**UTILITIES AND RENEWABLE ENERGY**

January 23, 2018

# Section 201: 30% Tariff on Solar Modules – What Will Be the Impact?

On Monday, January 22, 2018, the Trump Administration announced trade restrictions to apply to imports of solar cells and modules under the Section 201 safeguard proceeding initiated by Suniva in April 2017. In September, the U.S. International Trade Commission found that imports were harming domestic solar cell and module manufacturing industries and on October 31, the commissioners issued their remedy recommendations. On Monday, President Trump imposed 30% tariffs on crystalline silicon photovoltaic (CSPV) modules and cells for four years, declining by 5% each year to 15% in the final year, with a 2.5 GW quota of tariff-free imports of cells.

Allowing for declining balance of system costs, which last year made up almost two thirds of the total installed cost of utility scale solar systems, a 30% tariff on modules would be consistent with flat installed costs in 2018 verus 2017 for both utility scale and non-residential distributed solar. For residential systems, whose balance of system costs have declined less rapidly than utility scale, we calculate that at a 30% tariff on modules would be consistent with 2018 installed costs ~2% higher than 2017 levels and ~4% below 2016 levels.

Looking beyond 2018, as the tariffs roll off and underlying module and balance of system costs continue to decline, we expect utility scale and non-residential solar installation costs to hit record low levels in 2019 and to continue to decline thereafter. Residential solar installation costs should fall back to 2017 levels in 2019 and continue to decline thereafter.

In summary, the cost of solar modules has become a sufficiently small part of the installed cost of solar systems that the 30% tariff on modules is unlikely to have a material impact of the level of solar capacity installed, with a moderate reduction in the growth rate of installations in 2018 versus forecasts and a resumption of the expected trajectory afterwards.

The exemption of the first 2.5GW of CSPV cells from tariffs could encourage some increase in module assembly in the US, although the temporary nature of the tariffs may limit the impact.

*Please contact the team at Enovation Advisory with any questions or to arrange a more in-depth discussion.*

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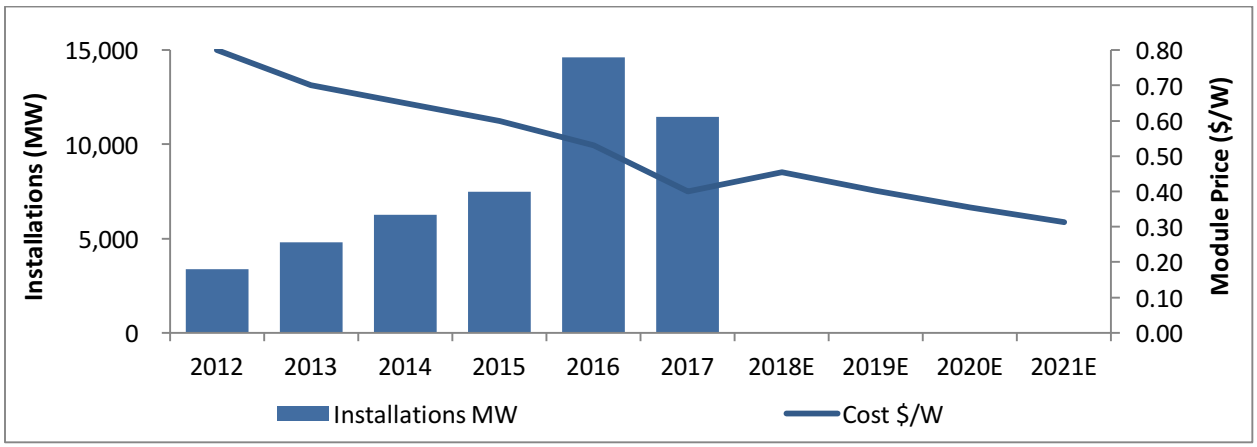
## Executive Summary

**On Monday, January 22, the Trump administration announced 30% tariffs on imports of CSPV modules and cells.** This is the culmination of a nine month long process set in motion in April 2017 by Suniva's filing of its Section 201 petition.

- In September 2017 the U.S. International Trade Commission (USITC) determined that increased imports of crystalline silicon photovoltaic (CSPV) cells and modules have caused serious injury to the U.S. CSPV cell and module manufacturing industry and on October 31 they issued their recommended remedies.
- **We analyzed the potential impact of the new tariffs on solar installations by examining historic module pricing, system installation costs and total solar installation volumes.**
  - Exhibit 1 presents total U.S. solar installations over 2012-17, as well as the average cost of solar modules in each of these years. We added an estimate for 2018-21 module prices incorporating the new tariff.
    - Solar module prices averaged ~$0.40/W in 2017, but prices had gone as low as $0.35/W before the Section 201 petition was filed, driving a surge in demand for modules in advance of tariffs. We have based our post-tariff module pricing on this $0.35/W pre-tariff import price for 2018 and an 8% annual decline thereafter.
    - The post-tariff module pricing also reflects the decline of the tariff to 25% in the second year (2019), 20% in the third year (2020) and 15% in the final year.

- **As illustrated in Exhibit 1, a 30% tariff will raise 2018 domestic module prices above 2017 average prices, but still below the level of 2016, when solar installations reached 14GW, their highest level to date.**

**Exhibit 1: Solar Installation Volumes and Module Prices for 2012-17**

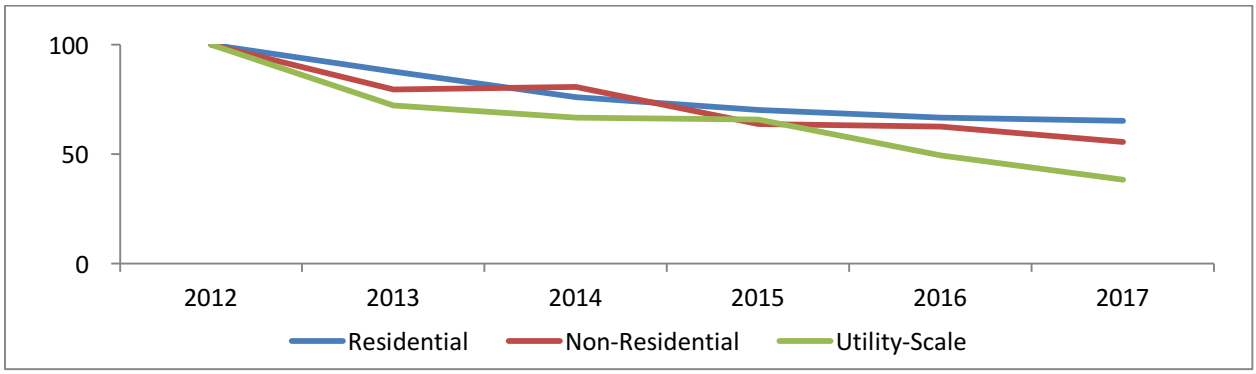



Source: GTM, NREL, PRG analysis

- **Critically, moreover, looking at the impact of tariffs on module prices overstates the impacts of tariffs on the installed cost of solar.**
  - In 2017, the cost of solar modules made up just 35% of the total installed cost of utility scale solar systems, and less than 15% of the cost of residential systems.

- Over the past several years, moreover, the balance-of-system (BOS) costs per watt, i.e. the other costs of solar installations (racking, inverters, wiring, labor, etc.), have also declined significantly across all types of systems, and are expected to continue to do so. (See Exhibit 2.)

**Exhibit 2: Balance-of-System Costs per Watt, 2012-17 (2012=100)**




Source: GTM, NREL, PRG analysis

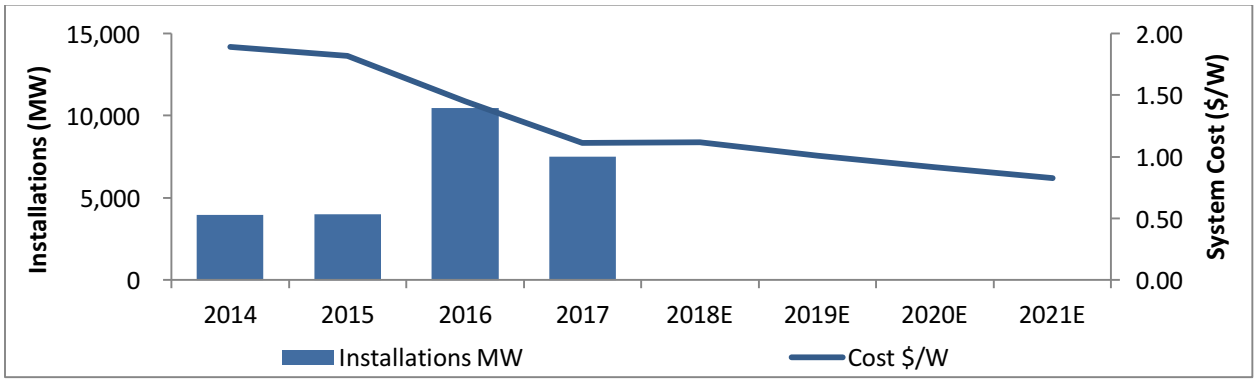
**Therefore, to understand potential impact that tariffs on modules could have on the level of solar installations, it is necessary to analyze how the tariffs affect the total installed cost of utility scale and distributed solar power systems.**

## Utility-Scale Systems

- Utility-scale systems have fallen in cost very rapidly over the past few years, with the rate of decline in BOS costs exceeding the rate of decline in module prices.
- As noted above, module prices averaged $0.40/W in 2017, and had gone as low at $0.35/W before Suniva's Section 201 petition was filed. The total installed cost of utility-scale systems cost averaged ~$1.10/W in 2017. Assuming international module prices fall back to $0.35, and that BOS costs fall by a further $0.05/W in 2018, then the installed cost of utility scale systems, before module tariffs, can be estimated at ~$1.00/W in 2018.
  - Looking beyond 2018, we assume that module and BOS costs per watt continue to decline by 8% annually.
- Assuming 30% tariffs in 2018, declining to 25% in 2019, 20% in 2020 and 15% in 2021, we see utility scale installation costs of $1.12 in 2018, $1.01 in 2019, $0.91 in 2020 and $0.83 in 2021.

**Therefore, we expect that tariffs should have a de minimis impact on utility-scale installations versus current forecasts, with a slight pause in growth in 2018 and a resumption thereafter.**

**Exhibit 3: Utility-Scale System Installations and Costs, 2014-17**

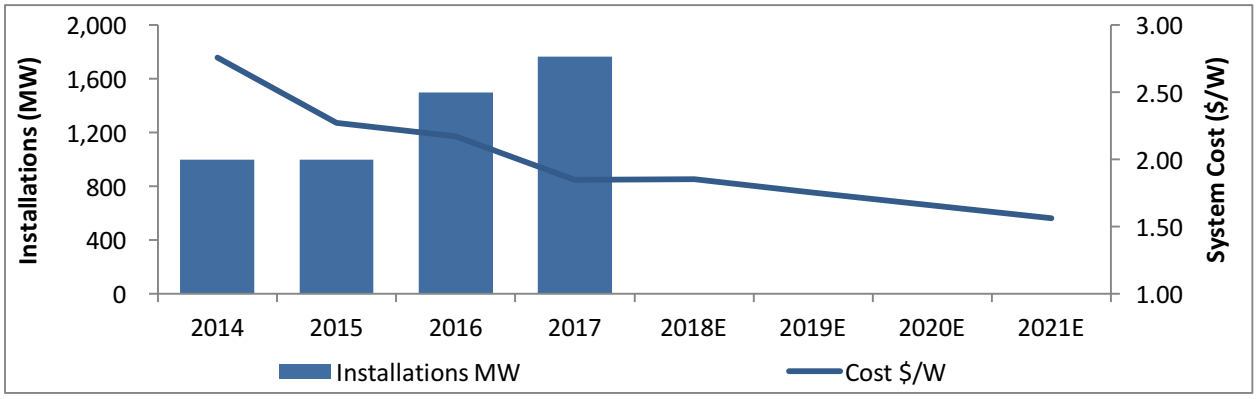



Source: GTM, NREL, PRG analysis

## Non-Residential Distributed Solar Systems

- Non-residential distributed solar systems have also shown a rapid decline in system costs in recent years. (See Exhibit 4.)
- In 2017, non-residential systems cost ~$1.85/W, when solar module costs averaged $0.40/W. If we apply the same assumptions used in our estimate of utility scale system costs, and assume that international module prices fall back to $0.35 in 2018, and that BOS costs decline by $0.05/W, well below the recent rate of decline, the total cost of non-residential systems this year can be estimated at $1.75/W, in the absence of tariffs on solar modules.
  - We assume pre-tariff module costs continue to decline by 8% and BOS costs by $0.05/W annually after 2018.
- Assuming a tariff on solar modules of 30% in 2018, declining by 5% each year through 2021, we estimate of total cost of non-residential systems rises to ~$1.86/W in 2018, inline with its 2017 level of $1.85/W, and then declines to $1.76/W in 2019, $1.66/W in 2020 and $1.56/W in 2021.
- Therefore, as with utility-scale systems, we expect that tariffs should have a de minimis impact on commercial installations.

**Exhibit 4: Non-Residential Distributed Solar System Installations and Costs, 2014-17**

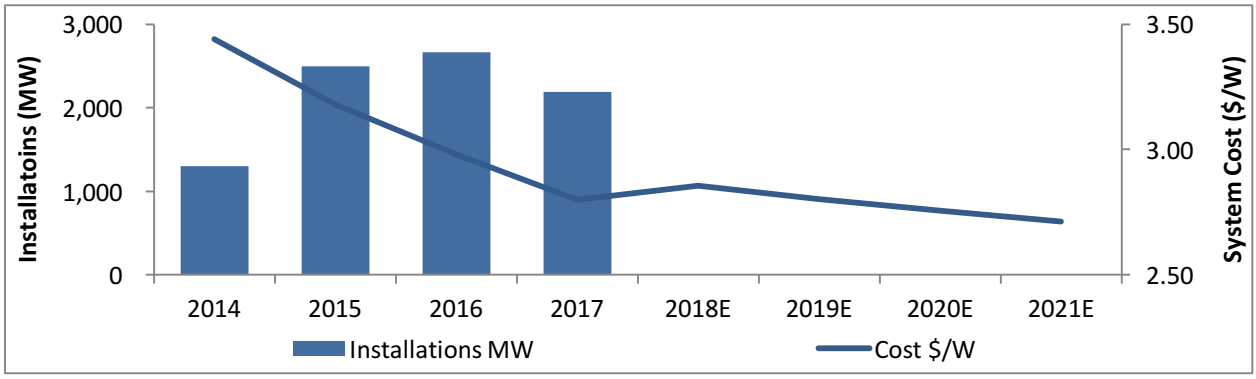



Source: GTM, NREL, PRG analysis

## Residential Systems

- Residential system price declines have been much slower than non-residential and utility-scale systems.
- In 2017 residential systems cost ~$2.80/W, when solar module prices average $0.40/W. (See Exhibit 5)
- Again assuming that international module prices fall to $0.35/W in 2018, but assuming no decline in residential BOS costs, the installed cost of residential solar systems this year can be estimated at $2.75/W, in the absence of tariffs on solar modules.
  - We assume pre-tariff module costs continue to decline by 8% annually after 2018 and BOS remain flat.
- Assuming a tariff on solar modules of 30% in 2018, declining by 5% each year through 2021, we see solar installation costs increasing to ~$2.86/W in 2018, a 2% increase on 2017, but 4% below 2016, and decling back to $2.80/W in 2019, $2.76/W in 2020 and $2.71/W in 2021.
- Residential installation volumes have been inconsistent in recent years due to capital constraints among the largest residential installers and changes in net metering and state incentive programs.
- Given the relatively limited impact of module tariffs on the installed cost on residential systems, we expect the level of installations to be driven more by state net metering programs and the availability of capital to residential installers.

**Exhibit 5: Residential System Installations and Costs, 2014-17**




Source: GTM, NREL, PRG analysis

## Winners and Losers

- Domestic (e.g., SolarWorld),as well as non-crystalline solar PV manufacturers (e.g., FSLR) should benefit from higher pricing and margins.
  - Somewhat surprisingly, Canadian manufacturers (e.g., CSIQ) were not exempted from the tariffs, as had been recommended the the USITC and had been expected by the market.
- Foreign solar manufacturers (e.g., JASO and JKS) should see some loss of market share and potentially lower margins. Furthermore, they could see a temporary drop in sales as many developers and installers increased their purchases of modules in advance of tariffs being imposed.

- Once they have gone through their inventory, developers and installers could suffer margin declines as they try to offset the impact of tariffs on new projects.
- The 2.5GW of tariff-free imports of CSPV cells each year is probably intended to encourage some increase in module assembly in the US using imported panels, but the temporary (only 4 years) and limited nature (30% tariff is only ~$0.06/W on cells and it declines by ~$0.01/W each year) will likely prevent much investment in new module assembly capacity.
- Overall, we see few companies suffering significant impacts as the effect of a 30% tariff on total installed cost should be limited, pausing the rate of growth in 2018 and resuming thereafter.