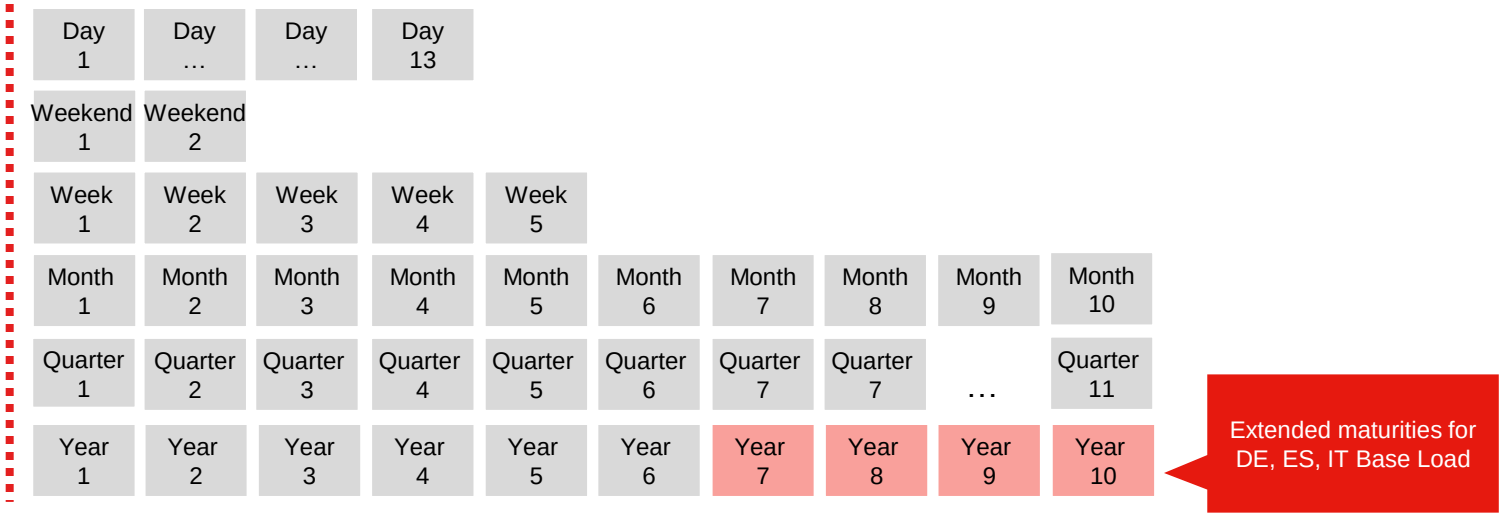
EEX Power Derivatives
PPAs and Long-Term Hedging

part of eex group

EEX Power Derivatives Markets

- The standard Power product setup of EEX comprises financially settled Futures with the following maturities for Base and Peak Load.*
- Each product has as its underlying the Spot index for the respective market (ie. for German power, the day-ahead price for the AMPRION control zone).
- EEX lists Power Futures for **20 European markets**.

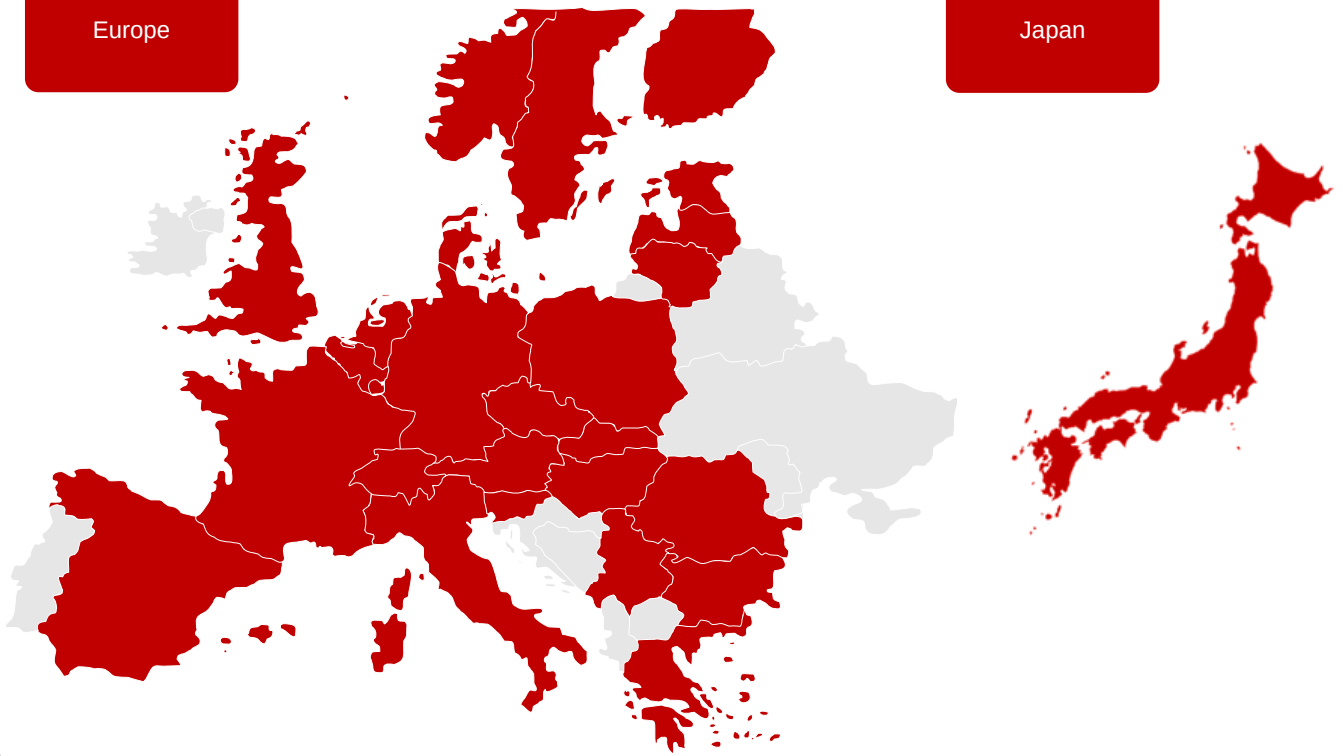


*Available maturities can vary. Please see the EEX website for the full list of markets and products

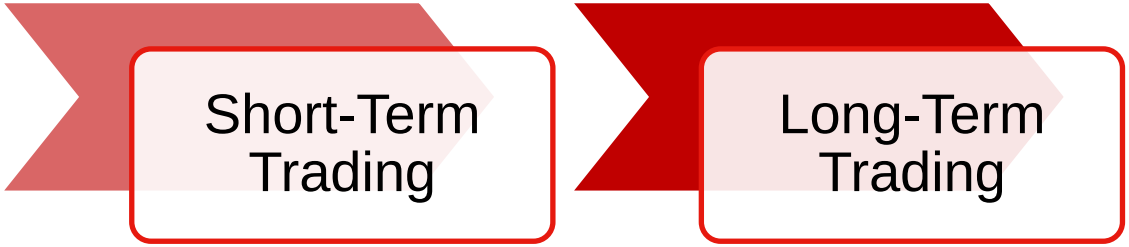
Market Coverage – EEX Power Derivatives

Europe

Japan



Renewables are driving two major trends in Power Derivatives markets



- Demand for hedging volatile short-term positions in individual Days and Weeks

- Demand for hedging long-term Price Risk due to renewable energy Power Purchase Agreements (PPAs)

Role of the Exchange in the PPA Market

Price Transparency

- EEX's market prices provide reliable price references.
- Project developers and buyers of PPAs can assess their valuations against EEX wholesale prices.

Price Risk Management

- Manage power price risk for renewable energy assets.
- Reduce the overall risk exposure for the largest risk element in RE portfolios.

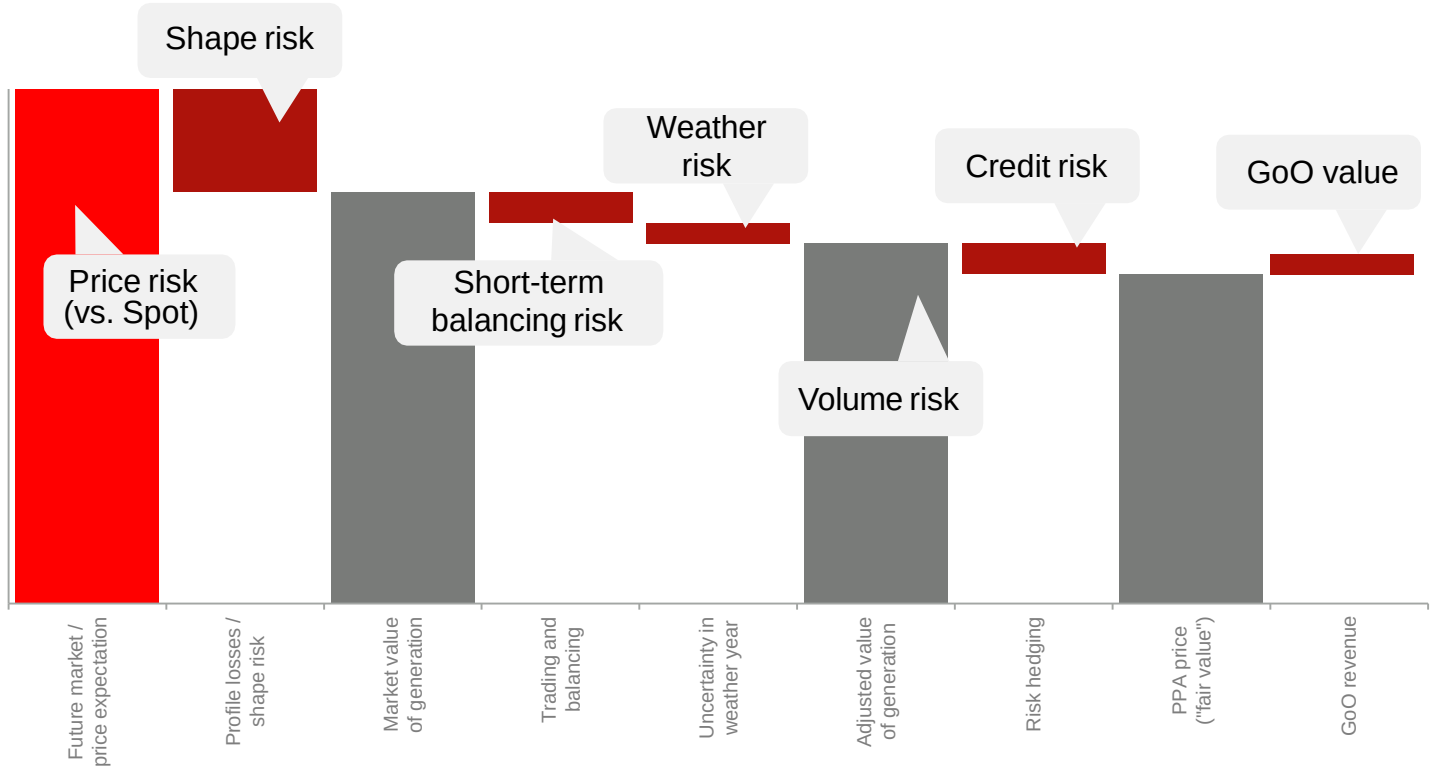
Counterparty Risk Management

- Trading and hedging on EEX alleviates counterparty risk for trading participants.
- This is especially important for long-term risk management.

Enabler of Renewable Energy Growth

- Price and counterparty risk is offloaded onto the clearing house, freeing internal risk capacity within trading participants.
- This enables taking on more PPAs and facilitates growth of renewable energy capacity in Europe.

Price Risk is the most important risk factor in a PPA



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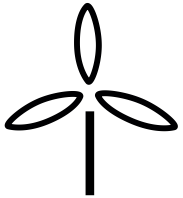
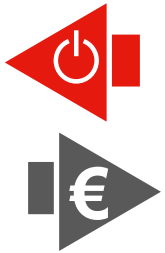
Source: Enervis Energy Advisors GmbH

How are EEX Members active in PPAs?

EEX Members and RE Developers sell Power via Long-Term PPAs





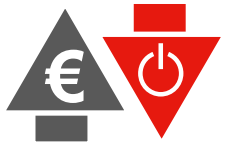
EEX Members buy Power via Long-Term PPAs and build RE assets

EEX Members provide balancing services on Spot & hedge via Futures

epexspot

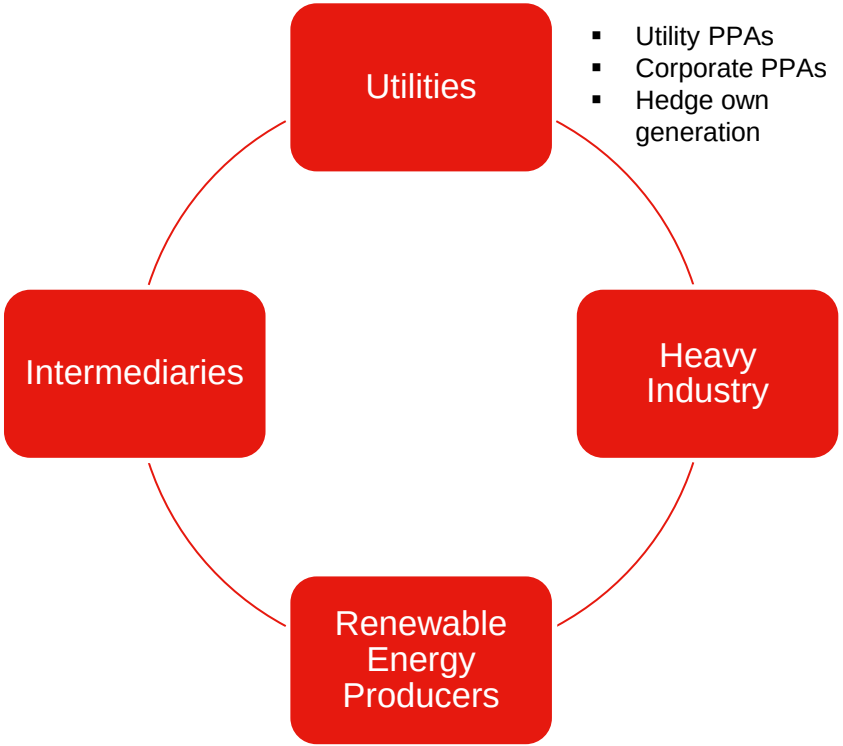
eex

Banks provide financing once PPA is in place



EEX Members sell Power via LT Corporate PPAs

Who are the PPA Hedgers on EEX?



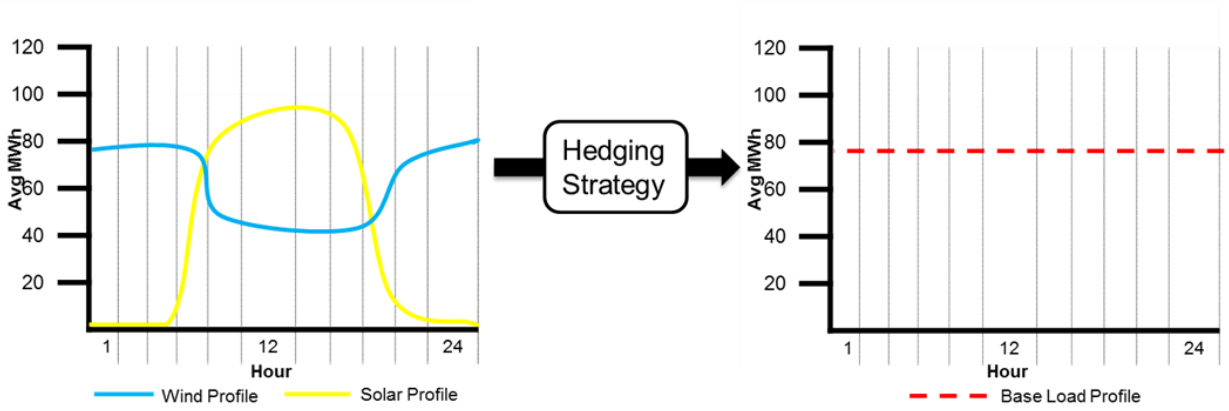
- Utility PPAs
- Corporate PPAs
- Hedge own generation

- Oil, aluminium, large industrial consumers
- Offtakers of RE to power industrial sites

- Solar IPP hedging PPAs

- Banks providing access to market for Renewable Energy developers
- Market players offering hedging services

Managing Renewable Energy Price Risk with Base Futures requires a Hedging Strategy



- Base Futures are a **best-fit product** and attract the most liquidity, creating a **strong price signal** and opportunities for trading at fair market prices
- To use the Base Futures to manage the risk of a wind or solar profile, a **Hedging Strategy needs to be designed** to translate the variable generation profile into a constant Base load profile
- Different Hedging Strategies can be employed, such as a **value-neutral hedge**

Development of Long -Term Hedging at EEX

May 2018	First long-term PPA hedge registered up to Cal+6 in Spanish Power
June 2018	First long-term PPA hedge registered up to Cal+6 in German Power
April 2020	Sonnedix becomes a member of EEX, first solar IPP
September 2021	Cal+10 goes live for German, Spanish and Italian Power Spanish regulatory intervention / gas price cap
February 2022	Russia – Ukraine war; 4 long-term deals registered in 2022 to Cal+5
April 2023	First Cal+1 to Cal+10 deals registered in Spanish Power, totalling 3.2 TWh First 8-year strip to Cal+10 registered in Italian Power
December 2023	28 long-term deals registered in Spanish and Italian Power in 2023, totalling 6.22 TWh
May 2024	First Cal+1 to Cal+10 deal registered in Italian Power

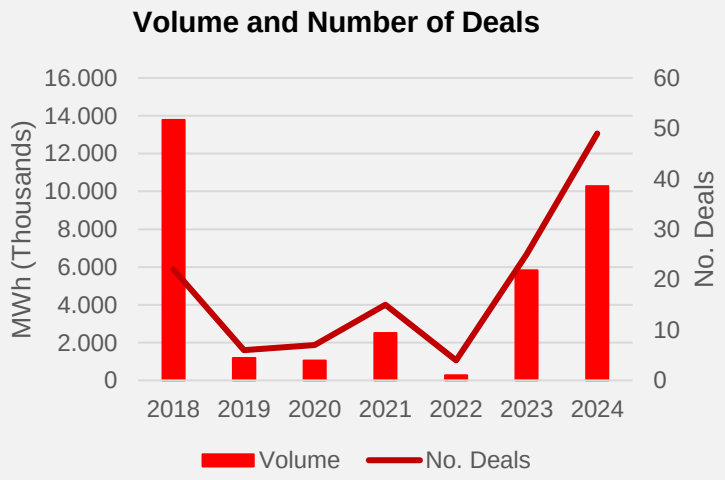
Long-term hedging in Spanish Power (1/2)

Since 2018, 127 Long-Term deals up to CAL+10 reaching > 33.5 TWh

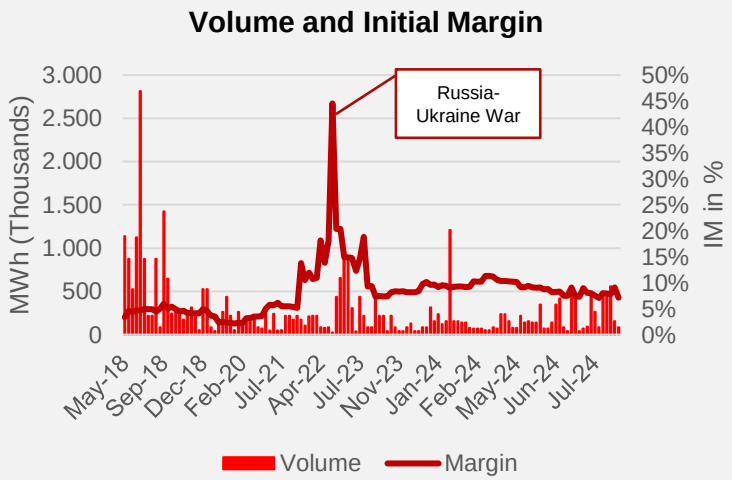
	Trade Date m/y	Product	Trade Price	Traded Volume in MWh	Initial Margin in % of Notional Value
1	5/2018	Q3 up to Cal24 (20 lots)	48.75 €	1,139,760	3.38%
…					
39	6/2021	Q+3, Cal22 to Cal26 (5 lots)	53.50 €	241,200	5.65%
…					
124	7/2024	Aug24 up to Cal29 (10 lots)	63.27€	474,960	7.96%
125	8/2024	Sep24 up to Cal29 (12 lots)	65.30€	561,024	7.84%
126	8/2024	Cal32 up to Cal34 (6 lots)	Variable	157,824	9.12%
127	8/2024	Cal25 up to Cal29 (2 lots)	61.60 €	87,696	7.14%

Total Trade Volume in MWh 33,611,712

Long-term hedging in Spanish Power (2/2)



- Cal+10 went live in H2 2021, however long-term hedging stagnated due to the energy crisis in 2022
- In 2023 deal flow and volumes rebounded in line with recovery of EU power markets
- 2024 YTD deal flow has already doubled that of 2023



- Initial margin values reflect recent volatility and have therefore reduced in line with return to stability in European power markets.
- Stable IM levels contributed to renewed growth and interest in long-term hedging.

Example: Long-Term Hedge in Spanish Power

Trade Date	Product	Expiry Year	Trade Price	Lots	Initial Margin per Contract	Trade Volume (in MWh)
05/02/2024	Spanish Power Base Year	2025	54.20 €	1	64,826 €	8,784
05/02/2024	Spanish Power Base Year	2026	54.20 €	1	41,785 €	8,760
05/02/2024	Spanish Power Base Year	2027	54.20 €	1	42,223 €	8,760
05/02/2024	Spanish Power Base Year	2028	54.20 €	1	56,940 €	8,760
05/02/2024	Spanish Power Base Year	2029	54.20 €	1	61,224 €	8,784
05/02/2024	Spanish Power Base Year	2030	54.20 €	1	51,596 €	8,760
05/02/2024	Spanish Power Base Year	2031	54.20 €	1	52,034 €	8,760
05/02/2024	Spanish Power Base Year	2032	54.20 €	1	52,034 €	8,760
05/02/2024	Spanish Power Base Year	2033	54.20 €	1	51,913 €	8,784
					525,996 €	**87,672**
				Initial Margin in % of Notional Value		**9.80%**

- The trading and clearing fees for this deal amounts to 1095 EUR per counterparty.
- Market participants benefit from counterparty credit risk especially for long-term hedging.

*Check daily values "Scanning Ranges" from ECC Reports & Files: https://www.ecc.de/en/risk-management/reports-and-files
**ECC Acceptable Collateral: https://www.ecc.de/en/risk-management/acceptable-collateral

Long-term hedging in Italian Power

Since 2024, 10 Long-Term deals up to CAL+10 reaching 0.7 TWh

Trade Date m/y	Product	Trade Price	Traded Volume in MWh	Initial Margin in % of Notional Value
01/2024	Cal 26 up to Cal 33 (1 lot)	74.90 €	70,128	**7.64%**
03/2024	Cal 26 up to Cal 33 (1 lot)	Variable	70,128	**7.21%**
03/2024	Cal 26 up to Cal 33 (2 lots)	Variable	140,256	**7.21%**
03/2024	Cal 26 up to Cal 33 (1 lot)	Variable	70,128	**6.91%**
03/2024	Cal 26 up to Cal 33 (1 lot)	Variable	70,128	**6.92%**
03/2024	Cal 26 up to Cal 33 (1 lot)	Variable	70,128	**6.87%**
03/2024	Cal 26 up to Cal 33 (1 lot)	Variable	70,128	**6.83%**
04/2024	Cal 26 up to Cal 33 (1 lot)	Variable	70,128	**6.69%**
05/2024	Cal 25 up to Cal 34 (1 lot)	78.00 €	87.648	**7.28%**
07/2024	Cal 27 up to Cal 29 (1 lot)	Variable	26.304	**5.36%**

May' 2024 - First **Cal+10 deal** registered in Italian Power

Long-term hedging in German Power

Since 2024, 10 Long-Term deals up to CAL+10 reaching 1 TWh

Trade Date m/y	Product	Trade Price	Traded Volume in MWh	Initial Margin in % of Notional Value
06/2024	Cal27 up to Cal31 (5 lots)	Variable	219,240	**7.48%**
07/2024	Cal29 up to Cal32 (2 lots)	Variable	70,128	**6.90%**
07/2024	Cal28 up to Cal32 (2 lots)	Variable	87,696	**6.98%**
07/2024	Cal28 up to Cal32 (1 lot)	68.70€	43,848	**6.77%**
07/2024	Cal27 up to Cal32 (2 lots)	Variable	105,216	**7.02%**
07/2024	Cal27 up to Cal32 (1 lots)	Variable	52,608	**7.46%**
07/2024	Cal27 up to Cal32 (2 lots)	Variable	105,216	**7.47%**
07/2024	Cal29 up to Cal32 (2 lots)	Variable	70,128	**6.99%**
07/2024	Cal27 up to Cal32 (2 lots)	Variable	105,216	**6.93%**
07/2024	Cal27 up to Cal32 (2 lots)	Variable	105,216	**6.93%**

Settlement Process for Long-Term Expiries

Establishing daily settlement prices to Cal+10 is done through a methodology combining regular Fair Value calibration and a pricing model.

Fair Value Market Survey

- **Bi-Weekly Market Survey** of trading members providing their Fair Values of the curve to Cal+10 for the German, Italian and Spanish Base Load Calendar contracts.

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Daily Settlement Methodology

- On days where there is no market survey, trade or order book pricing information in the respective contracts during the settlement price window:
  - A **pricing model** based on an algorithmic extrapolation of real market prices in near-term expiries is used to establish settlement prices.

If you would like to participate in the market survey, please contact the **EEX Market Operations Team**:
T +49 341 2156-222, trading@eex.com

EEX publishes a daily price curve for the next 10 years for DE, ES and IT Power

German Power Base 27.08.2024

Future	Last Price	Last Volume	Settlement Price	Volume Exchange	Volume Trade Registration	Open Interest
Cal-25	97.60	8,760	97.45	3,714,240	3,311,280	86,829
Cal-26	88.40	8,760	88.39	490,560	3,652,920	22,418
Cal-27	77.40	8,760	77.42	324,120	578,160	7,817
Cal-28	73.40	8,784	73.12	17,568	404,064	904
Cal-29	-	0	72.10	0	0	138
Cal-30	-	0	70.71	0	0	74
Cal-31	-	0	71.34	0	0	61
Cal-32	-	0	69.78	0	0	52
Cal-33	-	0	70.28	0	0	23
Cal-34	-	0	69.98	0	0	0

Backwardation

https://www.eex.com/en/market-data/power/futures

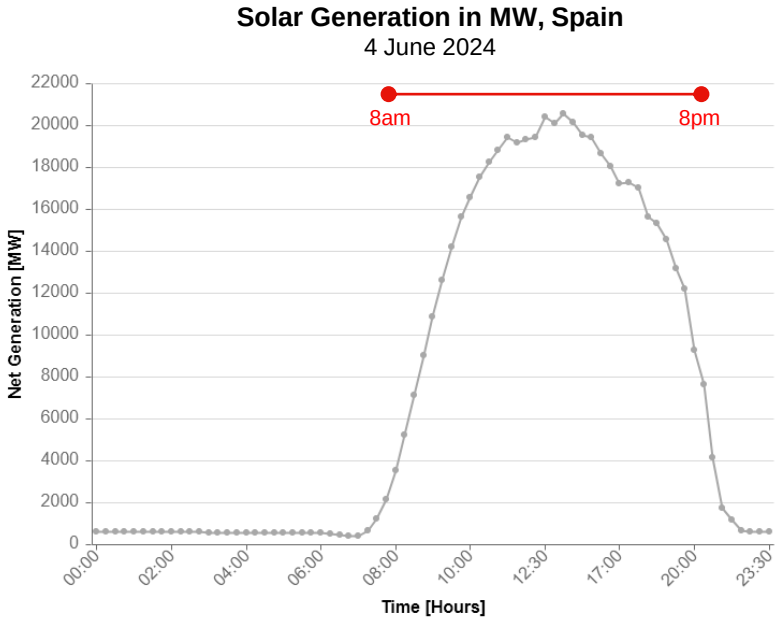
6 weeks historical data available online

Coming soon: Spanish Mon-Sun Peak Future

Purpose of Peak Products
- Originally designed to hedge price exposure during peak demand times.
- Traditionally focused on high electricity consumption periods, primarily Mon-Fri.

Shift in Hedging Demand
- Growing need to hedge price risk for solar power assets.
- Solar power production needs a different hedging approach due to its continuous nature.

Spanish Mon-Sun Peak Future
- Aimed to address solar power hedgers' needs.
- Encompasses a full week's power production during 8am-8pm.
- Reflects continuous solar power generation, not limited to weekdays.
- The high prevalence of solar power in Spain makes it an ideal test market for the new Peak products, which can be extended to other markets.
- Maturities will be offered from **Days to Calendars**



Source: ENTSO-E Transparency Platform

Planned for Q1 2025

Thank you

For any questions, please contact:
sales@eex.com

Or visit our dedicated website at:
https://www.eex.com/en/markets/power/power-purchase-agreements-hedging