibit 2 at 65.

b. Industry Adjustment Plans and Commitments

Although the Commission received no adjustment plan from petitioners (or any other domestic producer) within the 120-day time frame specified in Section 202(a)(4) of the Trade Act,[109] each petitioner subsequently submitted commitments regarding actions it intends to take to facilitate positive adjustment to import competition. I have carefully examined the company-specific commitments by SolarWorld in its posthearing remedy brief. SolarWorld outlined plans for investing to increase capacity, capacity utilization, and cost-savings; its plans for innovation and technology upgrades; its plans for R&D partnerships; and its plans for solidifying and expanding its customer base.[110] I have also examined the "prospective forward-action plan" submitted by Suniva, which indicates that its prospective plan depends on a successful agreement of a reorganization plan in its Chapter 11 bankruptcy proceeding and may change as a result of such an agreement. Suniva's prospective plan includes such objectives as quickly reactivating its production capacity, producing at full capacity, becoming profitable, resuming its R&D efforts, ***.[111] I have also considered the responses of U.S. producers to the Commission's questionnaire regarding the adjustments they would make to their operations to compete more effectively with imports if import relief were to be granted.[112]

c. Recommended Relief

i. Safeguard Action Proposals

Petitioners Suniva and SolarWorld have both proposed specific tariffs, rather than *ad valorem* tariffs, of $0.25 per watt on CSPV cells and $0.32 per watt on CSPV modules; the proposed tariffs would be in place for four years, and would be phased down annually.[113] Suniva has also proposed a minimum import price for imports of CSPV modules of $0.74 per watt which would be implemented in the form of a quota that would exclude all imports under that price; the proposed per-watt floor price would be in effect for four years, and would be increased annually.[114] SolarWorld has also proposed a quota on imports of CSPV cells of 0.22 GW, as well as a quota on imports of CSPV modules of 5.70 GW. The proposed quotas would be in place for four years, and would be increased annually.[115]

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[109] 19 U.S.C. § 2252(a)(4).

[110] SolarWorld's Posthearing Remedy Brief, Exhibit 1, at pages 5-13.

[111] Suniva Posthearing Remedy Brief, Exhibit 5, Attachment B.

[112] CR/PR at Table D-2.

[113] SolarWorld's Prehearing Remedy Brief at 10-14; Suniva's Prehearing Remedy Brief at 3-6 and Exhibit 1 at 1.

[114] Suniva's Prehearing Remedy Brief at 7-8 and Exhibit 1 at 1.

[115] SolarWorld's Prehearing Remedy Brief at 14-19. In addition to their proposals for import relief, petitioners also propose that the President take the following additional actions: 1) issue an executive order directing all U.S. government agencies to require use of U.S. origin solar cells; 2) initiate bilateral and multilateral negotiations to address global overcapacity in solar cells and modules; 3) direct his Administration to conduct a study of the cyber, electrical grid, and national security risks of using solar (Continued…)

By contrast, respondents generally urge that the Commission recommend no import relief, and that any recommended remedy should be limited to technical, financial, and trade adjustment assistance.[116] Some respondents support the institution of a small import license fee on imports of CSPV products in order to create a fund that could provide capital for investment in the domestic industry.[117]

ii. Cells and Modules Remedy Model[118]

In order to assess different remedy options on CSPV cells and modules, including tariffs, tariff-rate quotas, and quantitative restrictions, Commission staff constructed an innovative economic model of the CSPV cells and modules industry. This industry-specific partial equilibrium model is designed to estimate changes in prices and quantities of imported and domestic products, deployment of CSPV products, changes in the revenues and operating income of U.S. producers, and changes in U.S. tariff revenues that would result from potential trade remedies.[119] The remedy model in this investigation distinguishes between cell production and module production, rather than combining them into one CSPV product, and tracks different supply chains in order to allow for the model to provide estimates of different remedies on imports of cells and imports of modules.

For all of the scenarios which I analyze, I adopt several uniform assumptions. The domestic supply elasticity for both CSPV cells and modules was estimated to be between 2 and 4,[120] and I utilize *** as the domestic supply elasticity. The import supply elasticity was

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(…Continued)
panels of foreign origin in the United States; 4) provide funds to the domestic industry, which may come from collected U.S. AD/CVD duties on imports of solar cells and modules from China and Taiwan that are currently under suspension, or from any tariffs that are imposed as a result of this Section 201 proceeding, or from other sources; 5) consider taking actions to amend the Investment Tax Credit and other Federal tax incentives to stimulate U.S. solar demand and in particular for projects using domestically produced cells and panels; 6) pursue settlement negotiations with respect to the U.S. AD/CVD antidumping and countervailing duty orders on solar cells and modules from China and Taiwan and the duty deposits collected under those orders currently under suspension, as well as antidumping and countervailing duty orders imposed by China on imports of solar-grade polysilicon from the United States; 7) direct the DOE to fund the full cost of DOE SunShot Initiative research grants; and 8) direct DOL to immediately certify workers from any of the U.S. solar facilities that shut down during the period of investigation for benefits and services under the Trade Adjustment Assistance program. SolarWorld Prehearing Remedy Brief at 21-29; Suniva Prehearing Remedy Brief at 13-18.

[116] *See* SEIA's Prehearing Remedy Brief at 4, 49-50; SEIA's Posthearing Remedy Brief at 12-15.

[117] SEIA's Prehearing Remedy Brief at 56-59; SEIA's Posthearing Remedy Brief at 13-15 and Appendix A at 87-92; U.S. Polysilicon Industry's Posthearing Remedy Brief at 11-14; Tesla's Posthearing Remedy Brief at 9.

[118] *See* Memorandum EC-PP-023 (October 23, 2017).

[119] The model used in this investigation is more elaborate than remedy models in most past safeguard investigations. Those models were partial equilibrium models used to estimate the effects of trade restrictions on single industries.

[120] CR at V-25-26; PR at V-17-18.

estimated to be between 6 and 8,[121] and I utilize *** as the import supply elasticity. The demand elasticity for installed CSPV products was estimated to be between -1.5 and -1.0.[122] ***. In addition, the data used in the model is derived from the year 2016; however, because any first-year remedy would likely occur in 2018, I assume that ***.[123]

Due to my ultimate recommendation that the remedy exclude imports from specific countries that are members of certain free trade agreements and benefit from certain preferential trade programs, I exclude imports from Singapore and Canada from all remedies that I have modeled.[124]

Modeling results are presented in an appendix to these views.

iii. Impact of Restrictive Remedies on Firms and Workers

In any market for merchandise goods, tariffs increase import prices directly by applying a duty upon entry at the U.S. border, and in doing so generally lead to reduced import volumes and higher market prices. As a result, tariffs generally also result in improvements in domestic producers' output, revenues, and operating income, even as demand declines. Quantitative restrictions, or quotas, limit the supply of imports in the U.S. market, and therefore have similar effects. Tariff-rate quotas, which apply a higher tariff for imports entering beyond specified levels, also lead to similar results by combining elements of both quotas and tariffs. However, due to the competitive conditions discussed above, I find that the market for CSPV products is poorly suited to these types of trade restrictive actions. A consideration of the likely effects of petitioners' proposed remedies illustrates why this is the case.

Petitioners' requested $0.32/watt tariff on modules and $0.25/watt tariff on cells would have the effect of substantially increasing import prices,[125] and since imports comprise most of

[121] CR at V-26; PR at V-18.

[122] CR at V-27; PR at V-18.

[123] I used ***. My estimates focus on first-year effects because any remedy measures will likely have the most pronounced effects in that year, both in terms of benefits and costs.

[124] As discussed below, I recommend that that the remedy not apply to imports of CSPV products from Canada (defined based on module country of origin), as well as imports from Australia, the CAFTA-DR countries, Colombia, Israel, Jordan, Panama, Peru, Singapore, and CBERA countries (defined based on cell country of origin). With the exception of Canada and Singapore, import volumes from these countries were zero or *de minimis*, and therefore cannot be excluded from the model. *See* Views of the Commission on Injury, Section V.B.3.

[125] The model results indicate that imported cell prices are *** percent higher than baseline levels under petitioners' proposed remedies, while prices for imported modules are *** percent higher. SolarWorld's proposed quantitative restrictions of 5.7 GW for modules and 0.22 GW for cells in the first year are not "binding" in the model results; that is, they do not restrict imports or cause additional economic effects beyond those caused by petitioners' proposed tariffs. Similarly, petitioners' proposed tariffs lead to prices rising to a higher level than Suniva's proposed module price floor of $0.74 per watt, and therefore the price floor would not be binding if accompanied by those tariffs. Therefore, for purposes of this discussion, I focus on the effects of petitioners' proposed tariffs, although I recognize that the quota and price floor proposed by petitioners may have additional restrictive effects as conditions differ from 2016. For example, to the extent that prices are lower in the first year of the (Continued…)

the U.S. market, overall market prices for CSPV modules will rise substantially.[126] Demand for CSPV products is highly reactive to changes in price due to the fact that solar energy competes head-to-head with other forms of electricity, and PV installations using CSPV products will be less attractive to cost-conscious purchasers downstream. As a result of the price increases for CSPV modules, deployment of CSPV products will fall dramatically,[127] which is consistent with the decline in imports of CSPV modules.[128]

U.S. producers that have integrated cell producing operations will see increased prices, output, and operating income under this high tariff scenario.[129] However, their output gains will be limited by the extremely small size of the cell producing industry in the United States. Moreover, these benefits will not extend to most U.S. producers of CSPV products, which rely on imported CSPV cells to manufacture modules in the United States. These producers, which already operate at low capacity utilization rates and have accounted for most of the industry's closures over the last five years, will see both output and operating income decline as a result of the high tariff on imported CSPV cells proposed by petitioners.[130] It is likely that many of these producers will exit the market or will be unable to undertake planned expansions as a result of highly restrictive trade remedies.

While certain CSPV producers will likely experience modest benefits from restrictive tariffs, these benefits will be short lived. Safeguard relief is generally limited to four years or fewer, and tariffs, quotas, or TRQs must be phased out. In order to make a long-term positive adjustment to import competition, U.S. producers will have to quickly translate short-term profits into substantial investments needed to scale up operations. However, even under the most stringent remedies that petitioners have proposed, the industry will struggle to break even.[131] Therefore, U.S. producers hoping to use the remedy period to make significant

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(…Continued)
remedy than in 2016, Suniva's proposed price floor may lead to more restrictive effects than those referred to here.

[126] The model results indicate that overall market prices for CSPV modules are *** percent higher than baseline levels under petitioners' proposed remedies.

[127] The model results indicate that deployment of CSPV modules is ***, or *** percent, lower than baseline levels under petitioners' proposed remedies.

[128] The model results indicate that imports of CSPV modules are ***, or *** percent, lower than baseline levels under petitioners' proposed remedies.

[129] The model results indicate that output of U.S. modules using U.S. cells is *** percent higher than baseline levels under petitioners' proposed remedies. The price of U.S. modules using U.S. cells is *** percent higher baseline levels. U.S. producers' operating income from U.S. modules using U.S. cells is higher by $***.

[130] The model does not distinguish between the volume of imports of foreign cells and the output quantity of U.S. modules using foreign cells. The model results indicate that output of U.S. modules using foreign cells is *** percent lower than baseline levels, and U.S. producers' operating income from selling U.S. modules using foreign cells is $*** lower.

[131] The model results indicate that the domestic industry's overall operating income, including from U.S. modules produced from U.S. and foreign cells as well as foreign modules using U.S.-produced cells, is $*** higher under petitioners' proposed remedies. By contrast, the industry's operating loss in 2016 was $***. CR/PR at Table C-1b. The industry's operating loss in 2016 was due in part to *** which, due
(Continued…)

investments will likely find it difficult to attract the additional capital needed to substantially expand capacity. Investors will not likely be drawn to the modest profits offered by U.S. producers given their knowledge that the U.S. market will once again be exposed to global oversupply conditions upon the termination of the remedy.[132]

Similarly, the model demonstrates that U.S. producers' short-term benefits from restrictive tariffs will likely come at the cost of a sizable decline in demand, as measured by deployment of CSPV products.[133] Although petitioners argue that changes in demand will be minimal and that any short-term impact on demand will likely reverse after the safeguard remedies expire,[134] many market participants testified that they expect these adverse effects on demand for solar energy to have long-term impacts on the market. Many long-term utility projects that would have otherwise been served by CSPV modules will likely lose bids to suppliers of alternative sources of energy.[135] In addition, the Investment Tax Credit, which is scheduled to begin phasing out after 2019, would be considerably less of an incentive by the time the remedy terminates.[136] A restrictive trade remedy would also inject uncertainty into the marketplace and affect the flow of capital into the overall sector.[137] Finally, the short-term effects on demand caused by a four-year restrictive trade remedy would cause many businesses in the greater sector, including those with substantial cutting-edge expertise and invested capital, to go out of business or otherwise leave the market.[138] Therefore, any temporary gains made by certain U.S. producers as a result of petitioners' proposed remedies

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(…Continued)
to its nature, cannot occur again. CR at III-53; PR at III-27. If the domestic industry's operating loss in 2016 excludes this ***, it would be $***. Modified table C-1b, EDIS Doc. No. 628217. Therefore, the operating income gains made by the industry as a result of petitioners' proposed tariffs would barely allow the domestic industry to break even, if at all.

[132] As stated in the Views of the Commission on Injury, there have been many shutdowns of CSPV cell and module producers over the 2012 to 2016 period. CR/PR at Table III-3. An executive for NRG Renewables, an independent power producer, stated that there has been "massive destruction" of venture capital and private equity capital in the solar industry over the last ten years as a result of losses in the manufacturing sector, which has led to less investor enthusiasm for new solar manufacturing projects. Remedy Hearing Tr. at 343 (Cornelius).

[133] The model results indicate that deployment of CSPV products declines to *** in 2018 as a result of petitioners' proposed remedies, down from a baseline of *** in that year. This result is consistent with modeling results provided by external sources. For example, the IHS Markit Deployment/JEDI Jobs model provided by SEIA indicates that Petitioners' proposed remedies result in CSPV deployment of 4.9 GW in 2018, down from *** projected in that year. Joint Respondents' Remedy Hearing Presentation at 26. The GTM Research model shows that a $0.30 per watt tariff results in PV deployment, including thin film, of 7.7 GW in 2018 compared to baseline installations of 10.9 GW in that year. SEIA Posthearing Remedy Brief, Exhibit 2 at 36.

[134] SolarWorld Prehearing Remedy Brief at 41; SolarWorld Posthearing Remedy Brief, Exhibit 2 at 49-50 Suniva Posthearing Remedy Brief, Exhibit 5 at 11-12.

[135] Hearing Tr. at 299-300 (Shiao), 300-301 (McLaughlin).

[136] Hearing Tr. at 300 (Shiao).

[137] Hearing Tr. at 301-303 (O'Sullivan).

[138] Hearing Tr. at 300-301 (Werner, O'Sullivan).

would likely have lasting adverse impacts on demand for CSPV products, which would limit the degree to which the industry can make a positive adjustment to import competition after the remedies expire.

Finally, many of the businesses and workers comprising the broader solar industry in the United States would be adversely affected by any significant decrease in demand caused by petitioners' proposed remedies. Based on the model results, which indicate a dramatic decrease in deployment of CSPV products in the first year, I estimate that petitioners' proposed remedies would displace as many as 30,914 workers in the industries manufacturing BOS equipment and installing/developing CSPV projects.[139] In addition, thousands of jobs in other parts of the broader solar industry rely on high domestic deployment, including those involved in R&D, sales and distribution, and other services.[140] These jobs would also likely be adversely affected by a substantial decline in CSPV deployment. By contrast, there were substantially fewer jobs in the CSPV product manufacturing sector in 2016.[141] Therefore, the increase in domestic output of CSPV products resulting from petitioners' proposed remedies would not likely lead to substantial increases in employment within the CSPV manufacturing sector relative to the losses experienced elsewhere within the solar sector.[142]

Changes in employment within the broader solar industry, or in the CSPV manufacturing industry, are not net employment effects and may not meaningfully affect national unemployment rates. Displaced CSPV installation and development workers may find work supporting other types of electricity generation, in other areas of the construction sector, or in other industries. In addition, some workers may not lose their jobs if declining CSPV deployment is partially offset by increasing use of thin film in PV installations. However, this does not mitigate adverse displacement effects, as potentially hundreds of firms and tens of thousands of workers would see their economic opportunities within the CSPV sector severely diminished as a result of the remedies proposed by petitioners. In addition, CSPV products are

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[139] There were approximately *** workers in the installation/project development sectors, and *** workers in the BOS sector in 2016. ***. Therefore, I use a *** workers, which is *** employment. I conclude that petitioners' preferred remedies, which result in first-year deployment being *** percent lower in our model results, could lead to displacement of 30,914 fewer workers within these sectors.

[140] Solar Jobs Census at 27, 33.

[141] In 2016, CSPV manufacturers reported that there were *** workers in cell production operations and 1,253 workers in module assembly in the United States. CR/PR at Tables III-16 and III-17.

[142] Petitioners also argue that additional manufacturing of CSPV products in the United States will lead to increased employment in upstream manufacturing sectors, including those producing polysilicon, glass, aluminum, and paste. SolarWorld Prehearing Remedy Brief at 40; Exhibit 26. Respondents assert that upstream employment is driven by deployment of CSPV products, like all other sectors within the supply chain. Remedy Hearing Tr. at 365-366 (Prusa). Upstream suppliers have provided testimony supporting both arguments on this issue. Injury Hearing Tr. at 131-135 (Byerson); Remedy Hearing Tr. at 95-98 (Ulbrich) (stating that their upstream manufacturing output would increase in response to higher U.S. CSPV product manufacturing); Posthearing Remedy Brief of the U.S. Polysilicon Industry at 14; Letter to the Commission from DuPont Photovoltaics & Advanced Materials (stating that their upstream manufacturing output would be adversely affected by declining demand for CSPV products as a result of a restrictive remedy).

unique among energy-generating equipment, in that modules can be installed easily on residential structures in a way that is not as feasible for other types of equipment, including certain thin film modules.[143] As a result, the residential segment of the CSPV installation sector has been a substantial source of the employment created in the broader solar energy industry.[144] Although the most severe demand effects would likely be in the utility segment due to the direct cost competition with other sources of energy,[145] cost-conscious consumers in the residential segment would also likely demand fewer CSPV modules in response to lower savings.[146] Therefore, it is likely that a rapid increase in prices for CSPV products and a decline in CSPV deployment would have devastating effects for many of the small firms and construction workers engaged in residential installations.

In summary, under petitioners' proposed remedies or any restrictive alternative remedy, only a small portion of the CSPV industry would benefit, and many other firms and workers within and outside the CSPV industry would be much worse off. In addition, even those few producers of CSPV products that would benefit under these remedies would experience only temporary and modest performance improvements, accompanied by substantial and potentially lasting damage to their own market. Under these conditions, it is unlikely that the industry will be able to attract sufficient investment to be able to make a positive adjustment to import competition upon termination of the remedies.

Although petitioners' proposed remedies offer an extreme scenario, lower tariffs will also have dramatic effects on demand and prices in the market, while leading to fewer gains in output and profitability for U.S. producers.[147] In light of the unique competitive conditions in the U.S. market for CSPV products, I do not recommend the imposition of a duty, TRQ, or a trade-limiting quantitative restriction. Instead, as discussed below, I recommend a quantitative restriction set at levels that will not disrupt expected growth in CSPV demand but will help address the serious injury to the domestic industry by stabilizing import levels and preventing further surges.

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[143] As noted above, thin film accounted for less than 1 percent of residential installations in 2016. First Solar, the largest global thin film producer, primarily supplies products to the nonresidential and utility market segments. NREL, Tracking the Sun Public Data File, Tracking the Sun Public Data File, September 21, 2017; First Solar, "Form 10-K," Annual Filing to the Securities and Exchange Commission for the fiscal year ended December 31, 2016, pp. 2, 5-7, 10.

[144] SolarWorld Posthearing Remedy Brief, Exhibit 2 at 79-80; Injury Hearing Tr. at 269 (Fenster).

[145] SolarWorld Posthearing Remedy Brief, Exhibit 2 at 78.

[146] At the Commission's hearing on remedy, witnesses for GTM Research and Sunrun explained that when residential households see less than 10 percent savings relative to the cost of buying energy from utilities, they frequently forego household solar installations. GTM Research Remedy Hearing Presentation, Slides 13-14; Remedy Hearing Tr. at 213 (Shiao), 233-235 (Fenster). *See also* Cory Honeyman, MJ Shiao, and Benjamin Gallagher, *U.S. Solar Outlook Under Section 201*, GTM Research, 11-13 (EDIS Doc. 623265).

[147] For example, I considered model results from a 25 percent tariff on CSPV modules and a 0 percent tariff on CSPV cells, which are presented in the "25/0 % AVT" scenario in the Appendix. These results demonstrate that the domestic CSPV manufacturing industry would experience lower overall gains than the scenario described above, while deployment will still decline substantially.

iv. Quantitative Restriction

I recommend that the President impose a quantitative restriction on imports of CSPV products into the United States, including cells and modules, for a four-year period. I recommend that the quantitative restriction be set at 8.9 gigawatts in the first year, and increase by 1.4 gigawatts each subsequent year.[148] I recommend that the President administer quantitative restrictions on a global basis, as opposed to a country-specific basis due to the rapidly changing nature of available global supply. I also make several recommendations on whether and how the quantitative restriction should apply to specific countries under the implementing statutes of certain free trade agreements and under statutory provisions related to certain preferential trade programs, which I discuss in greater detail below.

As discussed above with respect to petitioners' proposed remedies, I find that any action that severely restricts imports or causes import prices to increase will likely lead to higher overall market prices and lower CSPV deployments, while providing only very limited benefits to U.S. producers of CSPV products. For this reason, I do not recommend any measure that is likely to result in substantially lower imports than would likely occur under projected conditions. That said, my proposed quantitative restriction for the first year is set at a volume intended to stabilize imports at a level lower than the volume that occurred in 2016. I have also recommended increasing the annual quantitative restriction steadily in each successive year to accommodate expected growth. These remedies will help address the serious injury to the domestic industry by preventing further surges in imports in response to changes in U.S. demand or in response to higher than expected global supply.

In accordance with Section 1102 of the Trade Agreements Act of 1979 and the President's authority in section 203(a)(3)(F) of the Trade Act, I also recommend that the President administer these quantitative restrictions by selling import licenses at public auction at a minimum price of $0.01 per watt. The license program could be administered using the expertise of the DOE in conjunction with the U.S. Department of Treasury or U.S. Customs and Border Protection. Such import license auctions offer several advantages. Because the quantitative restrictions are set at a level consistent with projected PV installations, it is likely that there will be sufficient licenses to meet domestic demand for imports, and most auctions will not result in additional costs to importers beyond the $0.01 per watt minimum.[149] Both

[148] A quantitative restriction must permit the importation of a quantity or value of the article "which is not less than the average quantity or value of such article entered into the United States in the most recent 3 years that are representative of imports of such article and for which data are available." Section 203(e)(4) of the Trade Act. As discussed in greater detail within the Views of the Commission on Injury, imports in 2016 were at far higher levels than in prior years due in part to the expectation that the Investment Tax Credit would expire that year. Therefore, using 2013 to 2015 as the "the most recent 3 years that are representative of imports" of CSPV products, the average quantity of CSPV products imported into the United States was ***. CR/PR at Table C-1b. The quantitative restriction that I have recommended is higher than this threshold quantity.

[149] I use the Cells and Modules Remedy Model to analyze the likely economic effects of this remedy for the first year. Using the assumption that PV deployments would decline by *** percent, I project that baseline demand for imported CSPV cells and modules from countries other than Singapore and (Continued…)

petitioners and respondents assert that a $0.01 per watt import license fee will not limit trade.[150] However, if there is greater demand for imports than expected, there will likely be greater competition for available import licenses. Under most quotas, import prices would increase under these circumstances, leading to economic rents being captured by foreign exporters. However, if import licenses are auctioned, those rents are collected as U.S. government revenues instead. Such auction prices under the proposed quantitative restriction also have benefits over tariffs, in that they would only cause increased market prices in response to unexpected increases in demand.[151]

Having made an affirmative finding with respect to imports from Mexico (with imports of CSPV modules from Mexico defined based on the country where the module was produced) under section 311(a) of the NAFTA Implementation Act, section 312(d) requires that any action proclaiming a quantitative restriction shall permit the importation of a quantity of the article that is not less than the quantity of such article imported during the most recent period that is representative of imports of such article, with allowances for reasonable growth.[152]

I recommend that the President allocate no less than 720 megawatts of the global quantitative restriction to imports of CSPV products from Mexico during the first year, which would expand by 115 megawatts each year. Importers from Mexico would need to buy import licenses at a minimum price of $0.01 per watt. As stated above, I recommend that the remainder of the quantitative restriction be administered on a global basis. However, I also recommend that the President allow importers from Mexico to acquire import licenses under the public auction system from the remainder of the global allocation, if there are no longer available import licenses within the Mexico-specific allocation.

Having made a negative finding with respect to imports from Canada (with imports of CSPV modules from Canada defined based on the country where the module was produced)

(…Continued)
Canada would be *** in 2018. Because an 8.9 GW quantitative restriction on all CSPV products would therefore not be binding under this scenario, I did not include that restriction in the model. However, I did include a $0.01 per watt "tariff" on CSPV cells and modules, which had minimal effects on all relevant economic indicators. The model results indicate that the quantity of imported cells would fall by *** percent and the quantity of imported modules would fall by *** percent, while deployment would fall by *** percent. Overall market prices would increase by *** percent and the industry's overall operating income would increase by about $***.

[150] Suniva Posthearing Remedy Brief, Exhibit 5 at 22; SolarWorld Posthearing Remedy Brief, Exhibit 2 at 58-59; SEIA Posthearing Remedy Brief, Attachment 1 at 87-88.

[151] Importers could seek to gain an advantage in the U.S. market by acquiring licenses at high auction prices and then importing less than the amount they have licenses for after effectively shutting out other importers. However, this risk could be mitigated by penalizing importers engaging in this practice using monetary fines or other deterrents.

[152] Imports from Mexico increased in uneven amounts during the 2012 to 2016 period, rising most significantly between 2012 and 2013 and between 2014 and 2015. Therefore, no individual year or set of years within this five-year period is more representative of imports from Mexico than any other. The average annual import quantity entering from Mexico was *** between 2012 and 2016, which I consider to be representative for this period. CR/PR at Table C-1b.

under section 311(a) of the NAFTA Implementation Act, I recommend that the quantitative restriction not apply to imports from Canada. Furthermore, I recommend that this quantitative restriction not apply to imports from Australia, the CAFTA-DR countries, Colombia, Israel, Jordan, Panama, Peru, Singapore, and the CBERA beneficiary countries.

v. Assistance to Facilitate Production Activities in the CSPV Industry

The Commission is authorized to recommend one or more appropriate adjustment measures, including the provision of trade adjustment assistance.[153] Such measures may include a variety of industry support programs, including programs used to support positive adjustment for both workers and firms.[154]

As discussed above, I recommend that the President impose a quantitative restriction on imports of CSPV products in the amount of 8.9 GW in the first year, to be administered on a global basis, using an import license auction program with a minimum price of $0.01 per watt. If all import licenses are sold at this price, it will generate U.S. government revenues of $89 million in the first year, and this amount would increase each year along with the number of available licenses under my proposed remedy.[155] Therefore, if all import licenses are sold at the minimum auction price, it will generate $440 million in government revenues over four years, a number which could potentially be far greater if there is competition for those licenses.

U.S. producers have submitted information about the types of investments that they plan to undertake over the next several years. These include cell and module capacity increases, technological improvements, and the rehiring of workers, and are anticipated to cost several hundred million dollars. As asserted by both petitioners and respondents, and as discussed in greater detail above, the U.S. industry will need to make these investments in order to achieve the economies of scale, maintain technological superiority, and reach maximum efficiency needed to be globally competitive with foreign producers. I have found that the domestic CSPV industry will likely not be able to attract investments or benefit in the long term if restrictive remedies result in lasting damage to the CSPV market. However, such investment is nonetheless necessary for the industry to make a positive adjustment to import competition.

In order to encourage these investments, I recommend that the President, to the extent permitted by law, authorize that the use of funds equal to the amount generated by import license auctions be provided for development assistance to domestic CSPV producers for the duration of the remedy period. The $440 million in additional revenues derived from the sale

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[153] 19 USC 2252(e)(2)(D).

[154] *Omnibus Trade and Competitiveness Act of 1988 (OTCA), Conference Report to Accompany H.R. 3*, Rept. 100-576, 100t h Cong. 2d Sess. (1988) at 675. "The term 'adjustment measures' refers to any existing authority to provide adjustment assistances, such as community assistance programs or manpower programs, not only trade adjustment assistance. In this context, the remedy of trade adjustment assistance means benefits other than those to which workers are already entitled under chapter 2 of the Trade Act of 1974, as amended."

[155] The model results for my proposed remedy project a slight trade limiting effect from a $0.01 per watt "tariff," which would result in slightly lower first-year government revenues of $***.

of import licenses would far surpass the domestic industry's gains in operating income under even the most restrictive remedies.[156] Such assistance would therefore be far more effective than a restrictive remedy in facilitating the domestic industry's investments in its own future competitiveness, and also far less destructive to the market.

Several current domestic producers are owned by foreign entities with their own financial concerns. Therefore, any federal resources provided to the domestic industry should be devoted solely to investments in productive pursuits related to domestic CSPV product manufacturing. Such investments could include the purchase and installation of production equipment located in the United States, the hiring of U.S. production workers, and U.S.-based research and development in improved product and production engineering technologies. In order to ensure the most effective use of resources, I recommend that the President rely on the DOE's depth of experience in advancing the viability and growth of this sector. Although current DOE support for this industry is limited primarily to R&D funding programs, DOE also has extensive experience, including both successes and failures, in providing more direct financing to U.S. solar manufacturers. I recommend that the President take actions that utilize authorized programs at the DOE to the extent practicable, and work with Congress to the extent necessary to authorize and appropriate any additional resources required to accomplish these objectives.

I also recommend that the President implement other appropriate adjustment measures, including the provision of trade adjustment assistance by the United States Department of Labor (DOL) and the United States Department of Commerce (DOC) to workers and firms affected by import competition.

Workers whose positions have been eliminated because of the impact of direct trade competition are eligible for additional unemployment compensation, retraining assistance, and healthcare through Trade Adjustment Assistance (TAA) for Workers, a program administered by DOL. Given that the domestic CSPV manufacturing industry has experienced a large number of closures and idling of capacity, many workers have lost their jobs and have taken advantage of this program. Since 2012, 2,124 workers have been certified as eligible for TAA, although only 244 workers have actually participated in the program. Suniva reports that its factory in Norcross, Georgia has not yet been certified for TAA for Workers by the DOL.[157] In order for dislocated workers in the industry to experience an orderly transition to productive pursuits, as required by section 201(b)(1)(B) of the Trade Act, I recommend that the President ensure that displaced workers are able to take full advantage of TAA programs.

Companies that have been negatively affected by trade may also be eligible for technical assistance through regional TAA Centers as part of a program administered by DOC. ***.[158] Therefore, I also recommend that the President ensure that CSPV producing companies have access to technical assistance provided by the TAA for Firms program.

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[156] As discussed above, the model indicates that petitioners' proposed remedies results in the industry's operating income being *** higher than baseline projections for the first, most restrictive year of the remedy.

[157] Suniva Posthearing Remedy Brief, Exhibit 5 at 27.

[158] ***.

III. Short- and Long-Term Effects of Proposed Remedies

The decision not to take the recommended actions would likely have adverse effects on the U.S. industry, its workers and the communities where production facilities of the industry are located, and on other industries. The domestic CSPV industry, facing consistent unprofitability and underutilization of capacity, would likely continue to experience shutdowns without additional financial support and investment. The producers within the domestic industry currently have insufficient capacity to compete effectively against large foreign producers that benefit from government incentives, established supply chains, and massive economies of scale. Regardless of whether no action is taken or a restrictive remedy is applied, the domestic industry would continue to face this reality in both the short and long term without a concerted effort to facilitate the industry's planned investments, particularly those allowing it to scale up production.

As discussed above, many sectors of the broader solar industry, from installers and project developers to producers of BOS equipment, as well as an array of service providers and upstream suppliers, have benefited substantially from increased CSPV deployments. However, these firms also benefit from increasing efficiencies and technological improvements within the supply chain, of which CSPV products account for the largest share of total value added.[159] A thriving and growing CSPV cell and module manufacturing sector will help the United States continue to drive innovation within the solar energy sector. Therefore, other U.S. industries would not benefit in either the short or long term from continued serious injury to the domestic CSPV industry.

The actions I have recommended would likely result in the continued growth of the U.S. CSPV cell and module industry while avoiding damage to the broader solar industry. My proposed actions would address the serious injury to the domestic industry and facilitate positive adjustment to import competition in several ways. The quantitative restriction that I have proposed would stabilize the market and prevent further surges of imports from occurring. Although continued growth of imports would be permitted, imports of CSPV products would not overtake or outpace projected PV installations under these restrictions. To the extent that U.S. demand increases beyond these projections, the effect would be price increases rather than an injurious surge of low-priced imports, as occurred in 2016.

In addition, the domestic industry producing CSPV products would continue to face import competition, but would be supported by resources equal to the revenues generated from the sale of import licenses. These funds would be substantial, and would help the domestic industry make the investments needed to reach its own targets for production capacity, technological advancement, and employment, which both petitioners and respondents agree are necessary for the industry to be globally competitive. Firms that are successful in using these resources to make necessary investments would likely be able to

[159] SolarWorld Prehearing Remedy Brief, Exhibit 16.

compete successfully with imports after these actions terminate, given the domestic industry's strong track record of producing innovative, highly efficient CSPV products.[160]

These recommended actions would not cause reduced deployment of CSPV products or corresponding lower employment within the broader solar industry. By contrast, a more restrictive trade remedy, such as those proposed by petitioners, would cause severe damage to industries and workers relying on the continued growth of solar power as the largest source of new energy installations. In addition, higher prices for CSPV products would affect U.S. consumers that increasingly rely on solar power as an alternative source of home-generated energy, allowing them to save money on utility bills. My recommended actions would preserve this technology's successes while creating an opportunity for the domestic CSPV industry to benefit as well.

[160] See section IV.F.1 of the Views of the Commission on Injury for more detailed discussion of the domestic industry's technological leadership. The U.S. CSPV market will continue to change and evolve, and certain U.S. producers may shut down as others begin operations. I have recommended the provision of TAA for workers to provide adjustment assistance to dislocated workers.

Appendix: Modeling Results and Estimated Effects of Various Remedies

The modeling results presented here are from three remedy scenarios, which are:

- **Broadbent remedy**: My remedy includes a one cent per watt minimum import license auction price and a quota on all CSPV products that will not likely be binding under current demand projections. Therefore, I use a $0.01/watt specific tariff on both CSPV modules and cells as a proxy for estimating the economic effects of my remedy.

- **25/0 % AVT**: I considered a 25 percent ad valorem tariff on CSPV modules and a 0 tariff on CSPV cells to assess the effects of a more moderate remedy than that proposed by petitioners.

- **Petitioner remedy**: SolarWorld's proposed remedies, which Suniva agreed with, include a $0.32/watt specific tariff and 5.70 GW quota on CSPV modules as well as a $0.25/watt specific tariff and 0.22 GW quota on CSPV cells.

Additional notes and assumptions:

- All remedies modeled here assume exclusion of imports from Singapore and Canada. All other imports excluded from the remedy recommendations are *de minimis* or zero, and therefore are not excluded from the model.

- Estimates of downstream employment are derived from my own calculations based on modeling results for CSPV deployment. I assumed that downstream employment in the BOS manufacturing and project development/installation sectors would decline proportionally with CSPV deployment.

- All results are for the first year of the remedy, which would correspond most directly with 2018 based on the timing of this investigation.

- Baseline quantity and employment estimates are ***.

- I use a domestic supply elasticity of ***, an import supply elasticity of ***, and a demand elasticity of *** for all scenarios.

- Imports of modules, as presented in the results below, include CSPV modules imported from covered sources subject to the remedies, in addition to imports from countries not covered by the remedies and imports of CSPV modules made from U.S. cells.

Quantities (***)

Factor	***	***	***	***
U.S. modules made from U.S. cells	***	***	***	***
U.S. modules made from foreign cells	***	***	***	***
Imports of modules	***	***	***	***
Total CSPV module deployments	***	***	***	***

Change in Quantities (***)

Factor	***	***	***	***
U.S. modules made from U.S. cells	***	***	***	***
U.S. modules made from foreign cells	***	***	***	***
Imports of modules	***	***	***	***
Total CSPV module deployments	***	***	***	***

Change in Quantities (%)

Factor	***	***	***	***
U.S. modules made from U.S. cells	***	***	***	***
U.S. modules made from foreign cells	***	***	***	***
Imports of modules	***	***	***	***
Total CSPV module deployments	***	***	***	***

Change in Prices (%)

Factor	***	***	***	***
U.S. modules made from U.S. cells	***	***	***	***
Imports of cells	***	***	***	***
Imports of modules	***	***	***	***
All CSPV modules	***	***	***	***

Change in Operating Income ($ *)**

Factor	***	***	***	***
U.S. modules made from U.S. cells	***	***	***	***
U.S. modules made from foreign cells	***	***	***	***
U.S. cells used in foreign-produced imported modules	***	***	***	***
Total U.S. operating income	***	***	***	***
***				

Estimates of Downstream Employment (Number of Workers)

Factor	***	***	***	***
Project Development/Installation	***	***	***	***
Balance of System Manufacturing	***	***	***	***
Total Downstream Employment	***	***	***	***