

Q3 2019

PPA Price Index





Q2 2019 Report Overview

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The LevelTen Energy PPA Price Index

LevelTen provides a quarterly in-depth look at PPA offer price averages submitted through the LevelTen Marketplace, for both wind and solar projects, in five independent system operator (ISO) regions, including CAISO, ERCOT, MISO, PJM and SPP. The LevelTen Energy Q3 2019 PPA Price Index is the sixth edition of this report and its purpose is to bring transparency to the market.

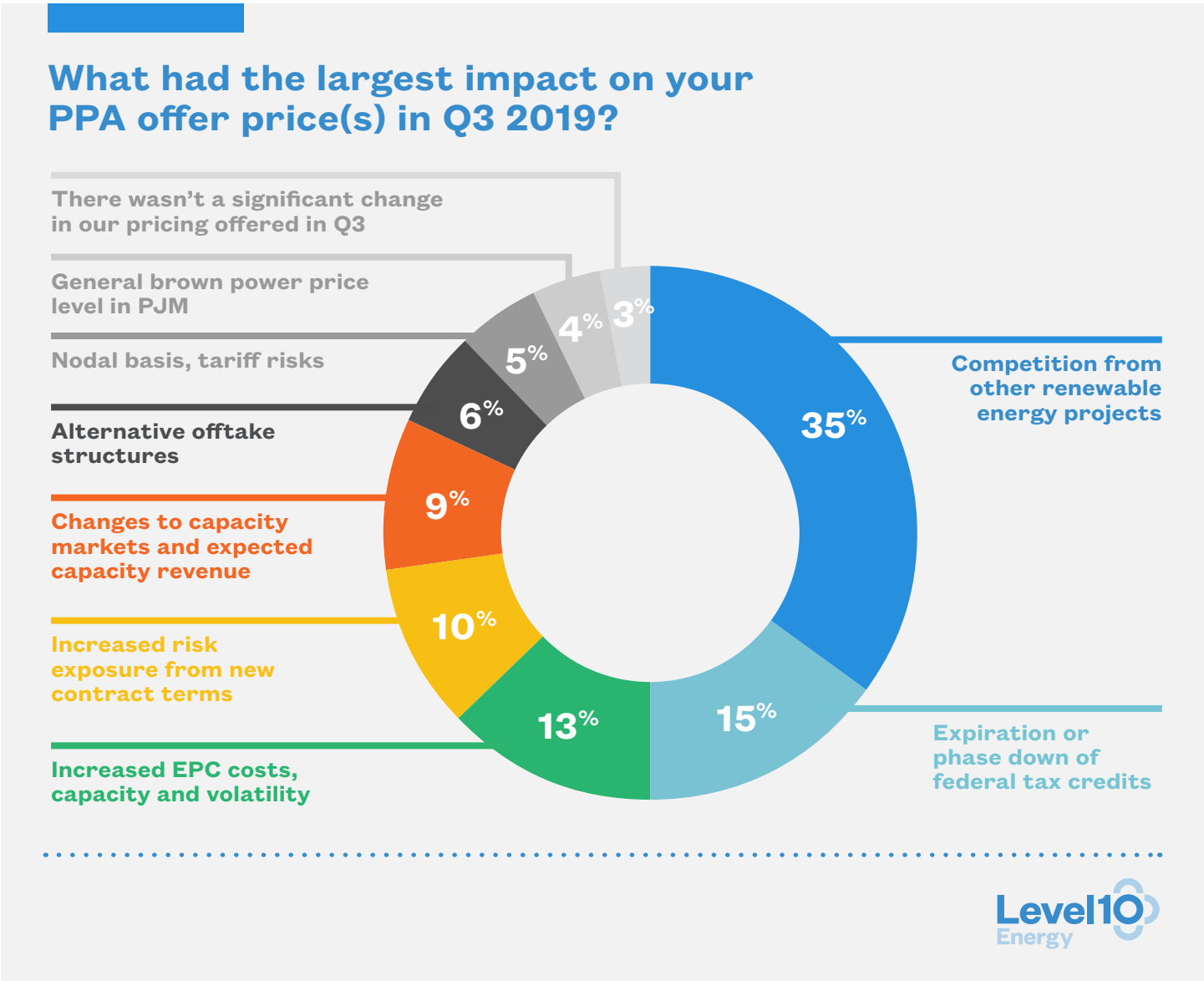
Q3 2019 Developer Survey

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 developers what market factor had the largest impact on their PPA prices this quarter. In addition, we explored how prices might change in 2020. Read on for the results.

Market Forces that Impacted PPA Offer Prices in Q3

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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 Q3.





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

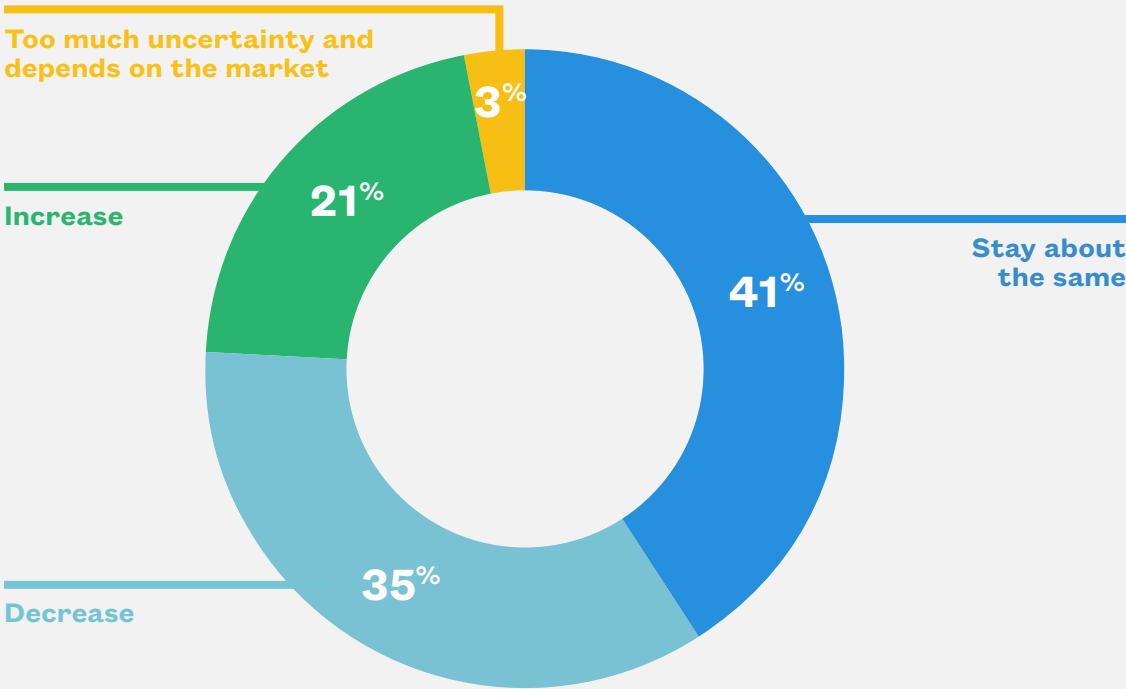
- While results this quarter were largely in line with what we saw in Q2 2019, developers still view competition as having the largest impact on PPA pricing. Looking back at the start of the year, 30% of developers held this view. That number increased in Q2 to 52% and has dropped back down to 35% in Q3; indicating that other factors are weighing heavily as well. The second largest impact on PPA prices has been tax credit expiration. The percentage was up from 6% in Q2 to 15% in Q3. Increased EPC costs was the third highest percentage but fell from 15% in Q2 to 13% in Q3.
- In Q3, we had the same number of respondents as Q2 (33 in total), and the majority of developers once again shared the view that PPA prices would stay the same in 2020. This quarter, 21% thought prices would increase, while 35% thought prices would decrease (compared to an even split at 27% last quarter). “There’s early indication that developers may be concerned about increasing prices,” said Rob Collier, Vice President of Developer Relations at LevelTen Energy.
- Once again, expiration of tax credits and competition from other projects are expected to be the second biggest drivers of PPA prices in 2020, behind competition from other developers.
- “Developers are seeing the largest opportunities for renewables growth in ERCOT and PJM. This is consistent with LevelTen’s perspective on the market, and where we’re seeing the highest value for corporates, which in turn is generating additional demand,” said Collier.
- Corporate demand, utility demand, and decreasing renewables costs are seen as the primary drivers of renewables growth. 68% of respondents said corporate demand is the top driver. “Given the many recent announcements we’ve seen, and interest among LevelTen’s customers, this is not surprising,” added Collier.

Will PPA Prices Increase or Decrease in 2020?

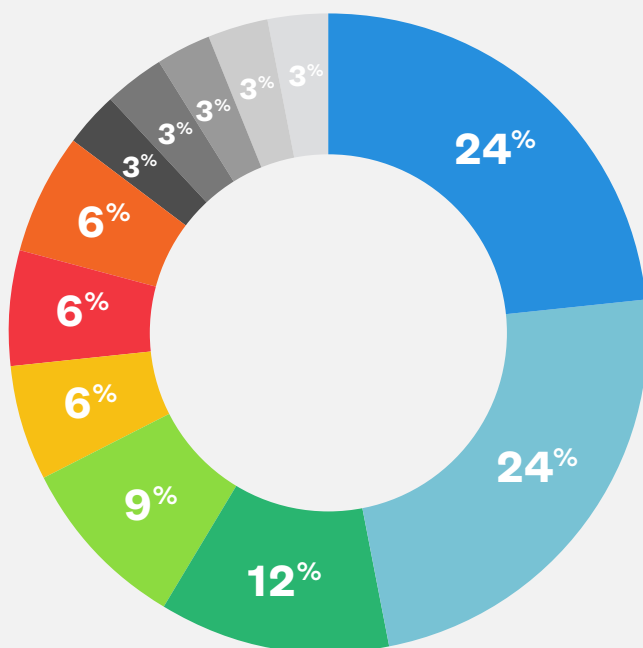
In addition to exploring what market factors impacted Q3 prices, we wanted to get a read from developers on how they expect PPA prices will change next year. In our survey, we asked two related questions:

- 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 or decrease?



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



Competition from other renewable energy projects **24%**

Expiration or phase down of federal tax credits **24%**

Federal/state policy **12%**

Increased demand from corporate/institutional buyers **9%**

Changes to capacity markets and expected capacity revenue **6%**

Decreased EPC costs **6%**

Increased risk exposure from new contract terms **6%**

Alternative offtake structures **3%**

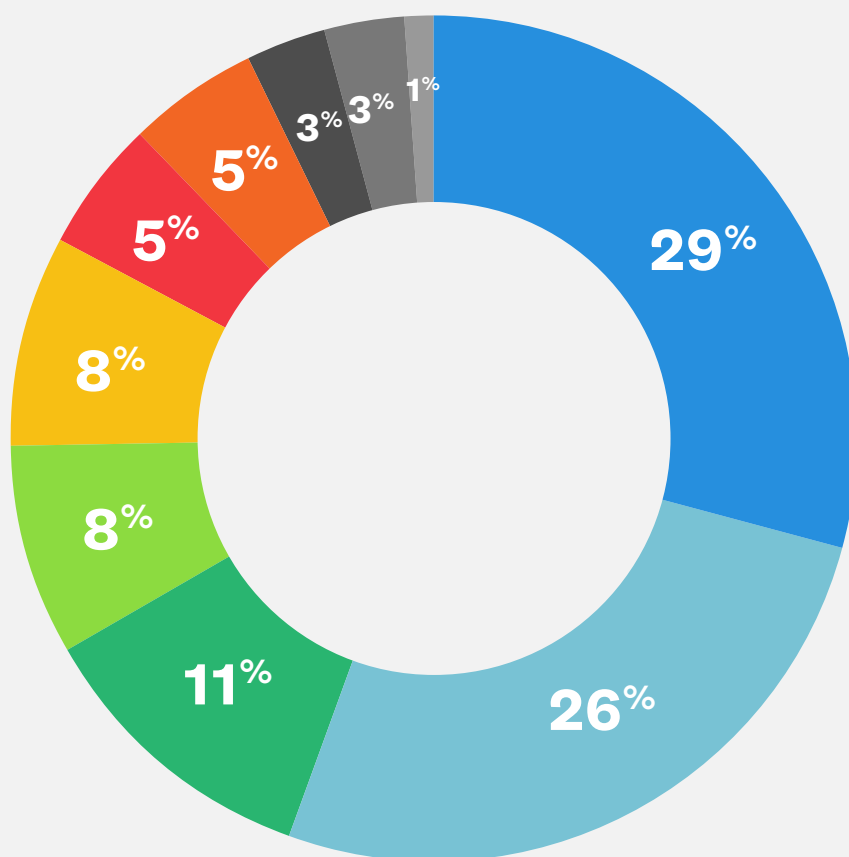
Congestion/curtailment - nodal basis **3%**

Cost of capital **3%**

Increased EPC costs **3%**

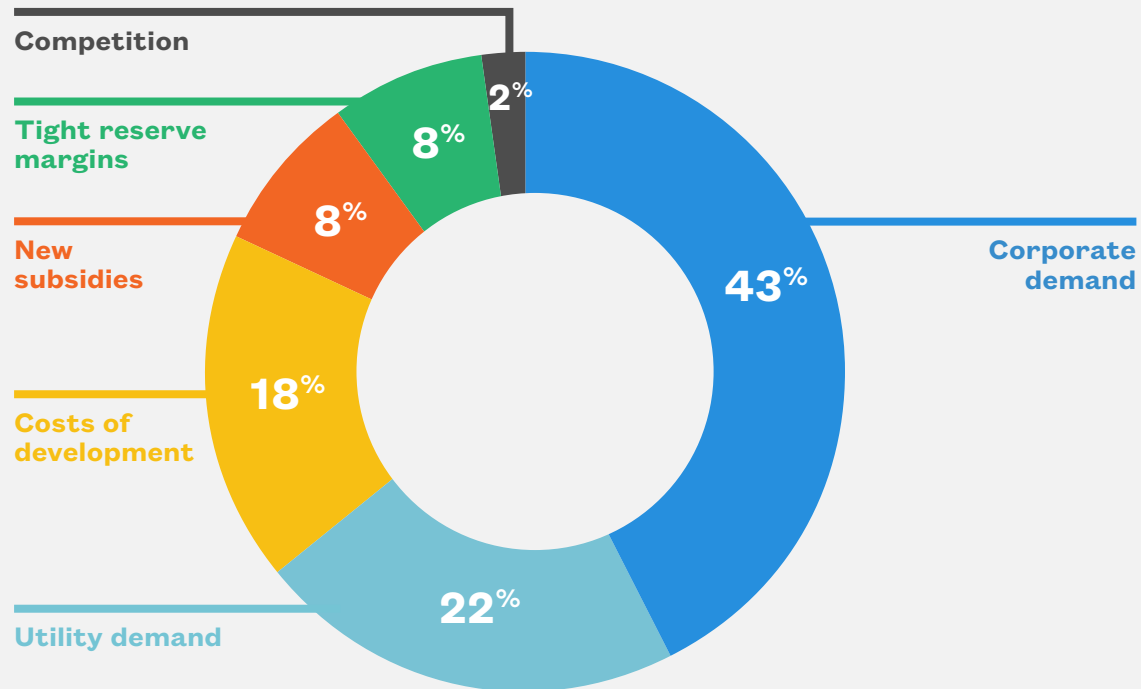
Interconnection costs & capacity **3%**

Where are you seeing the most opportunity for renewables growth?



PJM	29%
ERCOT	26%
MISO	11%
ISO-NE	8%
CAISO	8%
SPP	5%
WECC	5%
SERC	3%
NYISO	3%
Japan	1%
AESO	0%
IESO	0%
Europe	0%
APAC	0%
Africa	0%
South America	0%

What are the primary factors driving renewables growth in these markets?





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

- Less than half (41%) of developers surveyed said they expect prices to remain about the same in 2020; a 5% drop from Q2. 35% see prices as increasing (a 6% bump up from Q2), while 21% think prices will decrease (a 6% decrease from Q2).
- When it comes to market factors that will have the greatest impact on prices in 2020, “competition from other projects” shared the top position along with “expiration or phase down of federal tax credits, with 24% of respondents naming both as top factors.
- “Federal/state policy” rose to second place (a 9% increase from Q2), with 12% of respondents saying it would impact prices the most in 2020.
- Taking LevelTen’s Q1, Q2, and Q3 survey results in succession, the general sentiment appears to be that the industry is beginning to show some concern over 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 in which they commence construction on in 2020, and 55% said “no,” while only 15% said “yes.” In Q3, 15% of respondents saw the expiration or phase down of federal tax credits as having the largest impact on their PPA prices, and 24% feel this will carry over into 2020.
- Beyond tax credits, competition and policy, other factors that developers expect to impact prices include: “increased demand from corporate buyers” (9%), “changes to capacity markets and expected capacity revenue” (9%), “decreased EPC costs” (6%), and “increased risk exposure from new contract terms” (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 opaque, adding yet another hurdle to a complex transaction process. “We’re creating unprecedented 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,” said Bryce Smith, CEO and Founder of LevelTen Energy.

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.

Q3 2019 PPA Price Index Overview

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To determine how PPA offer prices have shifted from Q2 2019, we analyzed data on approximately 600 price offers from more than 360 renewable energy projects across the U.S. This quarter, we also incorporated data on typical and average project sizes, in order to communicate the scale at which these projects are being built to arrive at such low prices. These are data points we will track over time.

The following are a handful of key takeaways from Q3 2019:

- In Q3, PPA offer prices rose overall. Across markets, an evenly weighted index of P25 wind and solar prices increased \$0.47 per megawatt hour (MWh), or 1.9% quarter-over-quarter.
 - Solar prices dropped \$0.14/MWh, or 0.5%.
 - Wind prices increased \$1.08/MWh, or 4.4%.
- This is the second consecutive quarter prices have increased, though solar reversed course from last quarter and continued its long-term trend of decreasing prices.
- Annual change from Q3 2018 to Q3 2019:
 - P25 solar prices have dropped 5.4 percent.
 - P25 wind prices conversely have risen 11.2%.
- Term lengths: From Q2 to Q3 2019, average contract lengths continued to decrease. Wind project contract tenors dropped from 13.5 to 13.0 years and, likewise, solar contract lengths decreased from 14.0 to 13.9 years.

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**New This Quarter –
Project Size Details:**

In our 6th iteration of this report, we are reporting information on typical and average project sizes for both wind and solar projects in the LevelTen marketplace.

- **Solar Project Sizes (MWac)**
 - o Average: 108.6
 - o Median: 80.0
- **Wind Project Size (MWac)**
 - o Average: 182.8
 - o Median: 172.0
- **Combined**
 - o Average: 126.0
 - o Median 100.0

Q3 2019 Methodology

For the data presented below, the term “prices” refers to offer prices uploaded to the LevelTen Marketplace that were active as of 9/25/19. 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

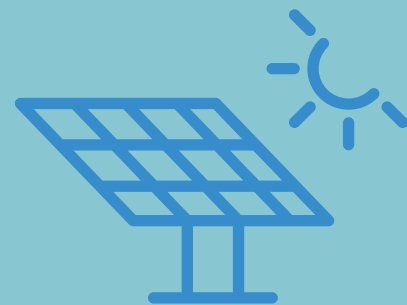
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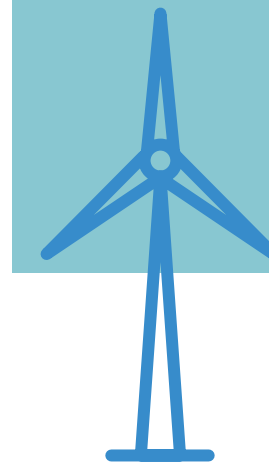
In Q3, the P25 Index for solar prices continued its downward trend dropping 0.5% in aggregate. Directionally this played out differently in different markets, but changes were fairly minor across the board.

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Other Index changes of note:

- The MISO market saw the largest drop in solar prices with a 3.7% drop in the P25 index, following on its 2.9% drop last quarter.
- The ERCOT, SPP, and CAISO Indices were all relatively unchanged. Given large downward movement in prior quarters, the consolidation here remains noteworthy.
- PJM was the lone market to have a material rise in prices, reversing a prior downward trend. P25 prices rose 1.9% or \$0.62 per MWh, while P50 prices rose \$1.05 or 2.9%.





Wind

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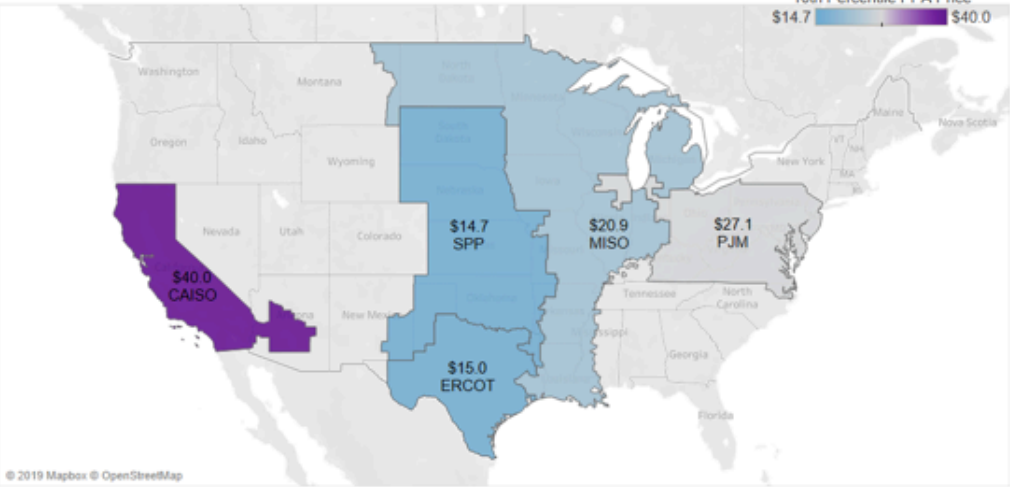
In Q3, the LevelTen Marketplace saw a continued rise in wind prices. This quarter, the MISO market was the primary contributor with a \$4+ rise in prices, amounting to a 19% increase.

Other Index changes of note:

- The SPP Wind P25 Index increased \$2.45 or 17.5%, nearly matching the MISO rise on a percentage basis.
- PJM bucked the trend again this quarter, dropping \$2.88 or 9.3%.
- The ERCOT P25 Index dropped slightly by \$0.40/MWh or 2.5%.
- CAISO P25 Index pricing was flat quarter over quarter.

National Market Overview

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



Marketplace Metrics

Total Projects	368
Price Offers Analyzed	634
Total MW Offered	46,377
Average Project Size (MW)	126.0
Median Project Size (MW)	100.0

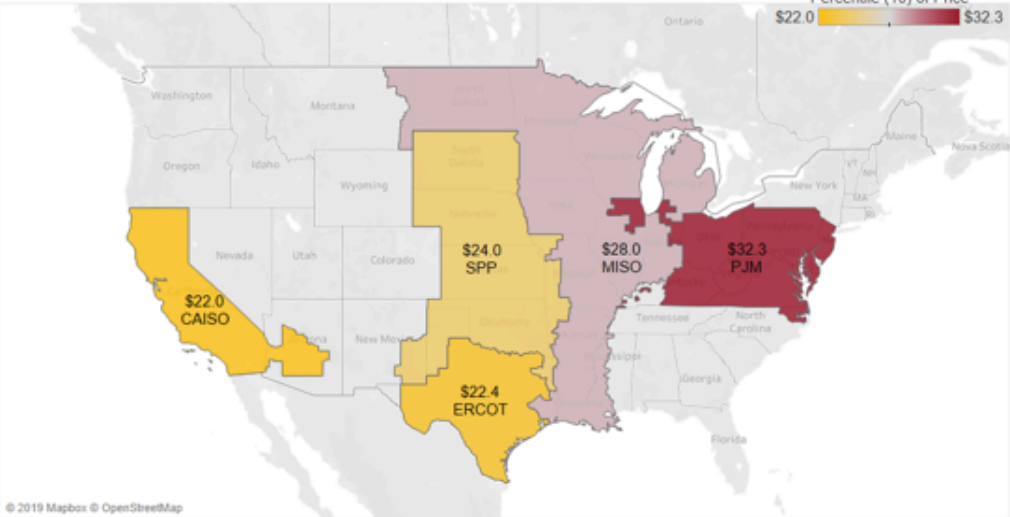
Solar Metrics

Total Projects	280
Price Offers Analyzed	457
Total MW Offered	30,409
Average Project Size (MW)	108.6
Median Project Size (MW)	80.0
Average Term Length (Years)	13.9

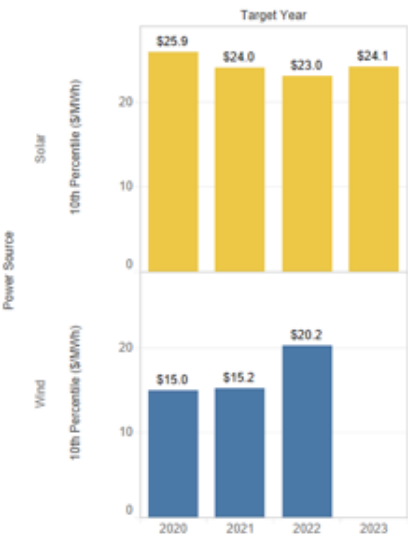
Wind Metrics

Total Projects	86
Price Offers Analyzed	177
Total MW Offered	15,720
Average Project Size (MW)	182.8
Median Project Size (MW)	172.0
Average Term Length (Years)	13.0

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

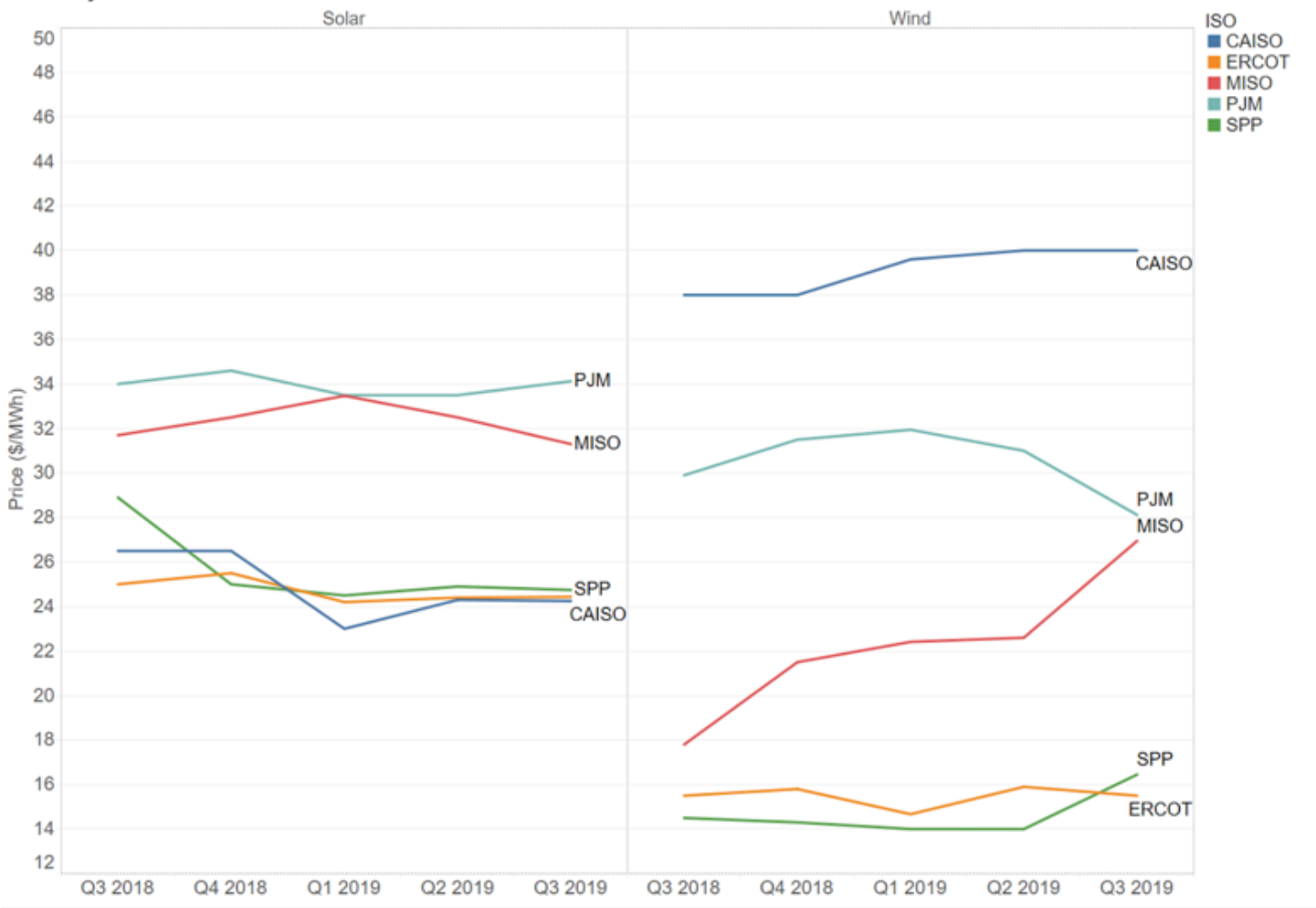


10th Percentile PPA Prices by COD



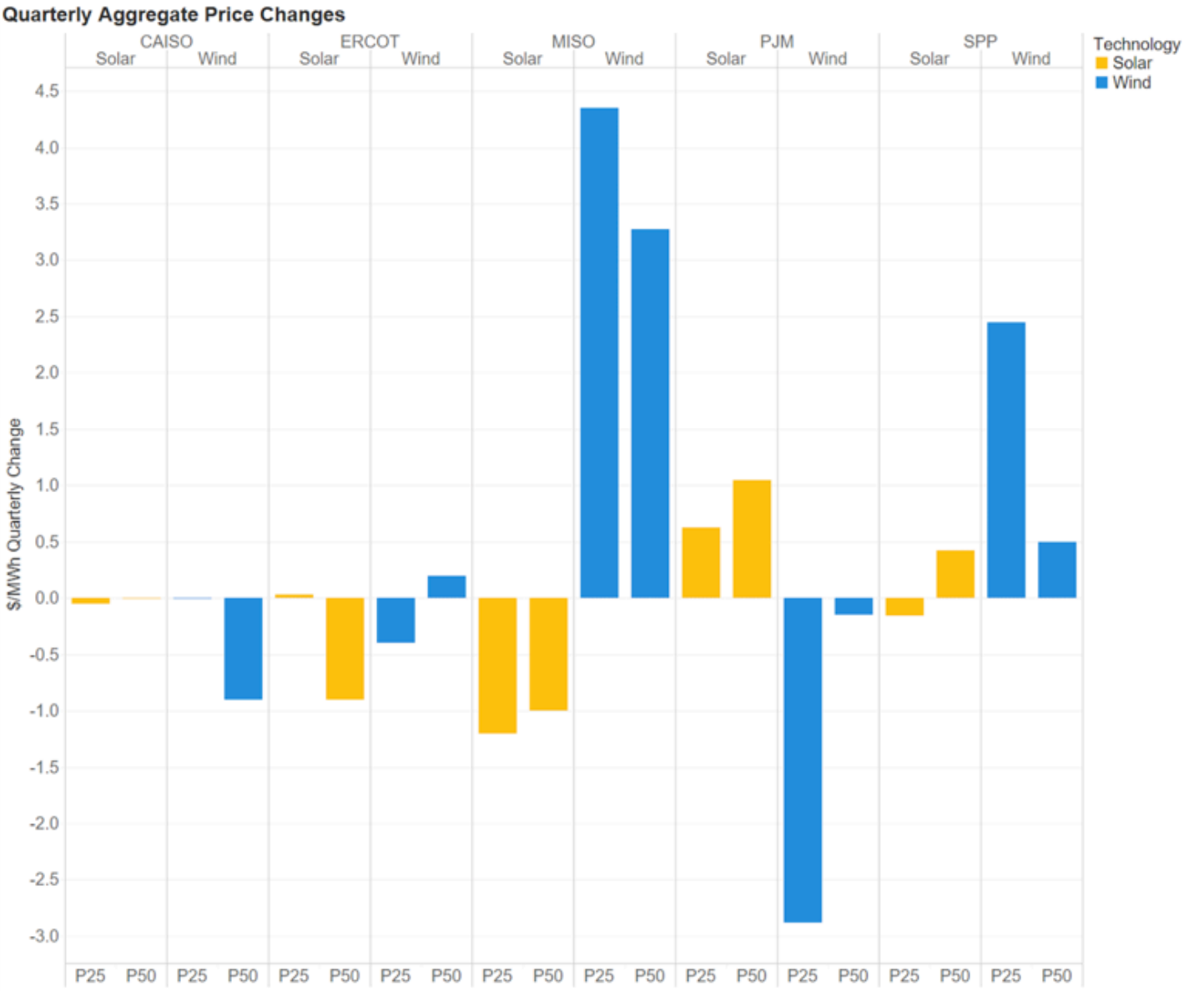
Price Index Comparison

Quarterly ISO Price Indices- P25



Quarterly Aggregate Price Changes from Q2 2019 to Q3 2019

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CAISO Market Overview

Wind PPA Price by Hub
P25 Hub Price

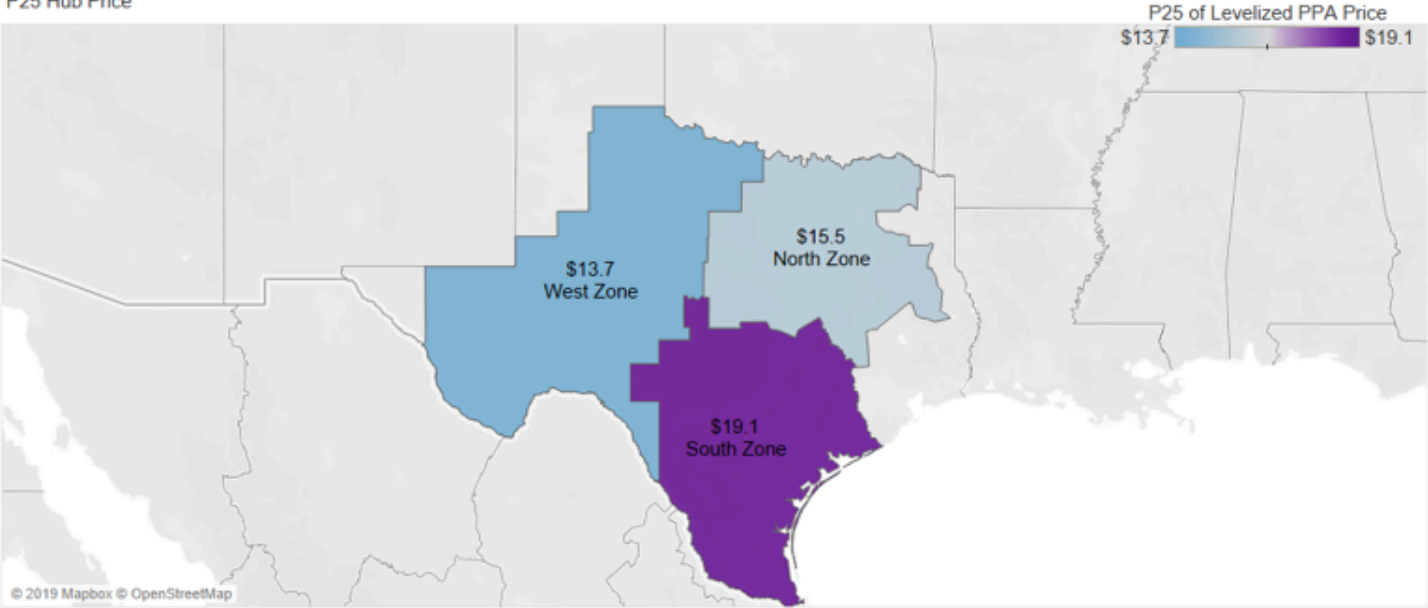


Solar PPA Price by Hub
P25 Hub Price

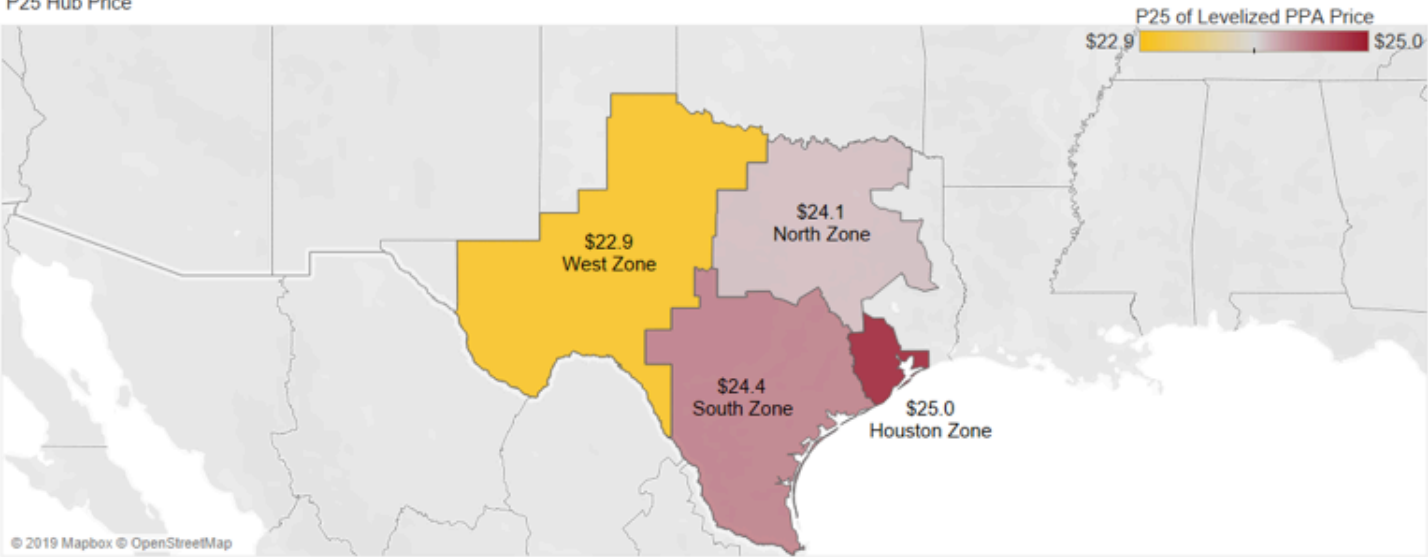


ERCOT Market Overview

Wind PPA Price by Hub
P25 Hub Price

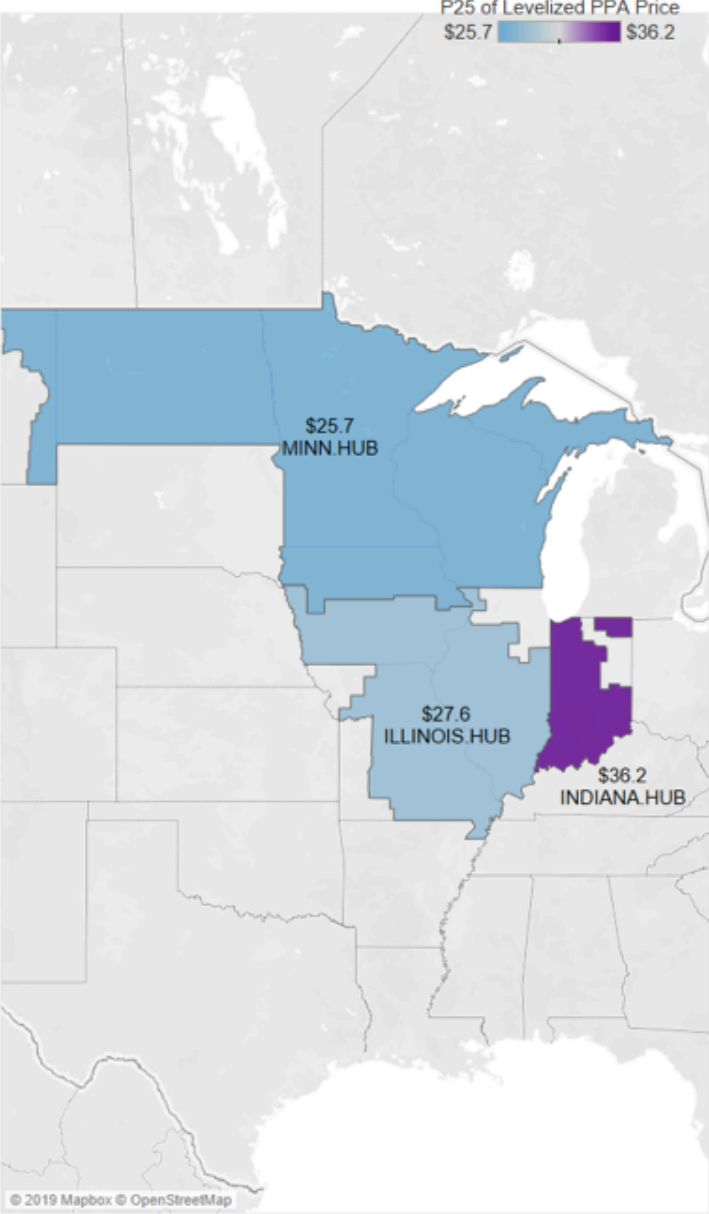


Solar PPA Price by Hub
P25 Hub Price

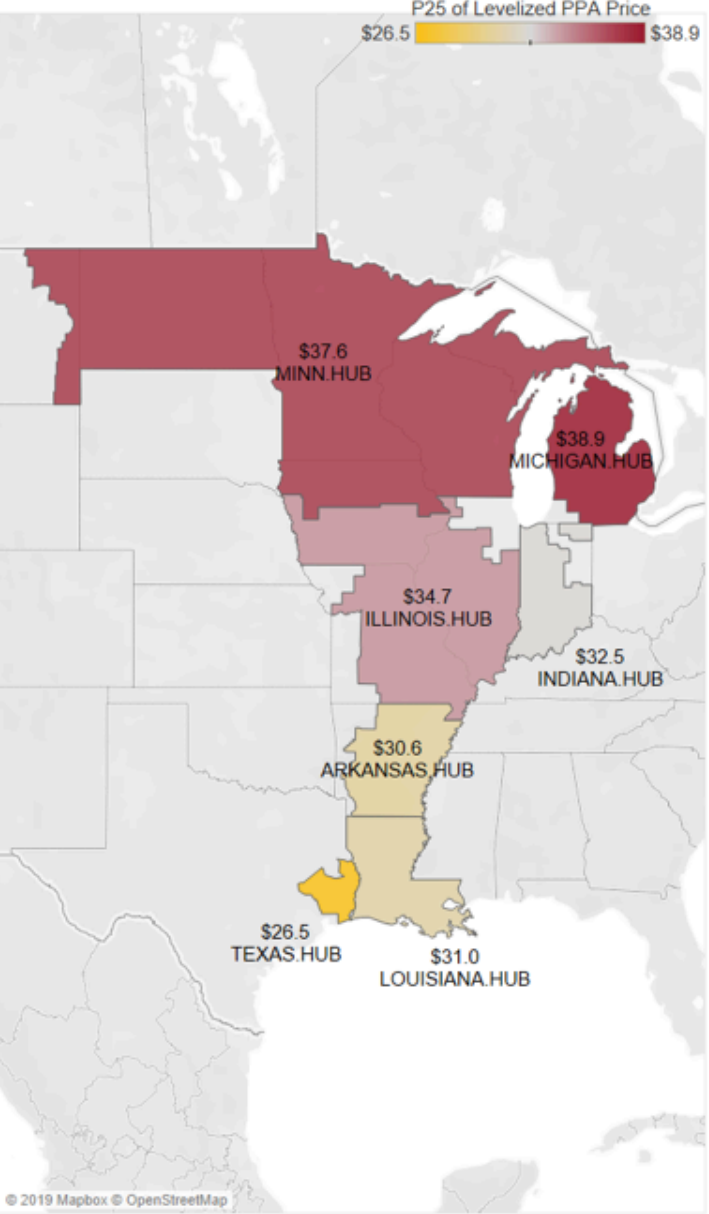


MISO Market Overview

Wind PPA Price by Hub
P25 Hub Price

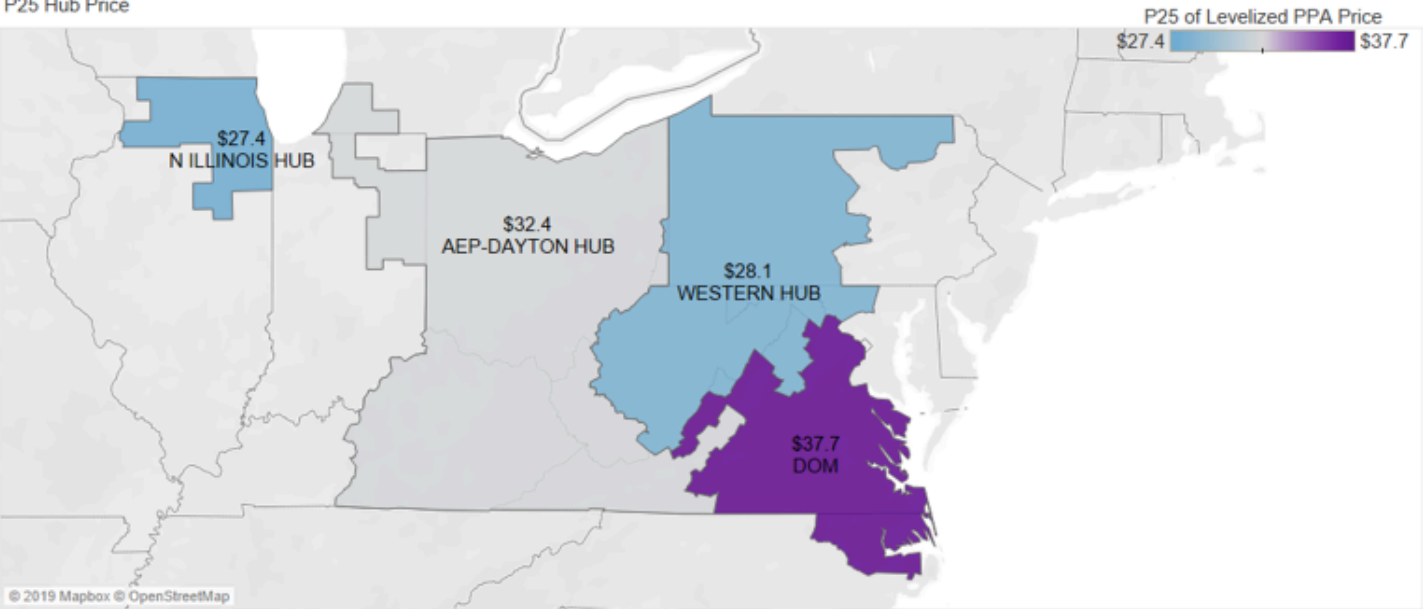


Solar PPA Price by Hub
P25 Hub Price

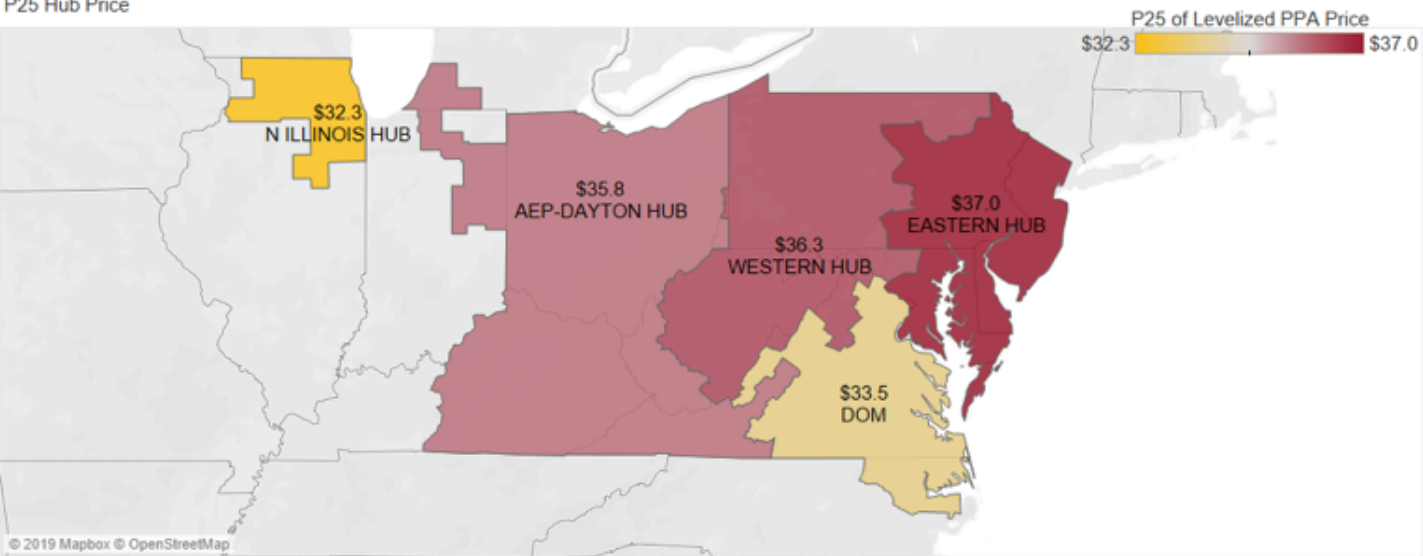


PJM Market Overview

Wind PPA Price by Hub
P25 Hub Price

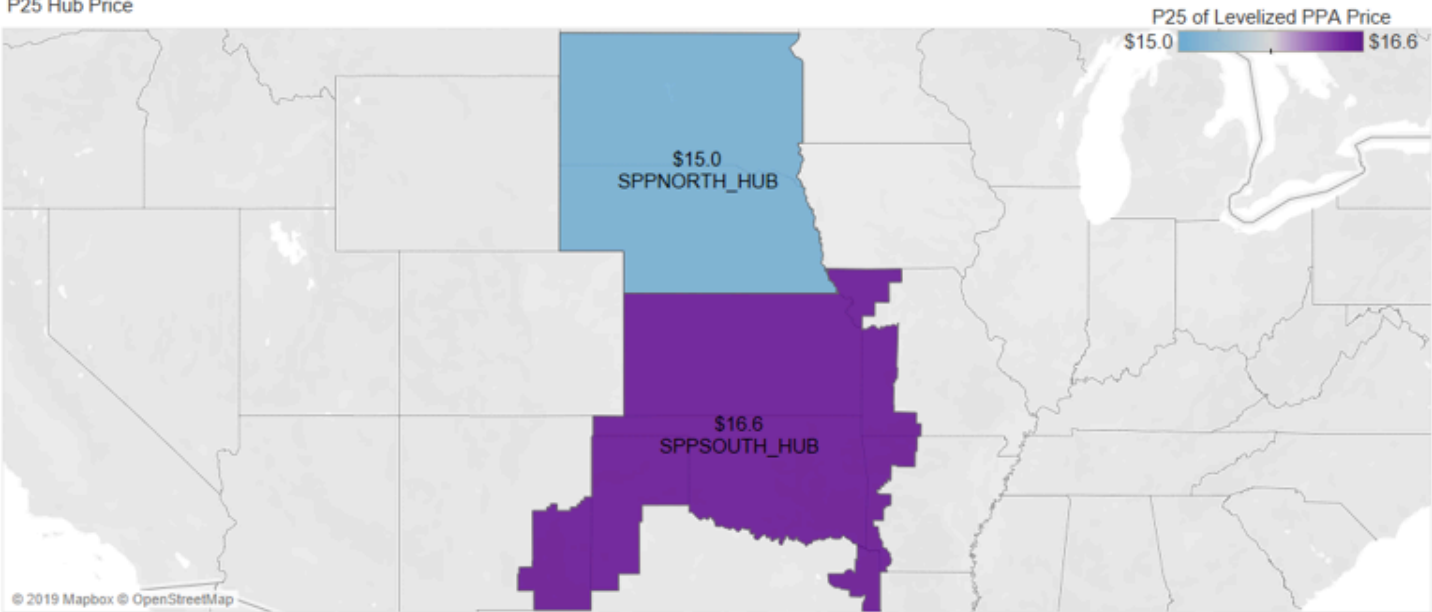


Solar PPA Price by Hub
P25 Hub Price

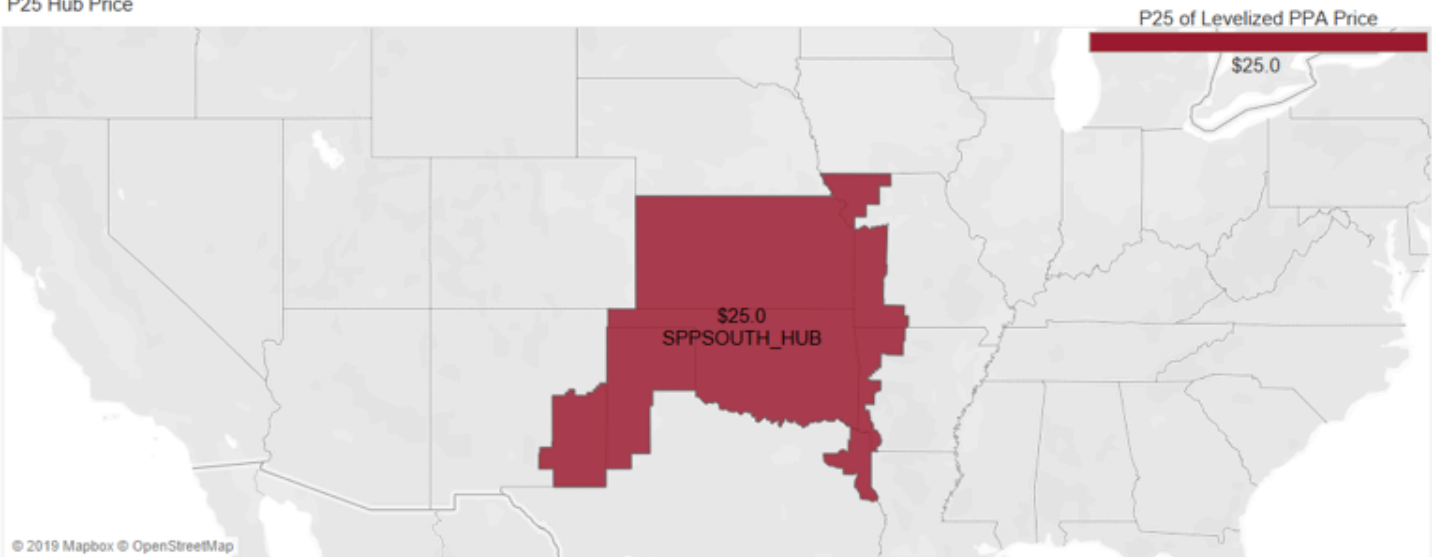


SPP Market Overview

Wind PPA Price by Hub
P25 Hub Price

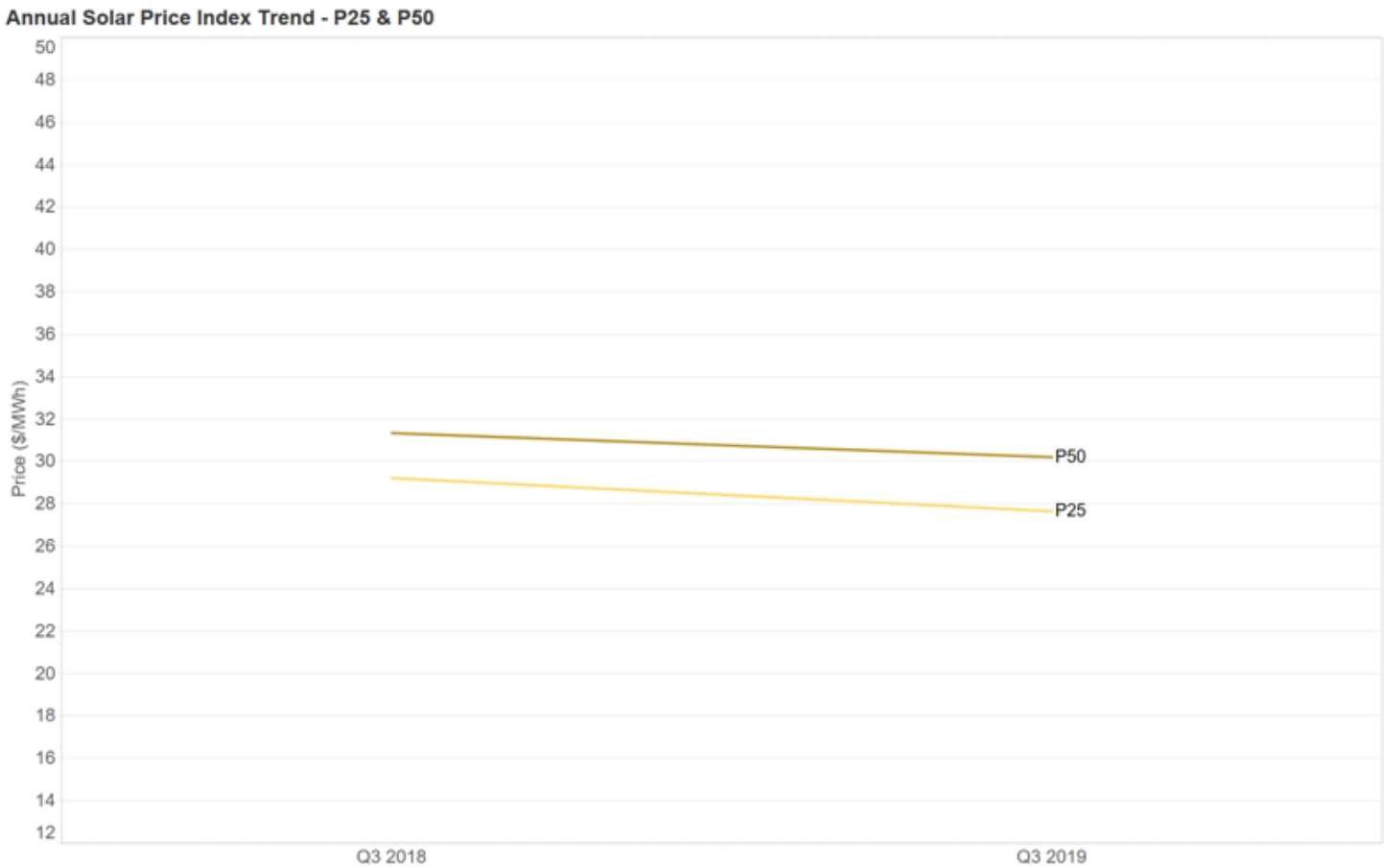


Solar PPA Price by Hub
P25 Hub Price



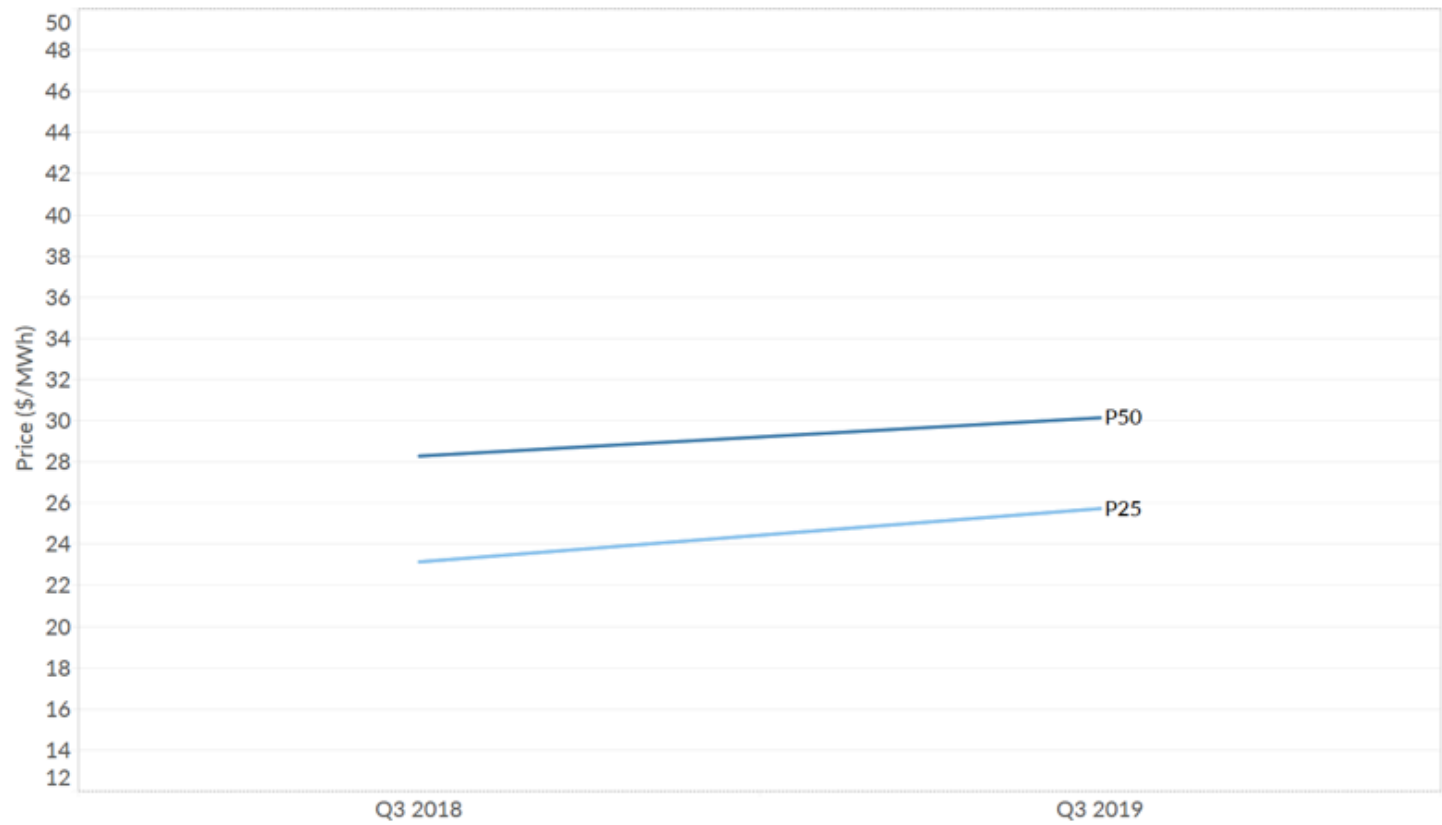
Annual Solar Price Index Trend – Q3 2018 vs. Q3 2019

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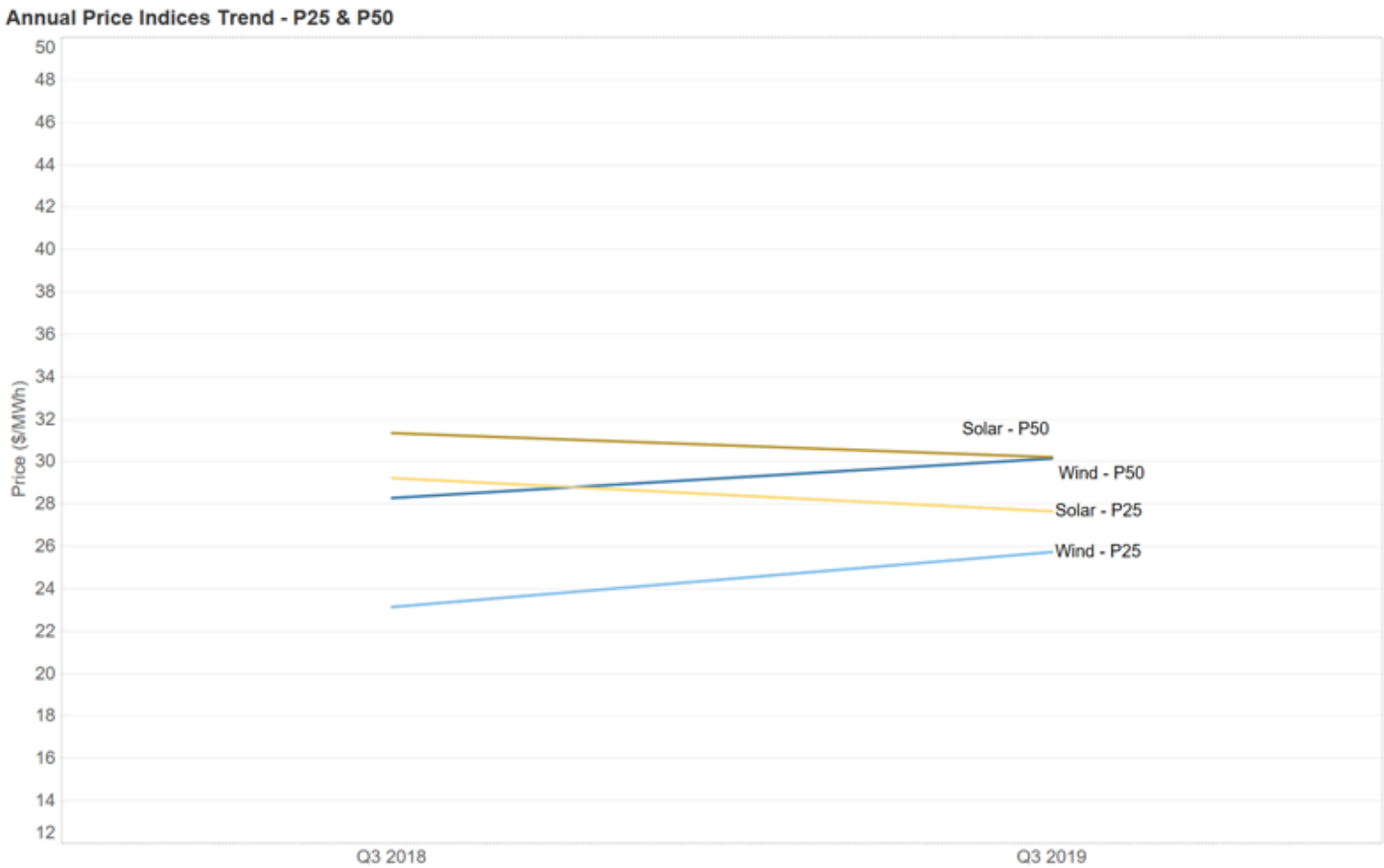
Annual Wind Price Index Trend – Q3 2018 vs. Q3 2019

Annual Wind Price Index Trend - P25 & P50



Annual Wind and Solar Price Indices Trend – Q3 2018 vs. Q3 2019

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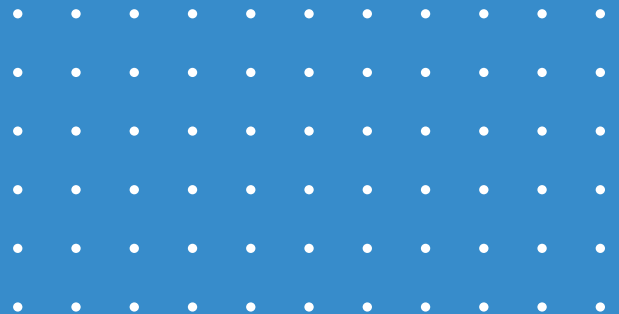




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