KYOS Energy Analytics

PPA Insights

Price developments in Europe

No 13 • February 2025

KYOS price assessments (2026-2035)

Since our last update in November 2024:
Strong fundamentals together with investment fund positions triggered a rally of EUA prices that marked a 15% increase. European gas storage levels continued that deplete at a fast pace, pushing up gas prices by 8%.

Forward electricity prices followed the move with front-year prices in Germany surging by 11% and Cal-26 Dutch prices rising by 8%. Consequently, our 10-yr renewable captured price forecast has been revised upwards across North-Western European markets.

Western Europe

	Baseload	Solar	Wind onshore
Great Britain	80.0	75.1 (60.0)	60.7 (48.6)
Ireland	79.3	77.5 (62.0)	53.2 (42.6)
Netherlands	82.4	50.0 (40.0)	65.0 (52.0)
Belgium	85.0	58.9 (47.1)	71.7 (57.4)
Germany	79.5	49.1 (39.3)	63.1 (50.5)
France	74.7	55.6 (44.4)	68.3 (54.6)
Switzerland	90.0	70.3 (56.2)	89.8 (71.8)
Austria	87.4	65.0 (52.0)	84.1 (67.3)

Northern Europe

	Baseload	Solar	Wind onshore
Denmark DK1	69.6	52.1 (41.7)	46.1 (36.9)
Denmark DK2	66.9	52.9 (42.3)	39.0 (31.2)
Norway NO1	64.9	53.3 (42.6)	54.9 (43.9)
Norway NO2	56.0	49.0 (39.2)	44.5 (35.6)
Norway NO3	42.7	39.2 (31.4)	25.8 (20.6)
Norway NO4	23.3	25.3 (20.3)	15.4 (12.3)
Norway NO5	57.8	50.5 (40.4)	54.5 (43.6)
Sweden SE1	20.6	22.4 (17.9)	12.9 (10.3)
Sweden SE2	22.9	22.8 (18.3)	14.0 (11.2)
Sweden SE3	66.3	51.0 (40.8)	50.6 (40.5)
Sweden SE4	76.2	55.5 (44.4)	51.9 (41.6)
Finland	60.4	55.9 (44.7)	33.5 (26.8)

KYOS baseload and PPA price assessments (EUR/MWh)

This upward momentum shall not hide another reality: The occurrences of negatively priced hours nearly doubled in most European markets last year. This trend forced PPA negotiators to find new strategies to manage this risk. While the risk of negative prices have traditionally been borne by PPA offtakers, structuring contracts that share this risk is increasingly common.

This is particularly relevant for solar transactions in the German, Dutch and Belgian markets where our 10-yr forecast indicate some of the lowest capture rates and highest number of negative prices.

In the Nordics, wet and mild weather conditions since the start of the winter has built up the hydrological balance, averaging well above normal levels. Since the past 3 months, NO4 spot prices averaged below 10 EUR/MWh, putting additional pressure on forward prices.

As shown in the table on the left, our 10-year price assessments for these regions remain exceptionally low. This implies that for renewable PPAs to be viable, buyers must be willing to pay a premium—despite the fact that the electricity from the grid in these markets is already green. The recent bankruptcy filing of "Better Energy", a solar project developer and PPA provider in Denmark and Sweden, underscores the challenging market conditions.

Note:
The capture prices in brackets include a conservative 20% risk discount, that we believe sellers are willing to give away to secure long-term deals.. The resulting price is an equivalent estimation of the P25 price.

KYOS

PPA Insights
February 2025

KYOS price assessments (2026-2035)

KYOS baseload and PPA price assessments (EUR/MWh)

Spain remains one of the most active market and we have seen more wind transactions than solar lately. A noticeable example is Engie's agreement to offtake electricity over a 10-year period from a 41 MW wind farm over 10 years currently under construction and developed by Altano Energy. Given market conditions, if the seller accepted a 20% risk discount to secure a long-term fixed price, we estimate the transaction to have been concluded at €44.30/MWh.

Wind transactions dominated the market in Italy as well, highlighted for instance with the 10-yr deal reached by the German developer Wpd to supply the LyondellBasel group with a 30 MW wind project in Sicily. We estimate the transaction at 58.80 EUR/MWh.

Note, the Italian government announced at the end of last year the introduction of state guarantees for renewable PPAs (essentially a guarantee that the government will fulfill the obligations of a defaulting party—be it the producer or the buyer) which is a supportive factor for the PPA market.

The share of electricity produced by renewables is generally lower in Central Eastern European markets compared to the rest of the Continent, resulting in higher baseload prices and higher capture rates.

For instance, the solar market in Romania is still nascent with about 1.7 GW installed at the end of the 2024. The current PPA market environment is supporting a fast growth though. The 113 MW Glodenia solar project has been facilitated with OMV Petrom's recent agreement to offtake a share of these volumes from the project developer Dtek. KYOS estimates the deal price at 49.20 EUR/MWh. Other large projects such as the 174 MW park developed Solapro or the 1 GW Dama Solar project provide further PPA opportunity for offtakers.

Note 1: The capture prices in brackets include a conservative 20% risk discount, that we believe sellers are willing to give away to secure long-term deals. The resulting price is an equivalent estimation of the P25 price.

Southern Europe

	Baseload	Solar	Wind onshore
Portugal	67.3	45.9 (36.7)	51.7 (41.3)
Greece	84.0	56.0 (44.8)	76.8 (61.4)
Spain	70.2	46.7 (37.3)	55.4 (44.3)
Italy (NORD)	97.9	84.5 (67.6)	99.6 (79.7)
Italian (CNOR)	97.1	82.8 (66.2)	97.6 (78.1)
Italy (CSUD)	92.5	69.3 (55.4)	91.2 (73.0)
Italian (SUD)	81.0	47.9 (38.4)	71.6 (57.3)
Italy (CALA)	81.7	49.6 (39.7)	74.5 (59.6)
Italy (SARD)	78.3	38.0 (30.4)	68.5 (54.8)
Italy (SICI)	82.1	50.1 (40.1)	73.5 (58.8)

Central-Eastern Europe

	Baseload	Solar	Wind onshore
Czech Rep.	89.6	65.9 (52.7)	84.5 (67.6)
Slovakia	85.3	63.0 (50.4)	79.3 (63.4)
Hungary	84.6	61.9 (49.5)	80.6 (64.5)
Poland	99.4	81.7 (65.4)	89.1 (71.2)
Romania	77.2	61.5 (49.2)	70.4 (56.3)
Bulgaria	100.1	86.7 (69.4)	99.8 (79.9)
Serbia	67.1	59.9 (48.0)	64.2 (51.4)
Croatia	88.1	71.4 (57.1)	84.4 (67.5)
N. Macedonia	86.8	60.8 (48.7)	84.4 (67.6)

KYOS methodology to assess 10-year PPA prices

The diagram below shows the methodology employed by KYOS to assess the development of PPA prices in Europe.

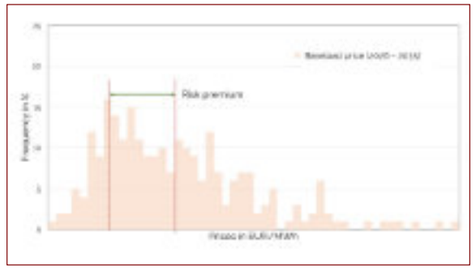
Build power forward curves → We build power forward curves for 40 European market zones. Given the 10-year period, we use our fundamental power market model (KyPF), which calculates power prices using fuel and CO_2 price projections, future electricity demand, renewable generation, storage, interconnection capacities, etc.

Create Monte Carlo simulations → We generate many paths of forward and spot prices around the fundamental power forward curve. Our Monte Carlo simulation model (KySim) captures short-term, long-term and seasonal volatility in forward prices, mean-reversion and regime switches in daily spot prices, and weather-driven volatility in hourly spot prices.

Create renewable generation simulations → We create paths of hourly solar and wind generation for each market. The generation volumes are negatively correlated to the hourly spot prices, in line with annual capture rates estimated by the fundamental model.

Calculate capture prices and risk → We calculate the average 10 year (2026-2035) baseload power price per market, plus the pay-as-produced capture prices for solar and on-shore wind. For the capture prices we show in brackets the 'conservative' P25 levels, using the distribution of potential outcomes (see graph to the right).

Risk premium



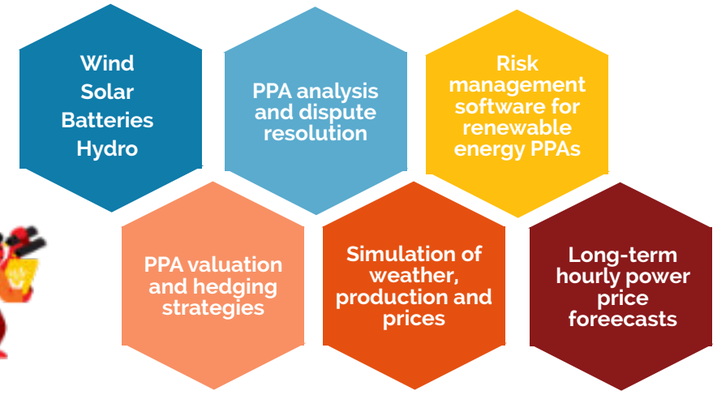
Fixed-price PPAs are often concluded below the long-term capture price forecast. The risk premium is the discount for a fixed-price guarantee on a 10-year PPA. It offers compensation for the buyer to manage fixed-price PPA exposures and costs.

The actual risk premium varies per market, technology, counterpart and PPA structure. In this report, we estimate it at the P25 (lower) level of the distribution of capture prices. We use this estimate across all markets.

KYOS PPA Valuation

PPAs often include complex pricing structures, e.g. price floors, risk sharing elements and specific reconciliation mechanisms. To capture all of this, KYOS offers:

- A fundamental power market model (KyPF) to create long-term electricity price forward curves. This is important given the long duration of many PPAs.
- Software modules to simulate price and volume risks. These are necessary to assess future earnings and hedging strategies.
- The ability to calculate capture rates using historical data, long-term fundamental curves, or user-defined.
- A flexible tool that breaks down PPA valuations into different components (e.g. price risk, cannibalization risk, etc.) With this tool, it is also possible to define own pricing structures.
- The option to evaluate and monitor the risk of one or more PPAs or as part of a larger portfolio, with or without hedging strategies.



KYOS

KYOS Renewable risk management

The KYOS renewable risk management system is part of the KYOS Analytical Platform, a cloud-based software solution. This system provides a complete picture of a renewable power portfolio with PPA contracts and hedges. Reporting includes: volumetric position, mark-to-market value, value-at-risk and earnings-at-risk.

The system also allows users to analyze the effect of applying different hedging strategies to lock-in value of e.g. a specific renewable project.

Strategies range from basic static hedges to advanced stack and roll strategies. If the project is in a market with limited liquidity, our system will show the effectiveness of proxy hedging the exposure in other markets, even by using other commodities than electricity.

We offer five different modules/packages to assess renewable power portfolios:

Advanced	Single project / PPA valuation Monte Carlo simulations	Single project / PPA valuation Monte Carlo simulations
	PFC builder KyCurve or KyPF	PFC builder KyCurve or KyPF
	Price data services - market prices	Price data services - market prices
Intermediate	Forward curves builder KyCurve Market curves	Forward curves buider KyPF Fundamental power curves
	Price data services - market prices	Price data services - market prices
Basic	Price data services - market prices	

Scan for more information

KyPPA

This is just a brief overview of what we can offer you. Have a look at our website **www.kyos.com** for more detailed information.

Do not hesitate to contact us for more information, or a short demonstration: **info@kyos.com**

Head office and European markets:

Nieuwe Gracht 49
2011 ND Haarlem
The Netherlands

E-mail: info@kyos.com
Tel: +31 (0)23 551 02 21

www.kyos.com

Japanese market:

GRANBIZ Tokyo Nihonbashi 5F, 10-5
Nihonbashi 2-chome, Chuo-ku,
Tokyo, 103-0027
Japan

E-mail: info@kyos.jp
Tel: +81-3-6386-8327

www.mpx.co.jp