Utility-Scale Solar Data Update: 2020 Edition

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November 2020

This work was funded by the U.S. Department of Energy's Solar Energy Technologies Office, under Contract No. DE-AC02-05CH11231. The views and opinions of the authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof, or The Regents of the University of California.

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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 MW_{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: utilityscalesolar.lbl.gov

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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

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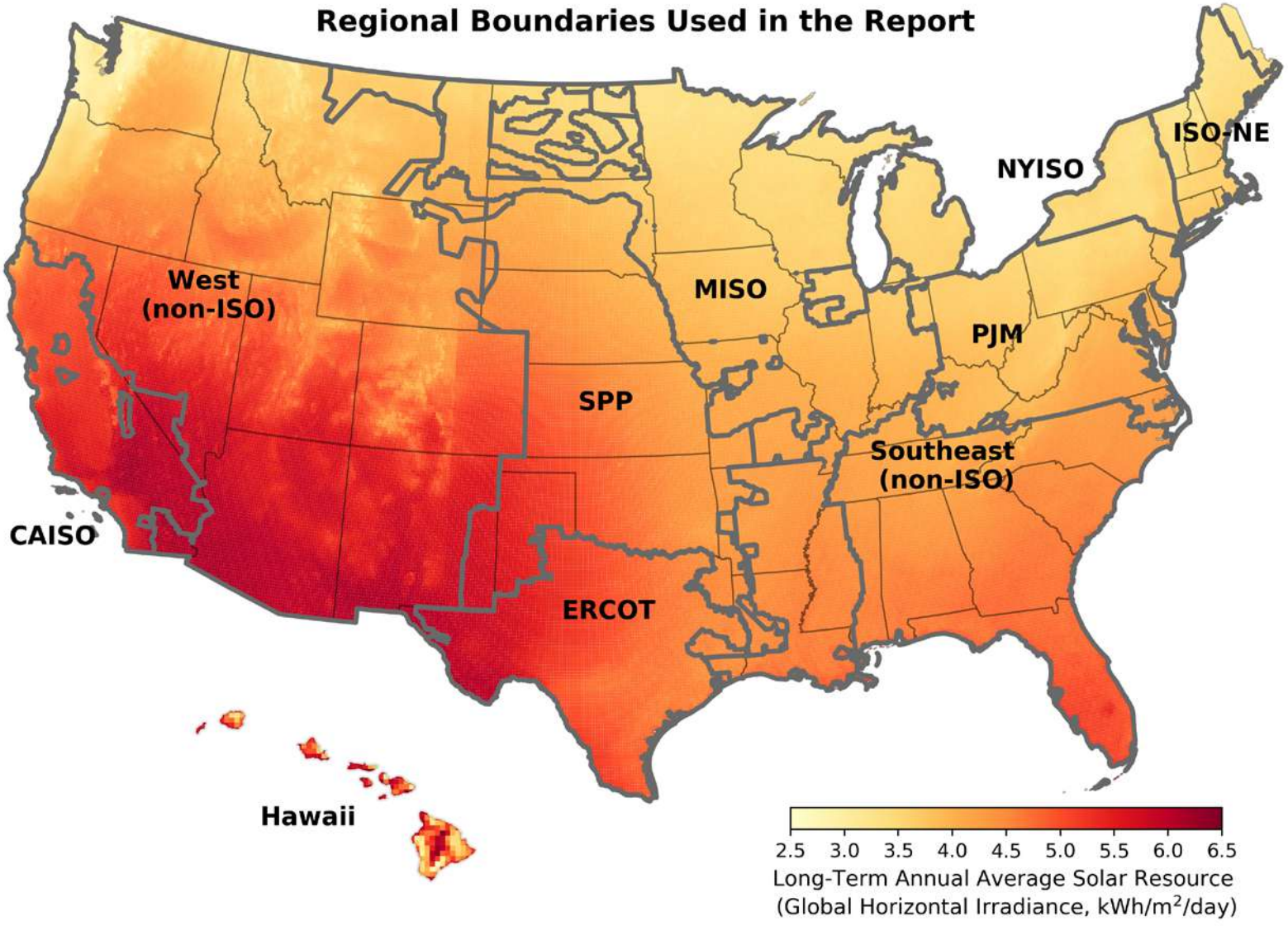
What's new this year in the online data set?

- 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

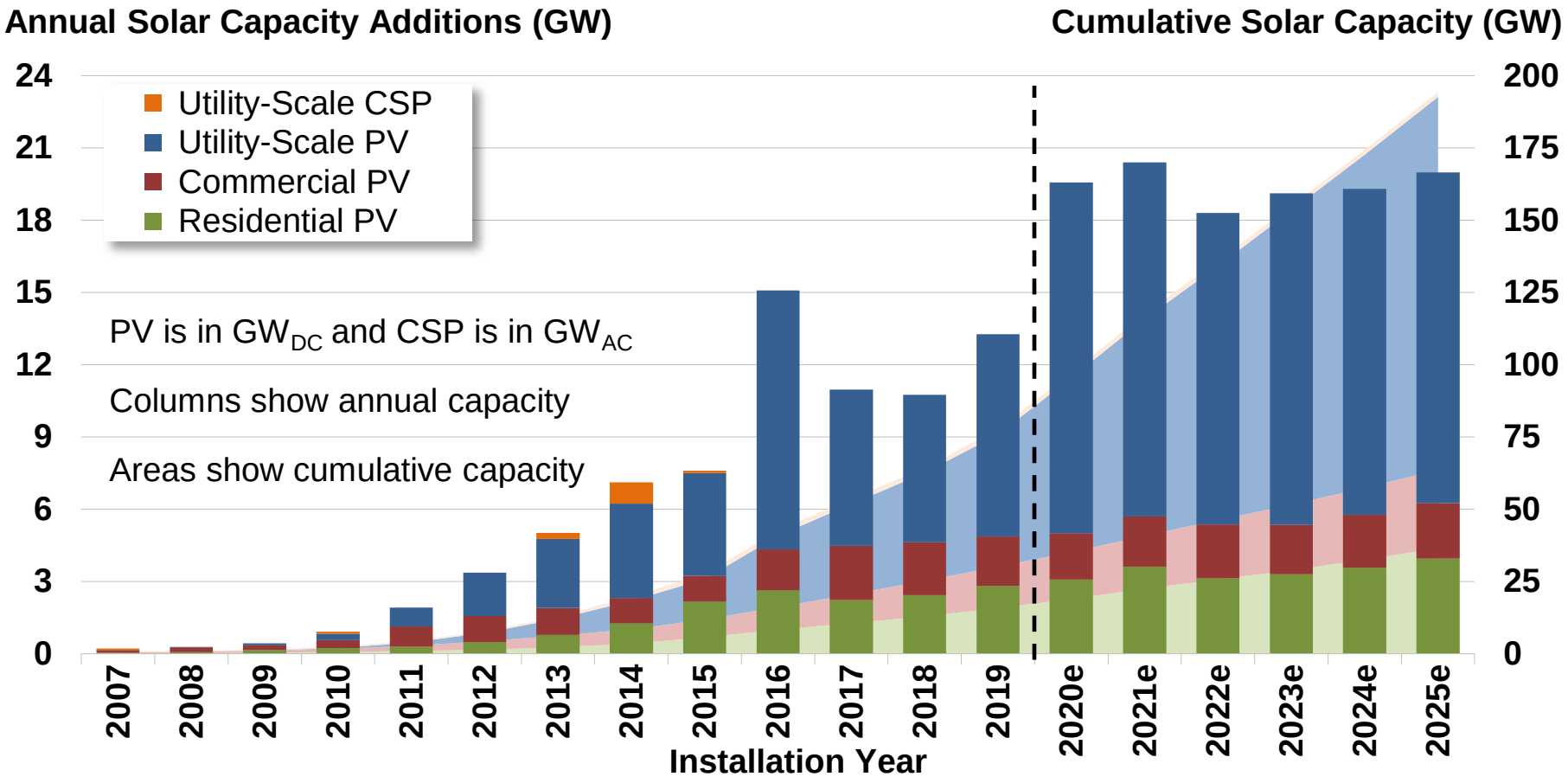
Regional boundaries applied in this analysis include the seven independent system operators (ISO) and two non-ISO regions



Source: NREL

Deployment and Technology Trends

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



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

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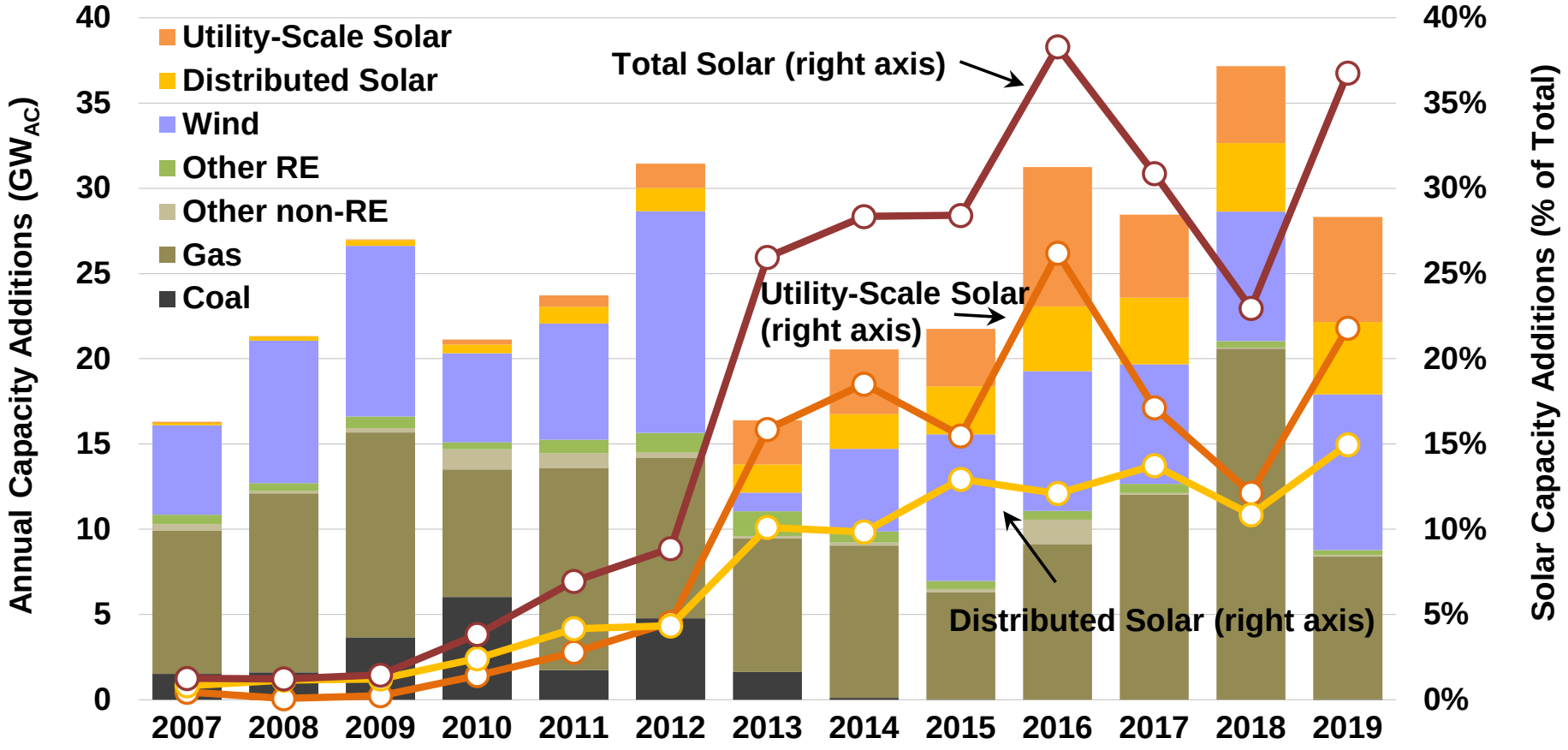
Annual capacity additions of different generator types



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%
Rest of U.S.	*0.9%*	*0.6%*	*1.0%*	*0.7%*
TOTAL U.S.	**2.6%**	**1.7%**	**2.9%**	**1.9%**

Source: EIA

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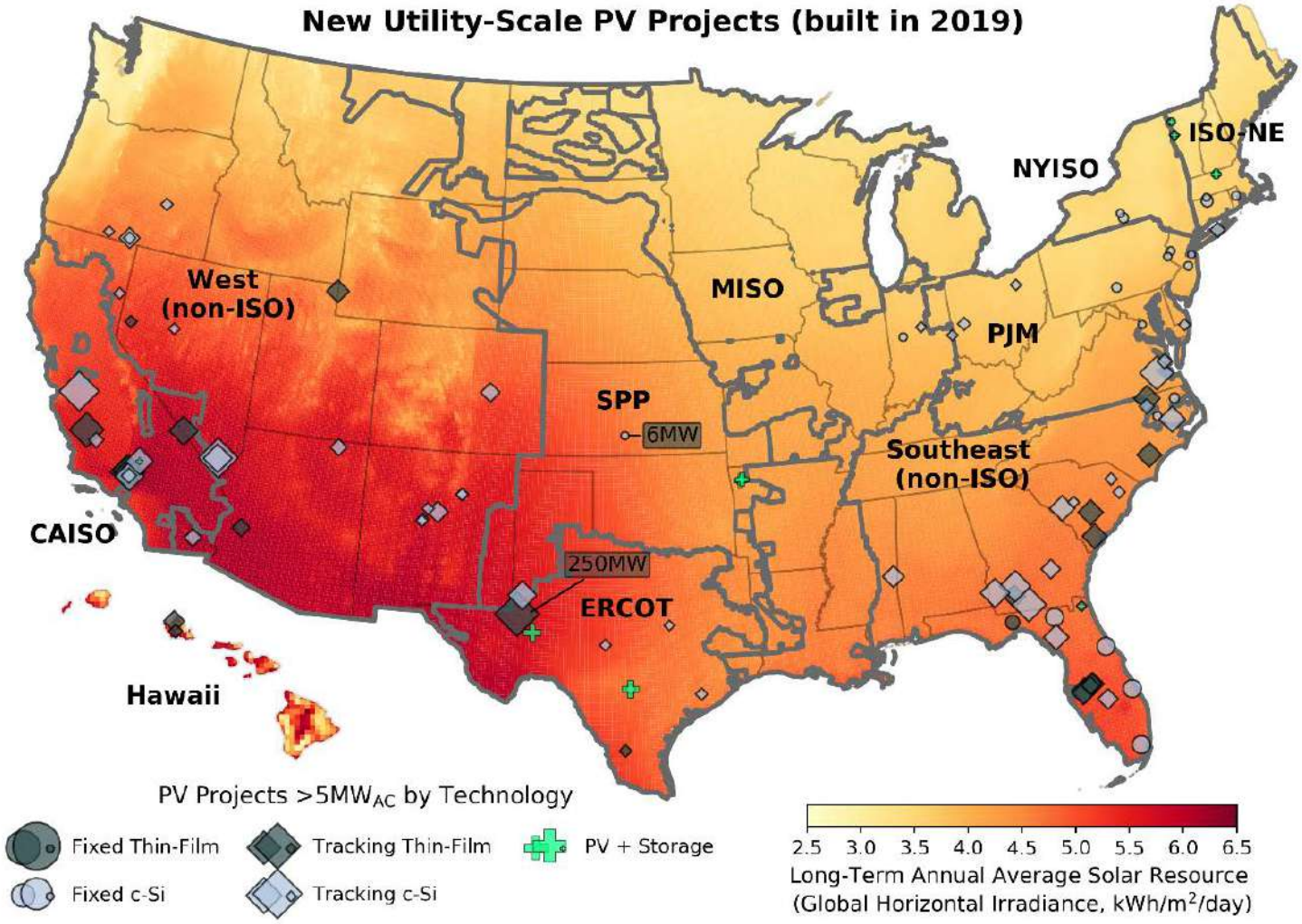
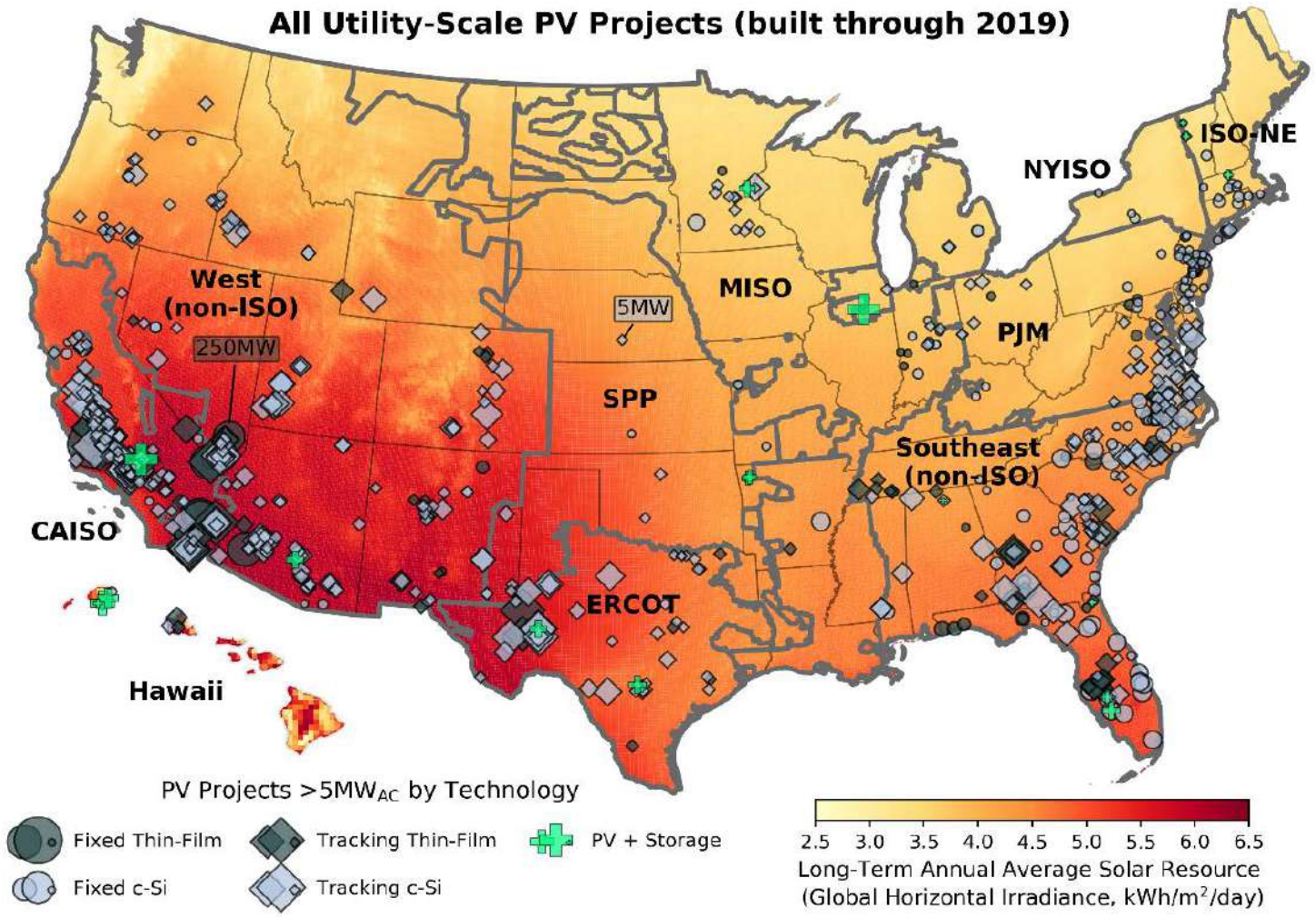
Utility-scale solar projects that were added in 2019



Source: Berkeley Lab

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

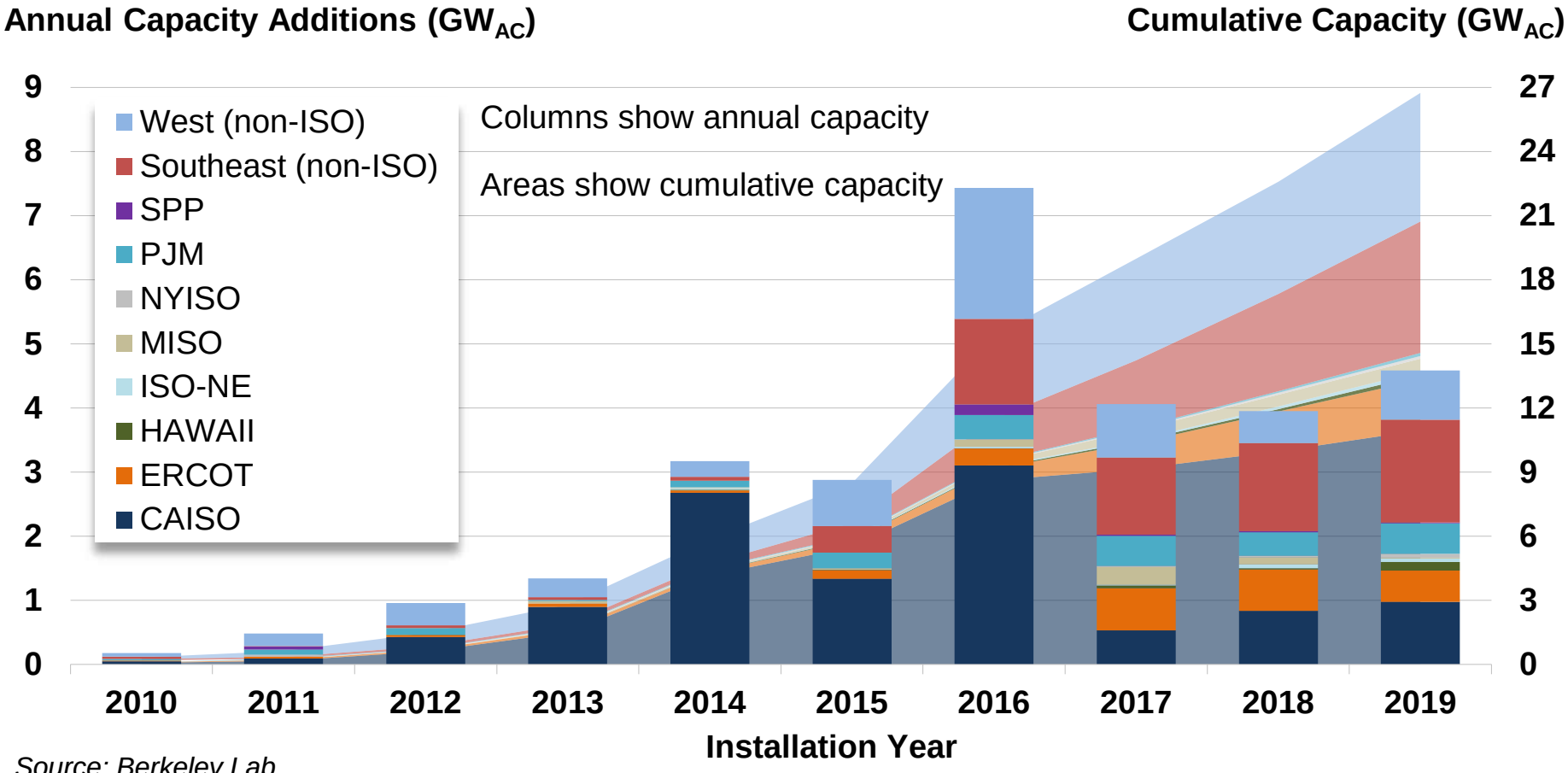
Utility-scale solar projects in operation at the end of 2019



Source: Berkeley Lab

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

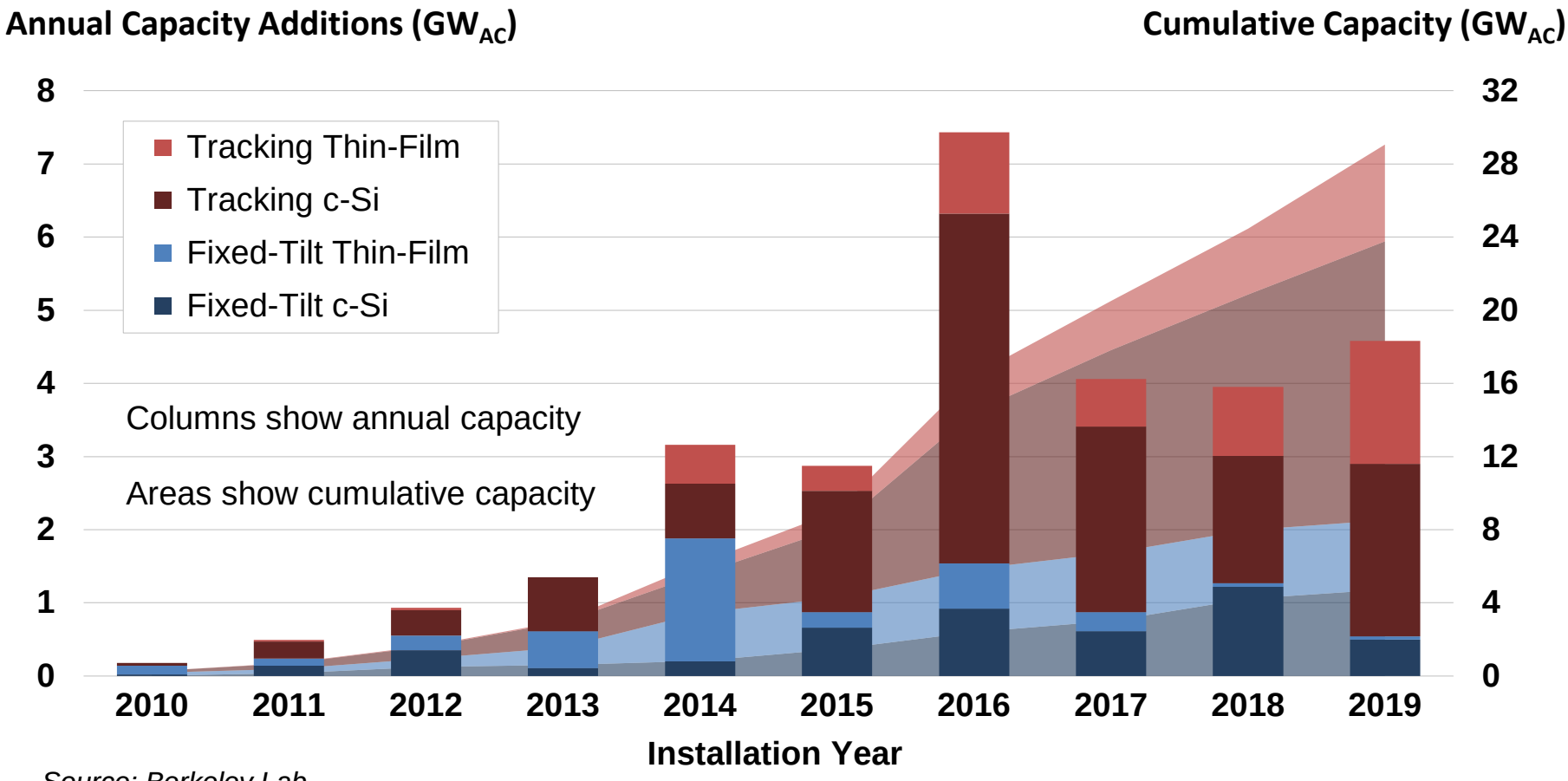
Annual and cumulative utility-scale PV capacity by region



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.

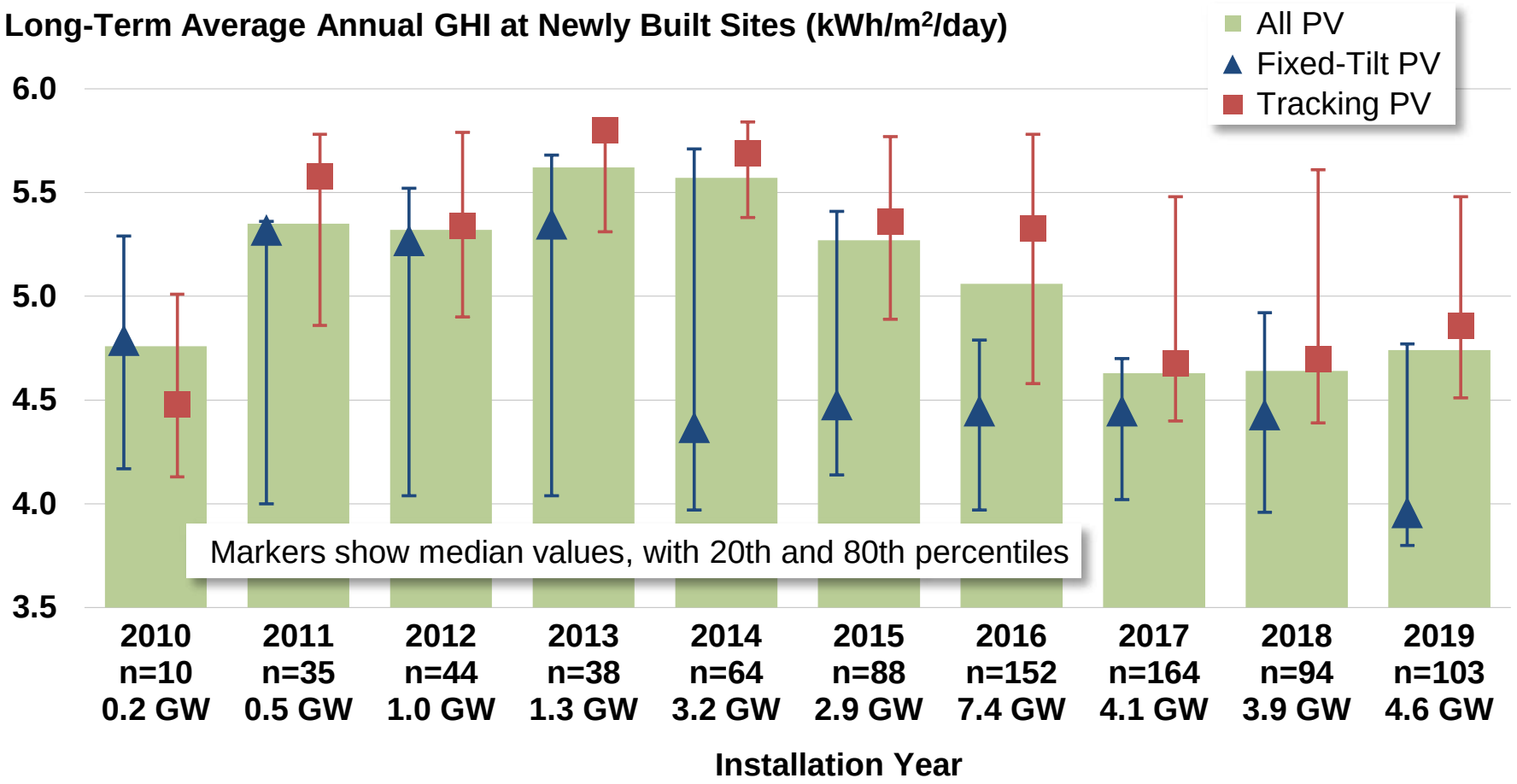
Annual and cumulative utility-scale PV capacity by module and mounting type



Source: Berkeley Lab

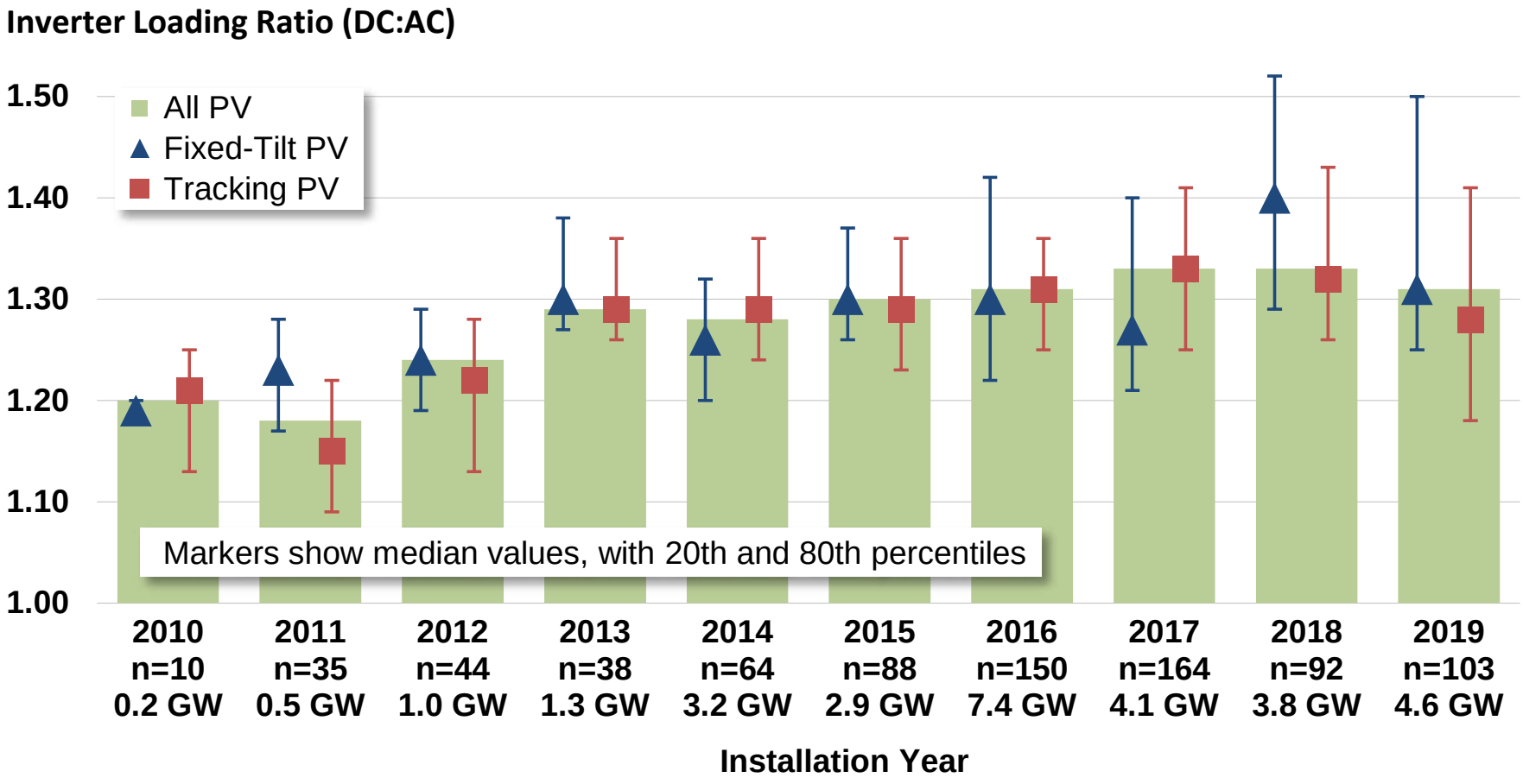
88% of all new utility-scale PV capacity added in the United States in 2019 employ tracking—the highest single-year share yet.

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



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

Inverter loading ratio by mounting type and installation year

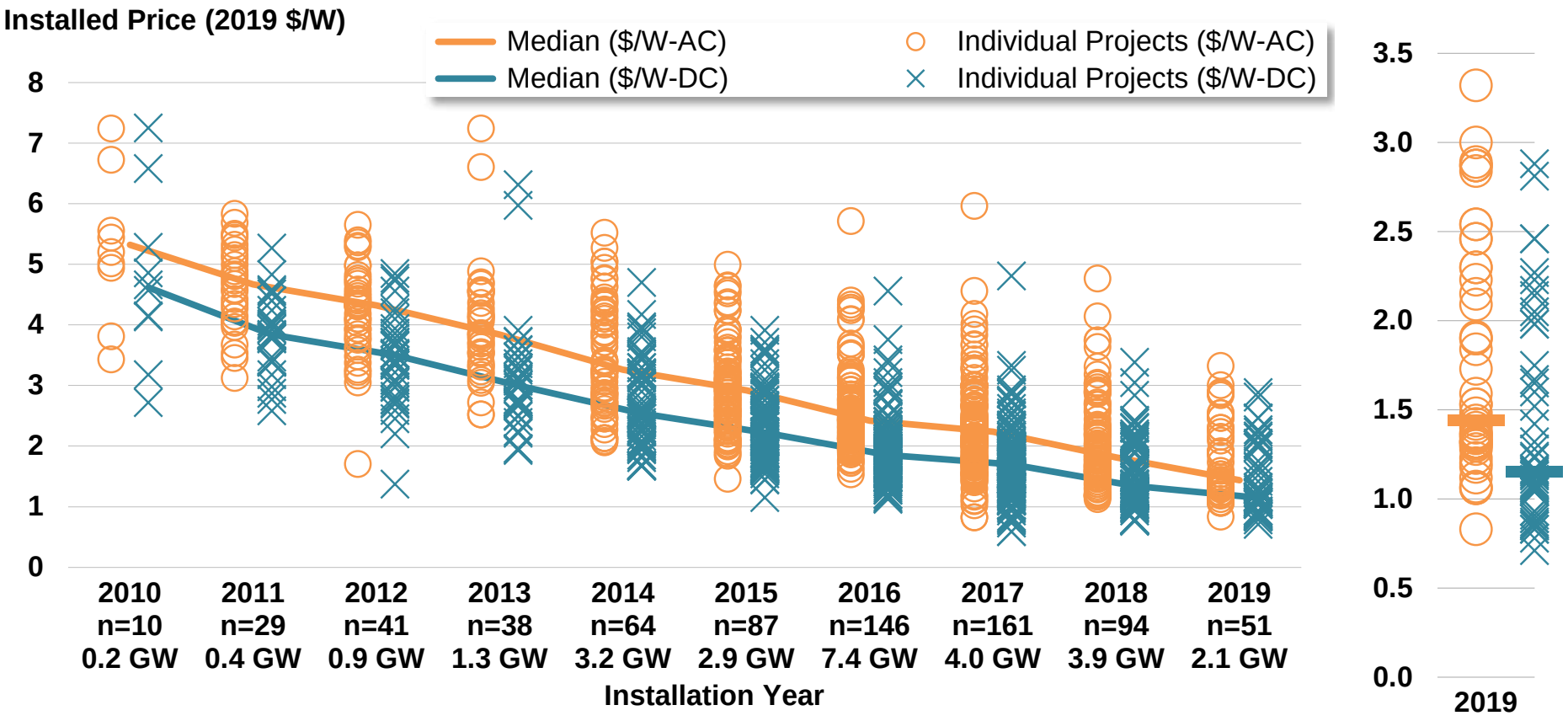


Source: Berkeley Lab

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}

Installed Prices

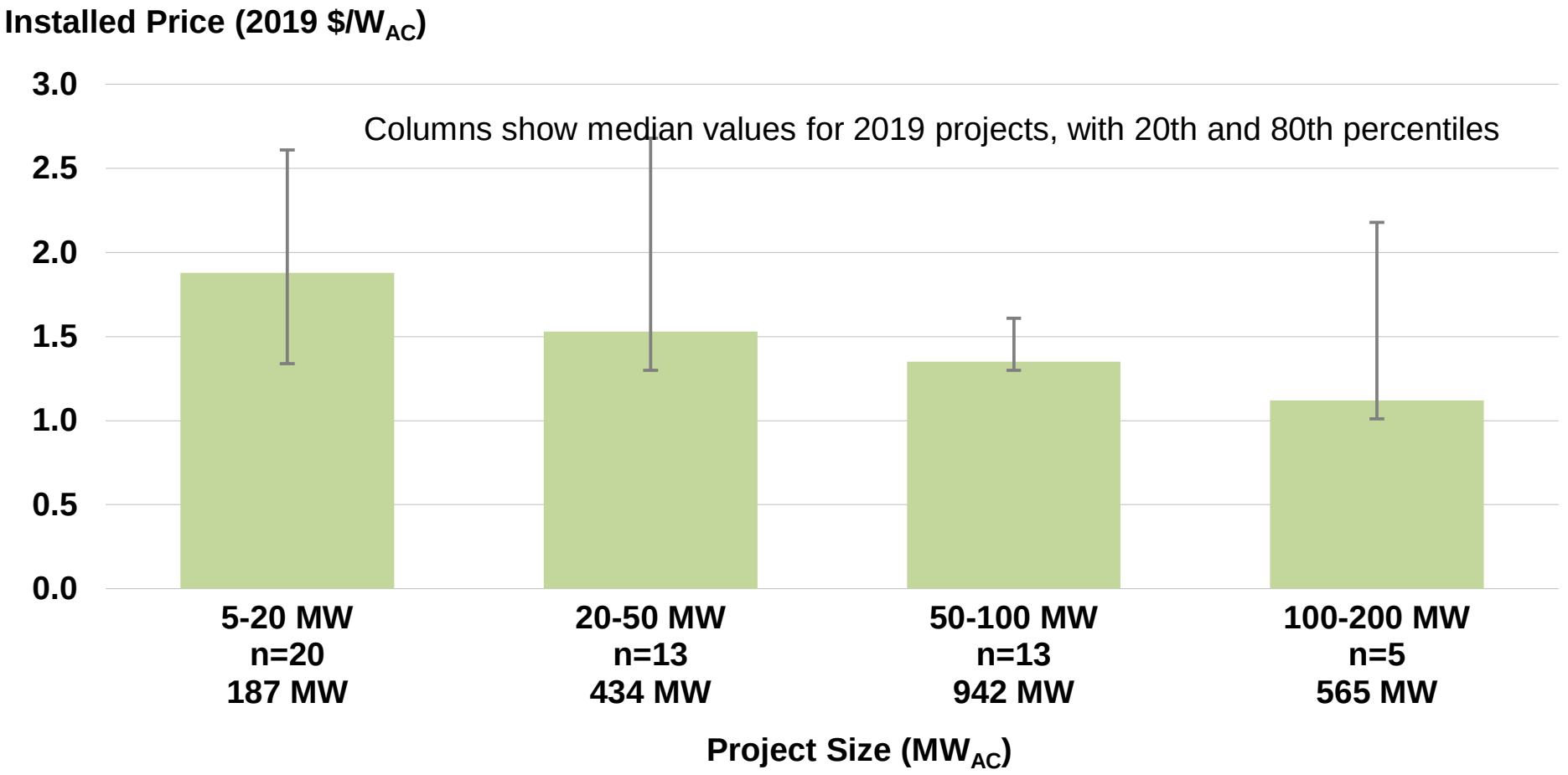
Installed price by year (in both DC and AC terms)



Sources: Berkeley Lab, Energy Information Administration

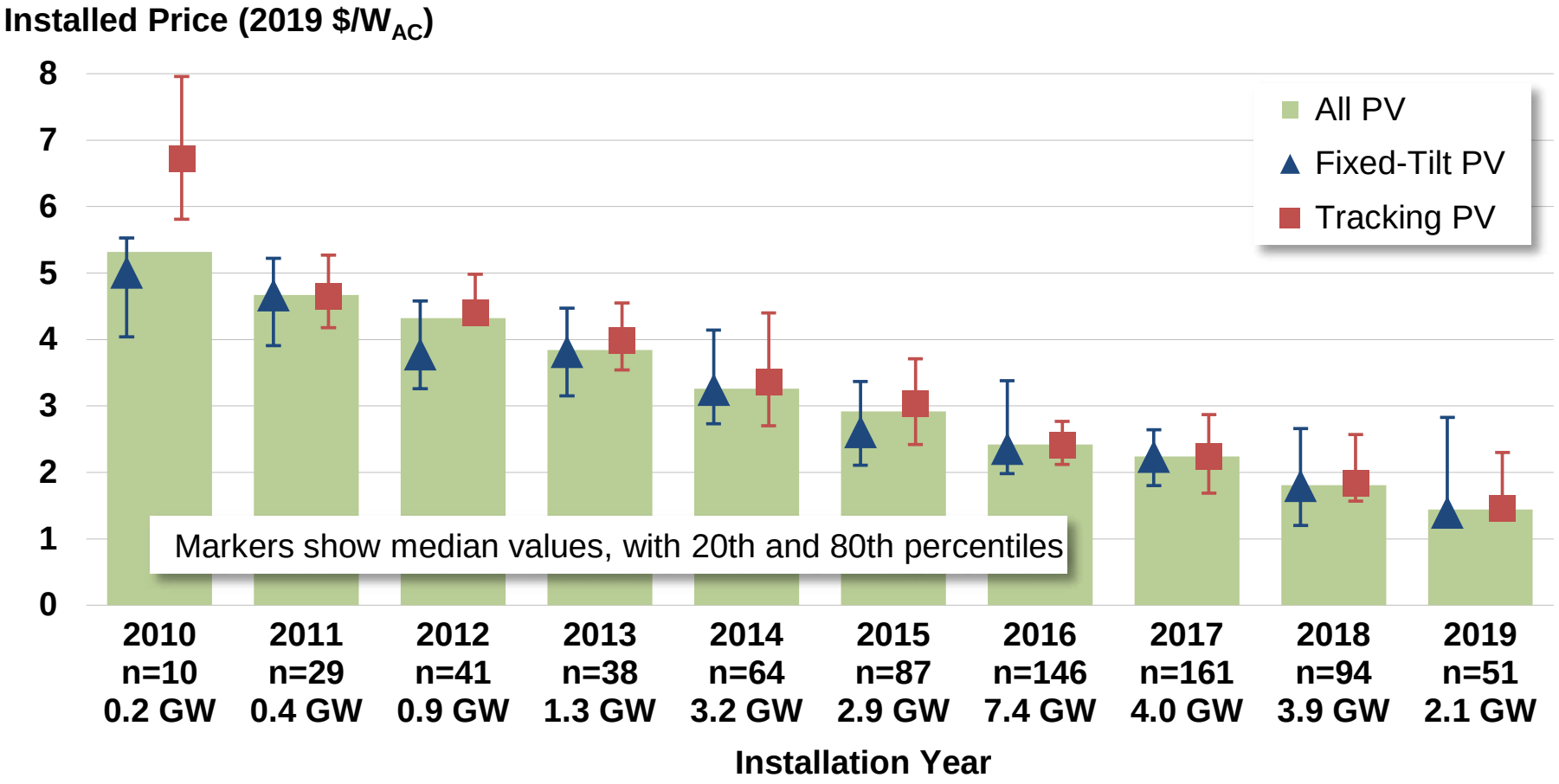
The median installed price of projects that came online in 2019 fell to \$1.4/W_{AC} (\$1.2/W_{DC}), down 20% from 2018 and down by more than 70% from 2010.

Installed price by project size in 2019



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

Installed price by mounting type and installation year



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

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