

Europe, Q4 2020 LevelTen Energy PPA Price Index





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About the LevelTen Energy PPA Price Index

An Unprecedented Look at the Renewable Energy Market

Each quarter, the LevelTen Energy PPA Price Index reports the prices that wind and solar project developers have offered for power purchase agreements (PPAs) available on the LevelTen Marketplace, the world's largest collection of PPA pricing offers, spanning 21 countries in North America and Europe.

The offers underlying our Index are from projects that are currently under development and posted by developers to the LevelTen Marketplace, giving the industry a transparent and unprecedented look at actual PPA price offers – not estimates of what PPA prices could or should be.

How to Use the LevelTen Energy PPA Price Index

By tracking how the P25 Index changes over time, LevelTen can alert the industry to changes in the market that may make it more or less attractive. We also give the industry a tool to see how macro-level factors, like increased competition or regulatory changes, are impacting renewable PPA prices.

It is critical to remember, however, that price does not equal value. Because PPAs are complex transactions that can't be valued on price alone, the LevelTen Marketplace provides advanced analytics - based on more than a billion data points automatically calculated every day – to give market participants a much deeper understanding of the expected value, and potential risk, of every PPA.

Q4 2020 Methodology

LevelTen Energy PPA Price Index

The offer prices presented below are expressed on a per-megawatt-hour basis within each country, and all offers conform to LevelTen's pricing standards, which include:

- a fixed price over the offer term;
- an as-generated production profile;
- a contract-for-differences structure i.e. virtual PPA or financially settled against a specific market reference price (typically the national country price);
- standardized credit assumptions.

Data are based on PPA prices that assume financial settlement against the hourly Day Ahead wholesale energy market price. We include only flat, as-generated (i.e. unit-contingent) price offers updated within the last 90 days. All prices include the bundled energy attribute certificates (EACs). Prices were offered across a range of project commercial operation dates with contract tenors ranging from 10-15 years. Price data are aggregated and reported in percentile buckets (e.g., "P25" refers to the most competitive 25th percentile offer price).

In Q4 2020, we analyzed data on 293 price offers from 121 renewable energy projects in 15 countries across Europe. We have reported only on countries with offers in the LevelTen Marketplace available to all LevelTen partners and customers; additional projects in other markets are available on the LevelTen Marketplace and through custom requests for proposals.

LevelTen Marketplace Developer Survey

LevelTen conducted an online survey of developers on the LevelTen Marketplace, and received 27 responses from developers with projects in North America and/or Europe.

About LevelTen Energy

To slow the rate of global warming and meet the growing demand for renewable energy, the world needs to rapidly accelerate utilityscale renewable energy project development. Unfortunately, the legacy processes developed to help companies find renewable projects, analyze the financials, or run RFPs are slow, manual, and can't scale at the rate required to meet modern market needs.

LevelTen Energy provides software that enables faster, safer and more efficient transactions for the renewable energy industry, delivering the transaction infrastructure required to accelerate the clean energy economy. LevelTen's platform provides renewable energy advisors, developers, large-scale buyers, and financiers with instant access to the full market of renewable energy projects, on two continents, combined with the automated analytics and technology to get better deals done, faster.

Get Access to the LevelTen Marketplace

Want to see it for yourself? Renewable energy buyers, advisors and developers should email **info@leveltenenergy.com** to schedule a free consultation.

Only LevelTen has:

- The industry's largest renewable PPA marketplace, with more than 4,000 pricing offers in 21 countries;
- Analytics that automatically calculate more than a billion risk and value data points every day for our advisor partners and customers; and
- A modern platform of automation software, developer management, data quality control, and standardized contracts — all to make faster and more efficient renewable energy deals possible, and all presented in a highly intuitive, user-friendly interface.



Contributors



Marvssa Barron

As a member of LevelTen's developer relations team, Maryssa works with developers to upload fresh price offers and the latest project development status updates on the LevelTen Marketplace.



Rob Collier Rob is the VP of Developer Relations, ensuring that renewable energy buyers and advisors have access to fresh supply, and developers receive market intelligence to make strategic business decisions.





Will Jolley

As Director of Technical Sales, Will supports LevelTen's advisor partners and clients, delivering the analysis they need to select a PPA that will meet their goals.



Jessica Johnson Jessica is the VP of Customer Success,

making sure that buyers and advisors are supported through every step in the procurement process.



Chinedu Oputa edge.



Flemming Sørensen Flemming is the VP of Europe, leading LevelTen's expansion across the continent from our European headquarters in Madrid.



Jason Tundermann

As Chief Operating Officer, Jason ensures that our product, analytics, and developer relations teams work in unison to deliver a stellar experience for buyers, developers, and advisors.



deal.

Whitney Johnson

In addition to ensuring all project data is up to date on the LevelTen Marketplace, as a member of the developer relations team Whitney facilitates the RFP process between buyers and project developers.

As an analyst on LevelTen's developer relations team, Chinedu contributes to quarterly market intelligence reports that give participating developers a competitive

Chris Watmore

Chris is the VP of Analytics and is the original author of our PPA Price Index. Chris' team delivers all of the analytics required to select a PPA and avoid a bad

Key Takeaways

COVID did not have a dramatic effect on PPA prices:

- There was not a huge increase in PPA offer prices following the first COVID-related shutdowns.
- The P25 Index for wind PPA offers started at 44,7€ in Q2, jumped up to 48,4€ in Q3, but then dipped slightly to 47,6€ in Q4.
- Solar offer prices dropped from Q2 to Q3, and then dropped again from Q3 to Q4. This is the opposite of what we're seeing in the United States, where solar prices increased every quarter in 2020. This indicates COVID-19 is not the only factor affecting PPA prices; regional market factors are playing an even larger role.

Developers took other actions to overcome COVID-related financial challenges:

- In LevelTen's survey of developers with projects on the LevelTen Marketplace, only 26% of respondents said they increased PPA prices to overcome challenges caused by COVID; 74% didn't select that as an action they took.
- Not all developers increased PPA prices; some took internal measures to maintain competitive PPA prices. 19% of respondents said they downsized operations and overhead, and 11% said they lowered their internal rate of return for projects.

COVID-19 delayed some (but not all) projects:

- In LevelTen's developer survey, 59% of respondents said COVID delayed commercial operation dates, and 41% said it delayed PPA negotiation and execution.
- "COVID required developers to scramble to implement new construction policies to keep their employees and contractors safe, and to work through permitting processes that could no longer take place in-person. Projects slowed to a halt in March, but as developers worked through those challenges, we saw the pace of construction and development increase, and many projects were still able to reach their expected commercial operation dates. On the buy-side, corporations remained committed to executing PPAs, but the process took longer for some. Procurement and finance teams were understandably focused on other priorities when shutdowns began, but as the world adjusted to a new normal, renewable energy transactions picked back up," said Rob Collier, Vice President of Developer Relations, LevelTen Energy.

Government demand for renewables booms:

• More than 40GW of renewable capacity will come to auction in 2021, but the effect on corporate procurement remains to be seen. Years ago, governments paid a premium and took on much of the risk, but now, developers are bidding at or close to wholesale market prices and governments have placed more risk on developers, making government contracts less desirable for developers than in the past. One thing governments do offer, as opposed to many corporates, is creditworthiness.

Industry Insight

Kyle Harrison, Senior Associate, BloombergNEF provided the following insight on this quarter's report.

Wind PPA Offer Prices

"The price distribution for wind projects across Europe emphasizes the importance for companies to lock in contracts sooner rather than later. Corporate procurement in the region has lagged behind other markets, but that could soon change due to a rapid scale-up in sustainability commitment from European companies. Higher quality projects will be the first to go, meaning companies that wait could expect to sign more expensive contracts, even as technology costs continue to come down."

Kyle Harrison, Senior Associate, BloombergNEF

Guarantees of Origin

"In addition to expanding to new markets, the roll-out of the Full Production Disclosure policy will mandate technology-agnostic GO tracking and documentation. This will create a more liquid certificates market in Europe and could give buyers more incentive to purchase GOs to meet their sustainability goals."

Kyle Harrison, Senior Associate, BloombergNEF

Spanish Solar

"Solar PPA prices in Spain are not just among the cheapest in Europe, they're also far more competitive than other markets in the region. Even the high range of solar PPA prices in Spain is cheaper than average forward prices. This paints a bullish outlook for Spain's PPA market moving forward."

Kyle Harrison, Senior Associate, BloombergNEF

Q4 European Market News

Three New Countries Join the AIB

In Europe, the Association of Issuing Bodies (AIB) is responsible for overseeing the distribution of renewable energy Guarantees of Origin (GOs). Issuing bodies in different European countries that wish to partake in the broader European GO market must do so by becoming a member of the AIB's European Energy Certificate System, or EECS. In 2020, several new issuing bodies joined the EECS, bringing the total number of members to 29, representing 26 countries.

Despite the economic tumult caused by the COVID-19 pandemic, in 2020, issuing bodies from three new nations – Slovakia, Portugal, and Serbia – became eligible to have their renewable GOs recognized by the AIB within the EECS framework. Latvia's issuing body, AST, was recognized as an AIB member in October of 2020, although Latvia's membership remains "import-only," and further regulatory standards must be met before AST-issued GOs are recognized as EECS Certificates. Looking forward, both Montenegro and Bulgaria have formally begun the process of joining the AIB.

Membership in the AIB will likely increase demand for renewables in those regions from corporations that are looking to reach their sustainability targets by acquiring GOs through power purchase agreements. <u>According to ECOHZ</u>, Q2 2020 European market demand for renewable generation paired with GOs reached 530 TWh: a 15% increase over 2019, and a new record.

European Governments Plan Auctions for 43GW of Renewables

Europe's ten largest markets are preparing auctions for a combined 42.7GW of renewable capacity to developers in 2021, comprising approximately 13GW of solar and 30GW of onshore and offshore wind capacity. Markets to watch include the UK, which may auction off <u>as much as 17GW</u> of capacity before the end of 2021, according to British consultancy Cornwall Insights, and Spain, where the Spanish government <u>has tendered</u> more than 3GW of capacity as the country's burgeoning solar industry continues to flourish.

How much this will impact corporate PPA buyers is yet to be seen. Before COVID, renewable subsidy programs in Europe were waning, as wind and solar projects became cost-competitive with coal. But now that there's a push to "build back better," political desire to fund renewables has increased once more. With more auctions, there is speculation that public-sector demand will absorb much of the renewable development activity in the near future.

That said, the European renewables industry has grown significantly, and costs have fallen over the past two years, resulting in some developers bidding at — or even below — the wholesale energy market price to secure development rights. Two years ago, a government contract was highly desirable for developers, but now that bids are lower, some developers may choose to work with a corporate instead.

Survey Q1: COVID's Impact on Project Development



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4%

Other (please specify)

Response: Depressed energy prices making it more difficult to find economical offtake

Survey Q2: How Developers Have Responded to COVID-Related Challenges

What measures have you taken to overcome financial challenges caused by COVID? (select all that apply)



Q42020 PPA Price Index



Price Index Comparison by Technology

Quarterly Aggregate Price Indices - P25



Highlights:

- The blended P25 Index, which is a combination of wind and solar in all countries, decreased 1,0€, or 2% quarter over quarter.
- The P25 Index for solar projects decreased 2,7%, to 41,1€ per MWh, compared to 42,3€ in Q3 2020. From Q2 2020, prices are trending down.
- The P25 Index for wind projects decreased 1,7%, to 47,6€ in Q4, however they remain above Q2 prices of 44,7€.

Each Index is for the 25th percentile, or the boundary of the lowest 25% of offer prices from project developers. We prefer to use the P25 Index because it provides a standardized measure for competitive pricing within each geography, while safeguarding sellers' confidential information. In general, we would expect the majority of corporate PPA transactions to occur within this most competitive pricing band, so it represents the most-competitive PPA prices. That said, it is important to highlight that the most competitive Marketplace offers (i.e., the "P1" or market clearing price) can be significantly lower than the P25 Index.

Q4 2020 Solar PPA Offer Prices by Country

Solar PPA Prices by Country

25th Percentile Offer Prices (€/MWh)



In Q4 2020, the P25 indices of PPA price offers for solar projects ranged from 31€ in Denmark to 62€ in Austria.

"Once again, the lowest solar prices in Europe occurred in Denmark and Sweden, which have a high penetration of renewables that keeps the market price of electricity low, therefore lowering PPA price offers," said Flemming Sørensen, Vice President of Europe at LevelTen Energy. "Spain also has low solar prices, on par with Sweden. One reason may be that Spain has a high number of projects under development, driving competition among developers that puts downward pressure on PPA prices."

This quarter Austria had the highest solar prices, which may be related to the country's previous government subsidies, but those will be changing soon. "The Austrian government has an ambitious goal to achieve 100% electricity supply from renewable sources by 2030, and in September it released details on its Renewable Energy Expansion Act, which replaces fixed feed-in tariffs with a sliding market premium, similar to Germany's programme," said Sørensen. "Finding suitable locations for solar projects in Austria will be one challenge to meeting that goal."

Q2 to Q4 2020 Solar P25 Price Indices by Country

Quarterly Country Price Indices - Solar

25th Percentile Offer Prices (€/MWh)



Highlights:

- In most markets, the P25 Index of solar prices remained mostly flat quarter over quarter. The highest percent changes occurred in the UK and Spain.
- The UK saw a 4,7% rise in solar prices from Q3 to Q4. One factor may be the UK government's announcement in November that solar projects may participate in the next auction, in which the government is expected to contract for up to 12GW of new capacity.
- Spain saw a 5,2% drop in solar prices quarter over quarter, • furthering its downward trend. "The Spanish renewables market is benefitting from new government-sponsored auctions, which will contract for roughly 3 GW per year over the next 6 years, with the first round scheduled for January 2021. In addition, the news of a new energy reform bill that includes state-funded PPA credit support of up to 600 million euros is helping reduce risk in Spanish projects, which could lower return requirements and thereby have a downward impact on PPA prices," said Sørensen.

Q4 2020 Wind PPA Offer Prices by Country

Wind PPA Prices by Country

25th Percentile Offer Prices (€/MWh)



In Q4 2020, the P25 Index of PPA prices for wind projects ranged from 30€ in Finland to 91€ in France.

"Resource availability and market dynamics play huge roles in determining PPA offer prices, especially for wind projects, which require more land (in windy places) than solar projects," said Sørensen. "The Nordics will likely continue to have low prices given the windy climate and land availability, whereas France's wind prices are likely to remain high due to the combination of a challenging permitting process, lack of available land for large wind projects, and the government contract-for-difference scheme."

Q3 to Q4 2020 Wind P25 Price Indices by Country

Quarterly Country Price Indices - Wind

25th Percentile Offer Prices (€/MWh)



Highlights:

- The wind P25 Index dropped 4,2% in France and 9,3% in Spain, quarter over quarter, and remained mostly flat in the UK and Finland.
- Over the last two quarters, Spain is the only market trending down for wind offer prices, driven by increased competition and new state-funded support.

Markets with the Highest % of Offers from Developers



This guarter, Italy remains the market with the highest percentage of offers from project developers on the LevelTen Marketplace, with Spain coming in second.

The UK dropped from third place to fourth place with a decline in the number of offers this guarter, while the number of offers in Germany held steady.

"Developers in the UK may have reduced the number of projects available for corporate and institutional off-takers so that they remain available for the new UK auction scheme that is set to run in late 2021." said Sørensen.

Project Sizes

Projects by Power Source



Power Source by Project Size



The majority (80%) of European projects with offers on the LevelTen Marketplace were solar projects.

The median project size for wind offers was 30,0 megawatts (MW), and the median size for solar was 12,9MW. These medians are smaller than in the United States, where we saw a median wind project size of 200MW and median solar project size of 120MW this quarter.

"They say everything is bigger in the U.S. - and this is also true for renewable energy projects. There are many factors that contribute to this. Onshore wind was developed earlier and more rapidly in Europe, so many of the best sites are already occupied. In addition, in recent years there has been significant local resistance to onshore wind farms, which is why policy makers in many regions have restricted their size and moved incentives to offshore wind. This has helped mature the offshore industry to a place where subsidy-free projects are now fully viable in several European countries. Finally, there is generally more land available in the U.S.; the EU is less than half the size geographically and has a higher population," said Sørensen.

PPA Prices by Target Commercial Operation Date

25th Percentile PPA Prices by COD



P25 Index prices for solar projects were highest for those with a commercial operation date (COD) of 2022, coming in at $36 \in$. For wind, the prices of projects with a COD of 2022 was $5 \in$ higher than those with a COD of 2023, coming in at $36 \in$.

Wind projects with a COD of 2021 are not available because of longer development timelines than solar.

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PPA Price Ranges by Technology

PPA Price Distribution by Power Source (€/MWh)



The range between the P10 and P90 Indices for solar projects was €20, and for wind projects it was €61.

"It's important to remember that regional economics play a critical role in determining the value of power purchase agreements, meaning a high-priced project in one country could actually be a better deal than a low-priced project in another. That's why LevelTen calculates over a billion data points a day to give market participants the most comprehensive view of the risk and value of every PPA offered on the Marketplace," said Will Jolley, Director of Technical Sales at LevelTen Energy.

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PPA Term Lengths

The average term length for wind PPAs was 11.2 years, and for solar it was 12.9 years. Last quarter, the average for wind was 10.7 years, and for solar it was 12.7 years.

These averages are shorter than in the United States, where tax equity financing puts upward pressure on PPA tenors (e.g., in Q4 the average term length for U.S. wind PPAs was 13.7 years and for U.S. solar it was 13.5 years).



Europe:

Wind: 11.2 Solar: 12.9

North America:

Wind: 13.7 Solar: 13.5





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