

Q2 2019

PPA Price Index





Q2 2019 Report Overview

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The LevelTen Energy PPA Price Index

To bring more transparency to the market, every quarter, LevelTen provides an in-depth look at power purchase agreement (PPA) offer price averages submitted through the LevelTen Marketplace. The report covers wind and solar projects in five independent system operator (ISO) regions, including CAISO, ERCOT, MISO, PJM and SPP. The LevelTen Energy Q2 2019 PPA Price Index is the fifth edition of this report.

Q2 2019 Developer Survey

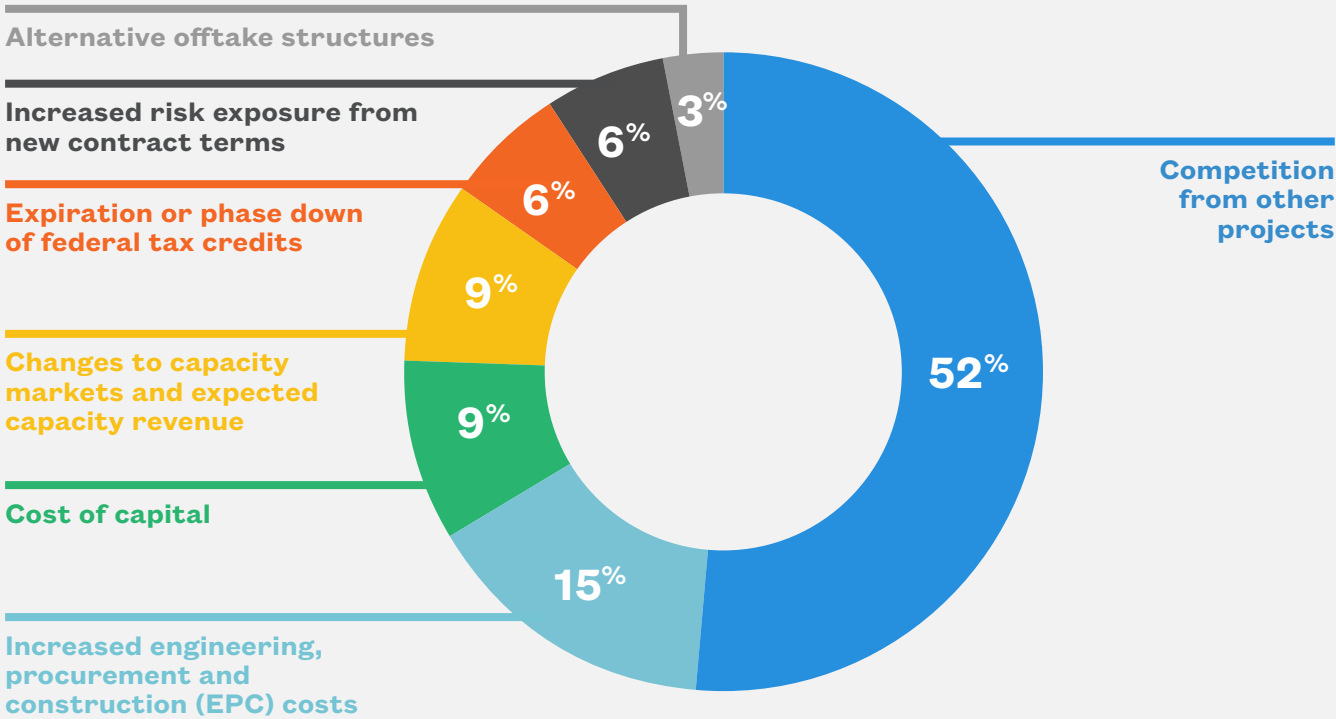
In addition to reporting on *how much* PPA offer prices have changed, we wanted to explore *why* they changed. To get a look behind the numbers, we conducted a survey of renewable energy market developers with active projects in the LevelTen Marketplace. Once again, we asked them what market factor had the largest impact on their PPA prices this quarter. In addition, we explored how prices might change in 2020.

Market Forces that Impacted PPA Offer Prices in Q2

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This quarter, we conducted a survey of 33 utility-scale renewable energy developers with active projects in the LevelTen Marketplace to get an understanding of what market forces impacted their prices the most in Q2.

What had the largest impact on your PPA offer price(s) in Q2 2019?





**Here are a few highlights
from the survey:**

- While no single factor dominated the results, once again “competition from other projects” was the most common response, with 52% of respondents saying that it had the largest impact on their prices in Q2. By comparison, in Q1 30% of respondents said competition had the largest impact.
- In Q1 and Q2, the second-most common response was “increased engineering, procurement and construction (EPC) costs,” with 15% of respondents naming it as a top factor. “One reason EPC costs may continue to be a powerful force in the market is a supply chain crunch that’s occurring as a result of the race to complete projects in advance of the phase down of federal tax credits,” said Rob Collier, vice president of developer relations at LevelTen Energy. “As developers rush to commence construction before the end of the year, the supply of key inputs such as modules, transportation services and major electrical equipment is dwindling, pushing up prices.”
- One new factor emerged in this quarter’s survey: “Cost of capital” was named by 9% of developers as having the largest impact on their offer prices. Last quarter, no developers named it as the number one factor. The tax credit phase down may also be playing a role in this. “Though it’s likely too early to see the direct impact on prices, as tax equity investors become a less dominant component of a project’s capital stack, other categories of equity investors will fill the gap,” said Collier. “The expectation is that these new investors will have lower hurdle rates than costly tax equity, thereby lowering the weighted average cost of capital for projects, and ultimately pushing PPA prices down.”
- Another factor that emerged in the results this quarter was “changes to capacity markets and expected capacity revenue,” which 9% of developers cited as having the largest effect on prices. Capacity markets are one way that ISOs ensure that the demand for electricity can be met at all times. Typically, through capacity markets, projects are paid for their availability during peak demand hours. The revenues that project developers receive from capacity payments may influence the cost of the PPA. In markets where capacity is valued highly, like some regions of PJM, changes to the capacity market structure and/or values of capacity can mean major shifts in PPA pricing for developers.
- This quarter, only 6% of developers said the “expiration or phase down of federal tax credits” had the largest impact on their PPA offer prices. “Many of the projects submitted to the LevelTen Marketplace in Q2 aren’t slated to commence construction until 2020 and beyond, which means the reduced tax credits are -- or should be -- already baked into the higher offer price,” said Collier.

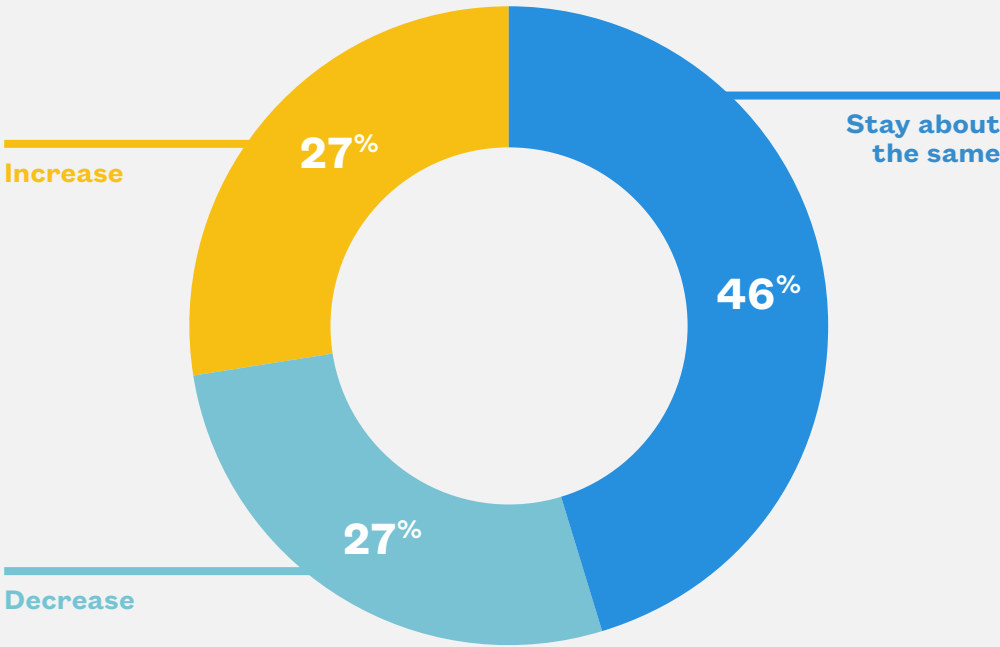
Will PPA Prices Increase or Decrease in 2020?

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In addition to exploring what market factors impacted Q2 prices, we wanted to get an early read from developers on how they expect PPA prices will change next year. In our survey, we asked two related questions:

- 1. In 2020, do you anticipate PPA prices will increase, decrease, or stay about the same?
- 2. What do you anticipate will have the largest impact on your PPA offer prices in 2020?

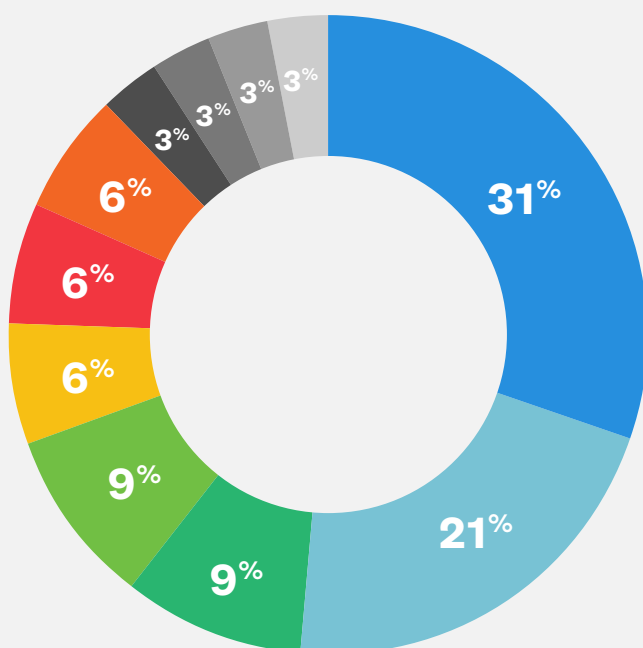
In 2020, do you anticipate PPA prices will increase, decrease, or stay about the same?



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What do you anticipate will have the largest impact on your PPA offer prices in 2020?



Competition from other projects **31%**

Expiration or phase down of federal tax credits **21%**

Cost of capital **9%**

Increased EPC costs **9%**

Alternative offtake structures **6%**

Increased demand from corporate buyers **6%**

Other **6%**

Changes to capacity markets and expected capacity revenue **3%**

Decreased EPC costs **3%**

Federal/state policy **3%**

Increased demand from utilities **3%**



**Here are a few highlights
from the survey:**

- Nearly half - 46% - of developers surveyed said they expect prices to remain about the same in 2020. The rest were evenly split between prices increasing (27%) and decreasing (27%).
- When it comes to market factors that will have the greatest impact on prices in 2020, once again, “competition from other projects” takes the lead, with 31% of respondents naming it as the top factor. That’s good news for corporate buyers; in addition to keeping prices lower, more competition means more projects to choose from in the market.
- The “expiration or phase down of federal tax credits” rose to second place, with 21% of respondents saying it would impact prices the most in 2020. “According to our survey, most respondents expect PPA prices to remain about the same next year, despite the federal tax credit changes. While the reduced tax credits would push prices higher, other market factors, like competition from other projects and increased demand from corporate buyers, would push them lower. The net effect could be that prices remain about the same in 2020,” said Collier.
- Taking LevelTen’s Q1 and Q2 survey results in tandem, the general sentiment appears to be that the industry is prepared to weather the tax credit phaseout. In our Q1 PPA Price Index, we asked developers if they expect the tax credit changes to decrease the number of projects they commence construction on in 2020, and 55% said “no,” while only 15% said “yes.”
- Beyond tax credits and competition, other factors that developers expect to impact prices include “cost of capital” (9%), “increased EPC costs” (9%), “alternative offtake structures” (6%) and “increased demand from corporate buyers” (6%), among others.



About the LevelTen Energy PPA Price Index

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Leveling The Playing Field

Power purchase agreement (PPA) prices have historically been shrouded in secrecy—adding yet another hurdle to a complex transaction process. We're creating unprecedented level of transparency by sharing data on projects featured in the LevelTen Marketplace to help developers make informed pricing decisions and sellers identify the best projects to service their sustainability goals.

Digging Deeper With Data

What's in the LevelTen PPA Price Index? A customized report detailing PPA pricing averages, broken down nationally and across independent system operators (ISOs), and split by wind and solar.

Regional Data

The PPA Price Index includes prices for the following ISOs:

- **CAISO:** California Independent Service Operator
- **ERCOT:** Electric Reliability Council of Texas
- **MISO:** Midcontinent Independent System Operator
- **PJM:** PJM Interconnection
- **SPP:** Southwest Power Pool

Stay In The Know

Up-to-date data is always the most useful—so we've committed to publishing our PPA Price Index on a quarterly basis. However, PPA prices represent only a fraction of the data required to effectively evaluate PPA opportunities. For real-time analysis of project value and risk, cash flow modeling, price curves and more, please request credentials to the LevelTen Marketplace at [Leveltenenergy.com/marketplace](https://leveltenenergy.com/marketplace).

Q2 2019 PPA Price Index Overview

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To determine how PPA offer prices have shifted from Q1 2019, we analyzed data on approximately 1,000 price offers from more than 360 renewable energy projects across the U.S. This quarter, we also looked at PPA term lengths, to see if there have been any notable changes. Typically, contract terms range from 15 to 20 years, but some corporate buyers would prefer shorter term lengths. We were curious if developers are responding to pressure from corporate buyers by decreasing the term lengths in their PPA offers. This is a data point we will track over time.

The following are a handful of key takeaways from Q2 2019:

- In Q2, PPA offer prices rose, but not dramatically. Across markets, an evenly-weighted index of P25 wind and solar prices increased \$0.18 per megawatt hour (MWh), or 1.2% quarter-over-quarter.
 - Solar prices increased \$0.19/MWh, or 1.0%.
 - Wind prices increased \$0.17/MWh, or 1.4%.
- It's not the first time prices have increased: P25 prices also increased slightly from Q3 to Q4 2018, but then dropped from Q4 to Q1 2019.
- The largest change in any market was a little over \$1.00/MWh, signaling decreasing price volatility.
- Term lengths: From Q1 to Q2 2019, average contract lengths decreased from 13.8 to 13.5 years for wind projects and likewise decreased from 14.4 to 14.0 years for solar projects.

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New this quarter - annual change:

With our 5th iteration of this report, we can now report longer term changes we're witnessing in the market:

- Year-over-year, prices have declined. An evenly weighted index of P25 wind and solar prices dropped 7% from Q2 2019 to Q2 2018, across ERCOT, PJM, CAISO, and SPP.
 - P25 solar prices dropped 5% on average year-over-year
 - P25 wind prices dropped 9% on average year-over-year.

Q2 2019 Methodology

For the data presented below, the term "prices" refers to offer prices uploaded to the LevelTen Marketplace that were active as of 6/27/19. Data is based on real-time prices for all ISOs and technologies except for CAISO wind, for which we included real-time and day-ahead prices to expand the data set. We included only as-generated (i.e. unit-contingent) price offers. All prices are hub-settled for a virtual PPA contract structure. Prices were offered across a range of project commercial operation dates with contract tenors ranging from 10-25 years. Price data is aggregated and reported in percentile buckets (e.g., "P25" refers to the most competitive 25th percentile offer price); national and ISO data is generally reported to the P10 level, while hub-specific data points are reported to the P25 level to maintain project developer confidentiality.

► Solar

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In Q2, the P25 Index for solar prices rose or stayed flat in all markets covered, with the exception of MISO. The spread between P25 and P50 prices narrowed in all markets. The tightening of this spread should be seen as a positive sign for increasing market liquidity and maturity.

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Other Index changes of note:

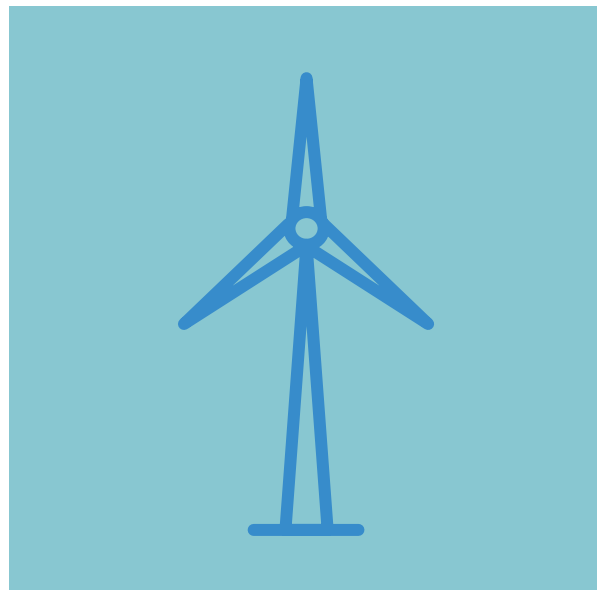
- The CAISO market saw the largest rise in solar prices, with a 5.7% rise in the P25 index, bouncing back somewhat from the 13% drop last quarter.
- ERCOT prices were relatively unchanged, with just a 0.8% rise from last quarter.
- MISO was the lone market to have a drop in prices, reversing an upward trend from the last three quarters.
- PJM P25 prices were unchanged, while P50 prices dropped slightly, marking the fourth consecutive declining quarter for the market.
- SPP solar was the only market, for either wind or solar, that saw P25 and P50 prices move in opposite directions. Changes were small though, with a roughly 1.5% move in either direction.

► Wind

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In Q2 the LevelTen Marketplace saw a low but generally broad-based rise in wind prices, with prices rising in four out of the five ISOs covered, and on both a P25 and P50 basis.

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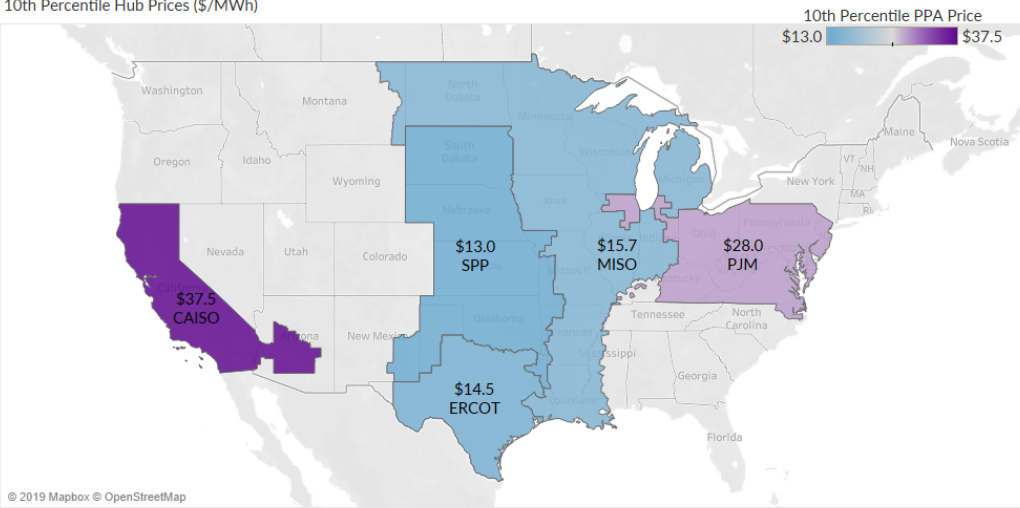
Other Index changes of note:

- The CAISO wind market has seen a lot of volatility in past quarters, but an increase in the number of offers in the market has resulted in more price stability this quarter, as we observed just a 1.0% rise in the P25 Index for wind. The CAISO market saw the broadest change in prices, with prices rising for both wind and solar on a P25 and P50 basis.
- The ERCOT P25 Index rose \$1.20/MWh, or 8%, which was the highest percent change of any market.
- MISO P25 Index prices rose slightly by \$0.20/MWh.
- PJM was the lone down market for wind this quarter, dropping by just under \$1/MWh and reversing a trend of increasingly higher prices we had been seeing over the last year.
- SPP P25 pricing was flat quarter-over-quarter.

National Market Overview

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Wind PPA Price by ISO
10th Percentile Hub Prices (\$/MWh)



Marketplace Metrics

Total Projects	361
Pricing Offers	957
Total MW Offered	41,768.9
P25 of Levelized PPA Price	\$24.25
P50 of Levelized PPA Price	\$29.79
P75 of Levelized PPA Price	\$35.41

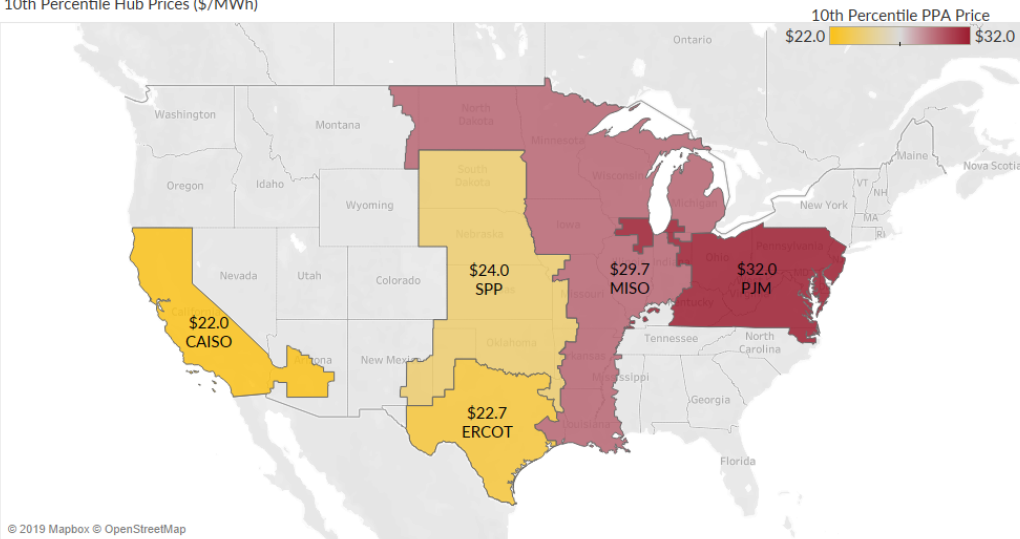
Solar Metrics

Total Projects	269
Pricing Offers	722
Total MW Offered	25,705.4
P25 of Levelized PPA Price	\$25.94
P50 of Levelized PPA Price	\$31.00
P75 of Levelized PPA Price	\$36.90

Wind Metrics

Total Projects	86
Pricing Offers	235
Total MW Offered	15,154.9
P25 of Levelized PPA Price	\$16.75
P50 of Levelized PPA Price	\$20.88
P75 of Levelized PPA Price	\$33.10

Solar PPA Price by ISO
10th Percentile Hub Prices (\$/MWh)

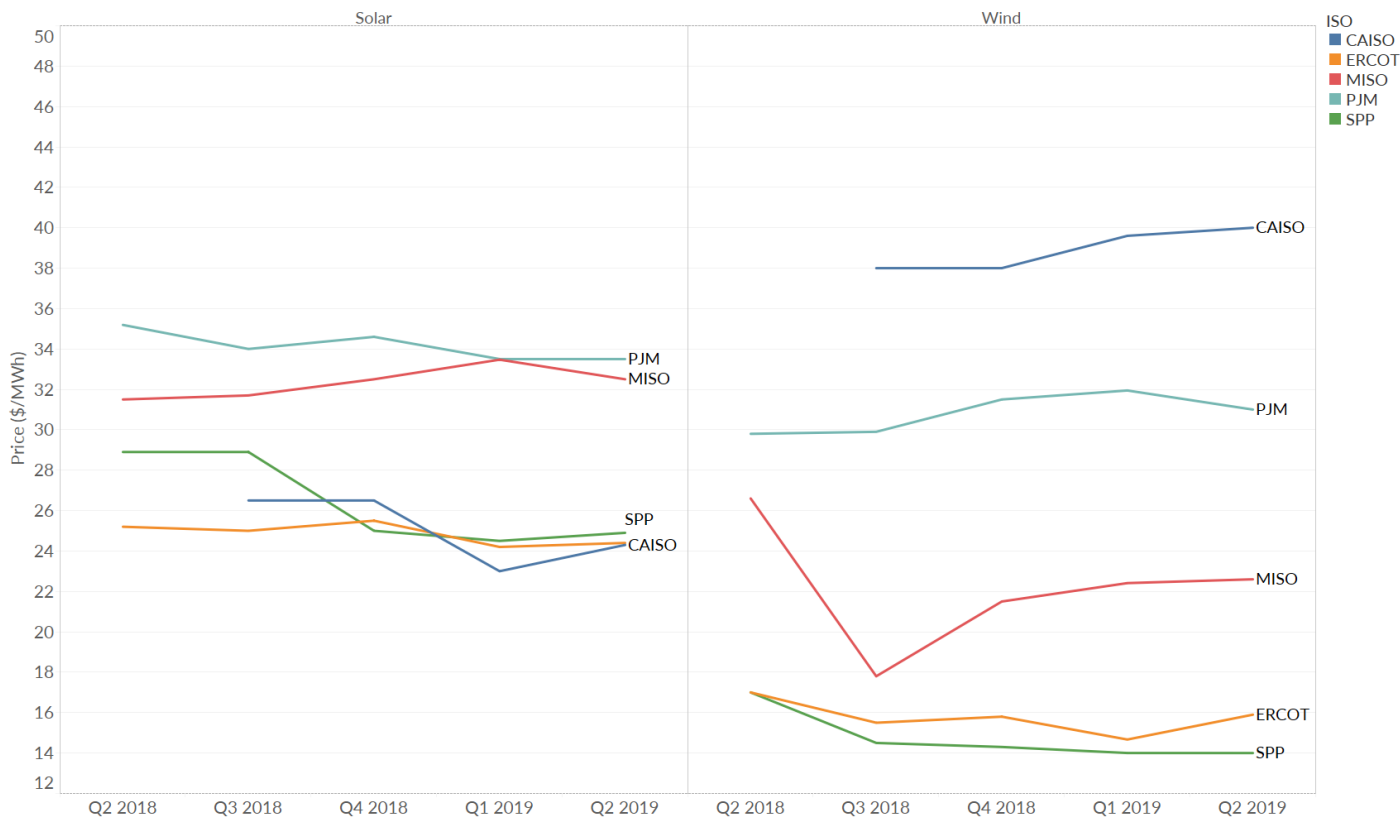


10th Percentile PPA Prices by COD

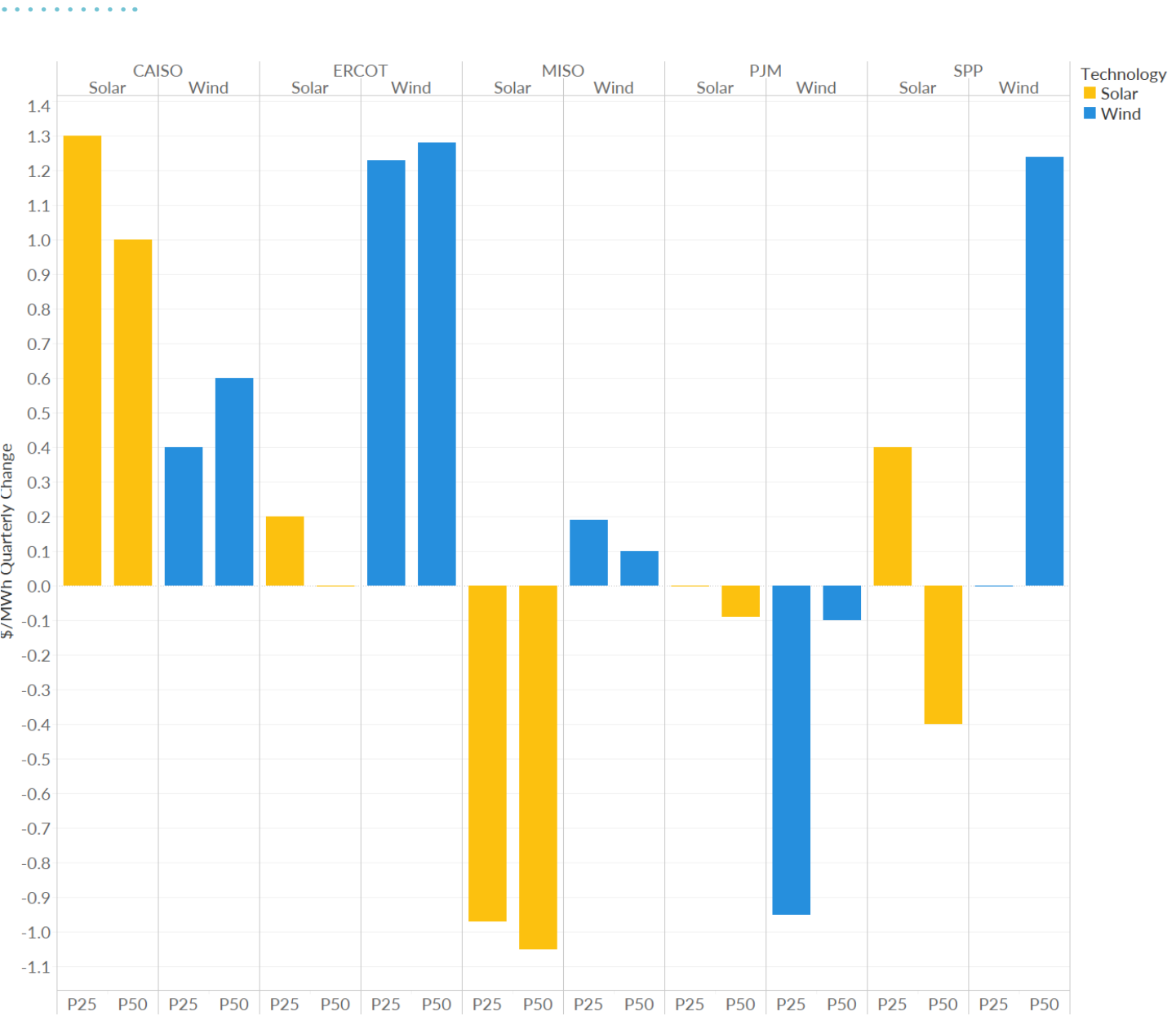


Price Index Comparison

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Quarterly Aggregate Price Changes

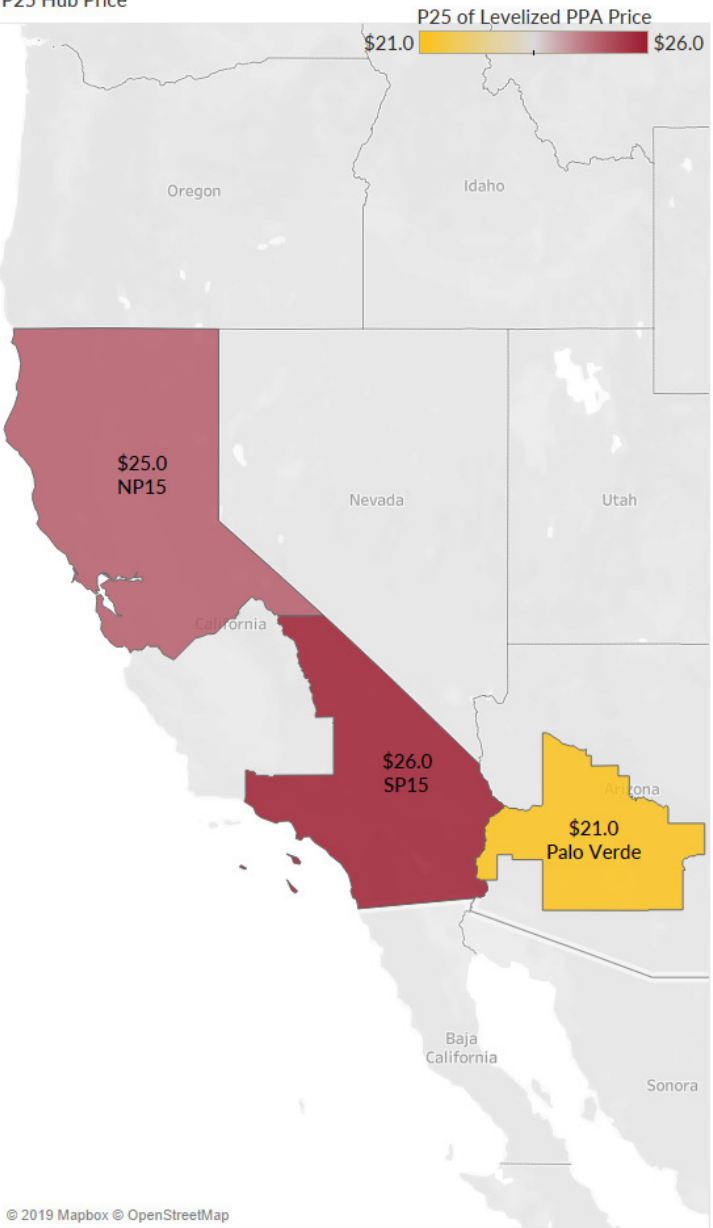


CAISO Market Overview

Wind PPA Price by Hub
P25 Hub Price

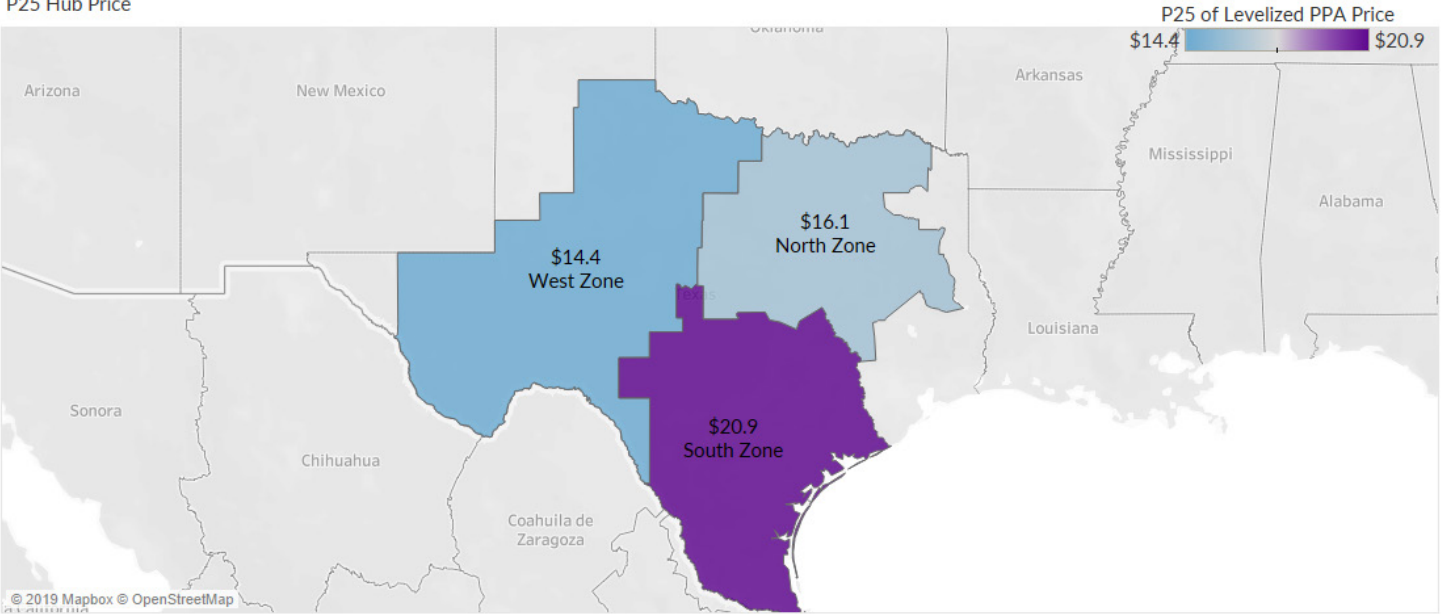


Solar PPA Price by Hub
P25 Hub Price

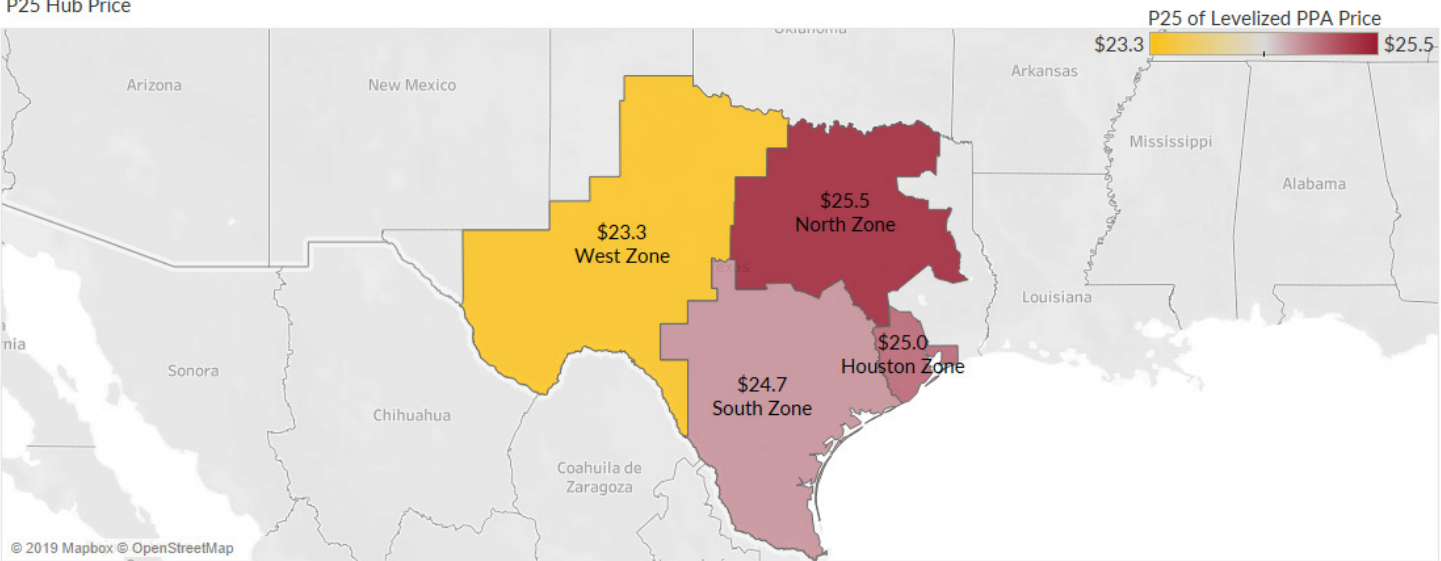


ERCOT Market Overview

Wind PPA Price by Hub
P25 Hub Price

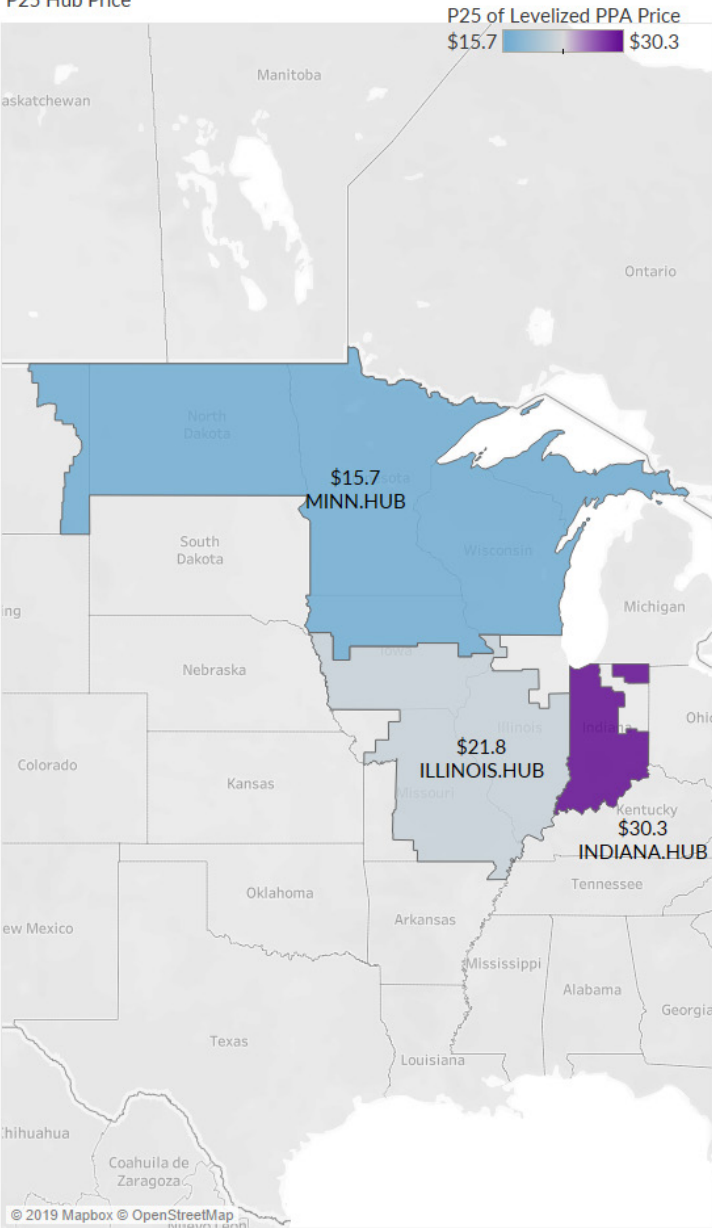


Solar PPA Price by Hub
P25 Hub Price

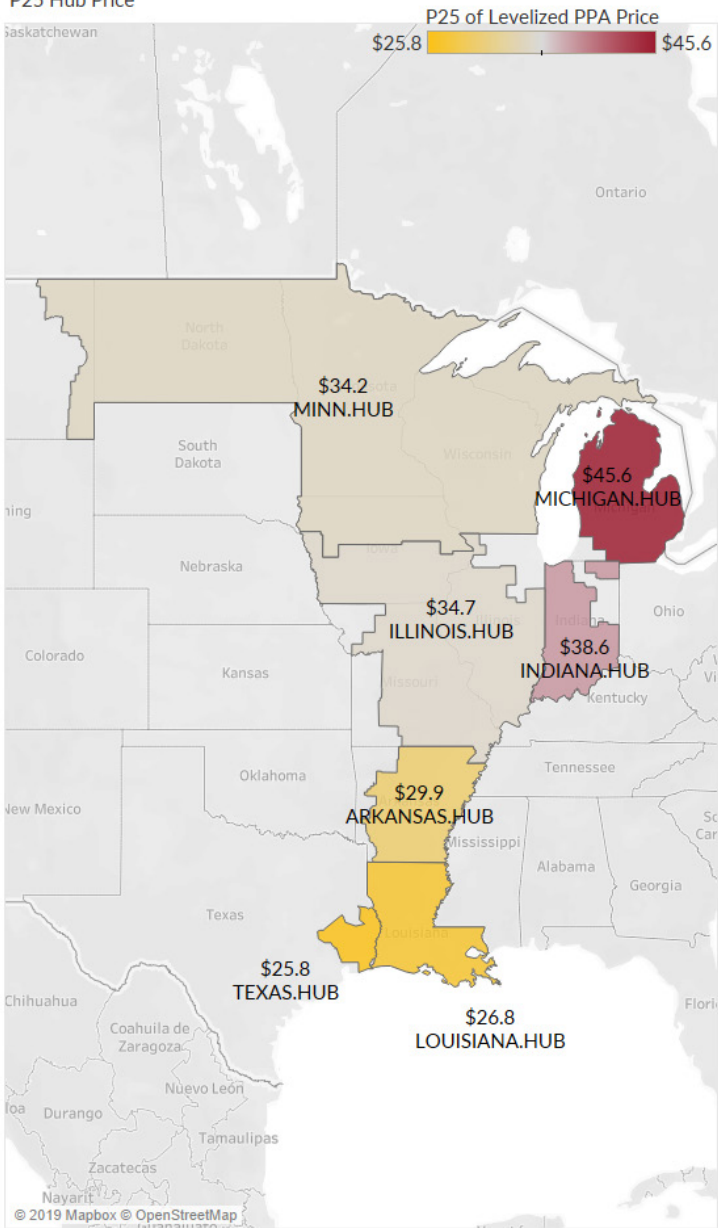


MISO Market Overview

Wind PPA Price by Hub
P25 Hub Price

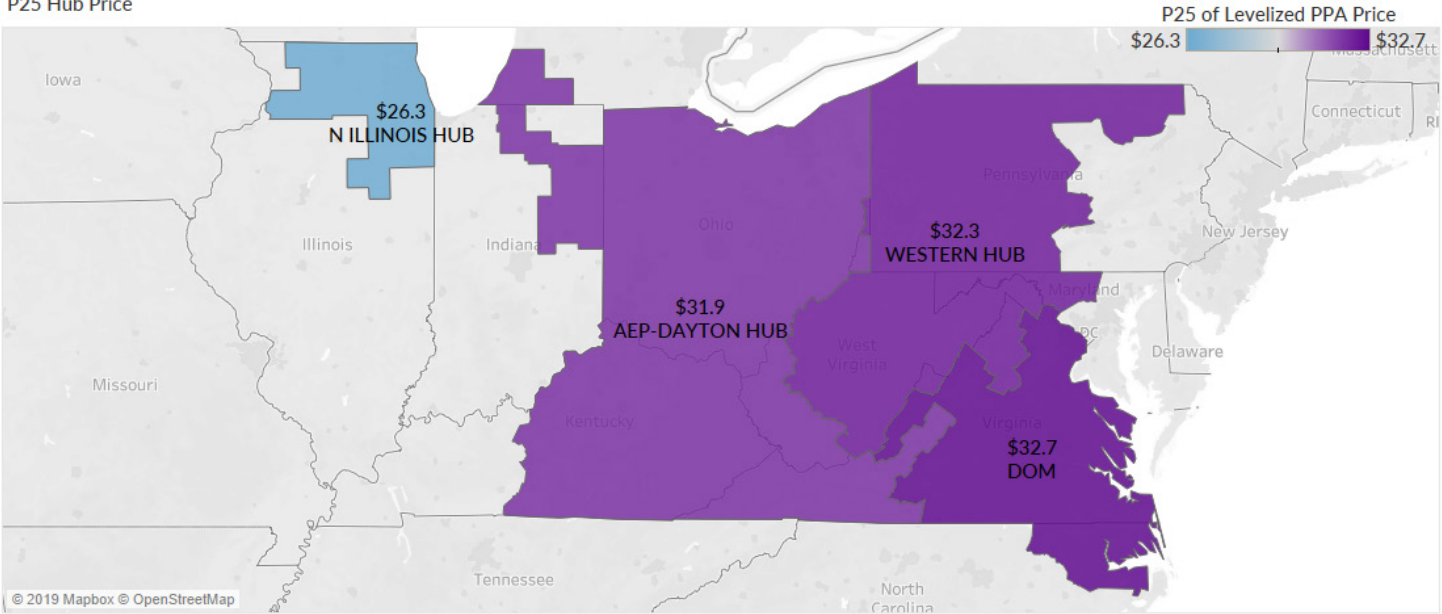


Solar PPA Price by Hub
P25 Hub Price

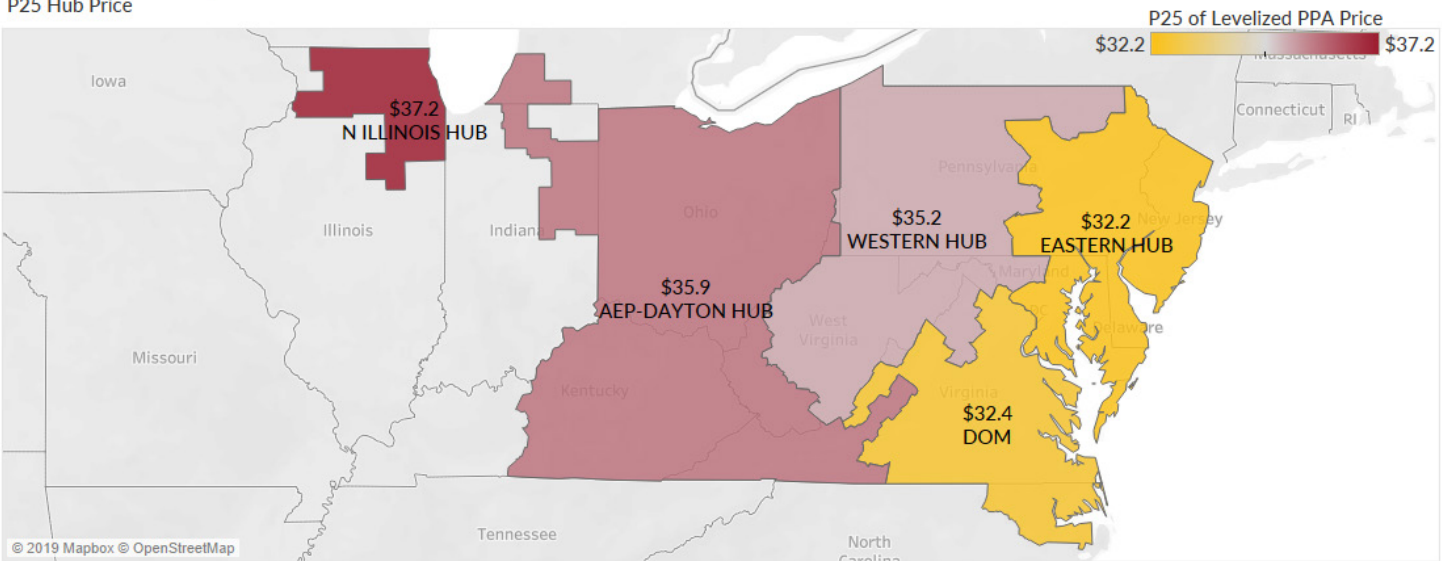


PJM Market Overview

Wind PPA Price by Hub
P25 Hub Price



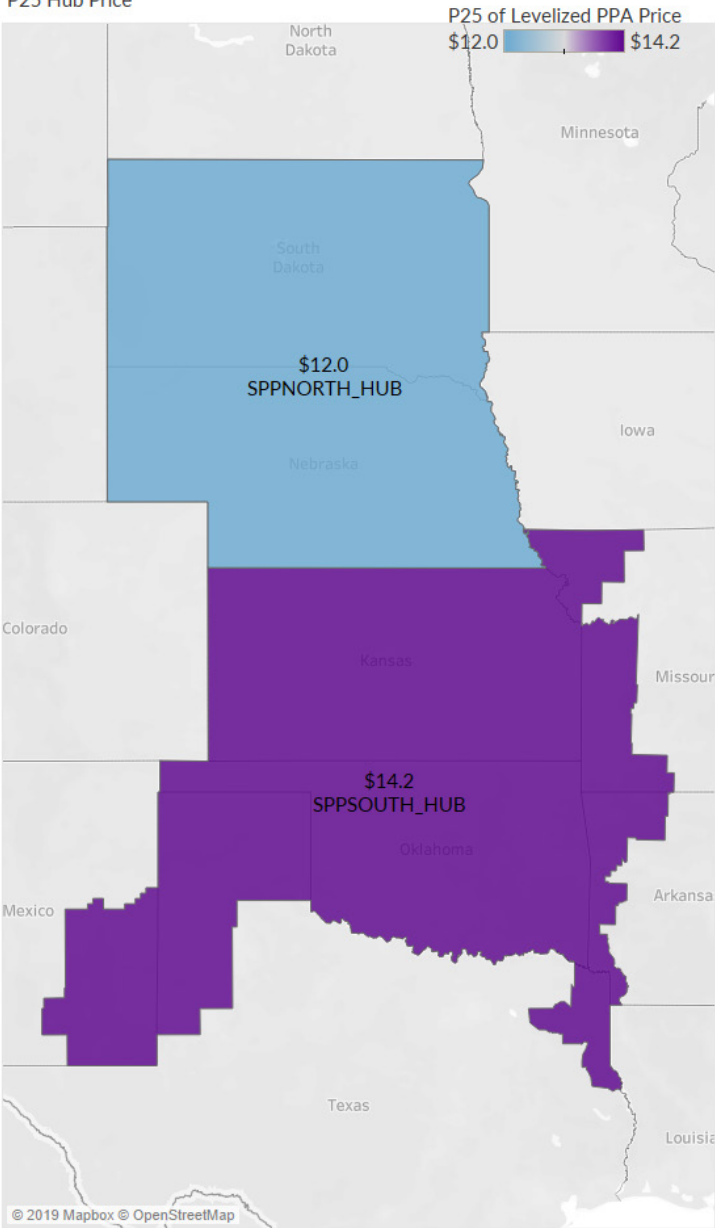
Solar PPA Price by Hub
P25 Hub Price



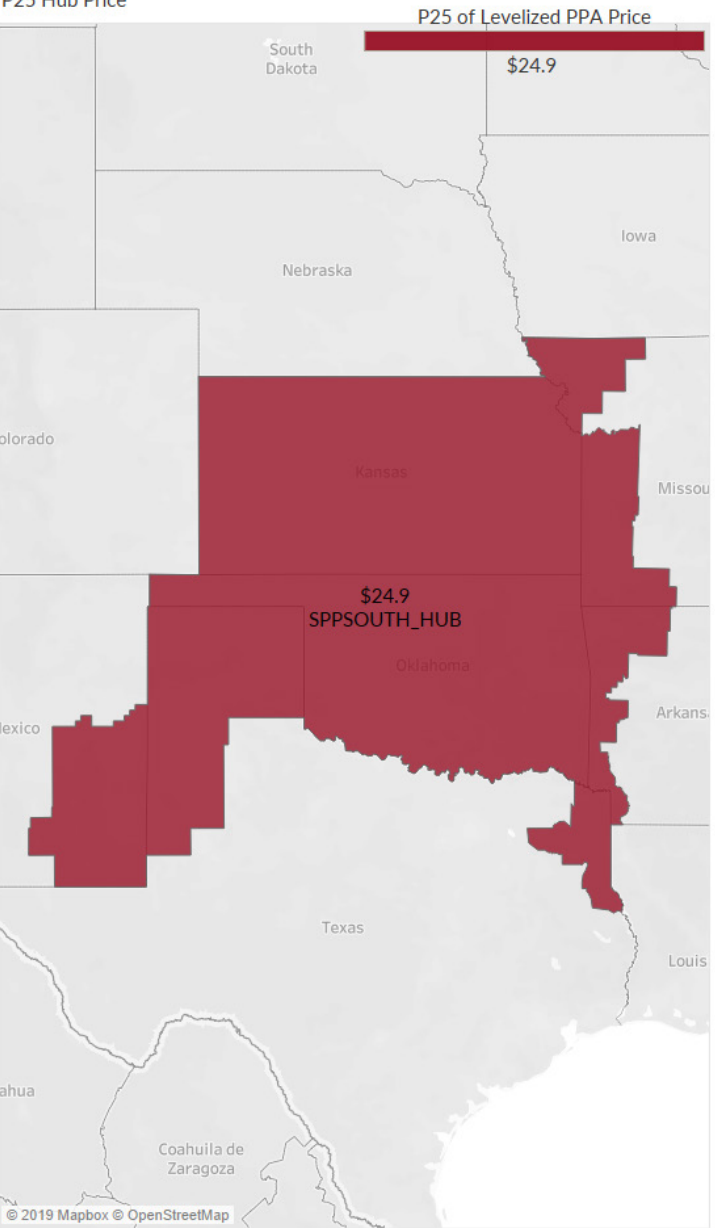
SPP Market Overview

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Wind PPA Price by Hub
P25 Hub Price



Solar PPA Price by Hub
P25 Hub Price





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