

# Distributed Solar Forecast

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Resource Adequacy Planning

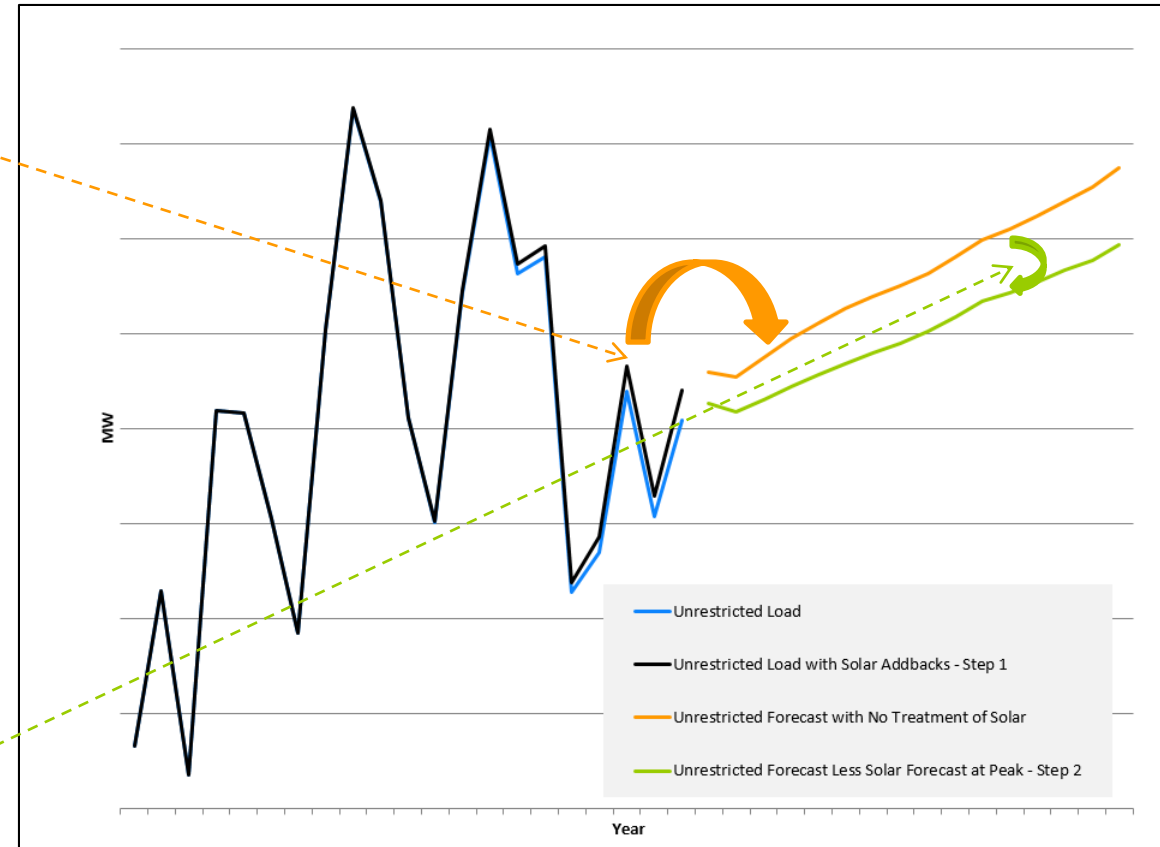
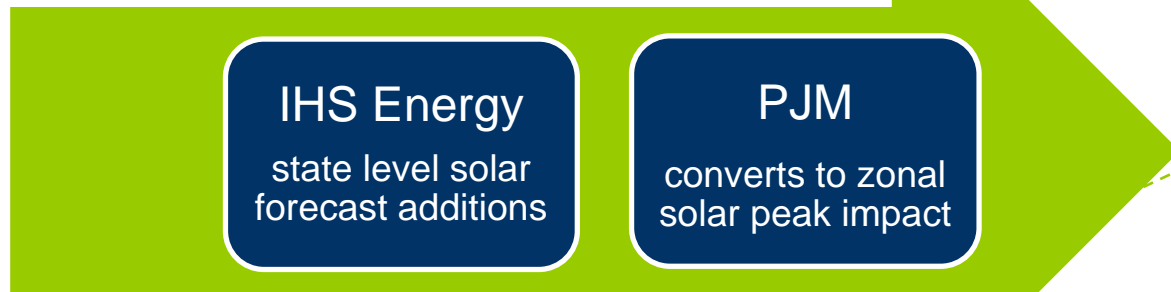
Load Analysis Subcommittee  
September 21, 2020

- Overview of methodology to include distributed solar in long term load forecast
- Distributed solar forecast assumptions for 2021 Load Forecast
- Potential enhancements

**Step 1 (gather data/update historical loads):** To account for the historical impacts of distributed solar generation, AWS Truepower back-casts hourly values by zone. These estimates are then added to the unrestricted load used in PJM load models.



**Step 2 (adjust forecast):** For forecasted values of distributed solar capacity, PJM contracts with IHS Energy to develop a distributed solar generation forecast specific to the PJM region. PJM then uses the state-level forecast to derive a zonal capacity at peak. Those values are then subtracted from the forecast created with solar addbacks.



## Key Assumptions

Solar forecast scenario overview	
Assumptions	Scenario 2: "NEM reform"
Federal policy support	Current ITC schedule
NEM policies and retail rate structures	From 2020 to 2025, utilities adopt (and regulators approve) changes to NEM and retail rate structures, which result in a more cost-based approach to customer-sited solar compensation; current detailed state NEM policy
Solar costs (\$/kW)	Solar costs decline by 5–17% in nominal terms from 2020 to 2036 (34-42% in real terms)
State policy support	Current RPS policies and state-level incentives maintained
Power demand	Base case demand

ITC = Investment Tax Credit

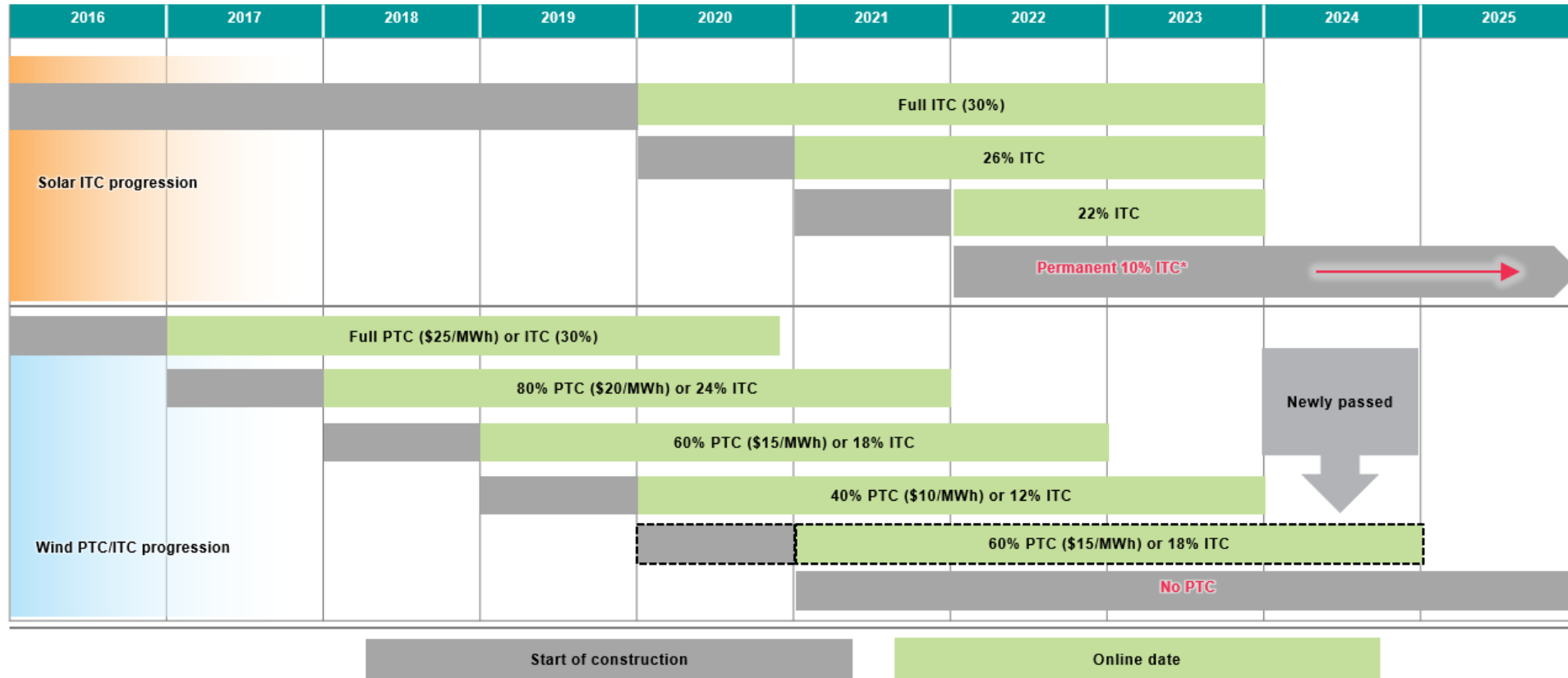
**Note:**  
Only the base case scenario is shown here. PJM receives three scenarios in the final distributed solar forecast which will be shared at a future LAS meeting.

Source: IHS Markit

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## Current ITC schedule

Evolution of tax credits by qualification date and online date



\*Investment Tax Credit (ITC) applied to residential taxes terminated for projects that start construction after 2021.  
Source: IHS Markit

## RPS and NEM policy assumptions by state

### Current RPS and NEM policy by state

State	RPS target (% of retail sales)*	Solar carve-out (% of retail sales)*/Distributed caveouts	NEM System Size Limits by Segment (MW)	NEM system size limits by segment (MW)
DE	25% by 2025	3.5% by 2025	5% of aggregated customer peak demand (utility can increase the cap)	0.025 (residential), 2 (Delmarva nonresidential), 0.5 (DEC, DEMEC non-residential)
DC	100% by 2032	2.5% by 2023, 5% by 2032, 10% by 2041	N/A	1 (single meter), 5 (community renewables)
MD	50% by 2030	14.5% by 2030	1,500 MW	2 or 200% of customer load
NJ	50% by 2030*	5.1% by 2021, gradually reduced to 1.1% by 2031	None****	100% of customer load
OH	8.5% by 2026		N/A	Not to exceed 120% of customer annual average load
PA	8% by 2021	0.5% by 2021	N/A	0.050 (residential), 3 (nonresidential), 5 (microgrids) (110% of customer's annual load for third-party owned/operated systems)
WV	-	-	3% of peak demand during previous year	0.025 (residential), 2 (industrial for large IOUs), 0.500 (commercial for large IOUs), 0.050 (C&I for small IOUs)
IN	-	-	1% of utility's summer peak load	1.5% of utility's summer peak load
IL	25% by 2025**	No RPS but required 4 million SRECs by 2030	5% of utility's peak load in prior year	2
KY	-	-	1% of utility's peak load in prior year	0.045
MI	15% by 2025***		Average of the previous 5 year peak load	0.15
NC	12.5% by 2021****	0.2% by 2020****	N/A	2 (residential customer-owned systems), 1 (commercial systems up to 200% of contract demand)
VA	100% by 2045*****	2000 MW by 2030	1% of state's peak load for prior year	0.020 (residential), 1 (nonresidential)
TN	-	-	N/A	N/A

Note: RPS includes solar carve-outs. \*New Jersey RPS target only includes Class I renewable technologies and the solar carve-out. \*\*Illinois solar carve-out requires that 50% of the solar procurements must be from distributed/community solar. RPS mandates at least 75% of the standard come from wind and solar. \*\*\*Utilities in Michigan have agreed to 25% by 2030. \*\*\*\*RPS compliance in North Carolina can be achieved through energy efficiency and renewable energy credits (RECs) from any state. \*\*\*\*\*Phase 1 utilities are required to achieve 14% by 2025, 30% by 2030, 65% by 2040, and 100% by 2050 while Phase II utilities are required to achieve 26% by 2025, 41% by 2030, and 100% by 2045. The primary drivers for solar development include existing Public Utility Regulatory Policies Act (PURPA) policy, planned requests for proposal (RFPs), solar resources, solar costs, and the previous state tax credit.

Source: IHS Markit

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## RPS and NEM policy assumptions by state (continued)

### Current RPS and NEM policy by state

State	NEM remuneration for on-site use or export generation**	NEG remuneration**	Community solar
DE	Retail	Retail	Virtual net metering
DC	Retail	Carries over at retail rate indefinitely, at generation rate for systems over 100 kW***	Virtual net metering
MD	Retail	Credited to customer's next bill at retail rate; reconciled annually in April at the commodity energy supply rate	Pilot program
NJ	Base \$152 TREC price (\$0.152/kWh), non-residential rooftop receives full TREC and ground mount receives 60%; residential rooftop, ground mount and carport receive 60%	Fixed \$152 TREC price (\$0.152/kWh)	85% of TREC Price (\$0.12920/kWh)
OH	Less than retail	Credited to next bill at unbundled generation rate (includes energy component but excludes capacity-related compensation)	None
PA	Retail	Credited at retail rate for a year, then any leftover excess is credited at generation and transmission portion of the retail rate, but not the distribution	Virtual meter aggregation*****
WV	Retail (credits cannot reduce monthly bills below the fixed monthly charge)	Retail	Virtual net metering
IN	Full retail through 2047 for net metering facilities installed through 2017 and through 2032 for those installed through 2022; 125% of average energy market price for facilities installed after 2022 or 1.5% cap is met.	Full retail through 2047 for net metering facilities installed through 2017 and through 2032 for those installed through 2022; 125% of average energy market price for facilities installed after 2022 or 1.5% cap is met.	None
IL	Retail (TOU for customers paying TOU rates)	Credited to next bill at retail rate, excess at end of year is granted to utility	Virtual net metering
KY	Less than retail	Utility will purchase all electricity produced at the rate set by the PSC, instead of the retail rate	Utility-run program
MI	Less than retail	Less than retail	None
NC	Retail	Carries over at retail rate, granted to utility at beginning of summer billing period	Utility-run program
VA	Retail	Retail	Utility-run program
TN	N/A	Retail	None

Note: \*NEM remuneration is a tariff structure under which the utility pays customers for excess generation, up to a given amount. The most common arrangement is "full retail rate NEM," in which excess generation is paid the same volumetric price that the customer pays for electricity; so, exports are effectively netted against grid consumption over a given period (typically one year). \*\*NEG over that period is sometimes paid at a lower rate, often based on the utility's avoided cost. \*\*\*Total remaining excess kWh at the end of the calendar year (valued at the generation rate) that amounts to greater than \$25 will be refunded to the customer. \*\*\*\*While no mandatory cap exists, LSEs are at their own discretion to cap at 5.8% of retail sales. \*\*\*\*\*Virtual meter aggregation is limited to the account holder's meters and only those within two miles of the Point of Interconnection (POI).

Source: IHS Markit

## RPS and NEM policy assumptions by state (continued)

### Current RPS and NEM policy by state

State	Unbundled energy attribute certificates	Virtual power purchasing allowed	Renewable energy offerings from utilities or electric suppliers/green tariff	Production for self-consumption—net metering
DE	Allowed		Retail choice	Up to 2 MW
DC	Allowed		Retail choice	Up to 1 MW
MD	Allowed	Allowed	Retail choice	Up to 2 MW
NJ	Allowed	Allowed	Retail choice	Cannot exceed on-site load
OH	Allowed	Allowed	Retail choice	No size limit
PA	Allowed	Allowed	Retail choice	Up to 3 MW
WV	Allowed	Allowed	-	Up to 2 MW
IN	Allowed	Allowed	Green tariff enabled to guarantee sufficient RECS; does not require new build	No size limit under green tariff
IL	Allowed	Allowed	Retail choice	Up to 2 MW
KY	Voluntary		Green tariff enabled	Up to 45 kW
MI	Allowed		-	Up to 150 kW
NC	Allowed		Green tariff in development	Up to 1 MW
VA	Allowed	Allowed	Green tariff enabled	Up to 1 MW
TN	Voluntary		-	-

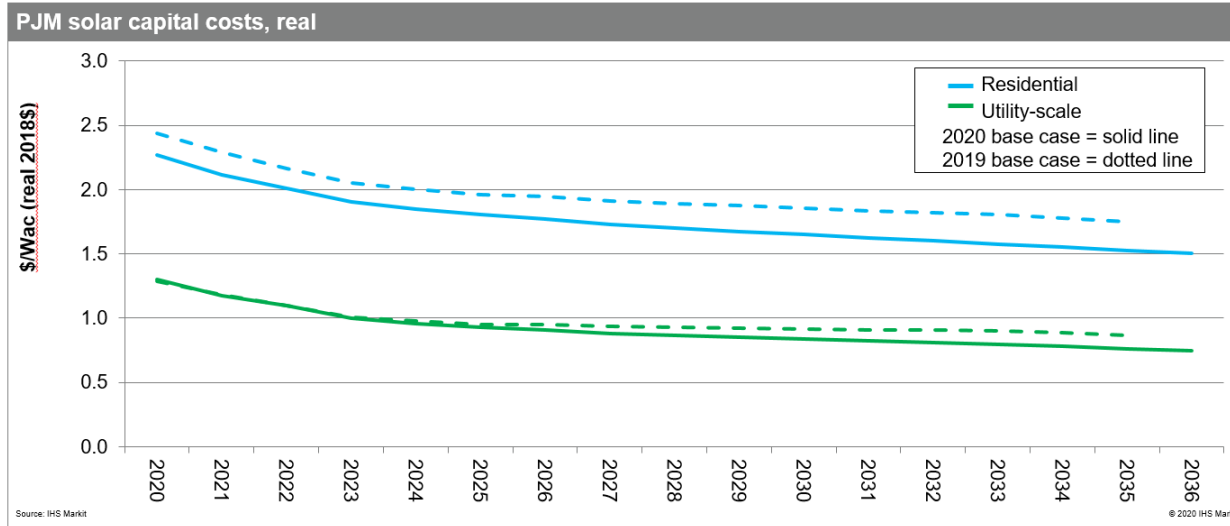
Note: Green tariffs only include programs where utilities build new renewables on behalf of corporate customers.

Source: IHS Markit

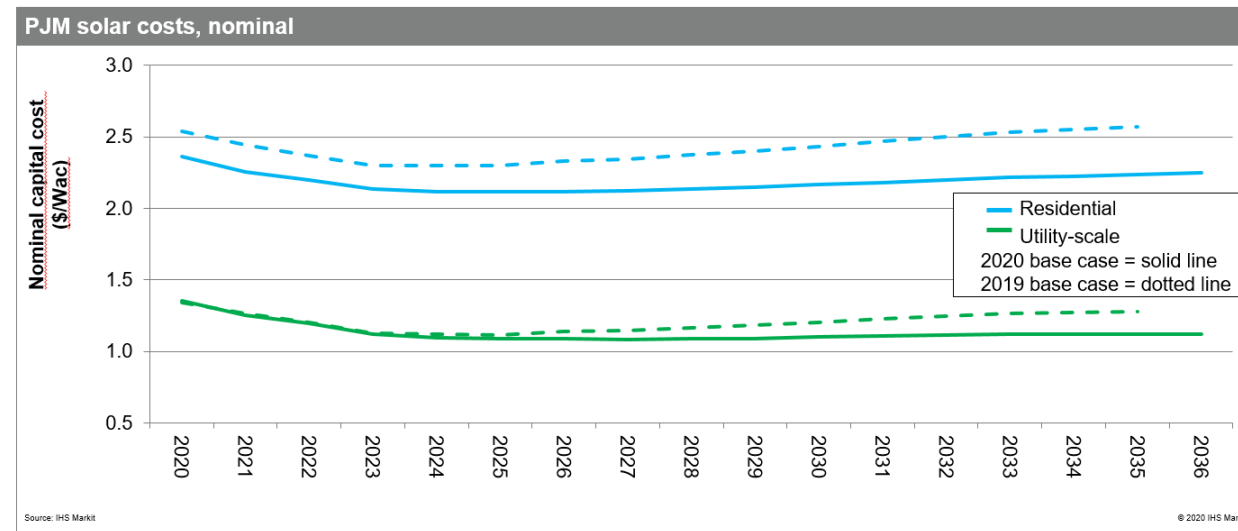
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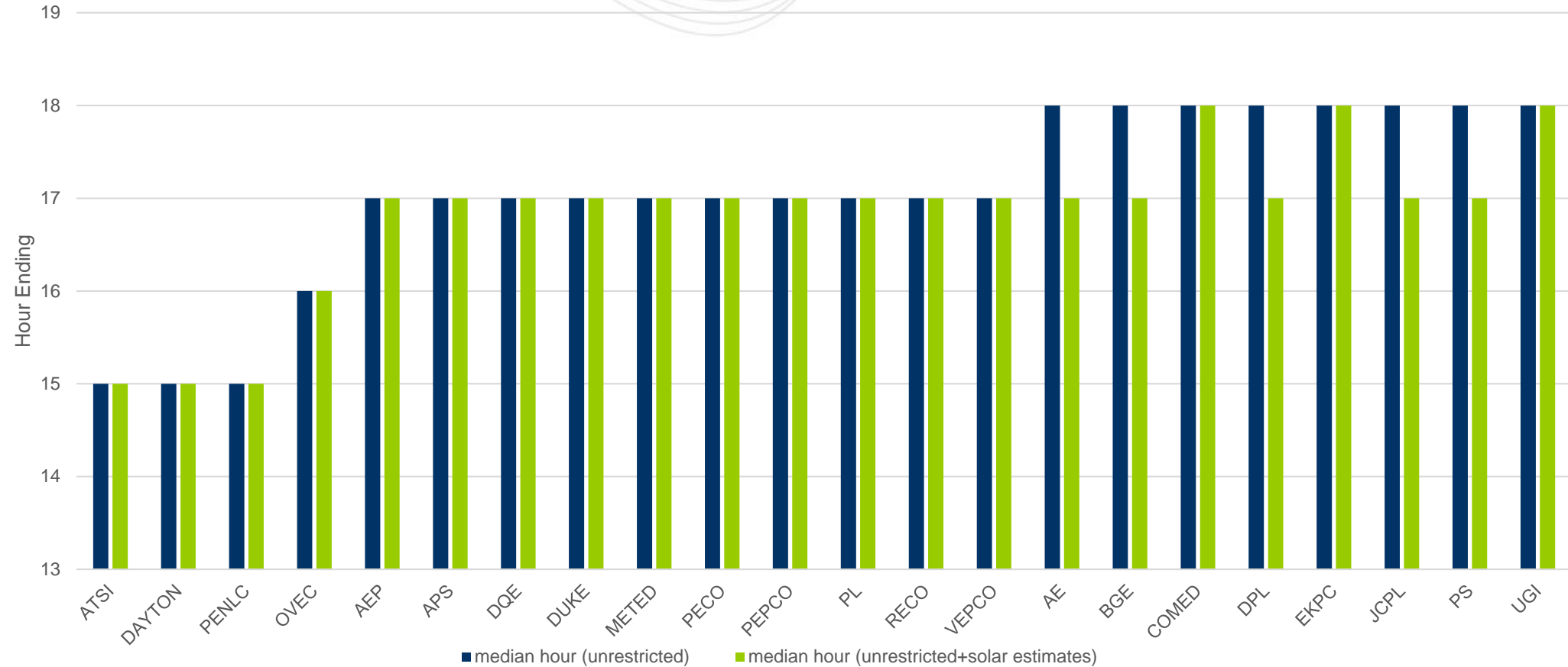


PJM solar capital costs (nominal)



- Currently PJM uses hour ending 17 as the basis of summer peak impact of solar.
- Some zones with higher solar penetration are peaking at hour ending 18 in the summer.
- We will investigate if we should use a different hour ending for the anticipated peak value for distributed solar.

Median Peak Hour Ending for 5 highest peaks from 2016 – 2020 (25 data points for each zone)



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## Distributed Solar Forecast



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