The Adverse Impact of Section 201 Tariffs:
Lost Jobs, Lost Deployment and Lost Investments

Solar Energy Industries Association

The High Cost of Section 201 Tariffs

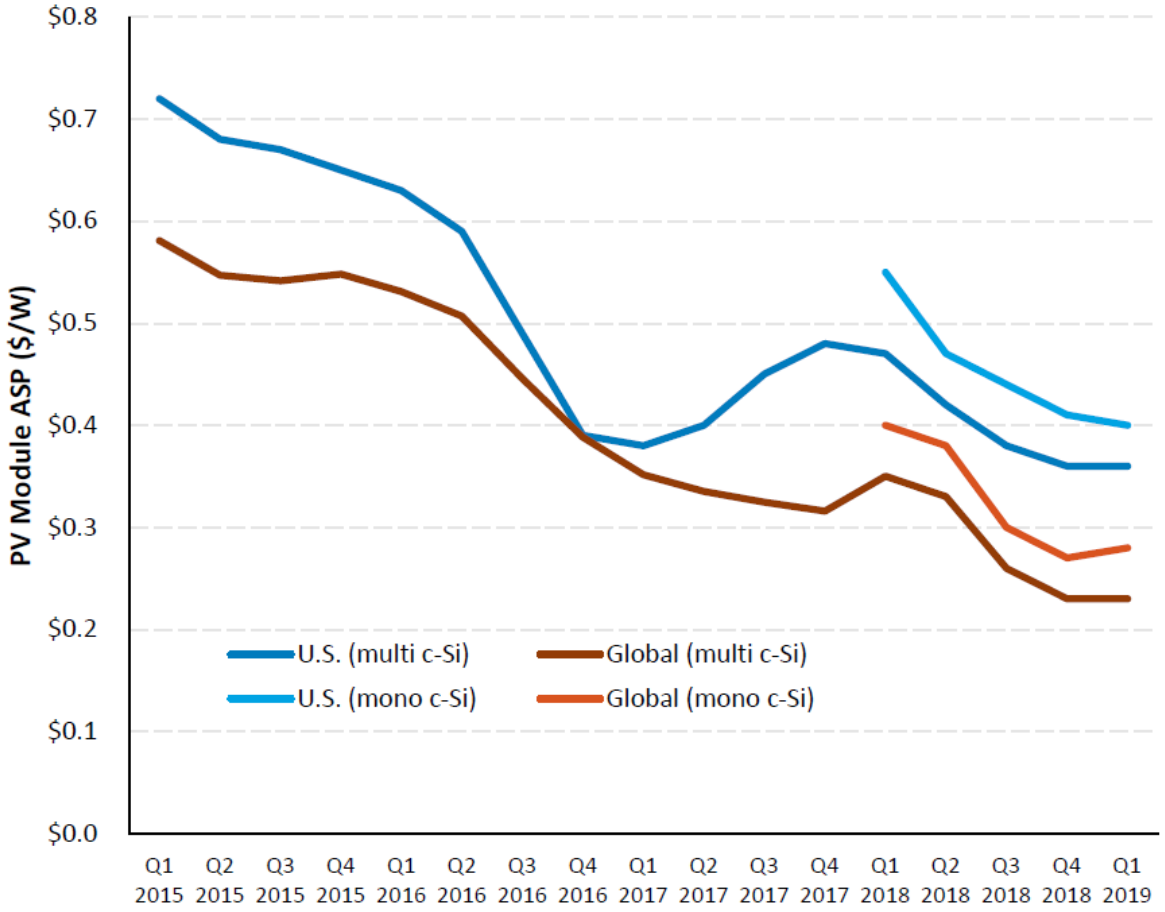
- **62,000 fewer jobs** from 2017 through 2021
- **10.5 gigawatts (GW)** of lost solar deployment
  - Enough to power 1.8 million homes and avoid 26 million metric tons of carbon dioxide emissions
- **$19 billion** in lost investment
- SEIA's 2017 market impact analysis accurately forecast these losses

Background - Section 201 Tariffs

- In early 2017, a domestic cell and module manufacturer submitted a petition to the U.S. International Trade Commission (USITC) seeking protection from imports.
- The petitioner's proposed remedy would have effectively doubled the cost of crystalline silicon photovoltaic (c-Si PV) products in the United States.
- The investigation itself created great uncertainty for U.S. solar businesses and significantly disrupted the U.S. market in 2017 and 2018.
- In January 2018, the president signed an order imposing "safeguard" tariffs on c-Si PV imports, including a tariff rate quota for cells, from all countries for four years:

2018	2019	2020	2021
30%	25%	20%	15%

Tariff Impact: Higher U.S. Prices



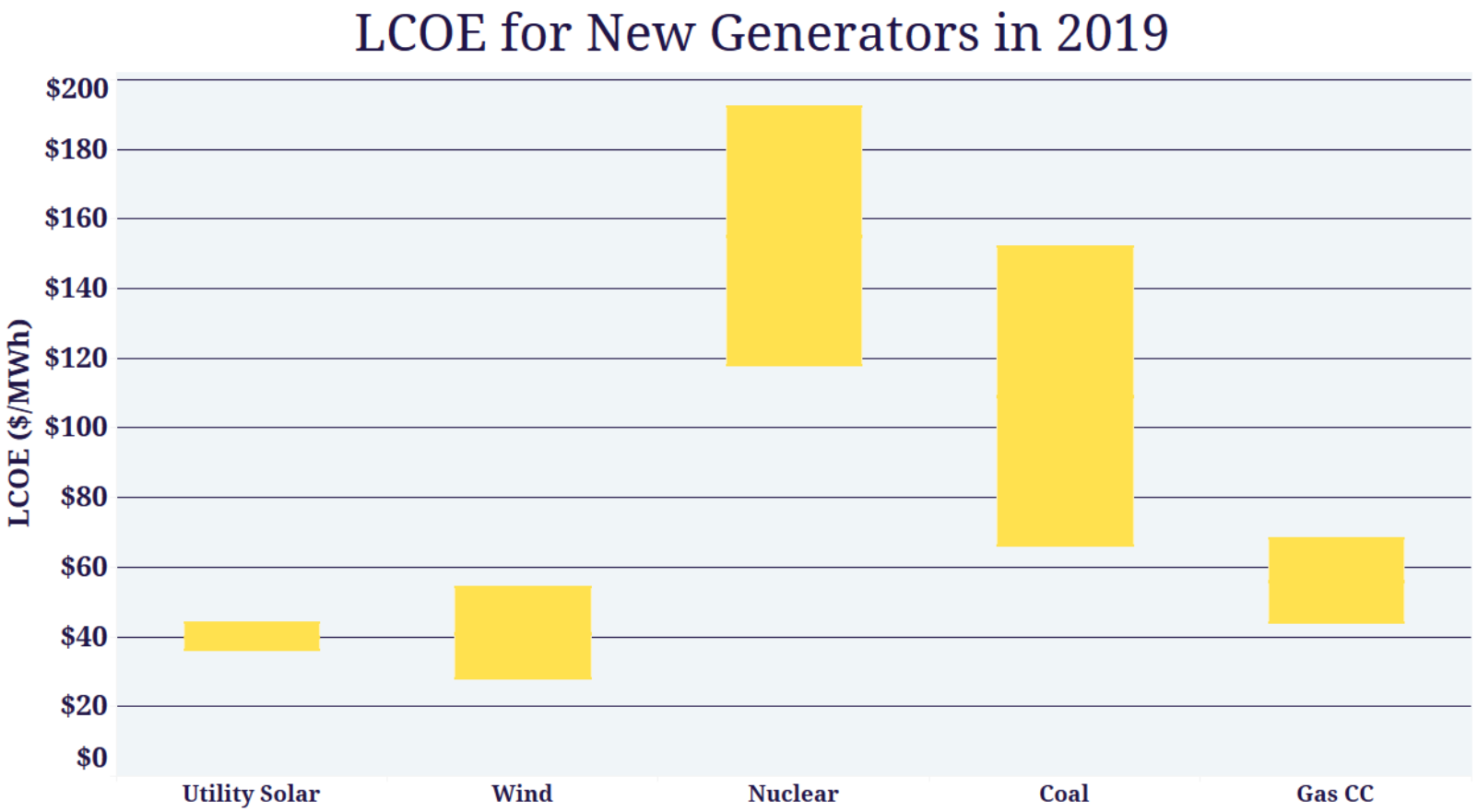
Technology advances have helped lower solar prices around the world.

In the United States, however, price declines have been significantly undercut by the safeguard tariffs—with U.S. prices now among the highest in the world.

Higher prices reduce the size of the addressable market by pushing economics in favor of substitutes (existing generation, gas and wind) in marginal markets.

Source: NREL, *Q1/Q2 2019 Solar Industry Update*

How Tariffs Hurt Demand



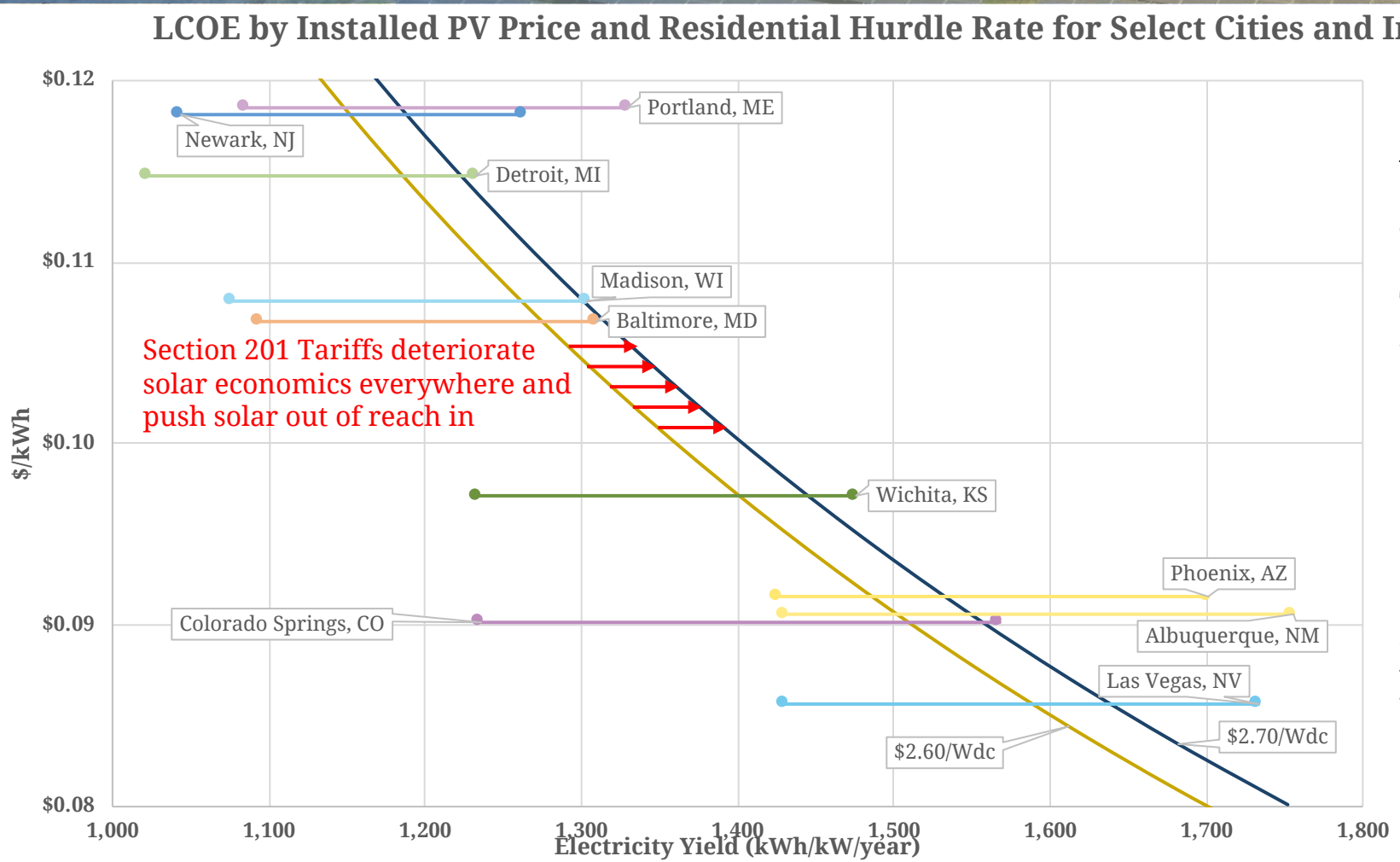
Source: Lazard's Levelized Cost of Energy Analysis – Version 13.0

Solar energy competes with all other forms of electricity generation.

In general, utility companies, homeowners and businesses choose to buy solar electricity when it is the most cost-effective option, though non-price factors may also spur solar adoption.

The adverse impact of tariffs is most pronounced in markets where solar has just achieved grid parity.

Elevated Prices Reduce Addressable Market



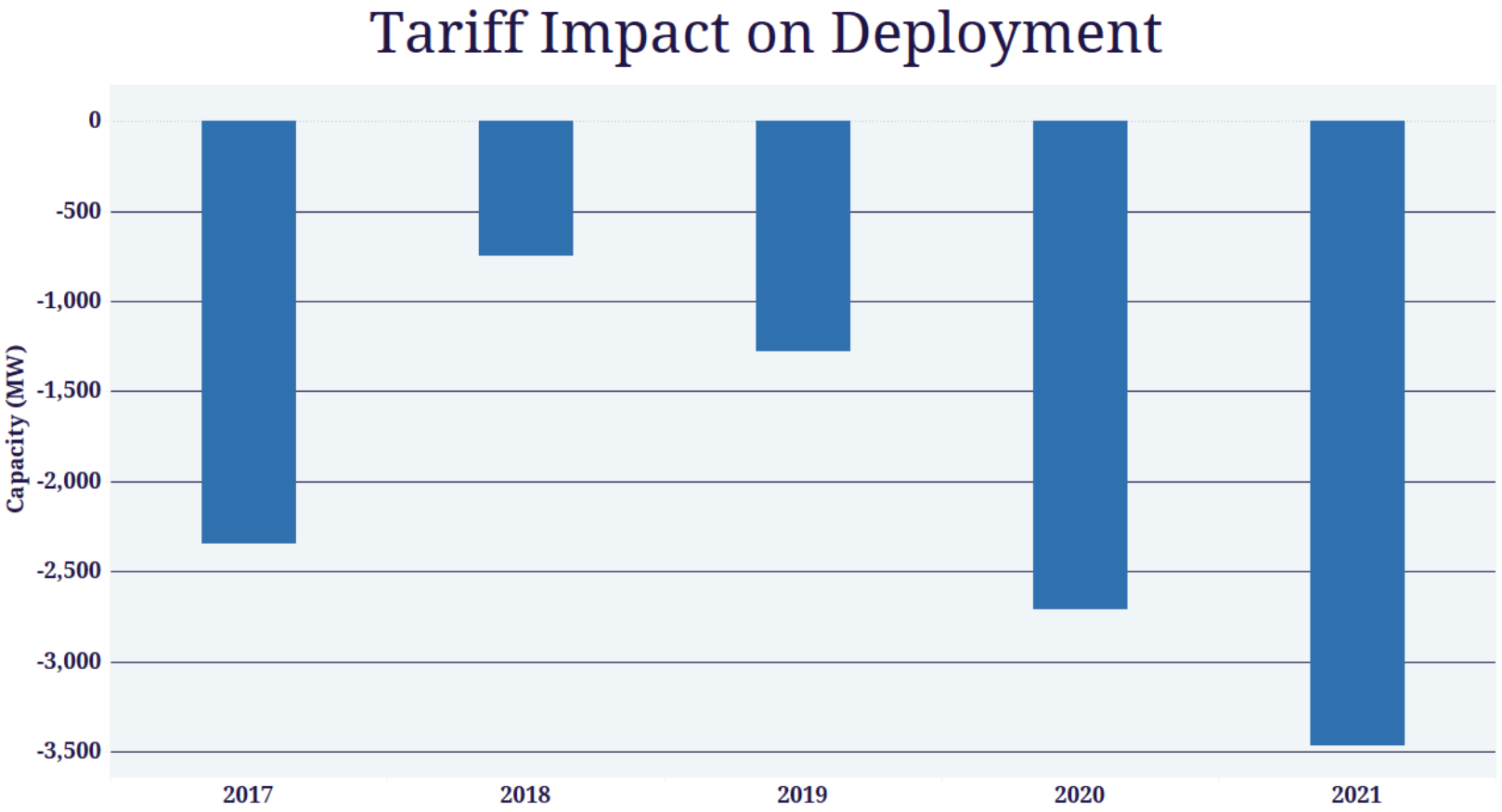
Solar energy must be price competitive with other forms of electricity generation and retail electricity rates.

The Section 201 tariffs significantly undercut price gains from technology advancements and **slow the pace of solar adoption** by shifting costs out of reach for many consumers.

Some geographies remain resilient but more expensive while increased costs push marginal markets out of reach.

More information about this chart can be found on slide 18.

Tariff Impact: Lost Deployment

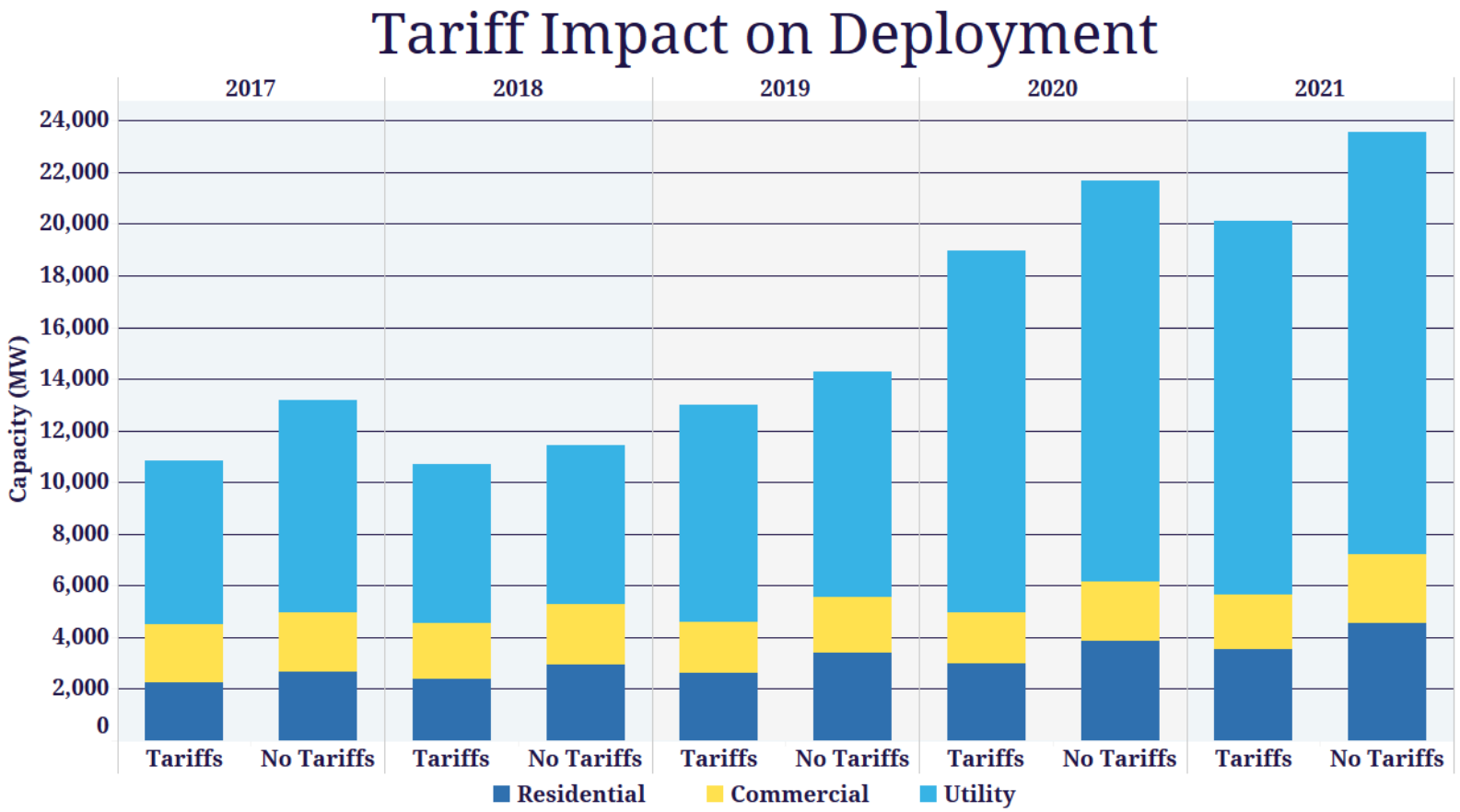


Source: SEIA

Uncertainty caused the market to **lose out on 3 GW of installations** as rumors and actual tariffs disrupted contracts in 2017 and 2018.

The safeguard tariffs **reduce the market for new projects by 7.5 GW** from 2019 - 2021.

Tariff Impact: Lost Deployment



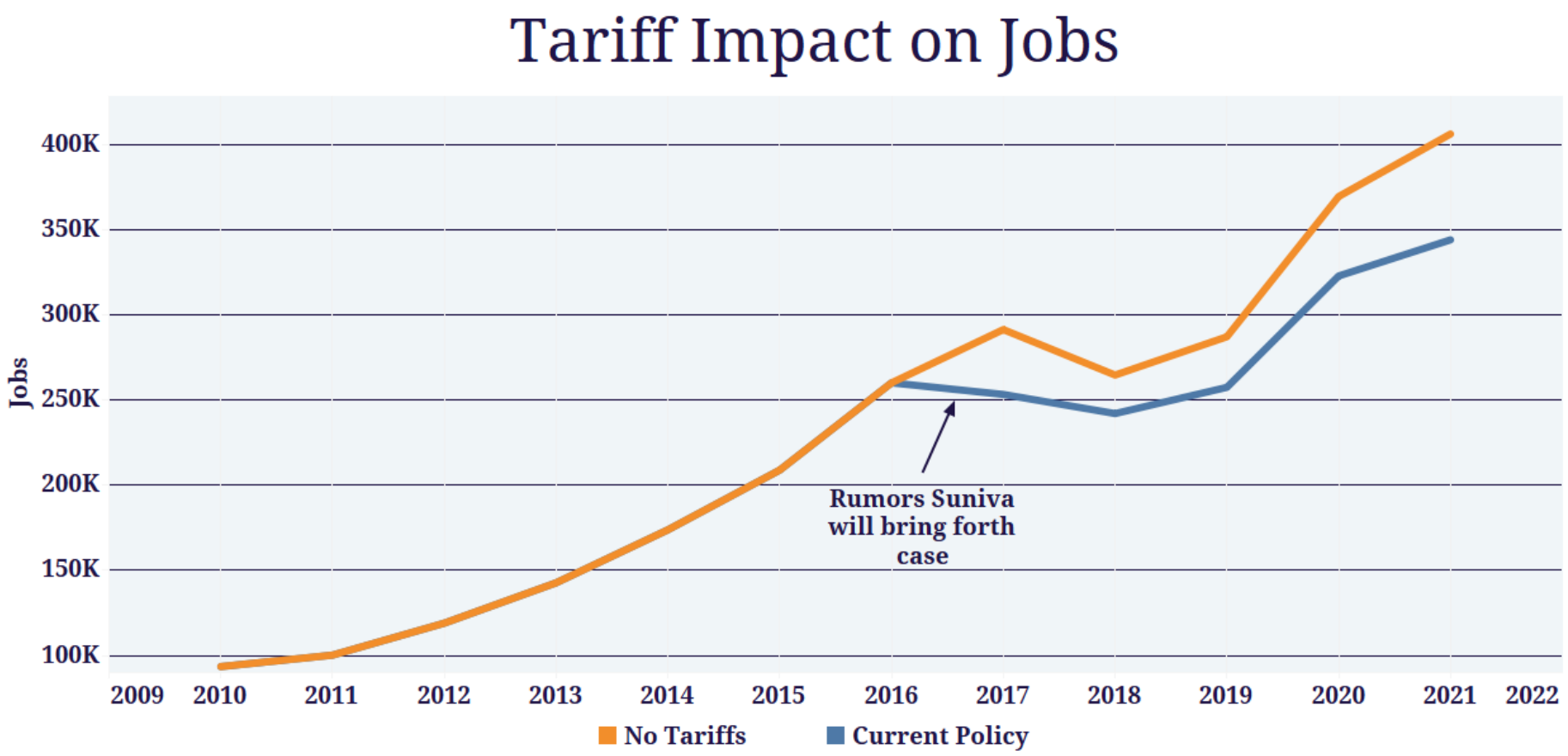
Source: SEIA

The U.S. solar market would be much better off without the tariffs.

The tariffs offset gains from state policy initiatives and technology advancements.

Deployment grow in later years industry growth opportunity is fueled by expansion into territories with less policy support for renewable deployment.

Tariff Impact: Lost Jobs



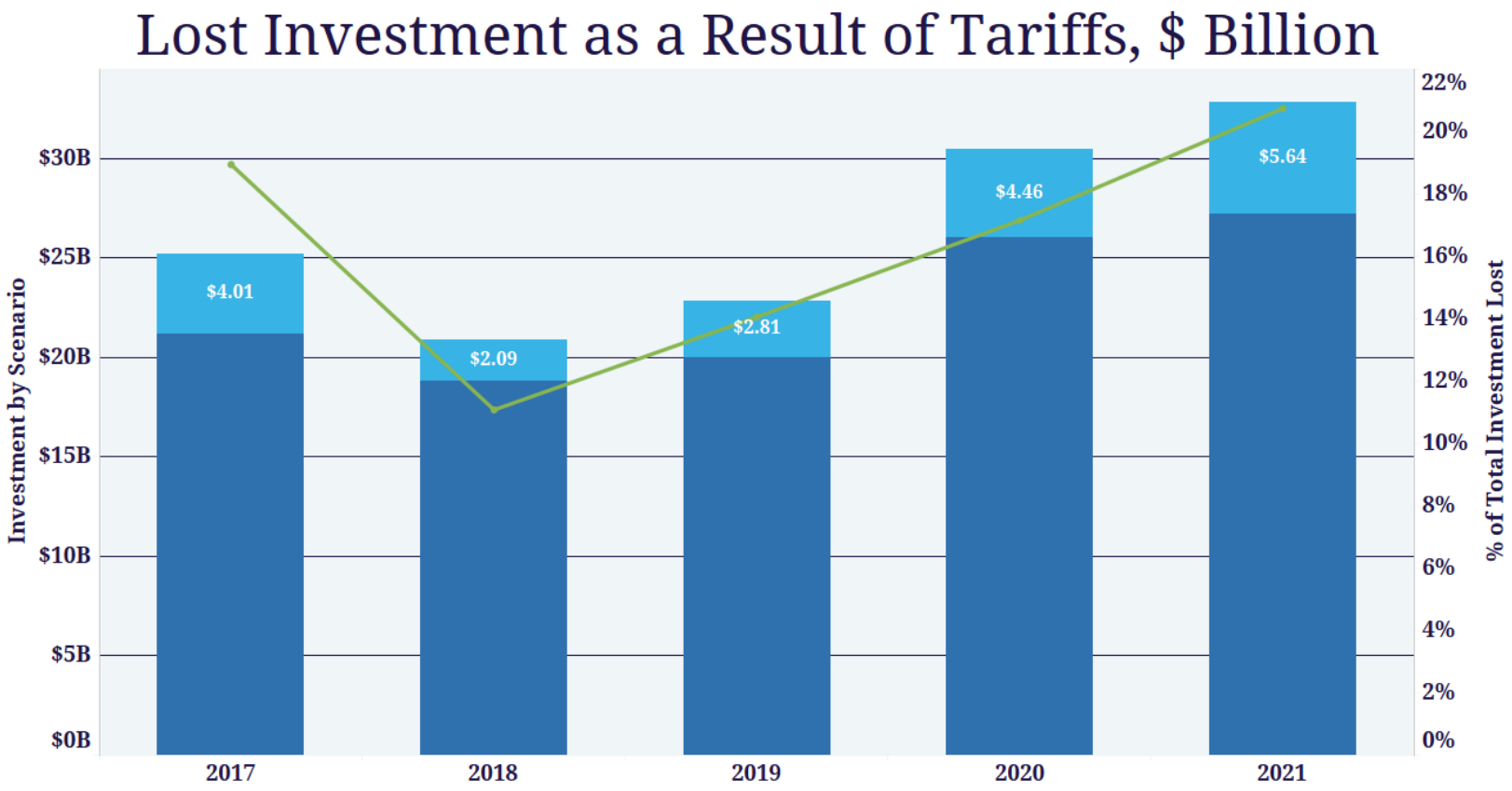
Source: SEIA

62,000
Lost Job Opportunities

$19 Billion
Lost Investment Opportunities

10.5 GW
Not Installed

Tariff Impact: Lost Investments



Source: SEIA

The tariffs result in $2-$5 billion annually and $19 billion total in lost investment from 2017 – 2021.

Solar cell and module tariffs are **costing the country more than $10.5 million per day** in unrealized economic activity.

Severely Hindering Growth

- After overcoming the 2017-2018 market shock caused by the Section 201 investigation, the solar industry has resumed moderate growth supported by hundreds of policy actions taken by state and local governments. (See DSIRE Insight, *50 States of Grid Modernization Q1 2019 Report).*
- **The 201 tariffs significantly reduce the efficacy of those policies**.
- The approximately 2,000 new jobs in CSPV module manufacturing jobs must be weighed against 62,000 lost employment opportunities, 10.5 GW of lost deployment and $19 billion in lost investments.
- Each new solar panel manufacturing job cost the U.S. 31 service jobs, 5.3 MW of deployment, and nearly $9.5 million in investments — this is a bad deal for America.

Methodology

Methodology:

- Two scenarios:
  1. **Current policy**: shows market conditions under the safeguard tariffs.
  2. **No tariffs**: estimates the outcomes of a market without the safeguard tariffs or investigation leading to the safeguard tariffs. (Note that this scenario does not assume the removal of AD/CVD tariffs or Section 301 tariffs on products from China that also impact the U.S. solar market.)
- **Jobs analysis**: employed National Renewable Energy Laboratory's (NREL) Jobs and Economic Development Impact (JEDI) to model both scenarios.

Methodology: Scenarios

- Current policy scenario:
  - Forecasts deployment under the current safeguard tariff schedule.
    - Tariffs at 30% in 2018, 25% in 2019, 20% in 2020, 15% in 2021 and no extension of the safeguard tariffs beyond the initial 4-year term.
  - Assumes no exclusion for bifacial PV modules.
    - The exclusion was revoked on October 9th, 2019. (Though the revocation is currently under court review, the risk posed means the market is currently treating it as revoked.)
  - Assumes no tariffs on thin-film photovoltaic products.
    - Thin-film PV is outside the scope of the Section 201 investigation and not subject to the tariffs applied to c-Si PV.

Methodology: Scenarios

- No tariffs scenario:
  - Considers only the removal of the Section 201 tariffs on c-Si PV products.
  - Assumes no changes to the AD/CVD tariffs on crystalline silicon photovoltaic (c-Si PV or CSPV*) imposed on products from China/Taiwan.
  - Assumes no changes to Section 301 tariffs on goods from China impacting the solar industry.
  - Assumes no changes to Section 232 tariffs on steel and aluminum.

*Note: in all the U.S. International Trade Commission investigations into, the commission and litigants have used the abbreviation “CSPV”. That abbreviation is not widely used outside of the USITC context. “c-Si” PV is the most common industry abbreviation.

Methodology - Assumptions

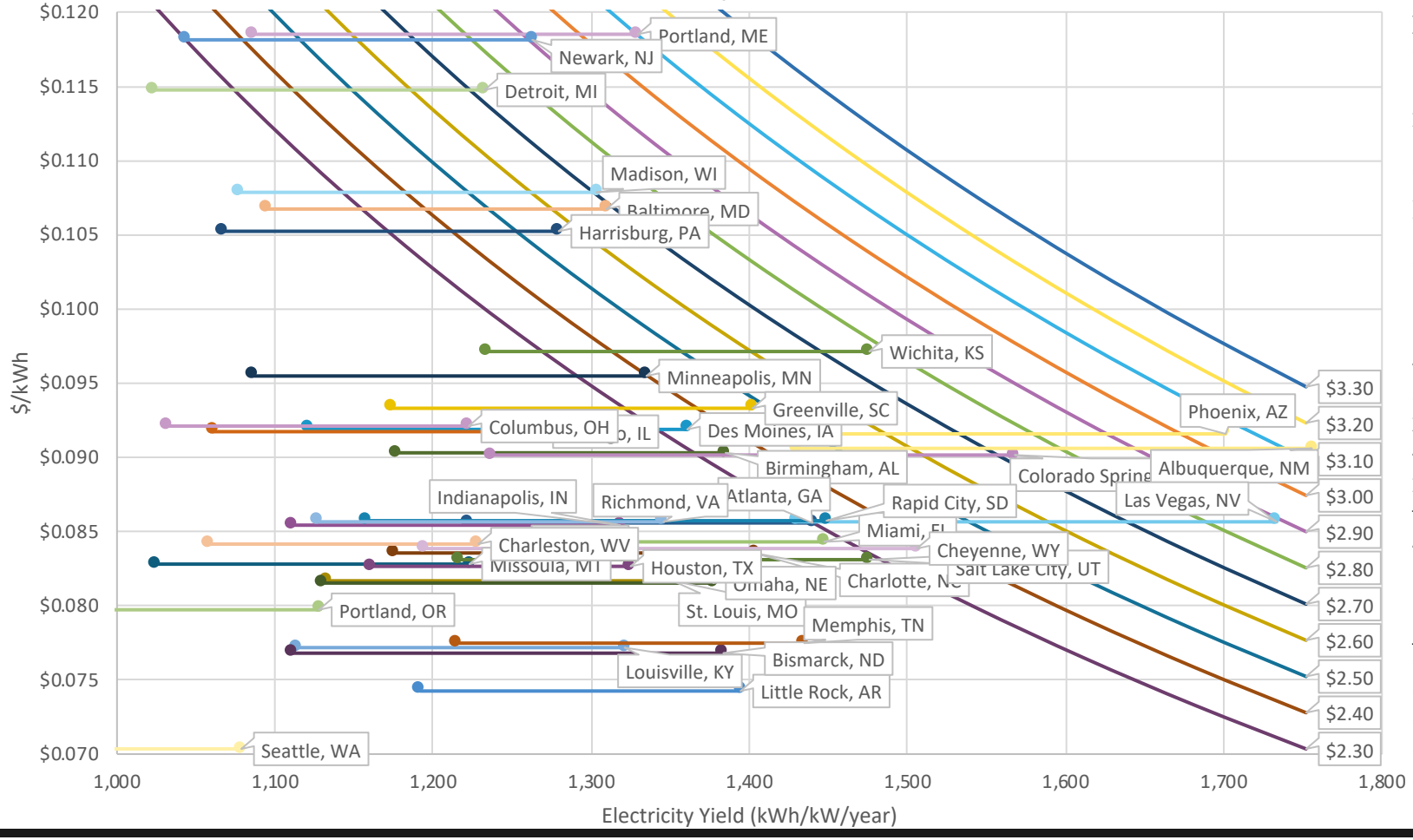
- Deployment:
  - Current Policy: Wood Mackenzie and SEIA *Solar Market Insight* report for 2019 Q4 forecast.
  - No Tariffs: Derived Wood Mackenzie and SEIA *Solar Market Insight* report forecasts from issues: 2019 Q4, 2016 Year in Review and 2017 Year in Review. The section 201 tariffs were the only major national solar policy change between the 2016 Year in Review forecast (produced prior to news of the 201 investigation) and the 2017 Year in Review forecast (produced in February 2018, after tariffs were announced).
- Prices (From Wood Mackenzie):
    - Residential, Commercial, and Utility by Year
  - Consistent between scenarios.
    - The only material difference between the scenarios was the imposition of tariffs and, while the price of the products to the end customer increased, that price increase is the result of a tax, not marginal investment. Accounting for module prices in this way is important to ensure meaningful results from the JEDI model.
  - Operations and maintenance (O&M) prices derived from National Renewable Energy Laboratory's 2019 Annual Technology Baseline.

Methodology - Employment

- JEDI Jobs Modeling:
  - Input/Output model: Input deployment and component cost parameters.
  - JEDI returns estimates for employment by job category in full-time-equivalent figures.
  - Employment levels for installation and wholesale trade are driven by deployment-related expenditures (annual installations) in each year.
  - Employment levels in operations and maintenance (O&M) are driven by expenditures for maintaining the overall operating PV fleet (i.e. cumulative installed capacity).

Addressable Market in Additional Cities

LCOE by Installed PV Price and Residential Hurdle Rate by City



How to read this chart:

* Curves represent levelized cost of electricity (LCOE) at different insolation (horizontal axis). Each isometric curve represents a different installed cost for a PV system at $0.10/W increments.
* The vertical position of the horizontal lines represent the LCOE that solar must be below for solar adoption to occur (hurdle rate) for selected cities.
* Horizontal lines represent the spectrum of possible energy yields in each city for PV installed on homes in each city.
- The right end of each horizontal line represents the ideal system in each city: system facing due south with almost no shading.
- The left end of each line represents a less ideal PV system: roof facing due west with 10% shading. (Note this is not the worst possible configuration.)
- Points on a horizontal line that are above an isometric cost curve, are in the money at that installed price.

Assumptions:

* Federal Investment Tax Credit set at 30%.
* Weighted Average Cost of Capital set at 8%
* No state incentives.
* Full retail net metering.
* Utility rates approximated using state average revenue

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