



Utility-Scale Solar Data Update: 2020 Edition

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Utility-Scale Solar Data Update: 2020 Edition

Purpose and Scope:

- ▣ Summarize publicly available data on key trends in U.S. utility-scale solar sector
- ▣ Focus on ground-mounted projects $>5 \text{ MW}_{\text{AC}}$
 - There are separate DOE-funded data collection efforts on distributed PV
- ▣ Focus on historical data, emphasizing the most-recent full calendar year

Data and Methods:

- ▣ See summary at end of PowerPoint deck

Funding:

- ▣ U.S. Department of Energy's Solar Energy Technologies Office

Products and Availability:

- ▣ This briefing deck is complemented by a data file and visualizations
- ▣ All products available at: utilityscopesolar.lbl.gov

Presentation Contents

Deployment and Technology Trends

Installed Prices

Performance (Capacity Factors)

Power Purchase Agreement (PPA) Prices and LCOE

Concentrating Solar Thermal Power (CSP) Plants

Capacity in Interconnection Queues

Data and Methods

What's new this year in the online data set?

Consistent use of new regional boundaries

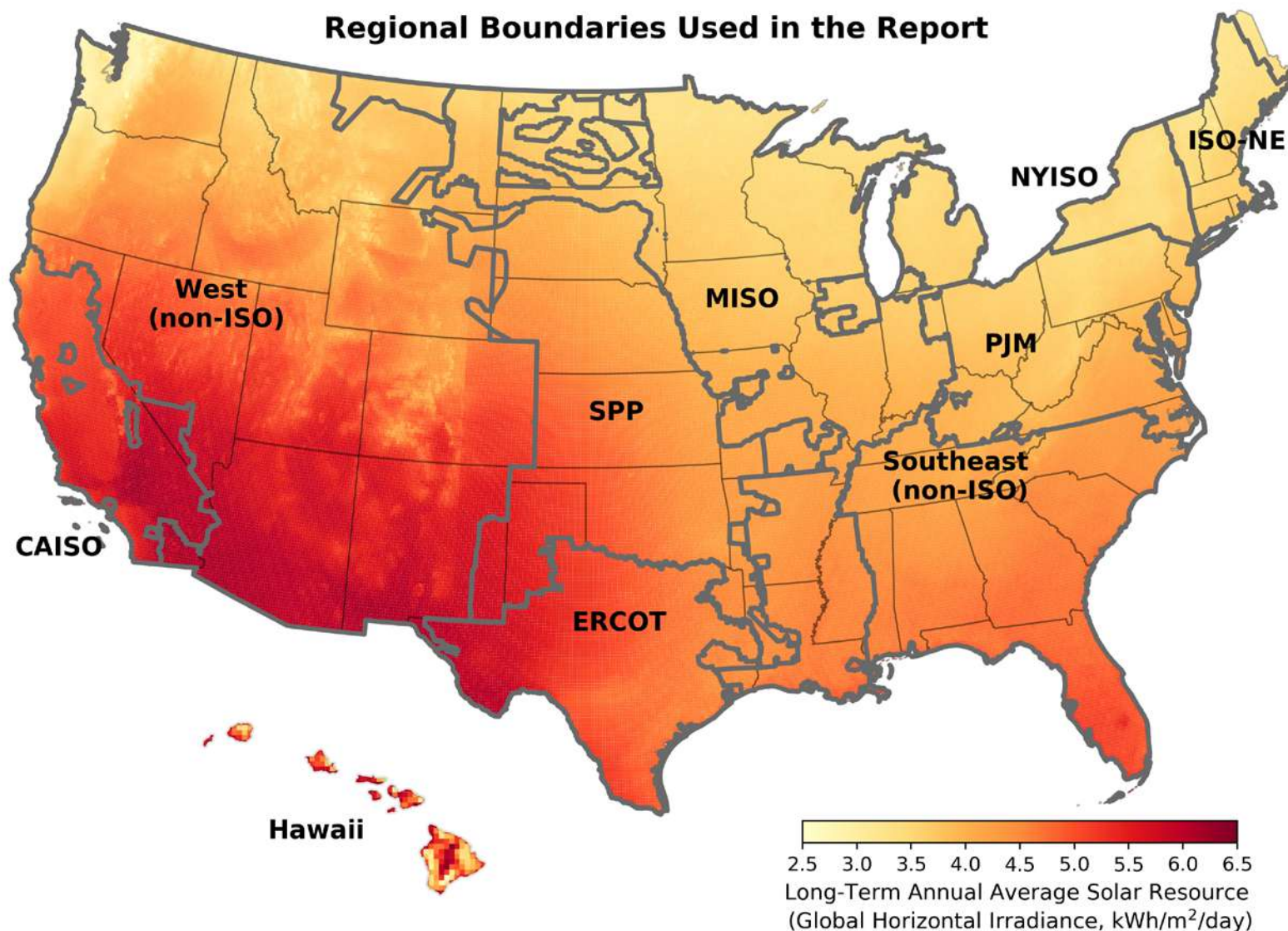
Additional data for online and planned hybrid projects

Inclusion of LevelTen Energy PV power sales price data

Further presentation of trends in levelized energy costs

Reorganization and refinement of content and figures

Regional boundaries applied in this analysis include the seven independent system operators (ISO) and two non-ISO regions





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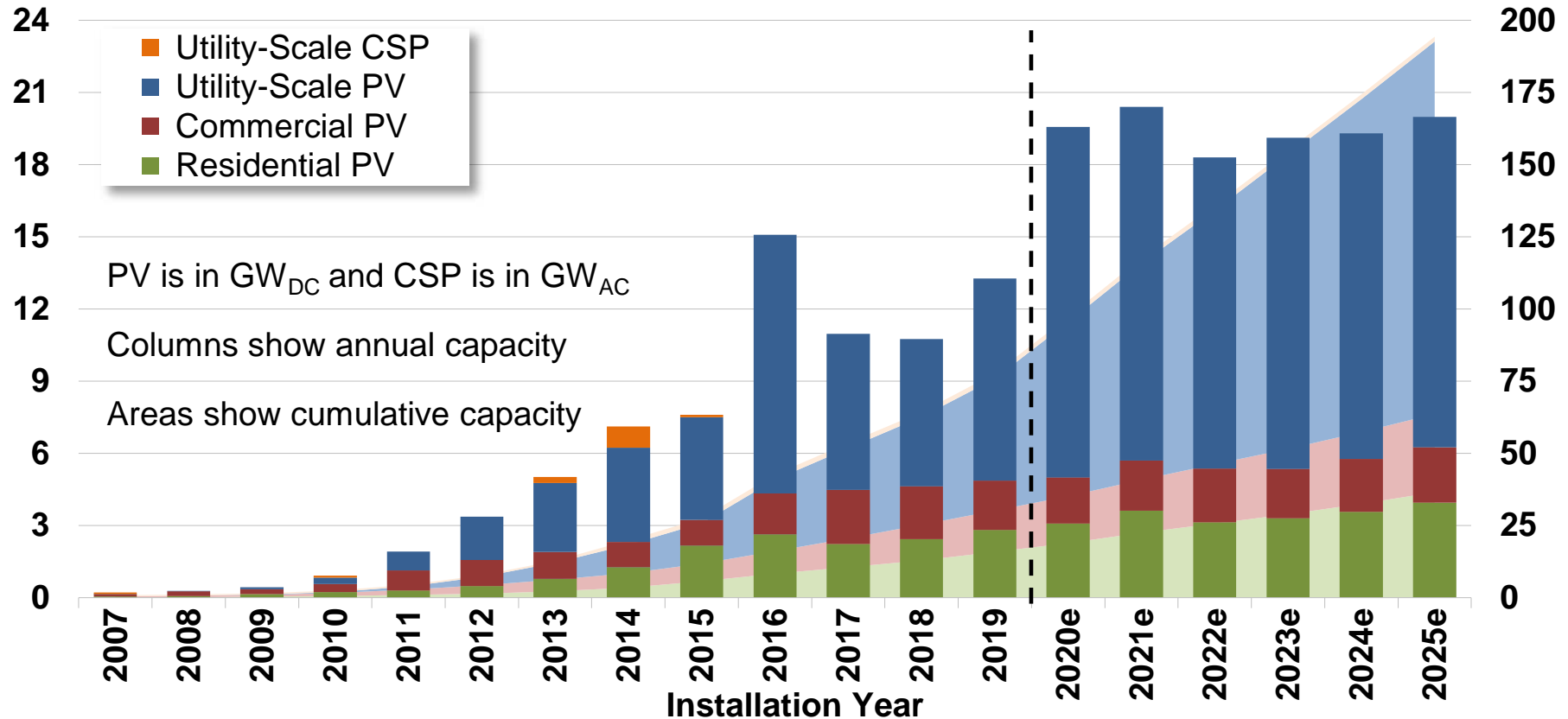
Deployment and Technology Trends



Annual and cumulative growth of U.S. solar power capacity

Annual Solar Capacity Additions (GW)

Cumulative Solar Capacity (GW)

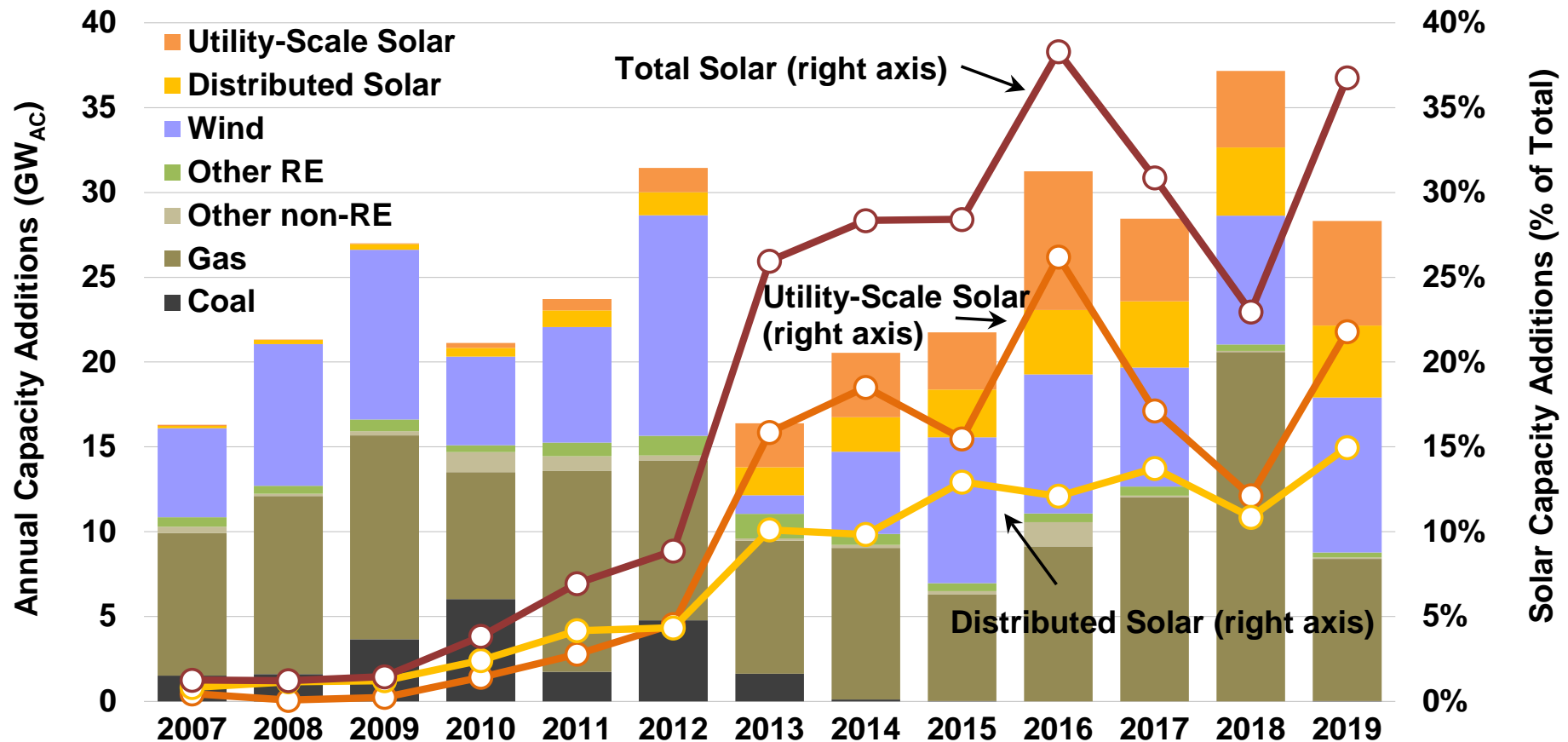


Sources: Wood Mackenzie and SEIA (2010-2019), IREC, Berkeley Lab.

Note: Wood Mackenzie and SEIA's definition of utility-scale PV capacity differs from LBNL both in size thresholds and treatment of project phase completion.

Interactive data visualizations: <https://emp.lbl.gov/technology-trends>
and <https://emp.lbl.gov/capacity-and-generation-state>

Annual capacity additions of different generator types



Sources: ABB, AWEA WindIQ, Wood Mackenzie, Berkeley Lab

Note: This graph follows GTM/SEIA's split between distributed and utility-scale solar, rather than our 5 MW_{AC} threshold

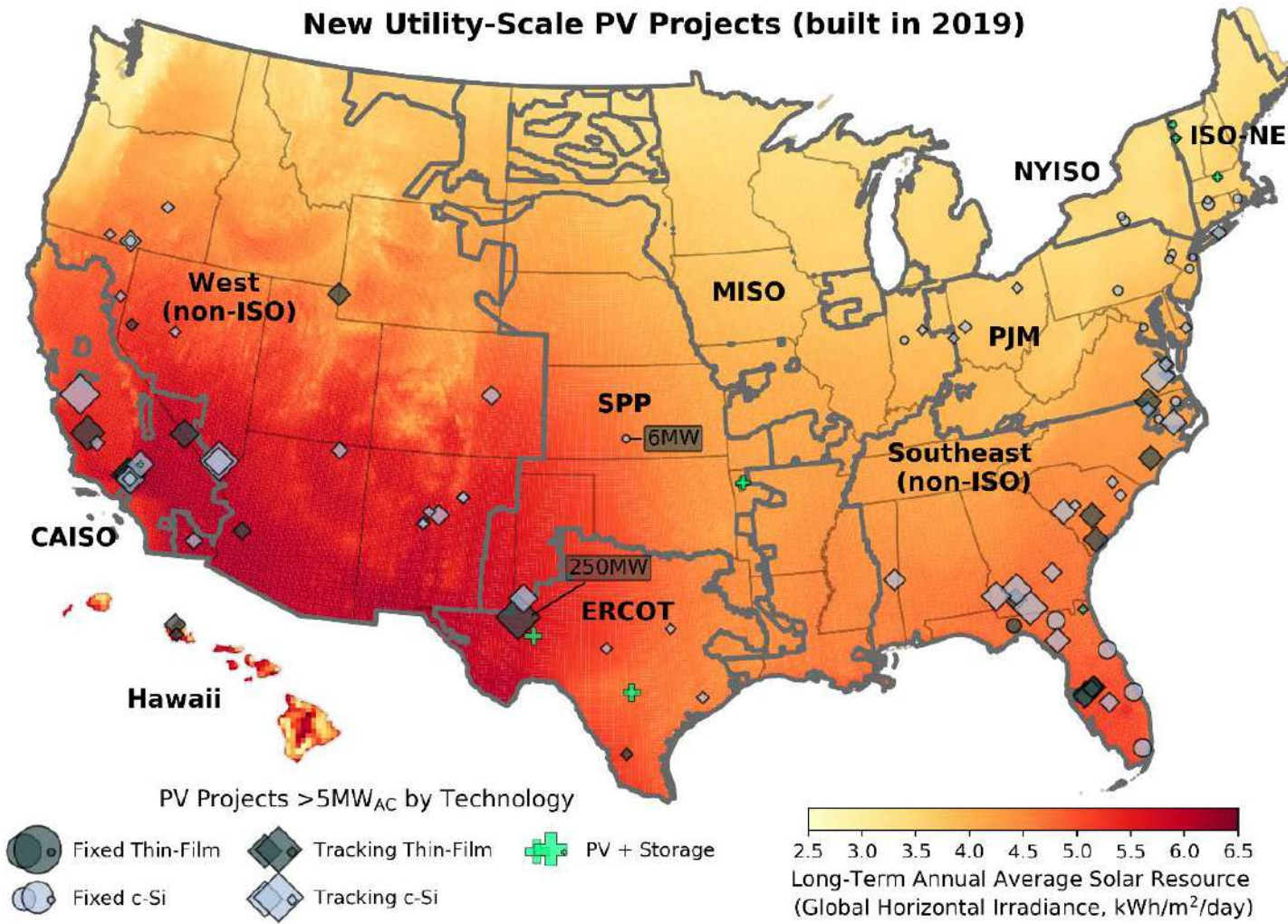
Over the past 5 years, solar (31%) and wind (28%) have accounted for 59% of all capacity additions to the U.S. grid (utility-scale solar was 18%)

Solar's market penetration by state

State	Solar generation as a % of in-state generation		Solar generation as a % of in-state load	
	All Solar	Utility-Scale Solar Only	All Solar	Utility-Scale Solar Only
California	19.9%	13.0%	17.7%	11.6%
Vermont	14.0%	7.5%	6.1%	3.2%
Nevada	13.7%	12.0%	14.8%	13.0%
Massachusetts	13.7%	4.9%	6.6%	2.4%
Hawaii	12.6%	2.4%	14.7%	2.9%
Arizona	6.6%	4.4%	9.9%	6.6%
Utah	6.6%	5.4%	8.5%	7.0%
North Carolina	5.7%	5.5%	5.6%	5.4%
New Mexico	4.7%	3.8%	6.6%	5.4%
New Jersey	4.7%	1.7%	4.7%	1.7%
<i>Rest of U.S.</i>	<i>0.9%</i>	<i>0.6%</i>	<i>1.0%</i>	<i>0.7%</i>
TOTAL U.S.	2.6%	1.7%	2.9%	1.9%

Source: EIA

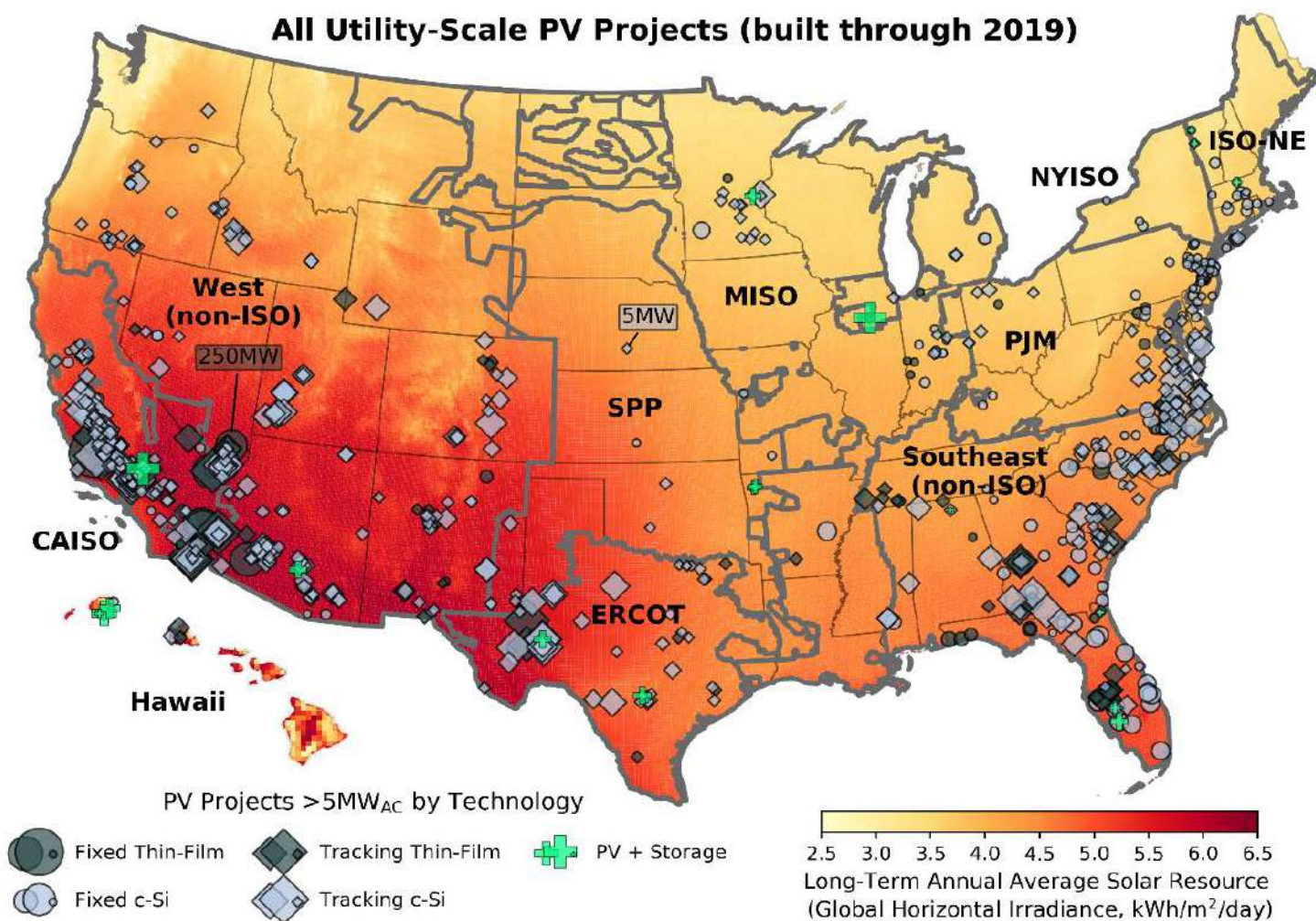
Utility-scale solar projects that were added in 2019



Source:
Berkeley Lab

Interactive data visualizations: <https://emp.lbl.gov/animated-map-pv-growth-gif>
and <https://emp.lbl.gov/technology-trends>

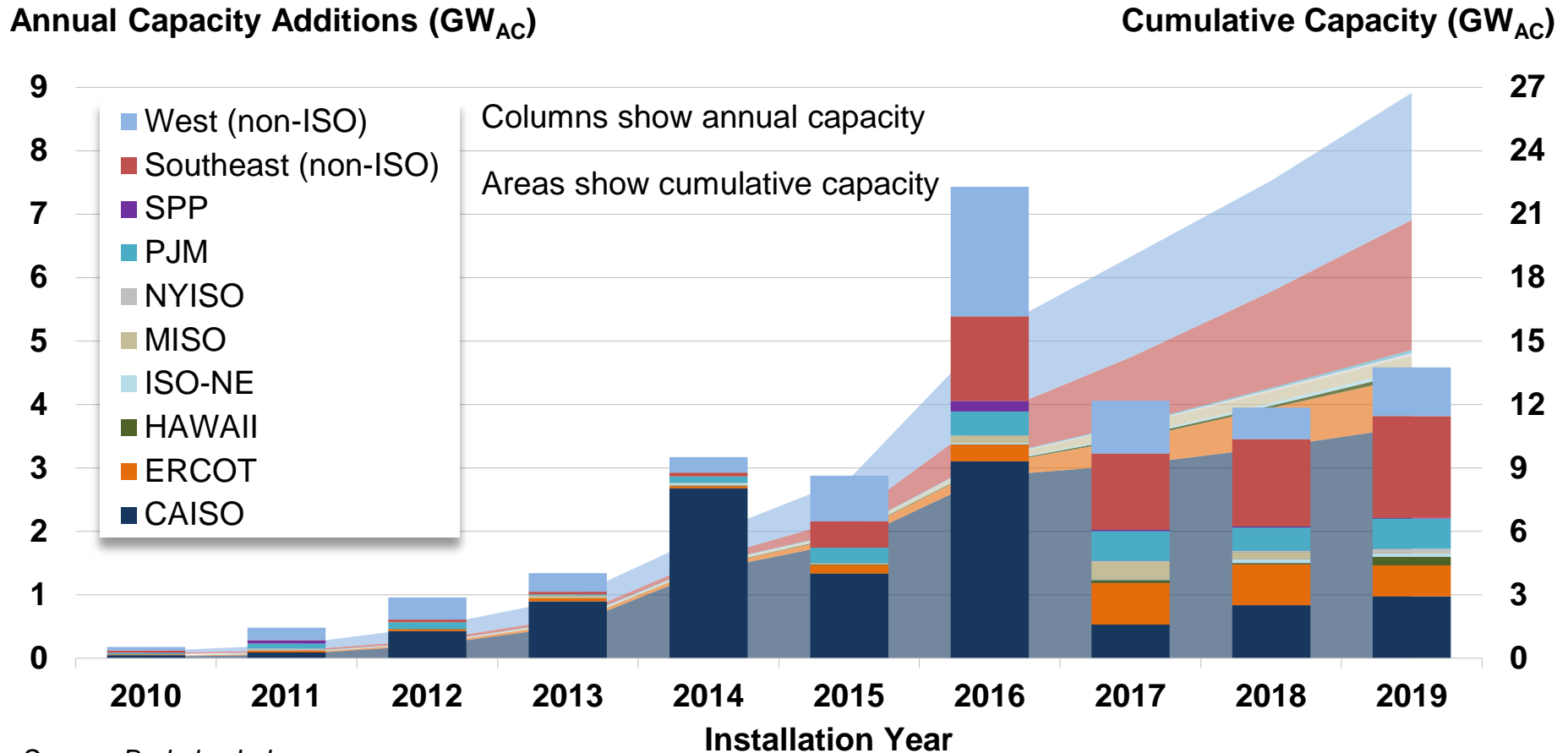
Utility-scale solar projects in operation at the end of 2019



Source:
Berkeley Lab

Interactive data visualizations: <https://emp.lbl.gov/animated-map-pv-growth-gif>
and <https://emp.lbl.gov/technology-trends>

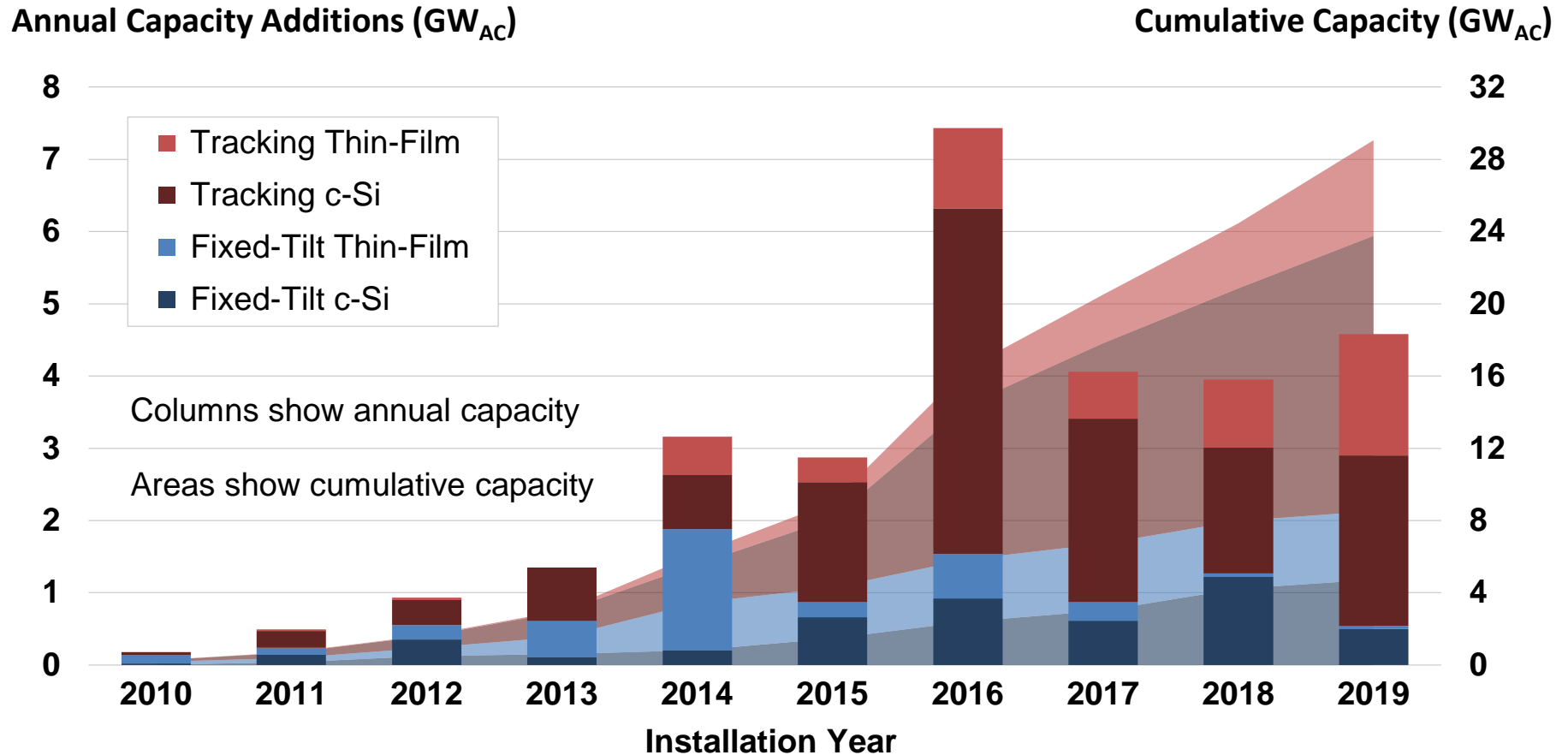
Annual and cumulative utility-scale PV capacity by region



Source: Berkeley Lab

For the third year in a row, the Southeast led all other regions in 2019 in terms of new utility-scale PV capacity additions.

Annual and cumulative utility-scale PV capacity by module and mounting type

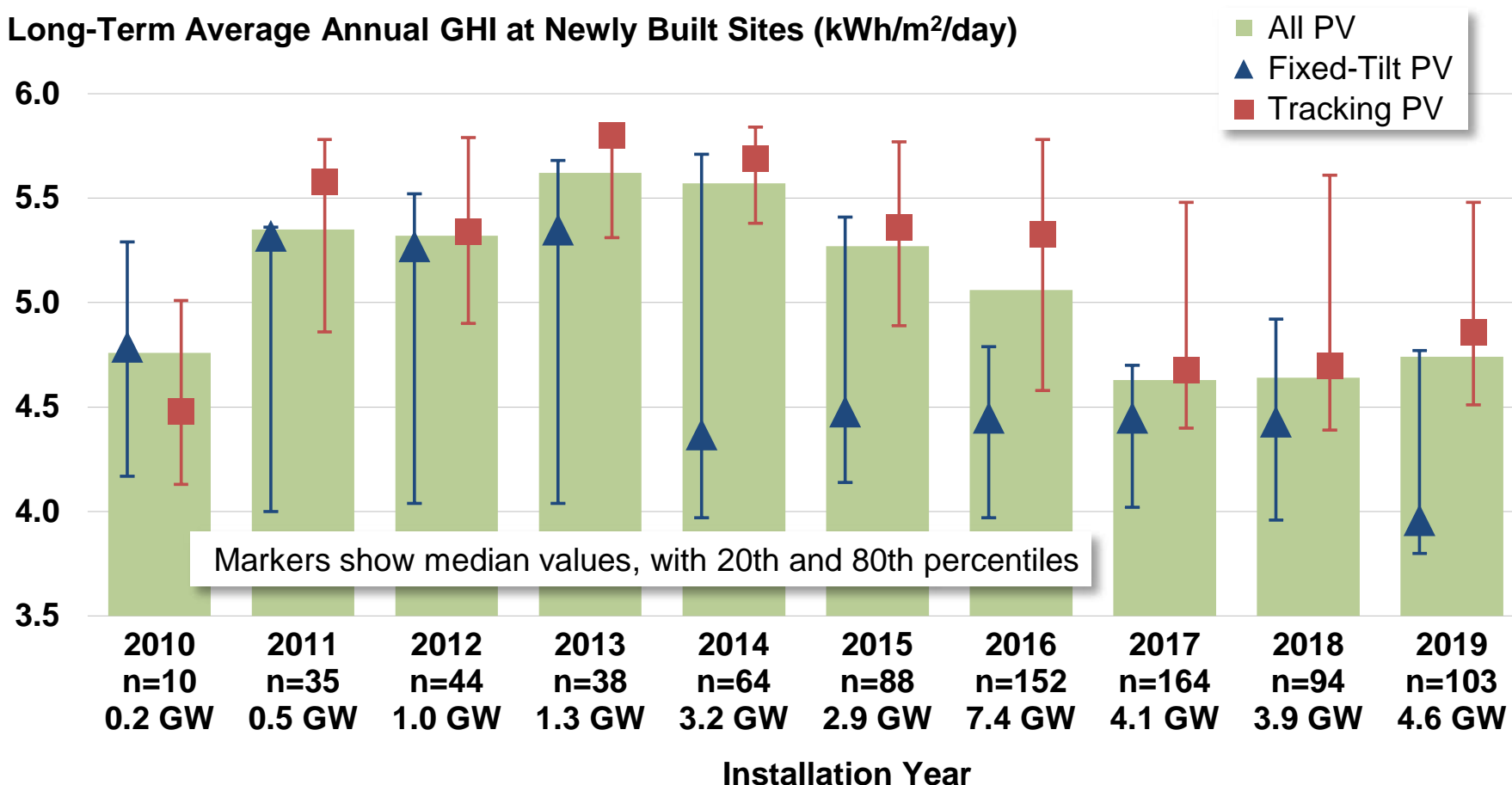


Source: Berkeley Lab

88% of all new utility-scale PV capacity added in the United States in 2019 employ tracking—the highest single-year share yet.

Global horizontal irradiance (GHI) by mounting type and installation year

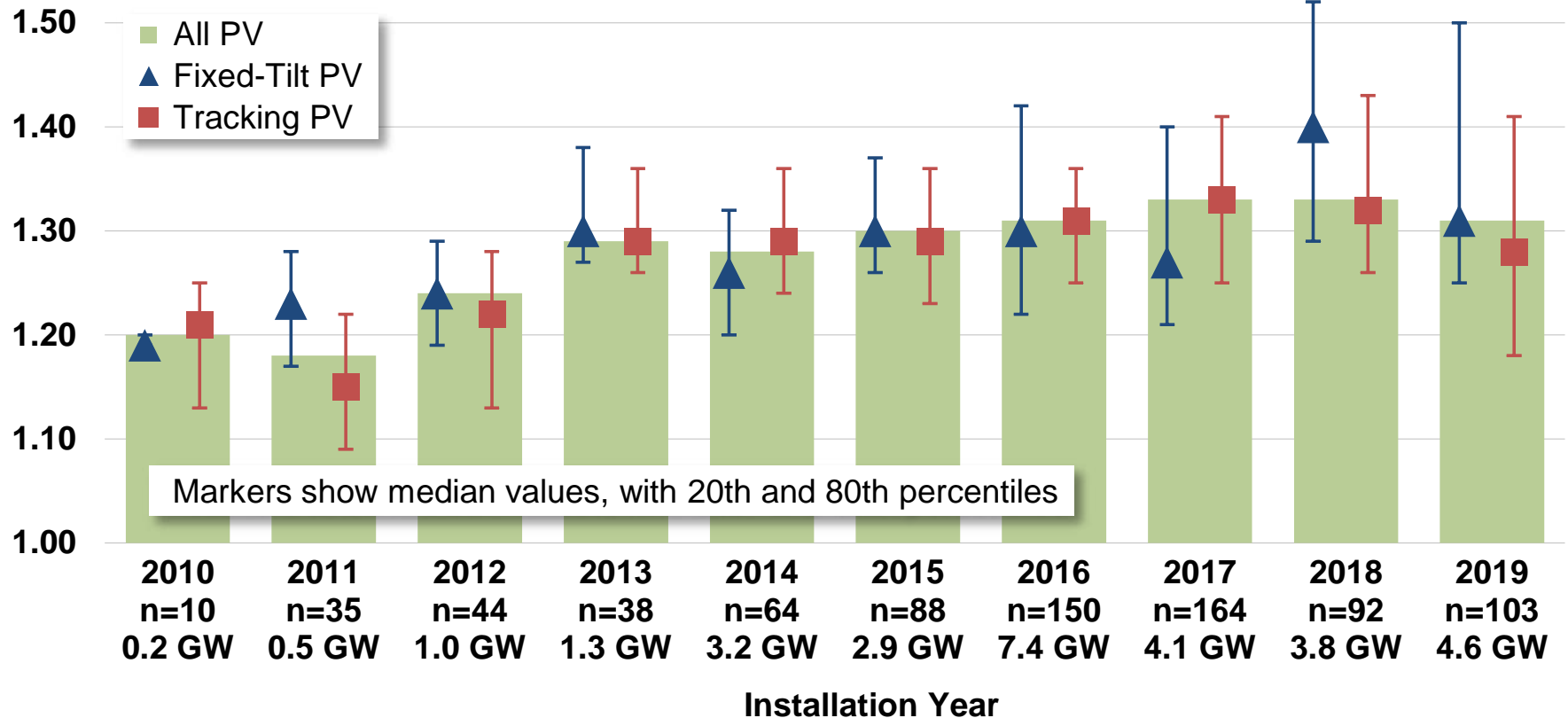
Long-Term Average Annual GHI at Newly Built Sites (kWh/m²/day)



Source: Berkeley Lab (project information) and NREL (long-term annual average solar resource)

Inverter loading ratio by mounting type and installation year

Inverter Loading Ratio (DC:AC)



Source: Berkeley Lab

Note: The Inverter Loading Ratio (ILR, or DC:AC ratio) describes the ratio of project capacity measured in MW_{DC} to the nominal inverter capacity measured in MW_{AC}



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Installed Prices



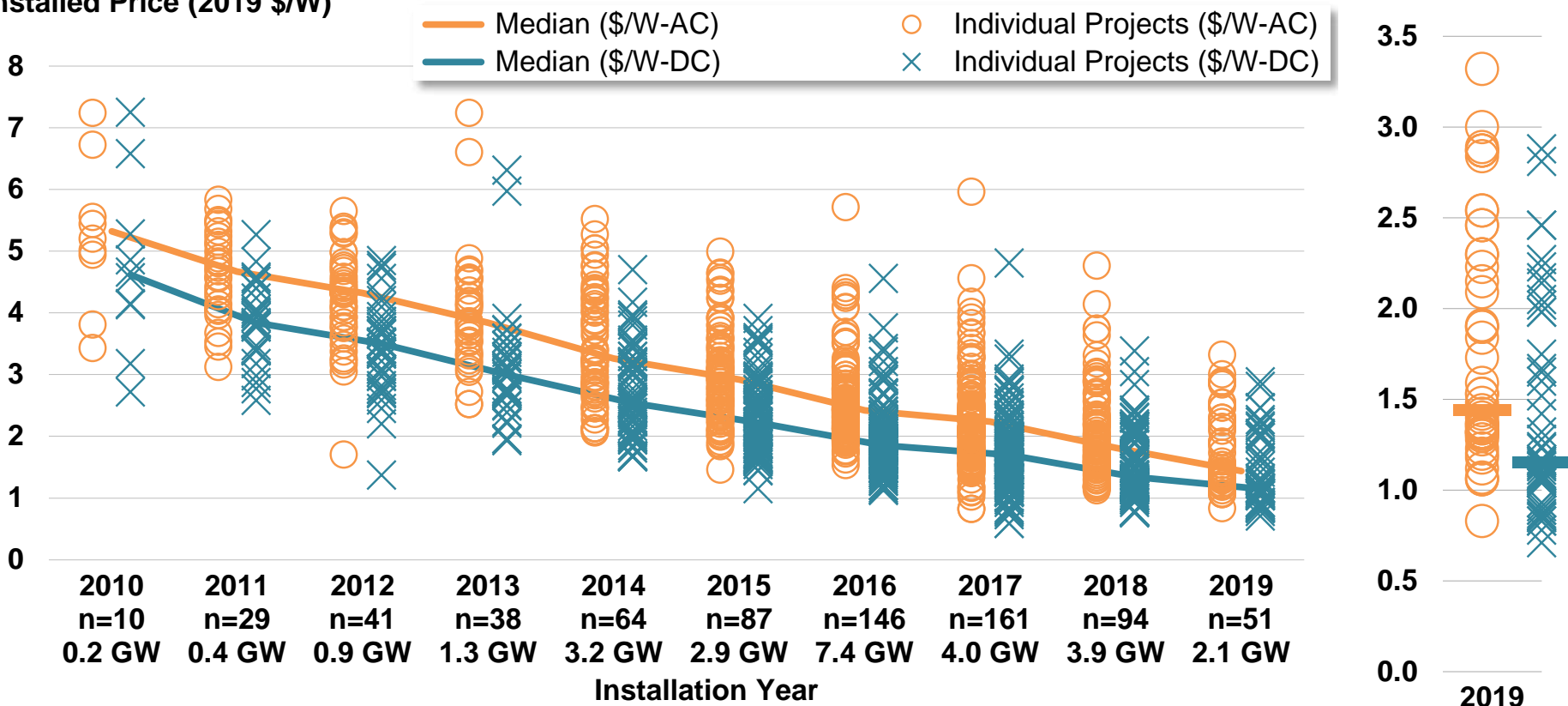
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ELECTRICITY MARKETS & POLICY

Installed price by year (in both DC and AC terms)

Installed Price (2019 \$/W)

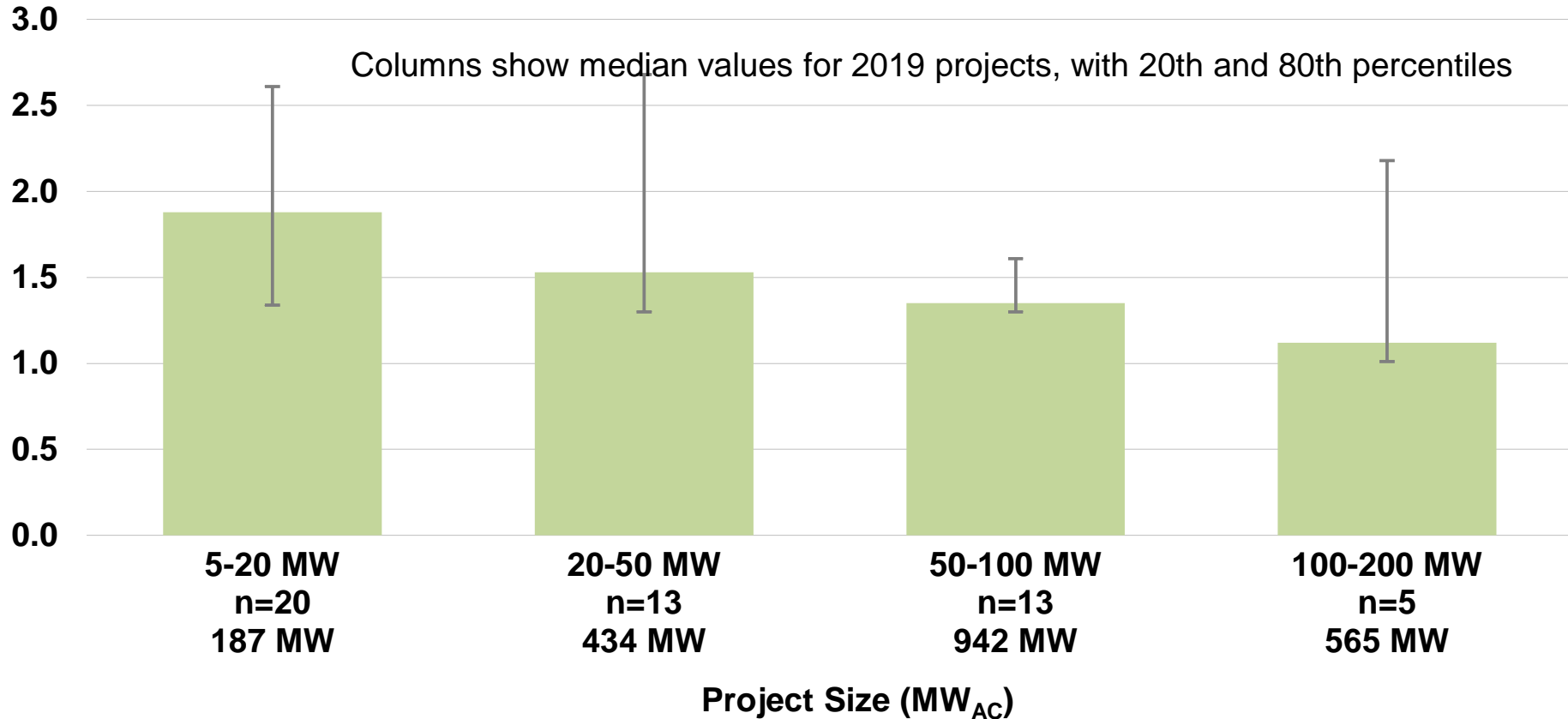


Sources: Berkeley Lab, Energy Information Administration

The median installed price of projects that came online in 2019 fell to \$1.4/W_{AC} (\$1.2/W_{DC}), down 20% from 2018 and down by more than 70% from 2010.

Installed price by project size in 2019

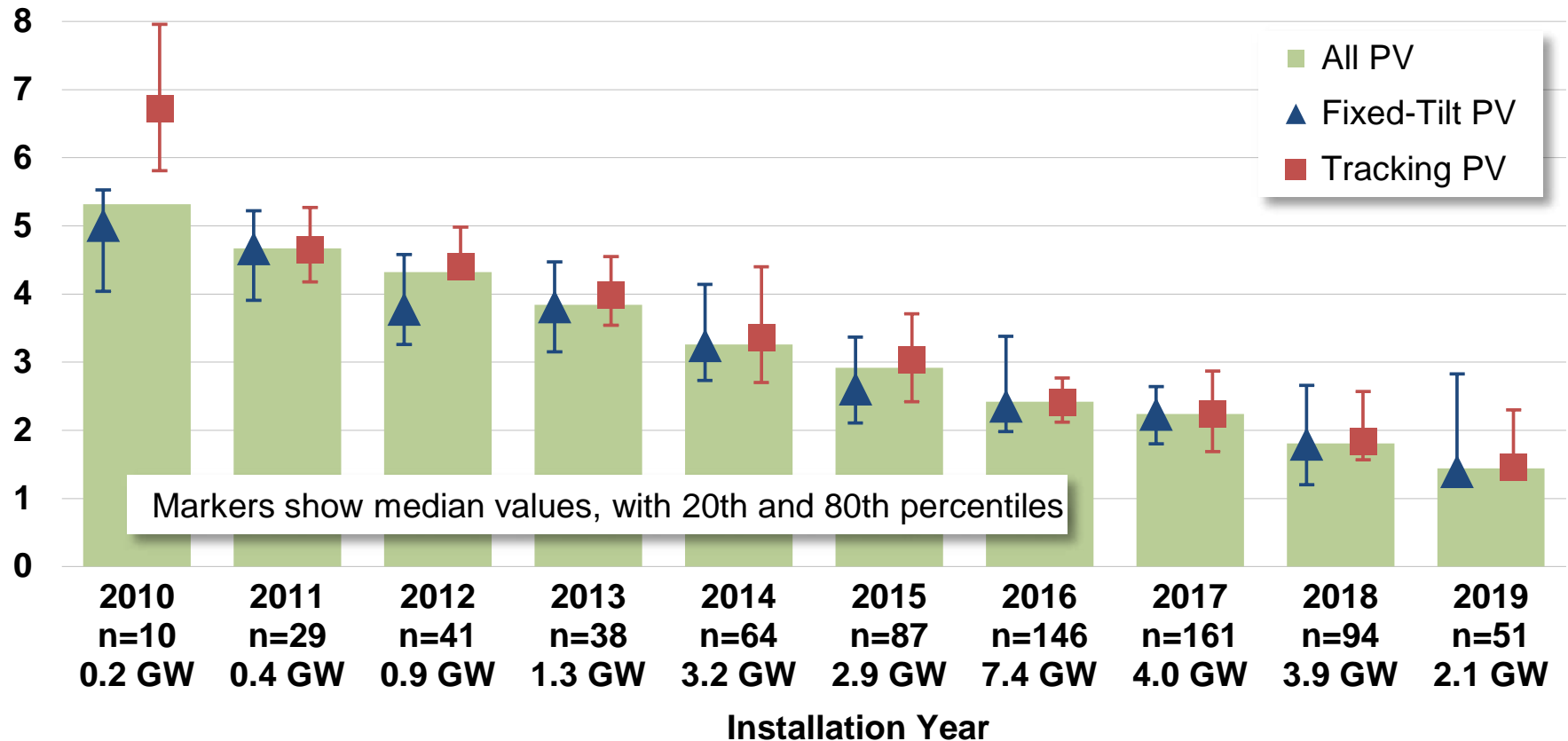
Installed Price (2019 $\$/W_{AC}$)



Economies of scale are evident in the 2019 project cost data.

Installed price by mounting type and installation year

Installed Price (2019 \$/W_{AC})



Sources: Berkeley Lab, EIA, FERC, SEC, trade press

The historical up-front cost premium for tracking has all but disappeared.