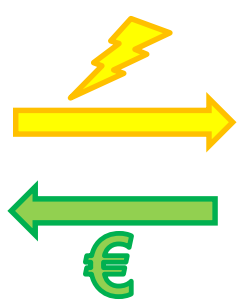
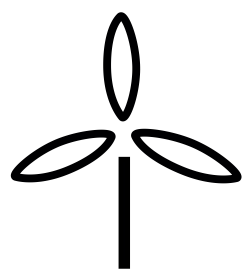


EEX Group Workshop
Renewable Energy and PPAs:
Hedging with EEX Power Futures

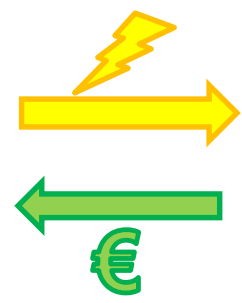
Speaker: Viviana Ciancibello | EEX
27 June 2019

How are EEX Members active in PPAs?

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



Banks provide financing once PPA is in place



EEX Members sell Power from their own RE assets via LT Corporate PPAs



Example: 23rd Long-Term hedge on Spanish Power cleared on 10.01.19

Trade Date	Product	Expiry Year	Expiry Month	Trade Price	Initial Margin per Contract	Lots (MW)	Initial Margin (in EUR)	Trade Volume (in MWh)	Notional Value
10/01/2019	Spanish Power Base Month	2019	2	52.54 €	2,903 €	2	5,806 €	1,344	70,614 €
	Spanish Power Base Month	2019	3	52.54 €	2,608 €	2	5,216 €	1,488	78,180 €
	Spanish Power Base Quarter	2019	4	52.54 €	6,880 €	2	13,759 €	4,368	229,495 €
	Spanish Power Base Quarter	2019	7	52.54 €	7,264 €	2	14,529 €	4,416	232,017 €
	Spanish Power Base Quarter	2019	10	52.54 €	6,163 €	2	12,326 €	4,416	232,017 €
	Spanish Power Base Year	2020	12	52.54 €	15,196 €	2	30,393 €	17,568	923,023 €
	Spanish Power Base Year	2021	12	52.54 €	13,140 €	2	26,280 €	17,520	920,501 €
	Spanish Power Base Year	2022	12	52.54 €	11,826 €	2	23,652 €	17,520	920,501 €
	Spanish Power Base Year	2023	12	52.54 €	17,958 €	2	35,916 €	17,520	920,501 €
								167,877 €	86,160
							Initial Margin in % of Notional Value		3.71%

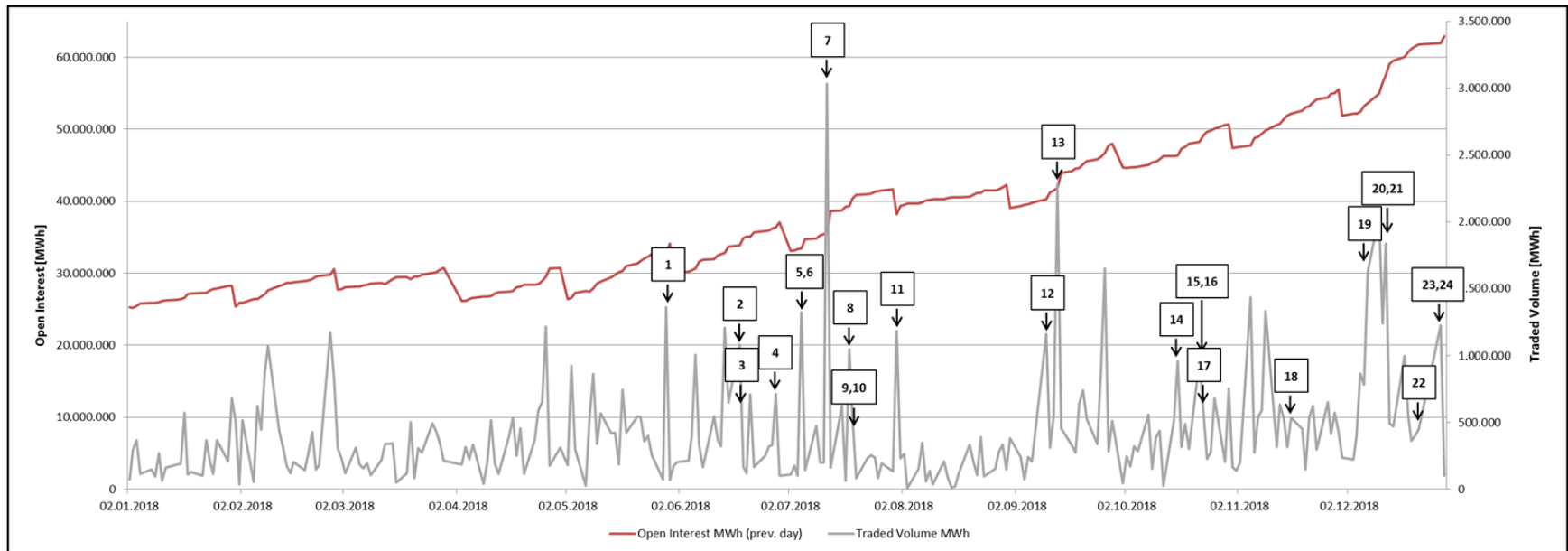
- A 2 MW long-term hedge was cleared in Spanish Power on 10 January 2019, with an **initial margin requirement of 167,877 EUR**
- The **execution price of each trade** was **52.54 EUR**
- The **Initial Margin percentage** of the notional value of the trade was **3.71%**

Long-term Hedges on Spanish Power Derivatives

	Trade Date	Product	Trade Price	Lots	Trade Volume in MWh	Notional Value in €	Initial Margin in €	Initial Margin in % of Notional Value
1	29/05/18	Q3 up to Cal24	€ 48.75	20	1,139,760	€ 55,563,300	€ 1,876,198	3.38%
2	18/06/18	Cal20 up to Cal24	€ 45.50	20	876,960	€ 39,901,680	€ 1,831,118	4.59%
3	28/06/18	Cal19 up to Cal24	€ 47.10	10	526,080	€ 24,778,368	€ 1,079,420	4.36%
4	05/07/18	Aug18 up to Cal24	€ 48.90	20	1,125,720	€ 55,047,708	€ 2,594,360	4.71%
5	12/07/18	Aug18 up to Cal24	€ 49.85	50	2,814,300	€ 140,292,855	€ 6,543,286	4.66%
6	18/07/18	Cal20 up to Cal24	€ 46.40	20	876,960	€ 40,690,944	€ 2,036,400	5.00%
7	19/07/18	Cal20 up to Cal24	€ 46.60	5	505,165	€ 10,216,584	€ 505,165	4.94%
8	19/07/18	Cal20 up to Cal24	€ 46.60	5	505,165	€ 10,216,584	€ 505,165	4.94%
9	31/07/18	Cal20 up to Cal24	€ 46.70	20	876,960	€ 40,954,032	€ 1,840,080	4.49%
10	10/09/18	Cal20 up to Cal24	€ 49.60	2	87,696	€ 4,349,722	€ 217,154	4.99%
11	13/09/18	Q3 up to Cal24	€ 53.35	50 & 25	1,424,700	€ 76,007,745	€ 4,529,442	5.96%
12	16/10/18	Cal19 up to Cal24	€ 45.91	12	631,296	€ 28,982,799	€ 1,508,724	5.21%
13	22/10/18	Cal21 up to Cal24	€ 47.70	7	245,616	€ 11,715,883	€ 630,945	5.39%
14	22/10/18	Cal20 up to Cal24	€ 48.65	7	306,936	€ 14,932,436	€ 732,396	4.90%
15	23/10/18	Cal19 up to Cal24	€ 51.65	5	263,040	€ 13,586,016	€ 606,360	4.46%
16	16/11/18	Cal20 up to Cal24	€ 48.50	4	175,392	€ 8,506,512	€ 394,667	4.64%
17	07/12/18	Cal19 up to Cal24	€ 51.35	5	263,040	€ 13,507,104	€ 561,204	4.15%
18	12/12/18	Cal19 up to Cal24	Variable	6	315,648	€ 16,367,134	€ 672,391	4.11%
19	12/12/18	Cal19 up to Cal24	€51.85	5	263,040	€ 13,638,624	€ 560,326	4.11%
20	20/12/18	Cal19 up to Cal24	€52.05	1	52,608	€ 2,738,246	€ 112,679	4.11%
21	27/12/18	Jan19 up to Cal24	Variable	10	526,080	€ 24,738,852	€ 1,233,678	4.99%
22	27/12/18	Jan19 up to Cal24	€ 51.25	10	526,080	€ 26,961,600	€ 1,233,678	4.58%
23	10/01/19	Feb19 up to Cal23	€ 52.54	2	86,160	€ 4,526,846	€ 167,877	3.71%
24	06/02/19	Cal20 up to Cal24	€ 49.90	1	43,848	€ 2,188,015	€ 76,482	3.50%

Total Trade Volume: 13,903,968 MWh

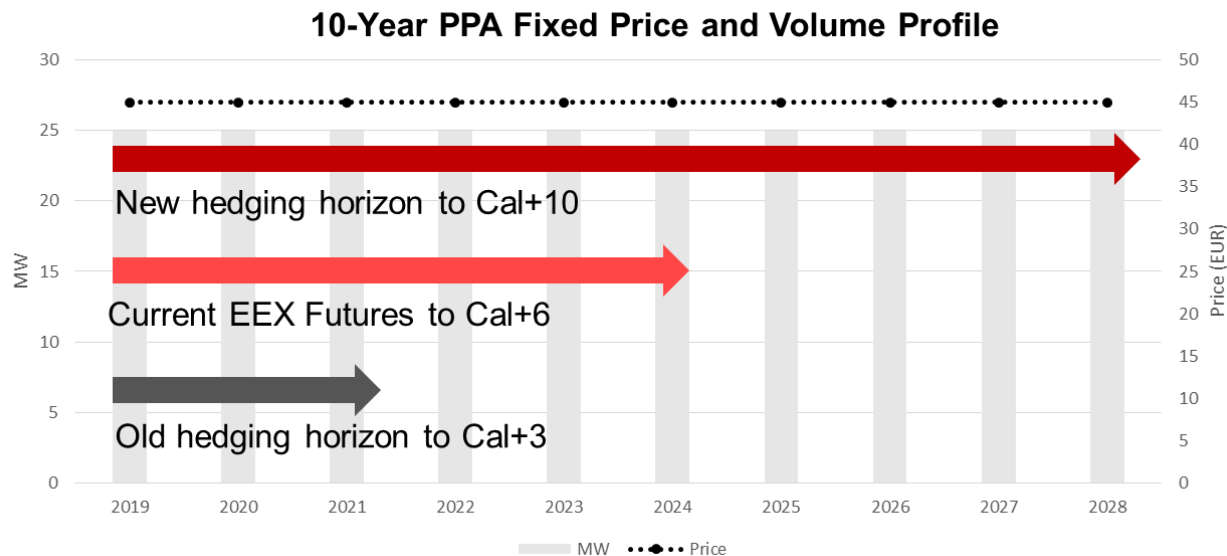
Long-term Hedges contribute to overall Open Interest in Spanish Power



- Long-term hedges cause **volume spikes** and contribute to Open Interest

New Renewables investments are driving demand for long-term risk management

- **EEX members have been increasingly demanding long-term hedging capability** in order to manage risk from long-term contracts such as PPAs, primarily used to fund the construction of new Renewable Energy assets
- EEX is working towards **extending to Cal+10 by Q4 19** in markets with high potential of PPA activity: **Spain, Germany and Italy**, with other markets to follow in 2020
- **A new daily settlement methodology is required** to ensure the long-dated expiries are settled efficiently



EEX Forward Curve: Monthly Calibration

Pricing Cal+10 logic needs an initial Forward Curve and regular (monthly) calibration. This will be done with the following approach, in combination with the Daily Settlement methodology:

Market Survey

+

Market Structure

- Monthly **market surveys** of a critical mass of trading members providing their pricing views of the curve to Cal+10. Target of 10-15 customers per market, including producers as well as off-takers.
- In case not enough members can share their price views with EEX the **market structure** is queried and used to determine the forward curve: Contango or Backwardation. Therefore the last visible Cal to Cal spread is used to extrapolate the end of the forward curve.
- Projections of external price providers are not used (based on customer feedback).

EEX Forward Curve: Monthly Calibration

- The Market Survey will be sent by the Market Operations team on a monthly basis to registered Traders for their views on market prices. The following values are requested, in order of priority:
 1. Fair Values to Cal+10
 2. Bid-Ask spread to Cal+10
 3. Market Structure (Contango or Backwardation)

Cal+10 Market Survey



Company Name: Date: YYYY-MM-DD

Spanish Power

	FEBY Jan20	FEBY Jan21	FEBY Jan22	FEBY Jan23	FEBY Jan24	FEBY Jan25	FEBY Jan26	FEBY Jan27	FEBY Jan28	FEBY Jan29
FV										
Bid										
Ask										

Market Structure: Comments:

German Power

	DEBY Jan20	DEBY Jan21	DEBY Jan22	DEBY Jan23	DEBY Jan24	DEBY Jan25	DEBY Jan26	DEBY Jan27	DEBY Jan28	DEBY Jan29
FV										
Bid										
Ask										

Market Structure: Comments:

Italian Power

	FEBY Jan20	FEBY Jan21	FEBY Jan22	FEBY Jan23	FEBY Jan24	FEBY Jan25	FEBY Jan26	FEBY Jan27	FEBY Jan28	FEBY Jan29
FV										
Bid										
Ask										

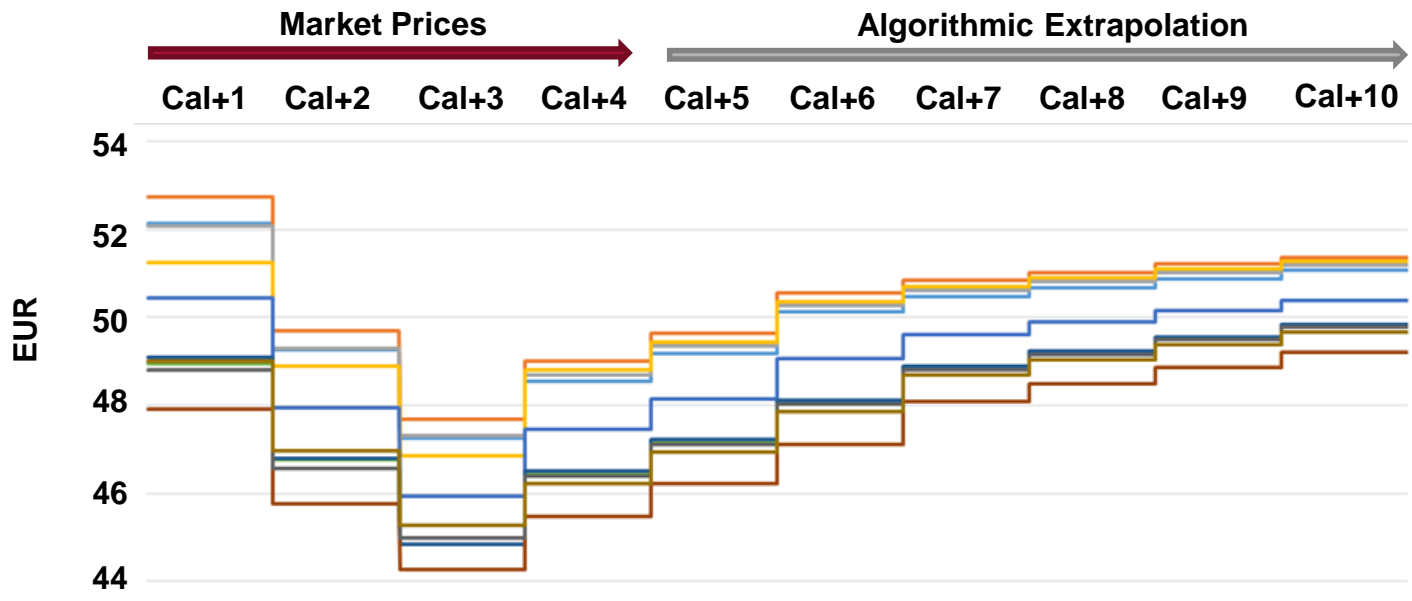
Market Structure: Comments:

If you would like to participate in the monthly market survey for German, Spanish or Italian Power, please contact the **EEX Market Operations Team**:

T +49 341 2156-222, trading@eex.com

EEX Forward Curve: Daily Settlement Methodology

- Market movements from the last liquid calendar contract are **extrapolated** to the end of the curve with falling volatility using an algorithm
- Example: Each colour is one day; prices up to Cal+4 are from the market; end of the curve follows Cal+4 movement as of Cal+5 onwards



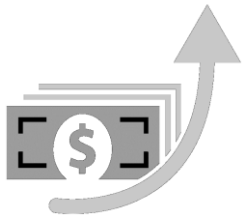
Merchant Renewables are the Next Phase in the Energy Transition



PPAs are one enabler of new Renewable Energy investments....



...but the market is in need of more standardisation and better risk management products in order to grow and meet the EU's ambitious targets.



Major energy players are already starting to hedge their long-term price risk with standard EEX products.



EEX will ensure we remain part of our Members' long-term hedging strategy, and explore opportunities to build new products for risk management of Renewable Energy.

Thank you!

Viviana Ciancibello

Senior Business Developer
European Power Derivatives

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