

North America Renewable Power Advisory

# **Solar PV Capacity Addition Forecast for PJM States: Summary report**

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# Summary

**IHS Energy forecasts 22.3 GW<sub>AC</sub> of solar photovoltaic (PV) capacity will be added in states that are fully or partially in the PJM market between 2016 and 2031.**

- Key drivers of this outlook include renewable power mandates requiring solar as part of the renewable mix, the improving economics of solar, and full retail rate net energy metering .

**Virginia, New Jersey, and North Carolina collectively account for 13.5 GW<sub>AC</sub> (60%) of the forecast.**

- The improving economics of utility-scale solar in Virginia is expected to lead to 3.9 GW<sub>AC</sub> of solar PV capacity additions by 2031; 3.1 GW<sub>AC</sub> of which is expected to be utility-scale solar power.
- New Jersey's solar mandate, 4.1% of retail sales by 2028, and full retail rate net energy metering are expected to support 3.5 GW<sub>AC</sub> of solar PV capacity additions by 2031.
- North Carolina's standard contracts for utility-scale solar Qualified Facilities and the growing need for capacity in the market underlie IHS Energy's 6.1 GW<sub>AC</sub> additions outlook for the state; however, the majority of these capacity additions are expected to be located outside of the PJM market.

**Solar capacity connected at the distribution level, including both customer-sited and utility-scale, is expected to total 13.9 GW<sub>AC</sub>, exceeding the 8.3 GW<sub>AC</sub> of additions expected from transmission-connected utility-scale solar.**

- State solar mandates and full retail rate net energy metering favor distribution-connected solar (e.g. New Jersey and Maryland).
- Utility-scale solar is forecast to total 11.0 GW<sub>AC</sub>; 24% of this capacity is expected to be connected to the distribution system.

**The federal investment tax credit's (ITC) scheduled reversion to 10% at the end of 2016 is fueling a near term surge in solar additions in 2016 (>1.5 GW<sub>AC</sub>), which will not be reached again in the outlook until 2026.**

# Assumptions

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# Key policy assumptions

Federal policies	Description
Investment tax credit	30% of qualifying capital investment through the end of 2016, 10% of qualifying capital investment thereafter
Depreciation	Five-year modified accelerated cost recovery system

State	Mandatory solar requirement (% retail sales)	Mandatory distributed generation requirement (% retail sales)	Mandatory unconstrained renewable power requirement (% retail sales)	Net energy metering (NEM) policy	Tax credits and other incentives
DC	2.5% by 2023	None	17.5% by 2023	Full retail rate NEM	
DE	3.5% by 2026*	None	20.5% by 2026*	Full retail rate NEM	Green energy program (rebates)
IL	1.5% by 2026*	0.25% by 2026*	23.3%** by 2026*	Full retail rate NEM	Solar rebate program
IN	None	None	None	Full retail rate NEM	
KY	None	None	None	Full retail rate NEM	
MD	2% by 2020	None	18% by 2022	Full retail rate NEM	
MI	None	None	10% by 2015	Full retail rate NEM	
NC	0.2% by 2018	None	12.5% by 2021**	Full retail rate NEM	35% investment tax credit; Expires year-end 2015, safe harbor available into 2016
NJ	4.1% by 2028*	None	17.9% by 2021*	Full retail rate NEM	
OH	0.5% by 2026	None	12% by 2026	Full retail rate NEM	
PA	0.5% by 2021*	None	7.5% by 2021*	Full retail rate NEM	
TN	None	None	None	No mandatory full retail rate NEM	
VA	None	None	None	Full retail rate NEM	
WV	None	None	None	Full retail rate NEM	

Notes: \*Denotes compliance years instead of calendar years, which end in May of the year indicated. \*\*Energy efficiency is a qualifying resource in North Carolina. \*\*\*Illinois has a wind requirement of 18.75% of retail sales by 2026 which is included in the unconstrained requirement.

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# Key power market and solar technology assumptions

Solar PV capital cost assumptions	2015 value (real 2014 \$/Watt <sub>DC</sub> )	Average annual rate of change through 2031
Utility-scale (≥ 5 MW)	\$1.66	- 4%
Commercial & Industrial (C&I) (10 kW – 5 MW)	\$2.33	- 4%
Residential (≤ 10 kW)	\$2.76	- 4%

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Other solar technology assumptions	Value
Annual degradation rate	- 0.8%

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Power market assumptions	Value
Annual power demand growth rate (average 2016-2031)	0.8%
Annual retail power price escalation rate (average 2016-2031)	2.3%
Annual wholesale power price available to solar escalation rate (average 2016-2031)	2.2%

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State	Average capacity factors* (AC capacity)		
	C&I and residential	Utility-scale fixed-tilt	Utility-scale single-axis tracking
DC	15.9%	19.6%	21.7%
DE	15.9%	19.7%	21.9%
IL	15.3%	18.8%	21.1%
IN	15.3%	18.7%	20.9%
KY	14.6%	17.7%	19.1%
MD	15.8%	19.5%	21.8%
MI	14.8%	18.1%	20.1%
NC	16.9%	20.8%	23.3%
NJ	15.0%	18.6%	20.0%
OH	14.9%	18.1%	20.2%
PA	15.4%	19.0%	21.2%
TN	15.6%	19.1%	21.3%
VA	16.2%	20.0%	22.4%
WV	14.6%	17.7%	19.1%

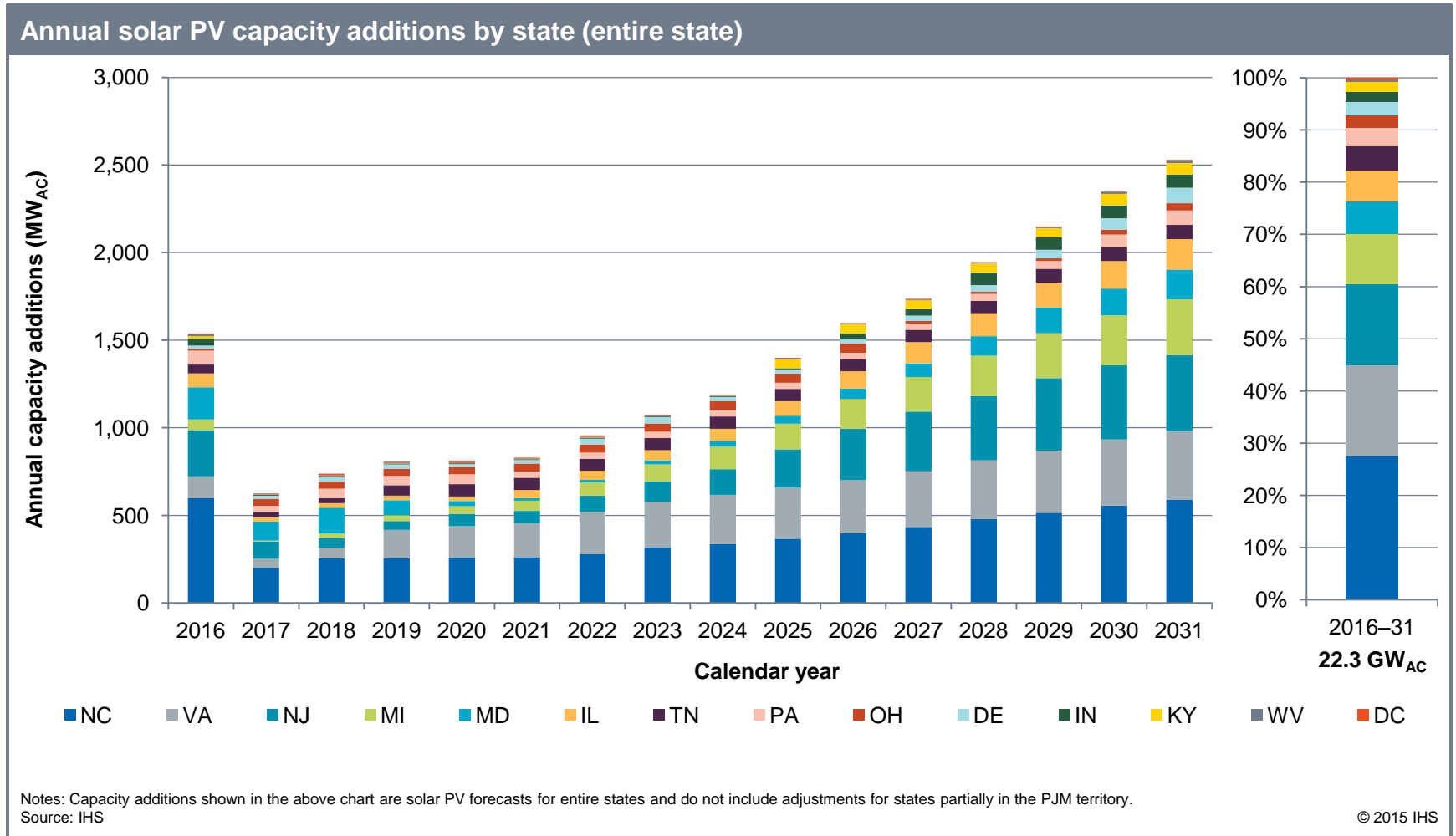
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Notes: \*Average capacity factor reflects the annual degradation rate of -0.8%. For states that are partially in the PJM territory, capacity factors were chosen that are representative of the solar resource in the portion of the state located in PJM. Capacity factors are estimated using typical meteorological year weather data.

# Solar PV capacity addition forecast results

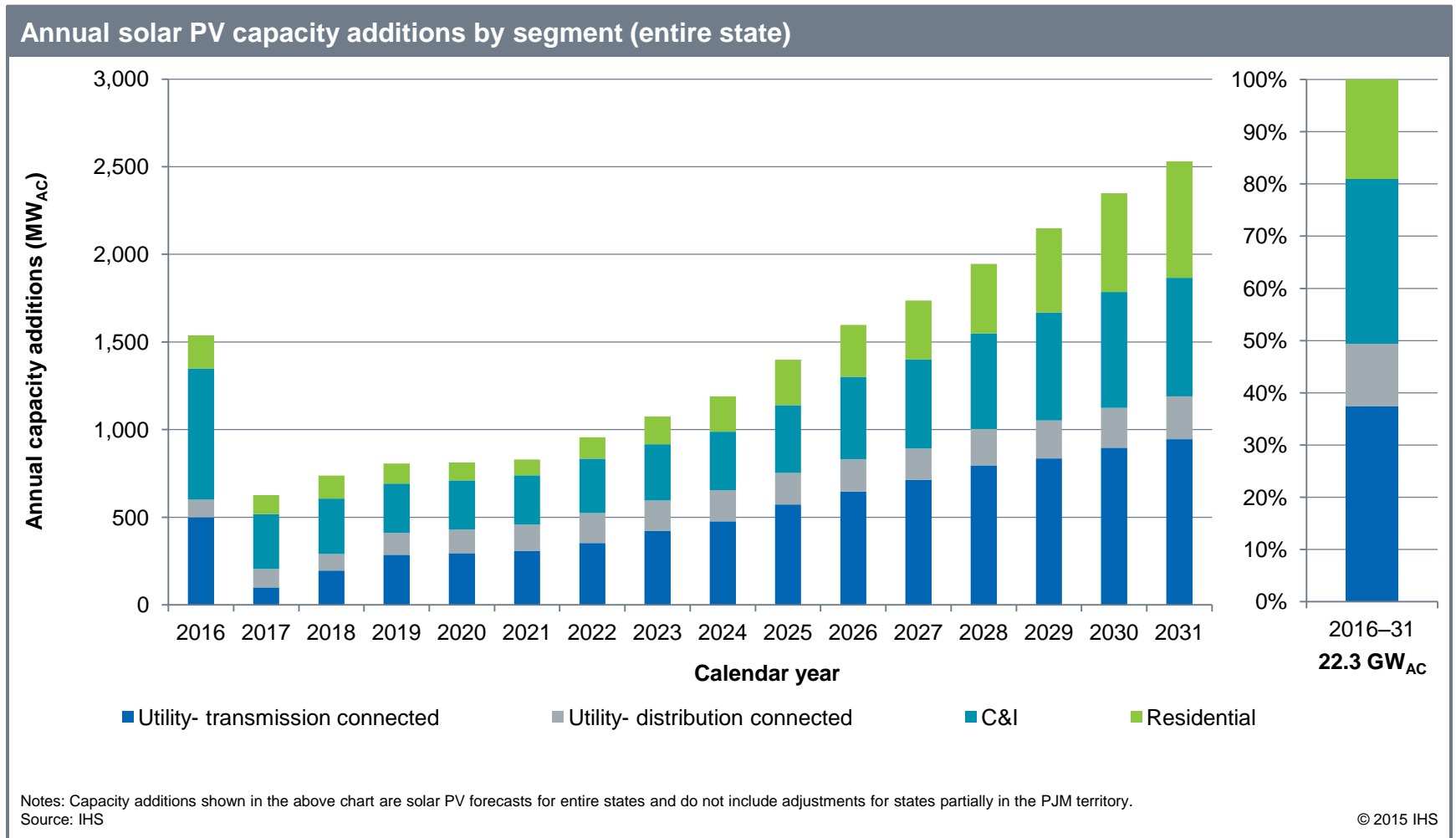
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# Solar PV capacity additions by state



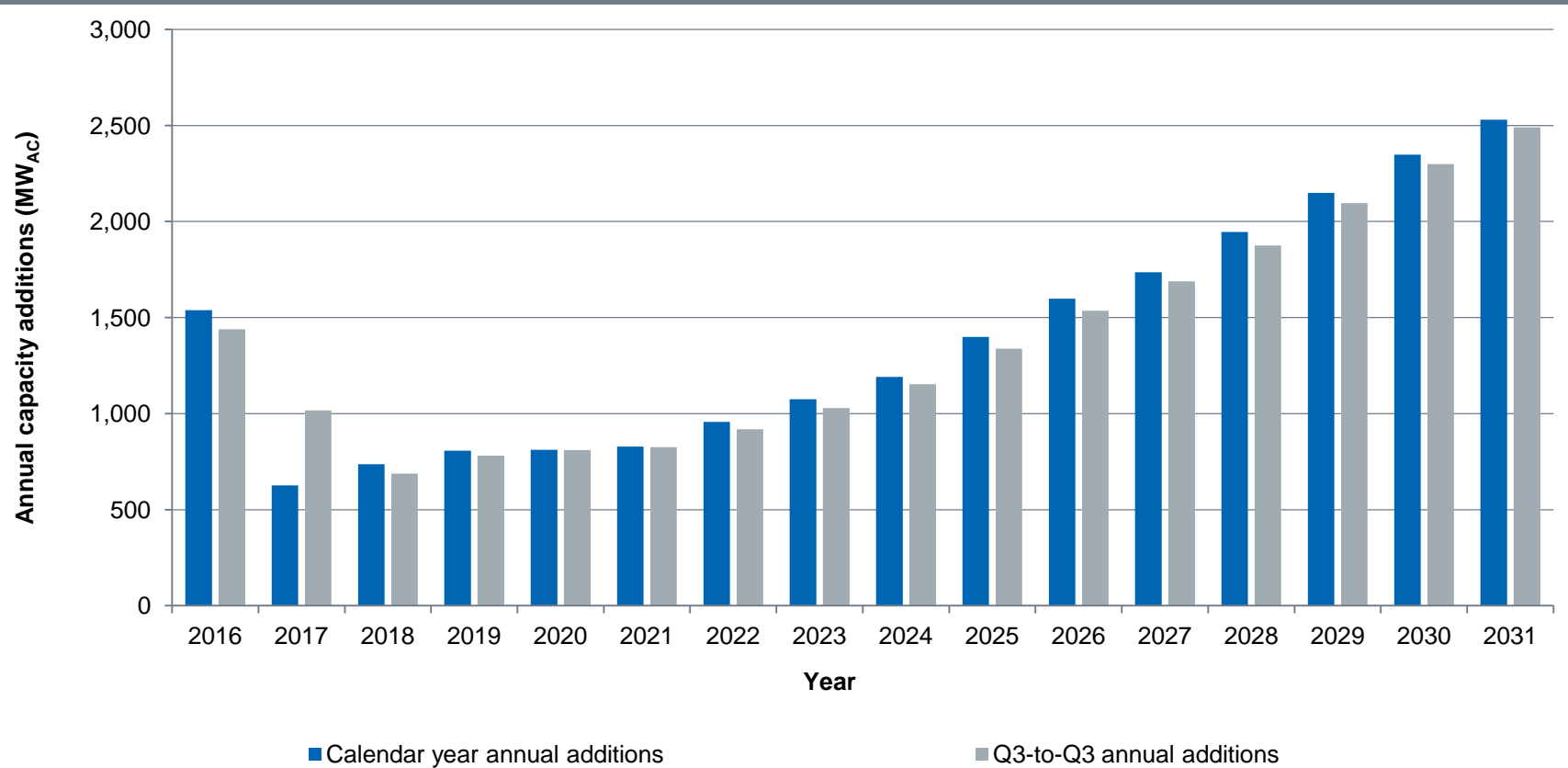


# Solar PV capacity additions by segment



# Solar PV capacity additions: calendar year vs. Q3-to-Q3 year

Annual solar PV capacity additions, calendar year vs. Q3-to-Q3 year (entire state)



Notes: Q3-to-Q3 annual additions are shown ending in Q3 of the respective year (e.g. Q3-to-Q3 in 2016 is Q4 2015 – Q3 2016). 2015 Q3-to-Q3 annual addition is a forecast of Q1-Q3 2015 additions.

Source: IHS

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