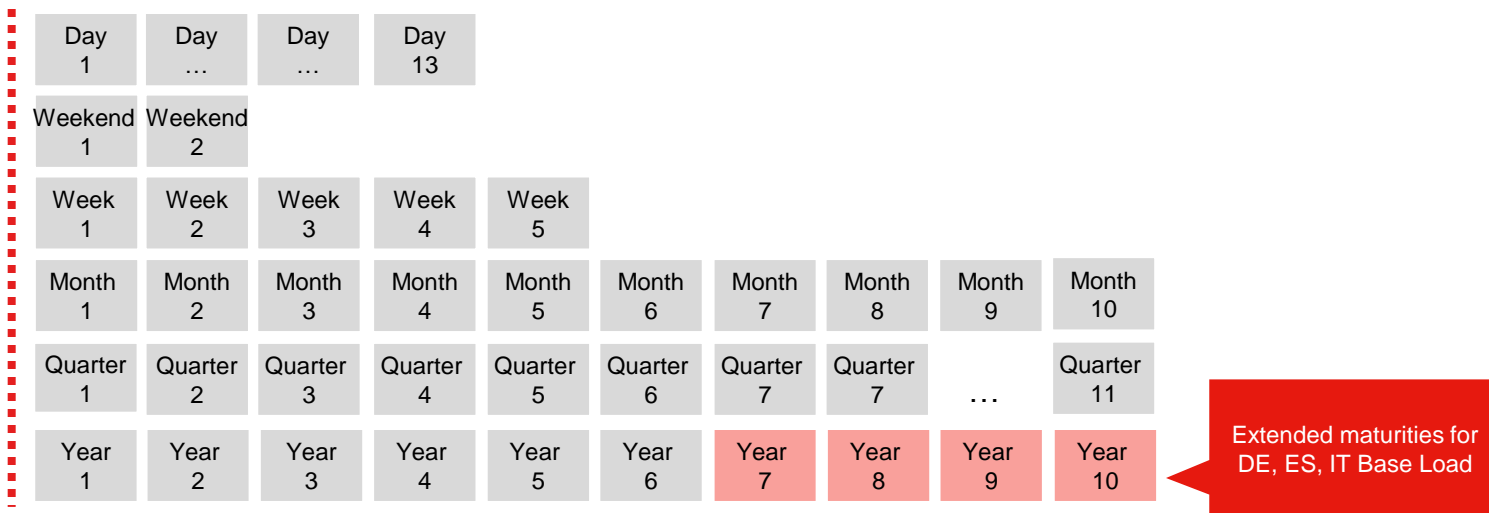


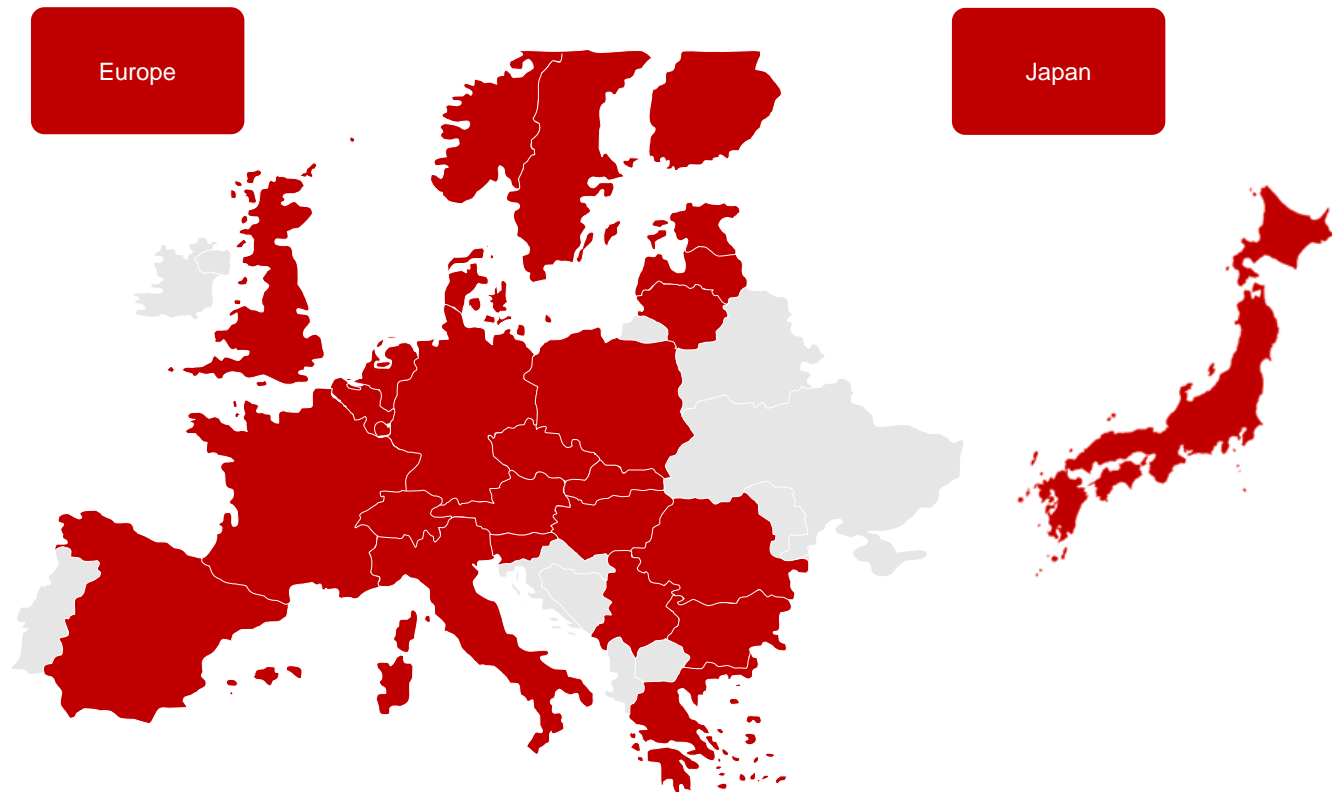
EEX Power Derivatives PPAs and Long-Term Hedging

EEX Power Derivatives Markets

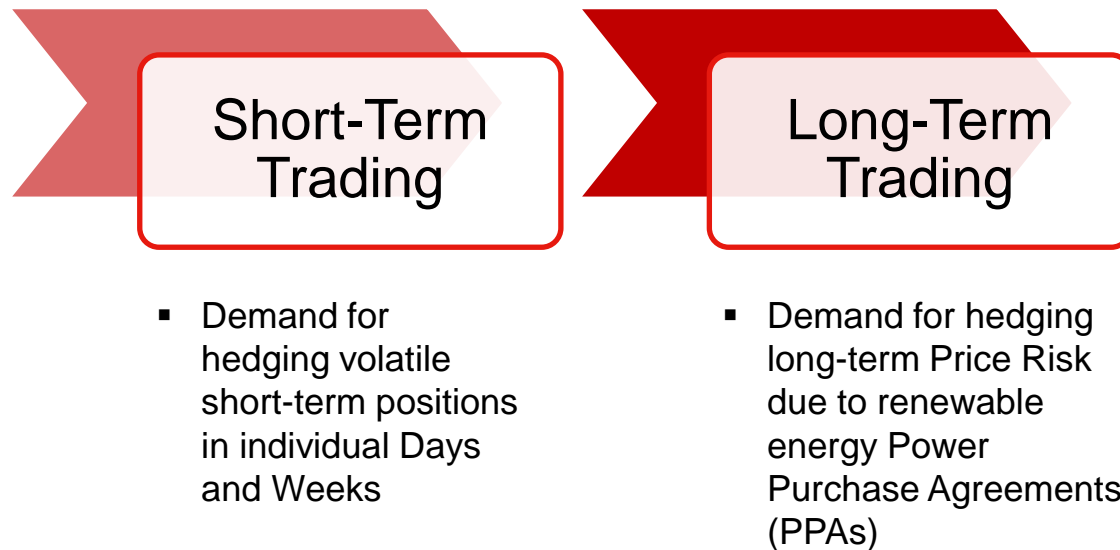
- The standard Power product setup of EEX comprises financially settled Futures with the following maturities for Base and Peak Load.*
- Each product has as its underlying the Spot index for the respective market (ie. for German power, the day-ahead price for the AMPRION control zone).
- EEX lists Power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



Market Coverage – EEX Power Derivatives



Renewables are driving two major trends in Power Derivatives markets



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.

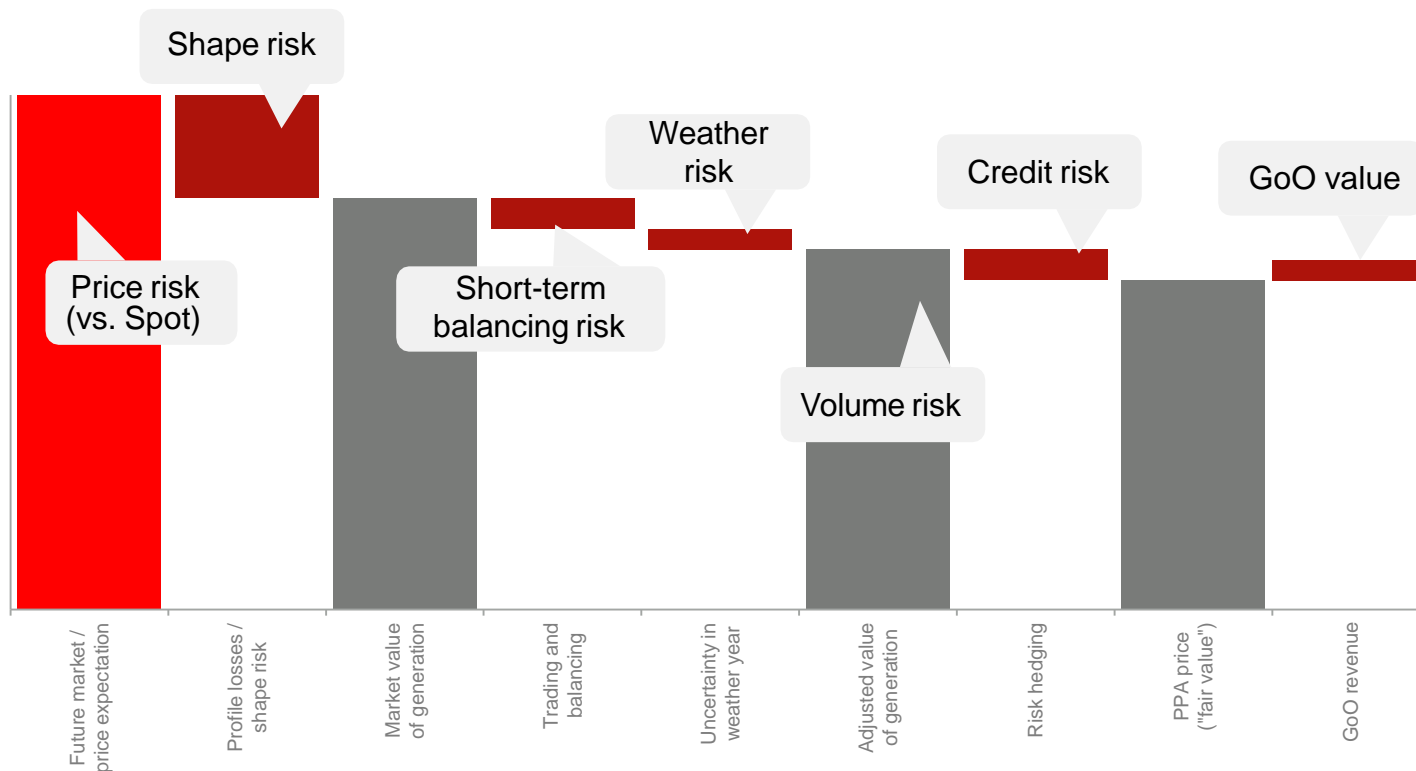
Counterparty Risk Management

- 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

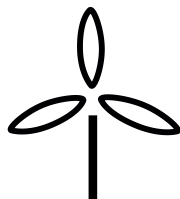
- Price and counterparty risk is offloaded onto the clearing house, freeing internal risk capacity within trading participants.
- This enables taking on more PPAs and facilitates growth of renewable energy capacity in Europe.

Price Risk is the most important risk factor in a PPA



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

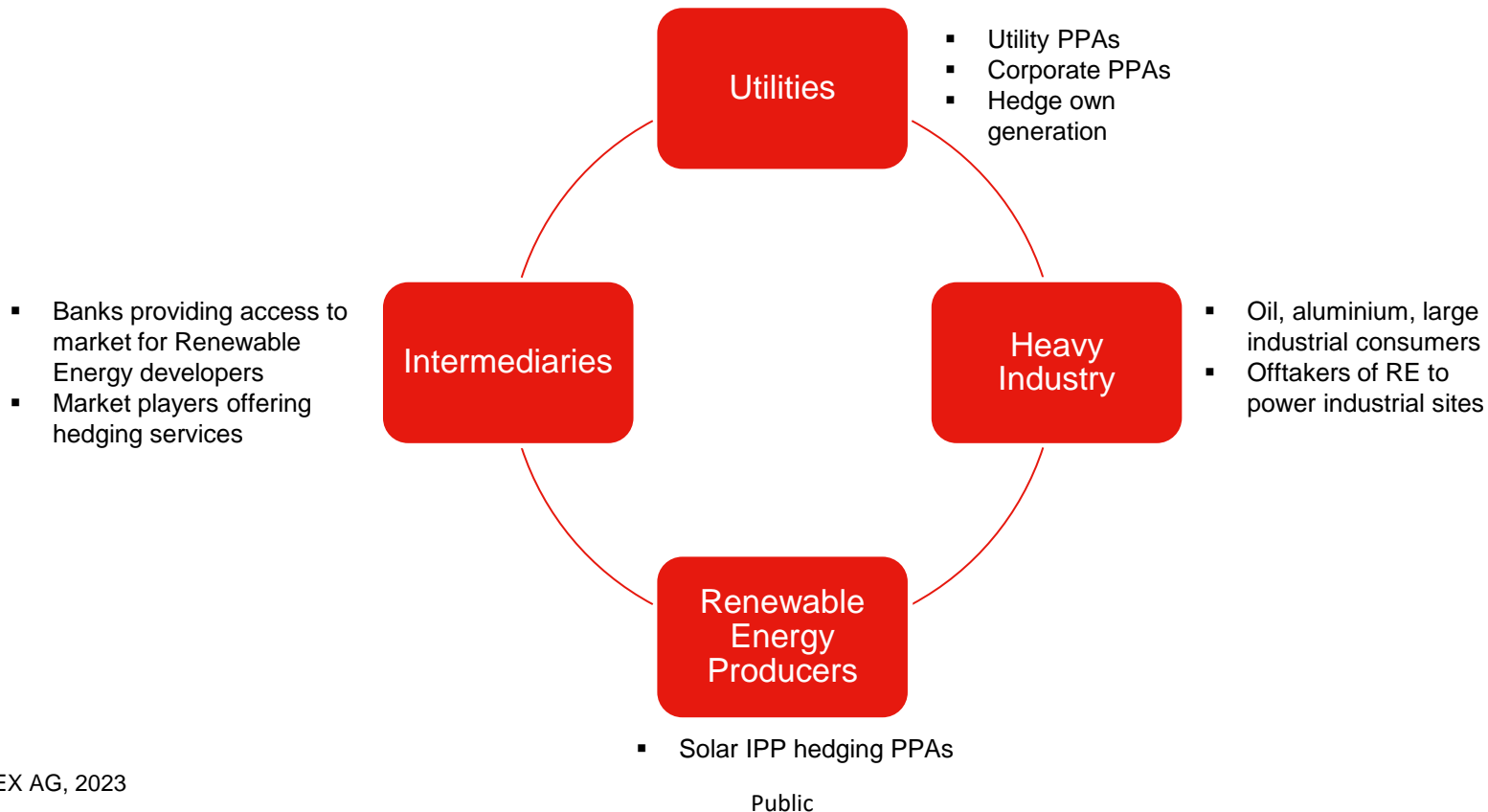
Banks provide financing
once PPA is in place



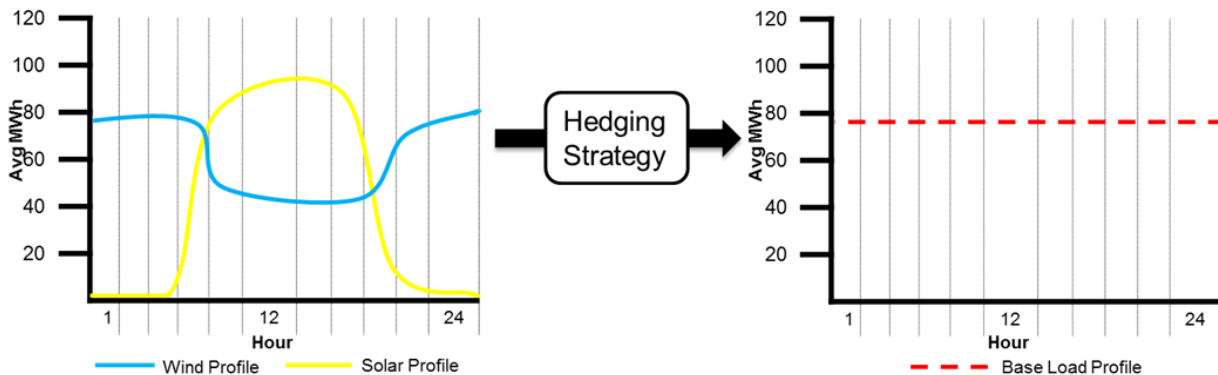
EEX Members sell Power
via LT Corporate PPAs



Who are the PPA Hedgers on EEX?



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**

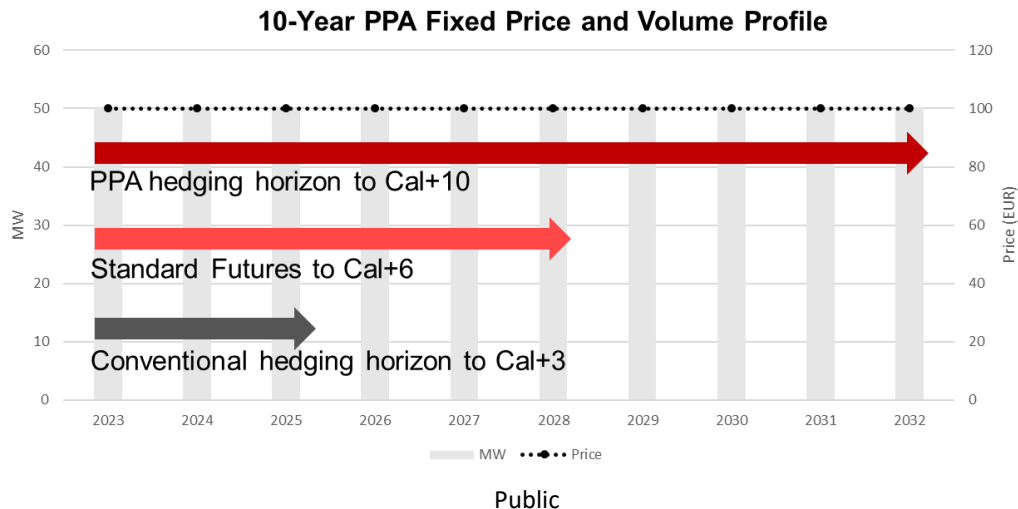
Development of PPA Hedging at EEX



| | |
|----------------|---|
| 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 |
| June 2021 | 51 long-term deals registered in Spanish Power, totalling 18.3 TWh |
| September 2021 | Spanish regulatory intervention / gas price cap Cal+10 goes live for German, Spanish and Italian Power |
| 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 |

Cal+10 Trading in German, Spanish and Italian Power

- EEX **extended Yearly Futures to Cal+10 on 27 September 2021** in markets with high potential of PPA activity: **Spain, Germany and Italy**, to facilitate long-term hedging and more PPA development.
- A settlement price curve to Cal+10 is published daily for all three markets, bringing more **price transparency** to PPAs and renewable energy asset valuations.
- PPA players can benefit from **long-term price risk hedging** and **counterparty risk management** by the ECC.



Long-term hedging in Spanish Power



Since 2018, **69** Long-Term deals up to CAL+10 reaching **> 23 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% |
| ... | | | | | |
| 37 | 4/2021 | M+2, Q+2, Cal 22 to Cal 27 (5 lots) | 46.15 | 292,320 | 5.01% |
| ... | | | | | |
| 66 | 11/2023 | Cal 24 up to Cal 28 (5 lots) | 78.20 € | 219,240 | 7.43% |
| 67 | 11/2023 | Cal 24 up to Cal 28 (5 lots) | 78.40 € | 219,240 | 7.41% |
| 68 | 11/2023 | Cal 24 up to Cal 28 (1 lot) | 78.40 € | 43,848 | 7.41% |
| 69 | 11/2023 | Cal 24 up to Cal 28 (5 lots) | 77.45 € | 219,240 | 8.16% |

Total Trade Volume in MWh 23,981,424

Example: Long-Term Hedge in Spanish Power

| Trade Date | Product | Expiry Year | Expiry Month | Trade Price | Initial Margin per Contract | Lots | Initial Margin (in EUR) | Trade Volume (in MWh) |
|--|-------------------------|-------------|--------------|-------------|-----------------------------|------|-------------------------|-----------------------|
| 9/29/2023 | Spanish Power Base Year | 2024 | 1 | 60.70 € | 75,806 € | 1 | 75,806 € | 8,760 |
| 9/29/2023 | Spanish Power Base Year | 2025 | 1 | 60.70 € | 42,661 € | 1 | 42,661 € | 8,760 |
| 9/29/2023 | Spanish Power Base Year | 2026 | 1 | 60.70 € | 44,501 € | 1 | 44,501 € | 8,760 |
| 9/29/2023 | Spanish Power Base Year | 2027 | 1 | 60.70 € | 44,588 € | 1 | 44,588 € | 8,760 |
| 9/29/2023 | Spanish Power Base Year | 2028 | 1 | 60.70 € | 43,920 € | 1 | 43,920 € | 8,760 |
| 9/29/2023 | Spanish Power Base Year | 2029 | 1 | 60.70 € | 46,778 € | 1 | 46,778 € | 8,760 |
| 9/29/2023 | Spanish Power Base Year | 2030 | 1 | 60.70 € | 49,406 € | 1 | 49,406 € | 8,760 |
| 9/29/2023 | Spanish Power Base Year | 2031 | 1 | 60.70 € | 49,406 € | 1 | 49,406 € | 8,760 |
| 9/29/2023 | Spanish Power Base Year | 2032 | 1 | 60.70 € | 49,717 € | 1 | 49,717 € | 8,760 |
| 9/29/2023 | Spanish Power Base Year | 2033 | 1 | 60.70 € | 49,844 € | 1 | 49,844 € | 8,760 |
| | | | | | | | 496,627 € | 87,600 |
| Initial Margin in % of Notional Value | | | | | | | | 9.34% |

- Initial Margin requirements are stabilising following the energy crisis.
- 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>

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

+

Daily Settlement
Methodology

- **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.
- 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

Base German Power 08.12.2023

| Future | Last Price | Last Volume | Settlement Price | Volume Exchange | Volume Trade Registration | Open Interest |
|--------|------------|-------------|------------------|-----------------|---------------------------|---------------|
| Cal-24 | 97.01 | 8,784 | 96.66 | 3,214,944 | 2,415,600 | 102,846 |
| Cal-25 | 97.21 | 8,760 | 97.07 | 1,068,720 | 586,920 | 27,187 |
| Cal-26 | 91.15 | 8,760 | 91.06 | 254,040 | 543,120 | 7,146 |
| Cal-27 | 86.00 | 8,760 | 85.85 | 61,320 | 87,600 | 1,318 |
| Cal-28 | - | - | 76.78 | 0 | 87,840 | 203 |
| Cal-29 | - | - | 73.62 | - | - | 23 |
| Cal-30 | - | - | 71.98 | - | - | 7 |
| Cal-31 | - | - | 71.59 | - | - | 2 |
| Cal-32 | - | - | 70.49 | 0 | 131,760 | 17 |
| Cal-33 | - | - | 69.69 | - | - | 0 |

Backwardation

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

6 weeks historical data
available online

Thank you

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European Power Derivatives

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