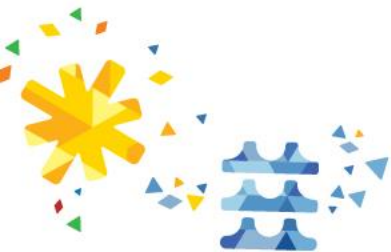




Cycle of Round Tables – “APREN and the Universities” | Day of the Sun
Solar PV Production in Portugal

IST | 3rd of May of 2018





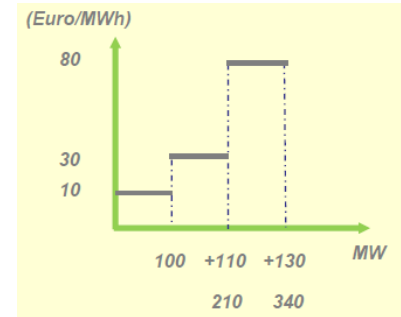
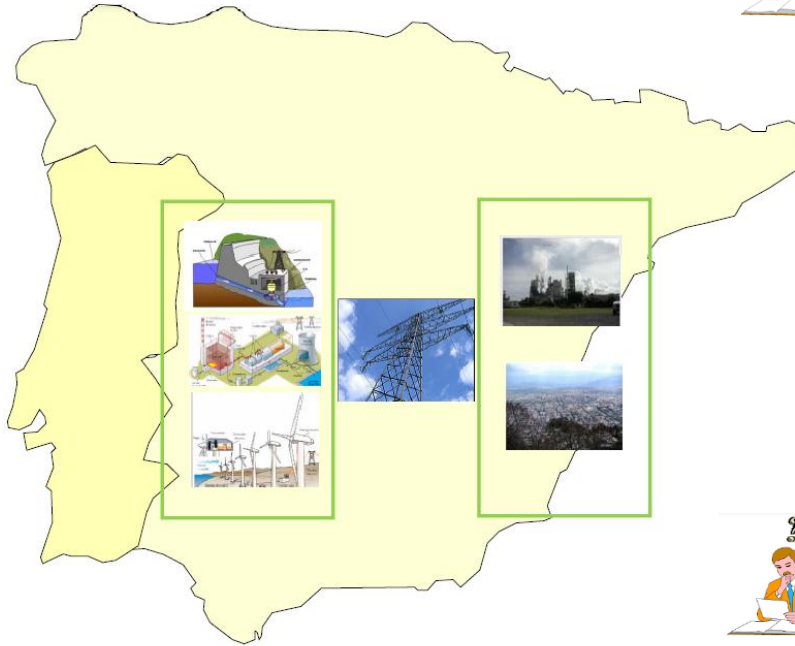
Manuel Barbosa
The challenges of the solar energy in the
Iberian market

Market: where demand meets supply.



Supplier offer (hour i):

- Quantity: up to its available capacity;
- Price: supplier decision.
- Incremental (marginal) pricing:



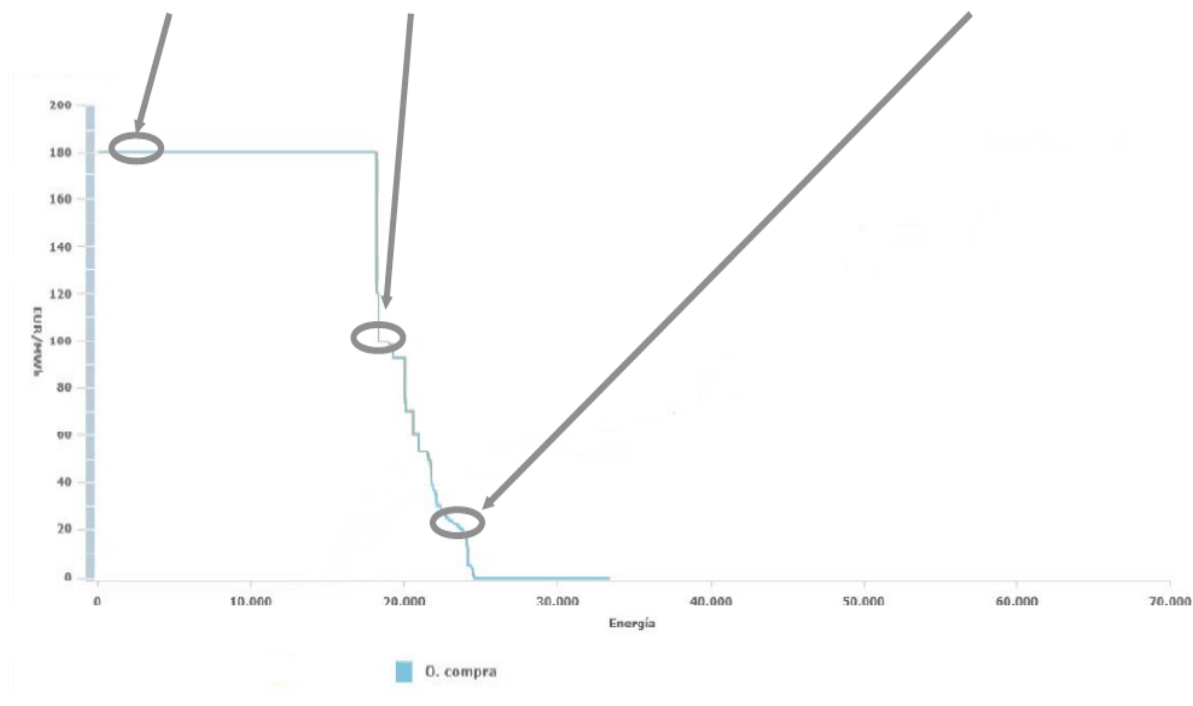
Purchaser offer (hour i):

- should decide both Quantity & Price;

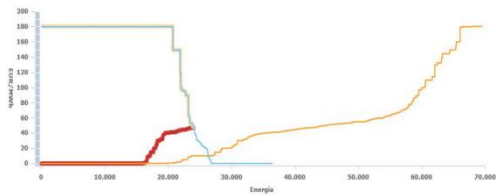
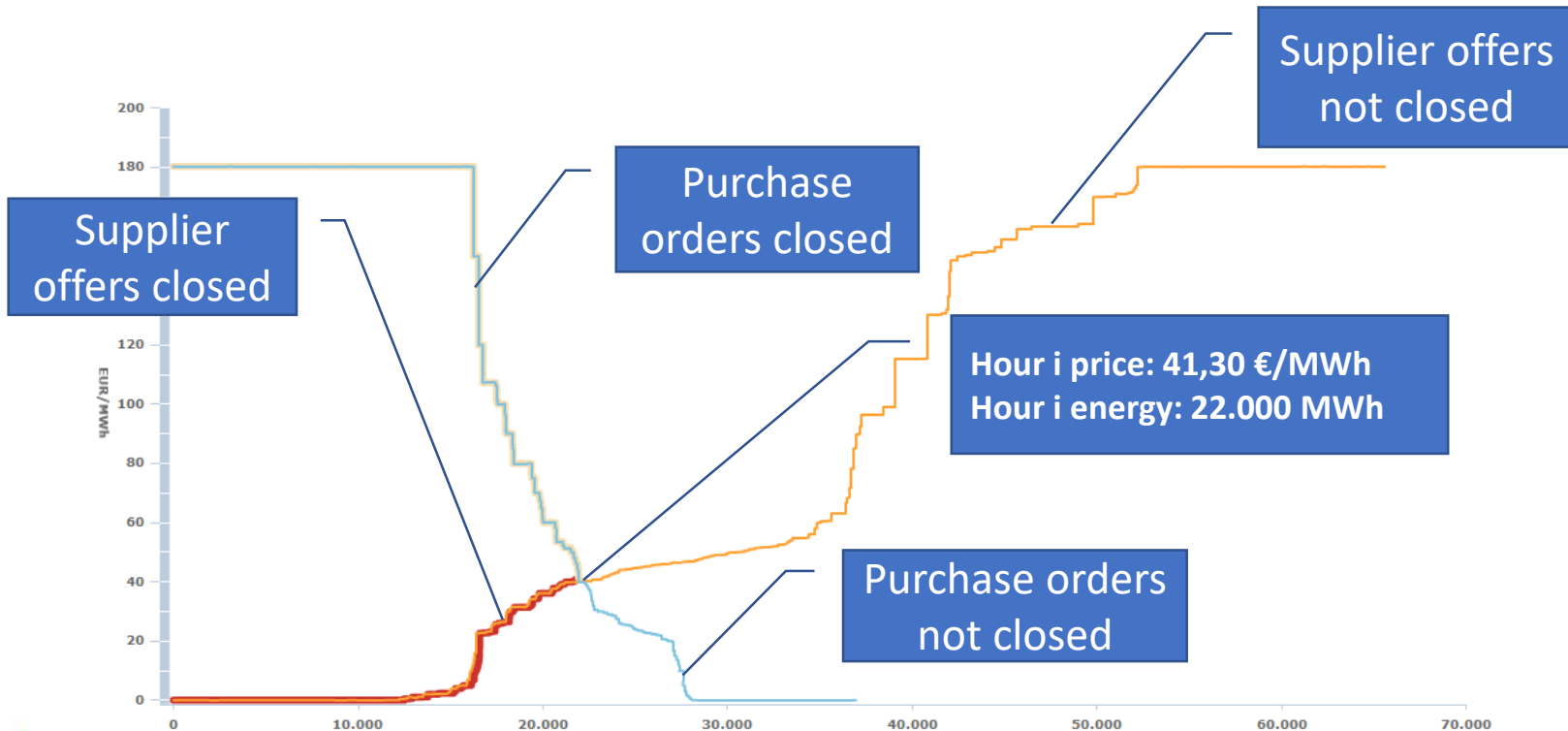
All purchase orders are ordered by volume and price (hour i).

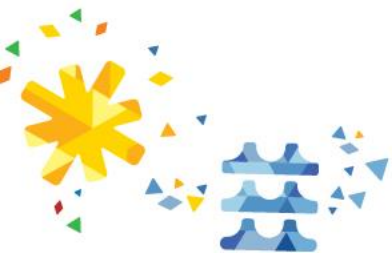
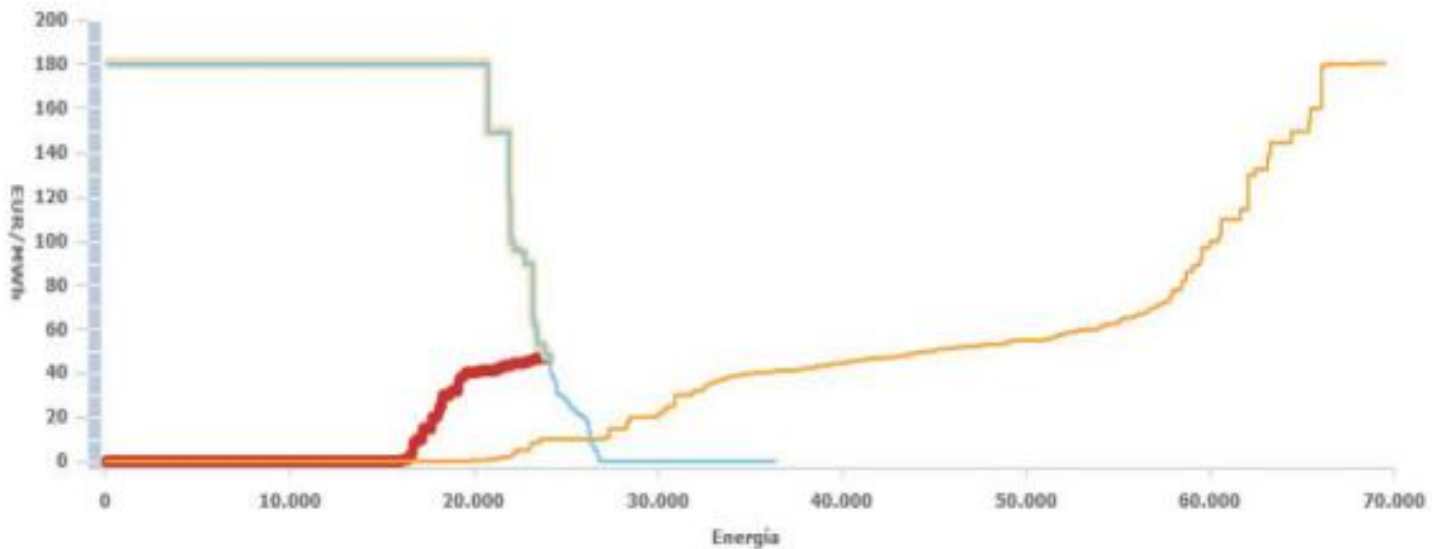
Example:

- 15,0 MWh @ 180,30 EUR/MWh;
- 10,0 MWh @ 100,00 EUR/MWh;
- 3,0 MWh @ 20,00 EUR/MWh.

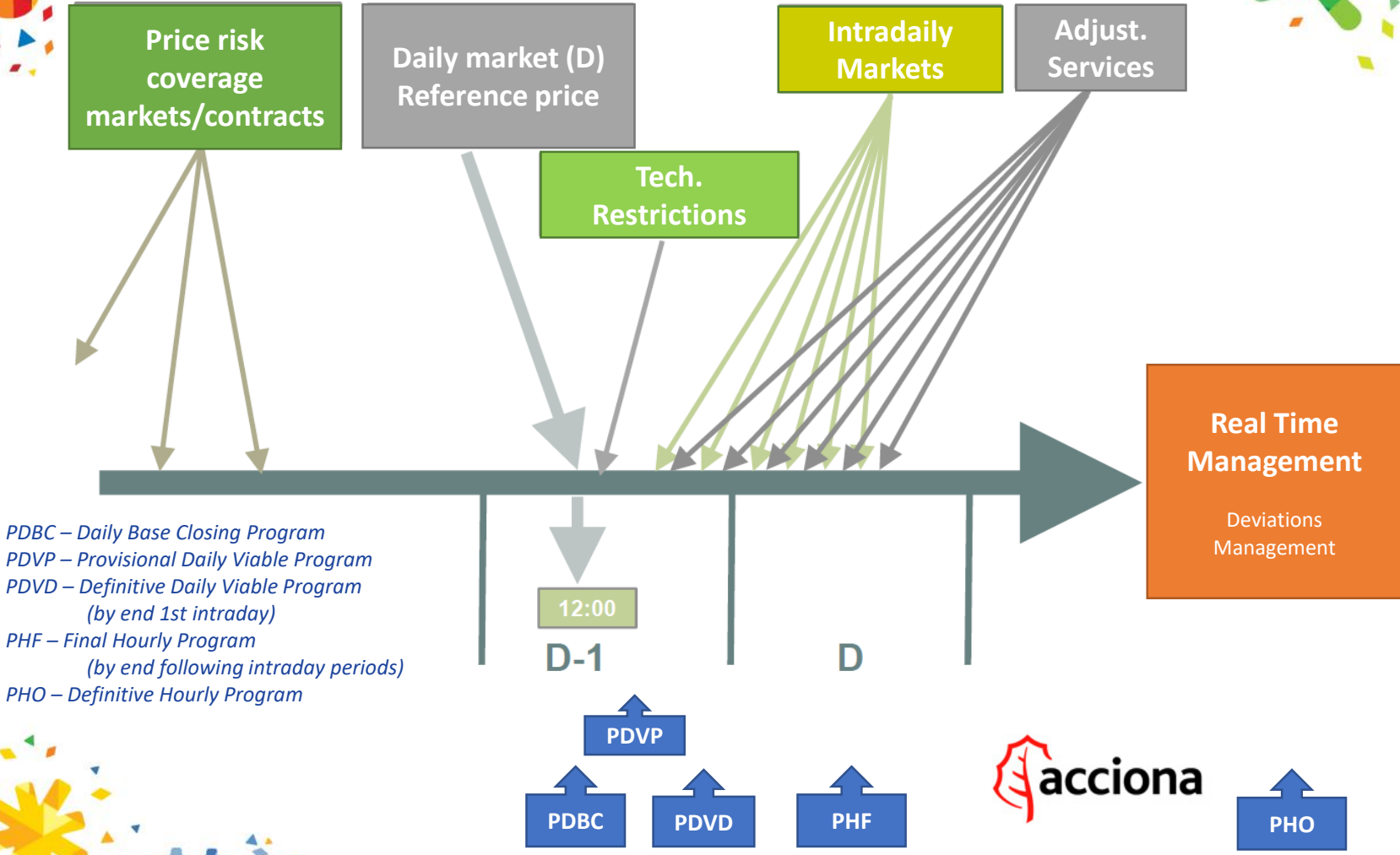


All supplier offers are ordered likewise (hour i).
Crossing of both curves will determine both energy and
sell price on each individual hour.





Time sequence...



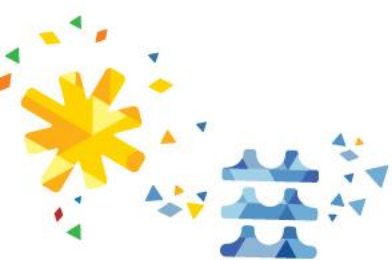
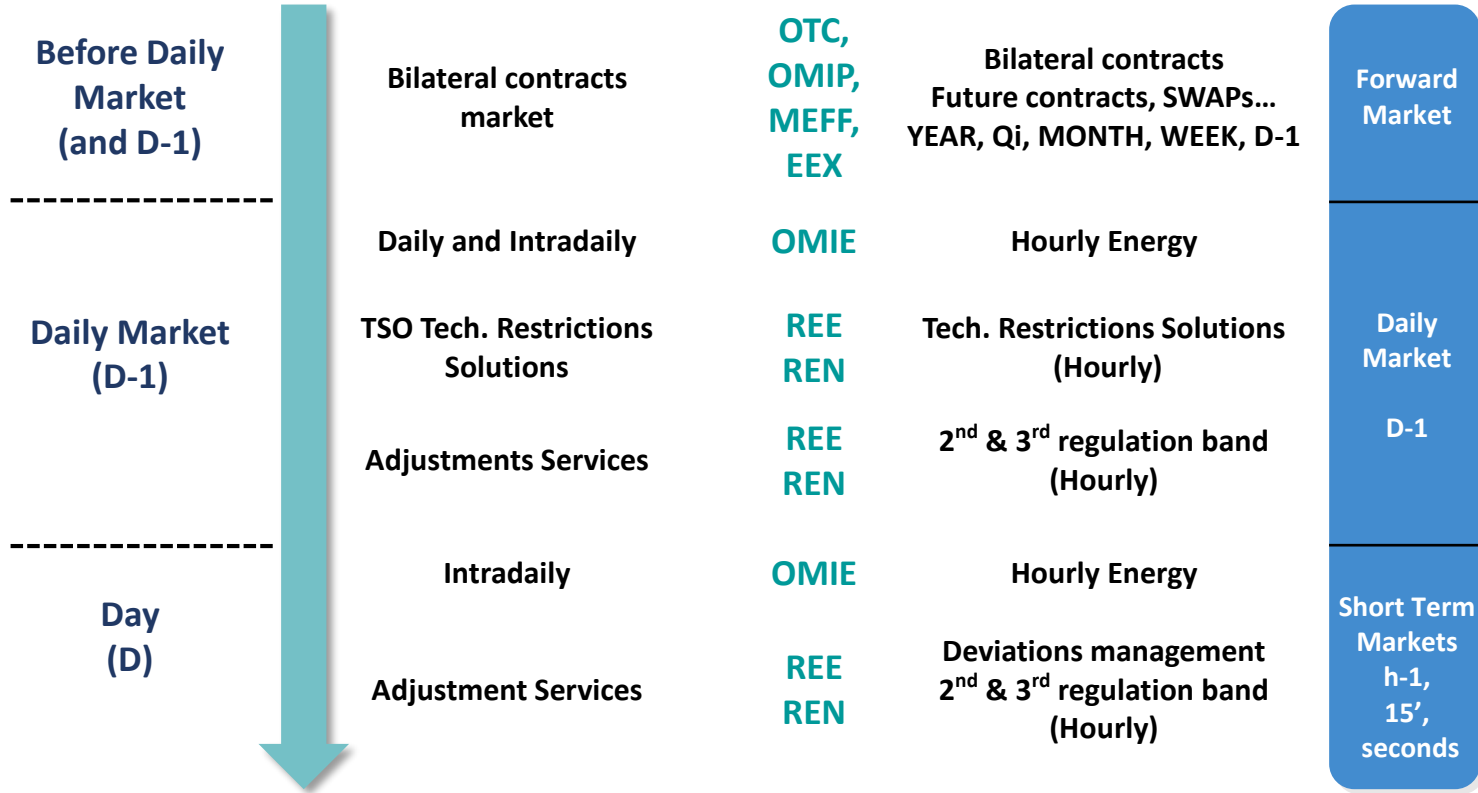
PDBC – Daily Base Closing Program
PDVP – Provisional Daily Viable Program
PDVD – Definitive Daily Viable Program
(by end 1st intraday)
PHF – Final Hourly Program
(by end following intraday periods)
PHO – Definitive Hourly Program



Time sequence...

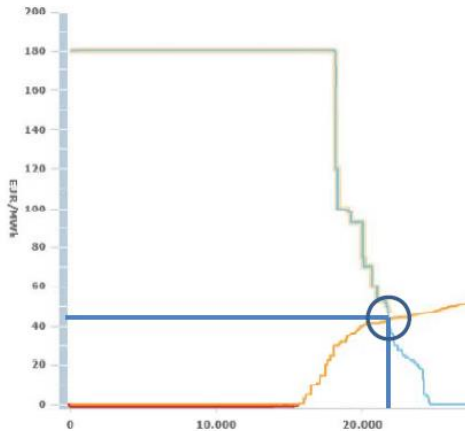


Negotiation	Market	Operator	Product
-------------	--------	----------	---------



Bilateral (physical or financial)....

Buyer and seller fix quantity and price on a determined timeline.
Example: 100 MWh/year + 50 EUR/MWh.



If price gets below fixed value – ex. 44 EUR/MWh – then Buyer pays Seller:
6 EUR/MWh x 100 MWh;

Buyer pays EUR 44/MWh to OMiE and
pays 6 EUR/MWh to Seller.

TOTAL 50 EUR/MWh.

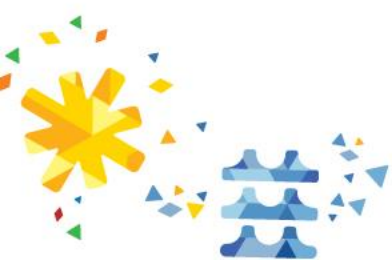
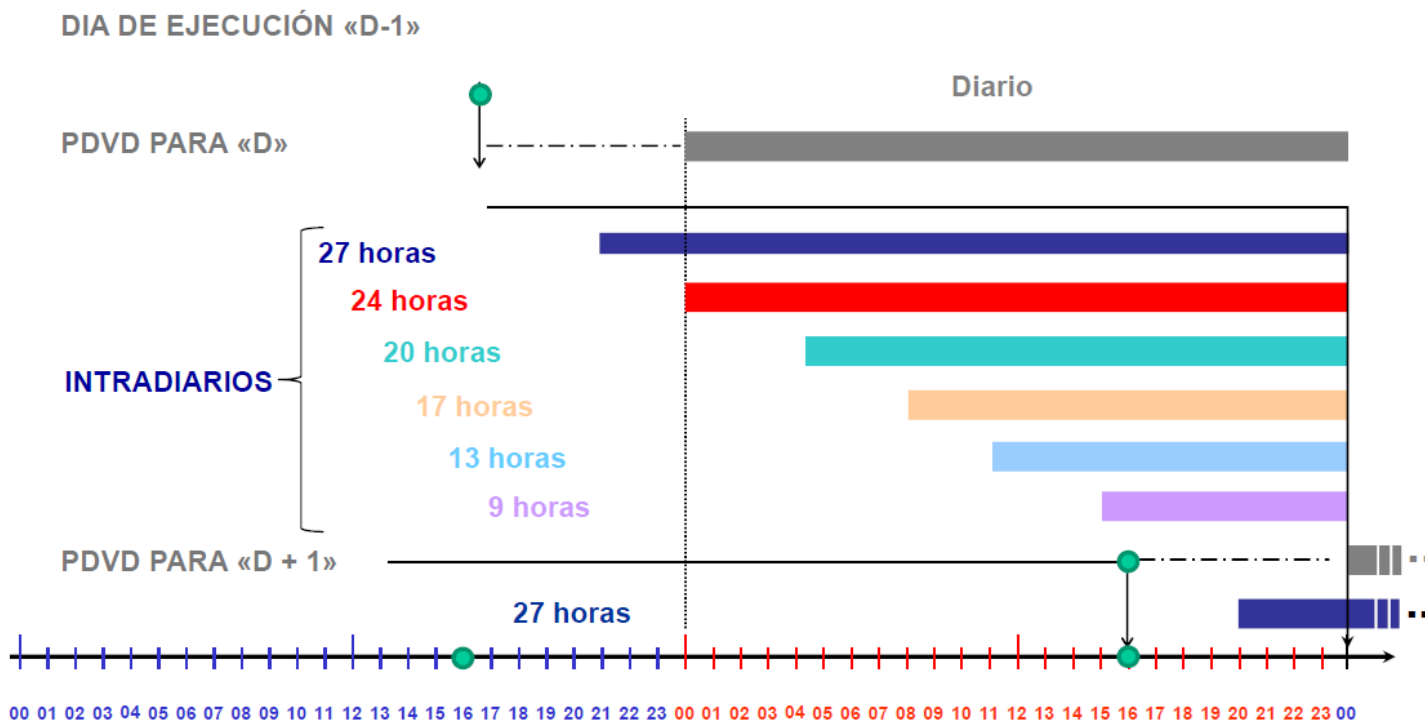
If price gets higher than fixed value – ex. 54 EUR/MWh – then Seller pays Buyer:
4 EUR/MWh x 100 MWh;

Buyer pays EUR 54/MWh to OMiE and gets
4 EUR/MWh from Seller.

TOTAL 50 EUR/MWh.

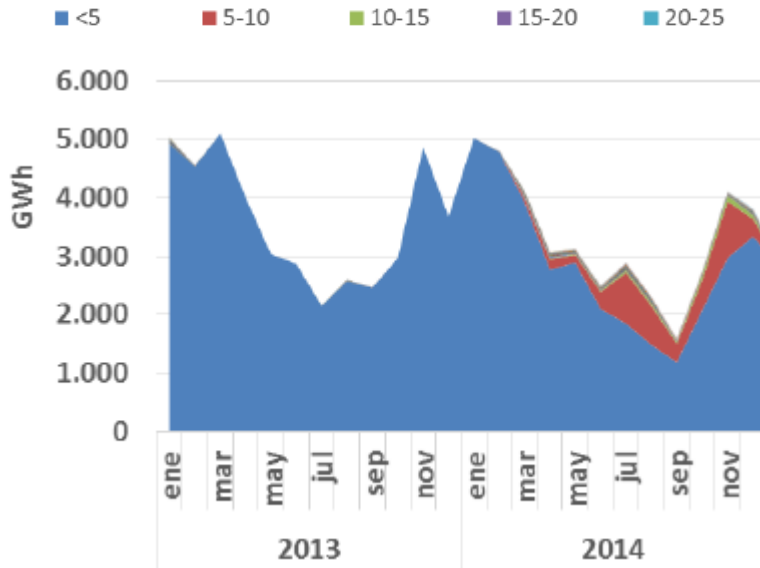


Time sequence... (intradaily)

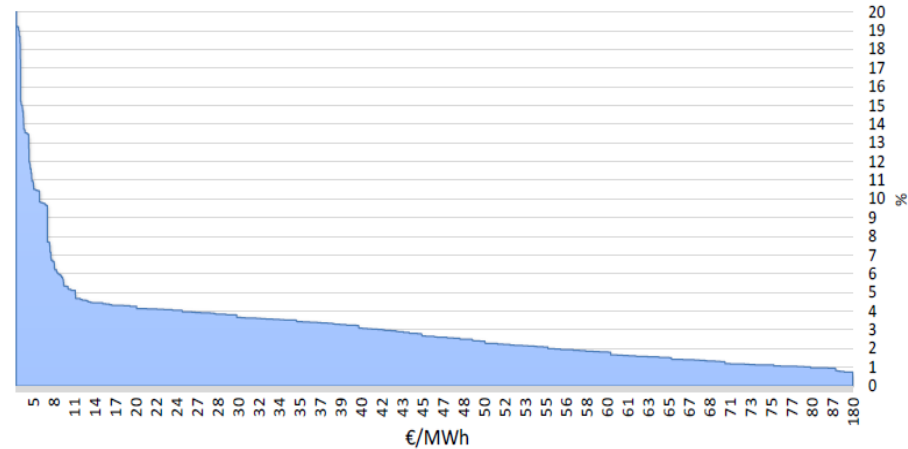


Renewable energy facilities have been affected by pool prices (Spain regulation change in 2013/2014) , so they are including price in their market bids, at least to achieve their variable costs.

WIND PRICES BIDDING 2013 - 2014



POWER PERCENTAGE BY PRICES BIDDING 2014 (RENEWABLE AND COGENERATION)

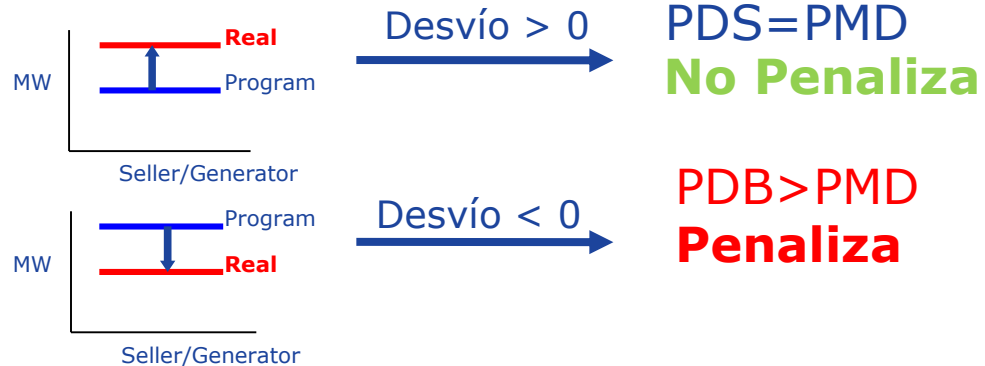
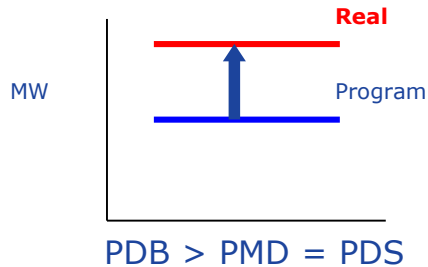


DEVIATIONS. Deviated energy & penalized.

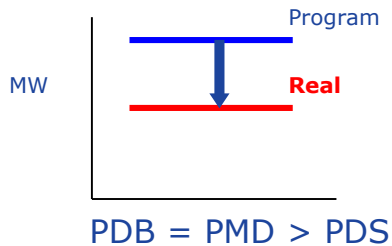
$$\text{Deviation (MWh)} = \text{Real Measure} - \text{Program (on each hour)}$$

Positive deviation (seller/generator): Rising Deviation Price (PDS) applies

a) System: Demand > Program



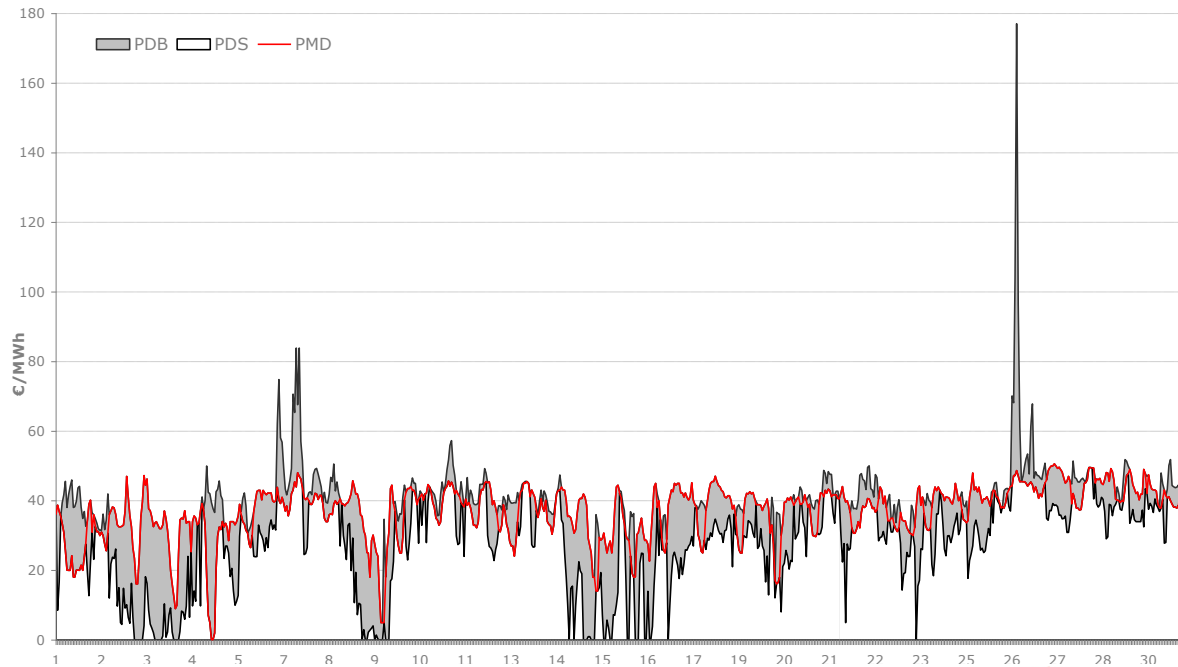
b) System: Demand < Program



Energy deviation vs the program

Programming deviation. Deviation price

- If $E_{real} > program$, PDS applies and if the system does not need that deviated energy, $PDS < PMD$, so this is penalized (deviation sold at smaller price than $PMD \rightarrow$ deviation over cost).
- If $E_{real} < program$, PDB applies and if the system needs that energy, $PDB > PMD$, so this is also penalized (we would be re-buying the deviation at a bigger price than $PMD \rightarrow$ deviation over cost).







Cycle of Round Tables – “APREN and the Universities” | Day of the Sun

Solar PV Production in Portugal

IST | 3rd of May of 2018

