Webinar

Risks for regulated renewable assets in Spain

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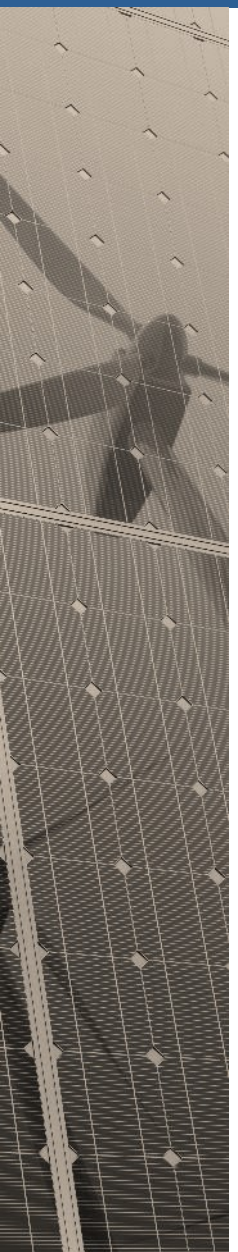
KYOS Energy Analytics

April 18th, 2023

Agenda



15:05 Introduction

- KYOS renewable energy services
- Spanish renewable sector/regulated assets

15:15 Market risk exposure of regulated assets

- Explanation of risks
- Case study

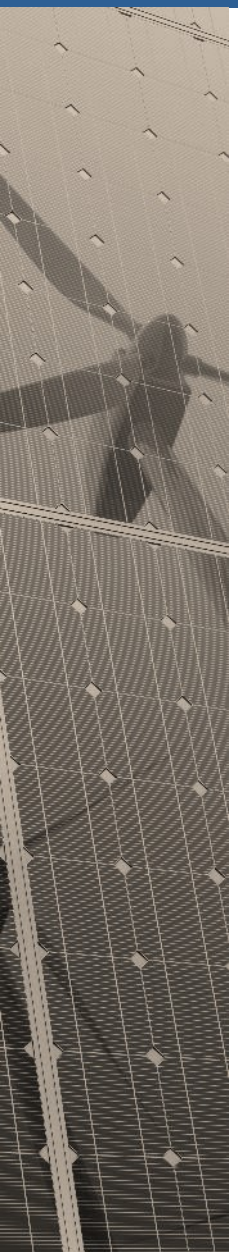
15:35 – Q&A and discussion

15:45 – End of the webinar

KYOS Energy Analytics

- International client base across Europe, plus Americas and Japan
- 30+ people, of which 20+ in Haarlem
- More than 100 corporate clients for its software services

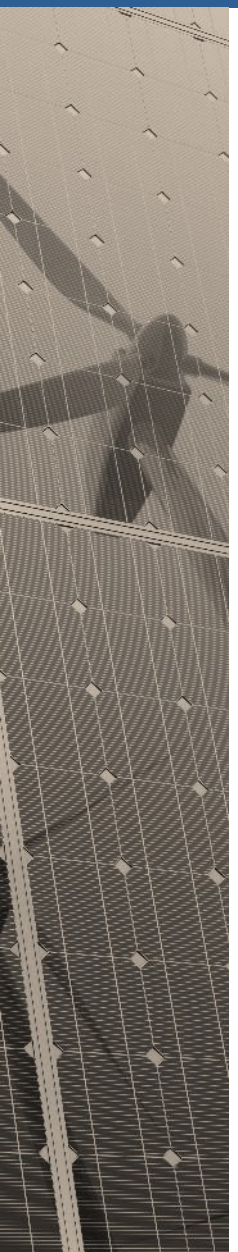
KYOS approach to renewable energy assets



- Apply advanced financial models combined with experience of the energy market to value and optimize renewable assets and PPAs
  - Models developed by own quant team. All with background in econometrics or similar studies. Combined experience >40 years
  - Many KYOS employees have experience at energy companies and bring real life market knowledge

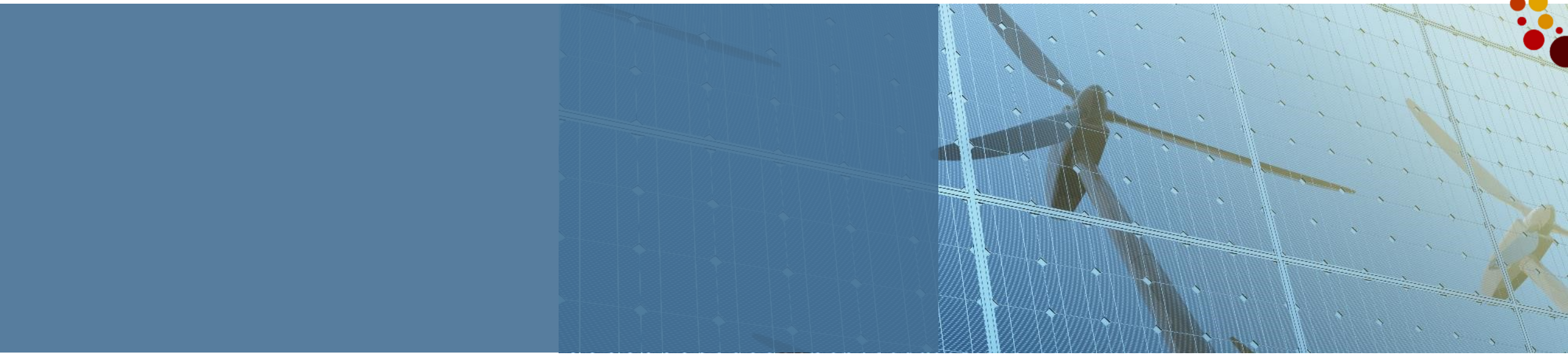
- Calculate the market value that an asset can obtain by optimizing it in the market
  - Use realistic scenarios and trading strategies for the valuation of the market value
  - Use transparent methodologies and scenarios

KYOS renewable energy services



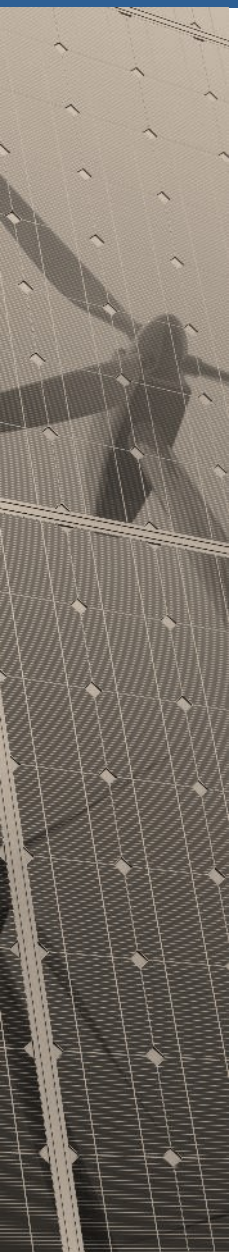
KYOS supports all players in the renewable energy sector

	Project developer	Bank or investor	Utility or Aggregator	Corporate off-taker
Software	• KYOS Analytical Platform - complete software system to price and manage renewable assets and PPAs • Make long-term power price projections and perform what-if analysis • Monitor and manage a complete portfolio of assets, PPAs and hedges • Analyse different hedging strategies before entering in new deals • Obtain detailed risk reports for managers, investors and analysts			
Advisory	• Valuation and risk management support during PPA negotiations and M&A activities • Assess specific market risks of renewable asset or PPA • Support with evaluating business cases of energy storage projects • Benchmark projects for energy storage projects • Support with arbitration cases, re-financing and re-powering			



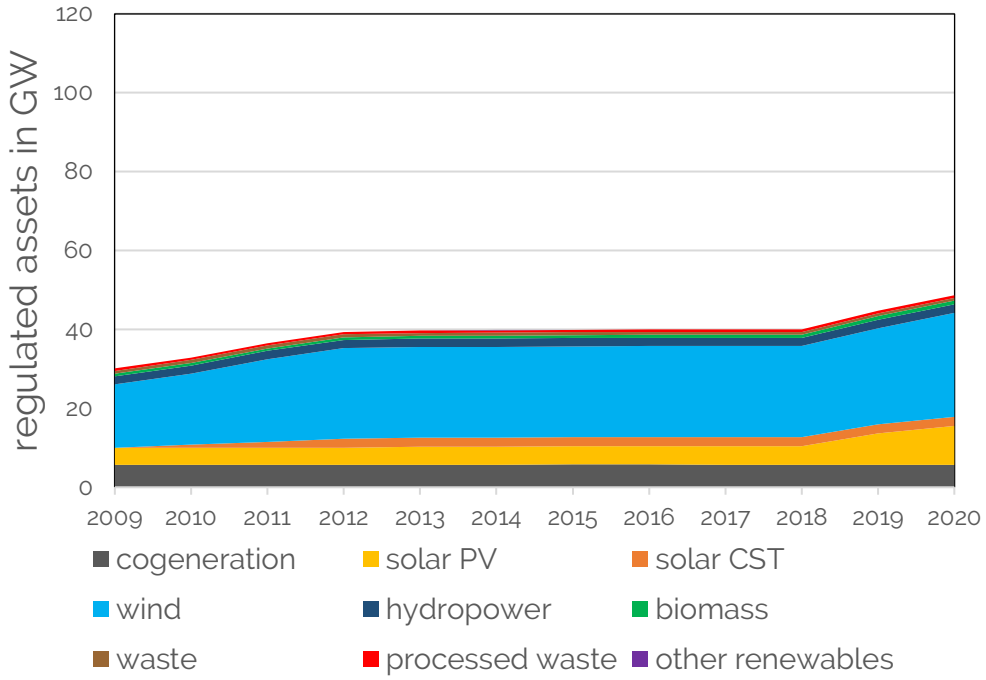
Spain

Generation assets in Spain

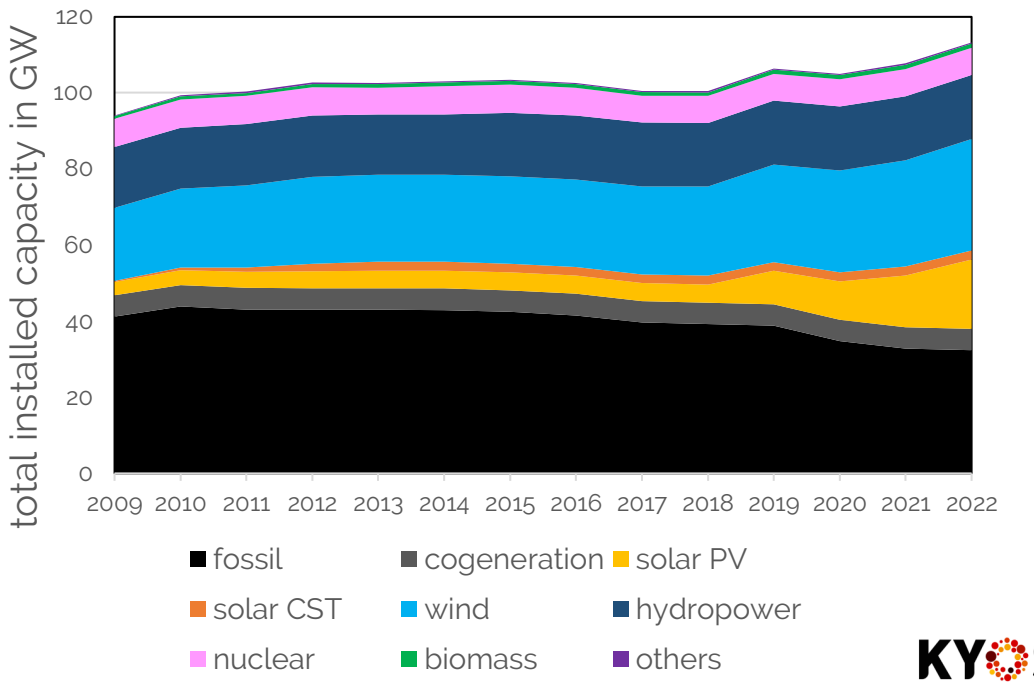


- Different support schemes
- Majority of renewable assets fall under a scheme (regulated assets)
- Focus today: Regulated assets based on RD 413/2014:
  - Cogeneration technologies (gas, biogas, coal, oil, and waste residues)
  - Renewable generation (solar PV, solar CSP, wind, hydro, others)

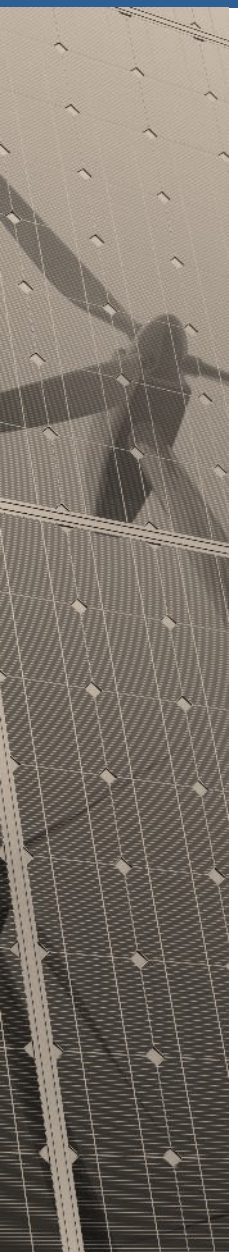
Installed capacity - regulated assets



Installed capacity - all assets



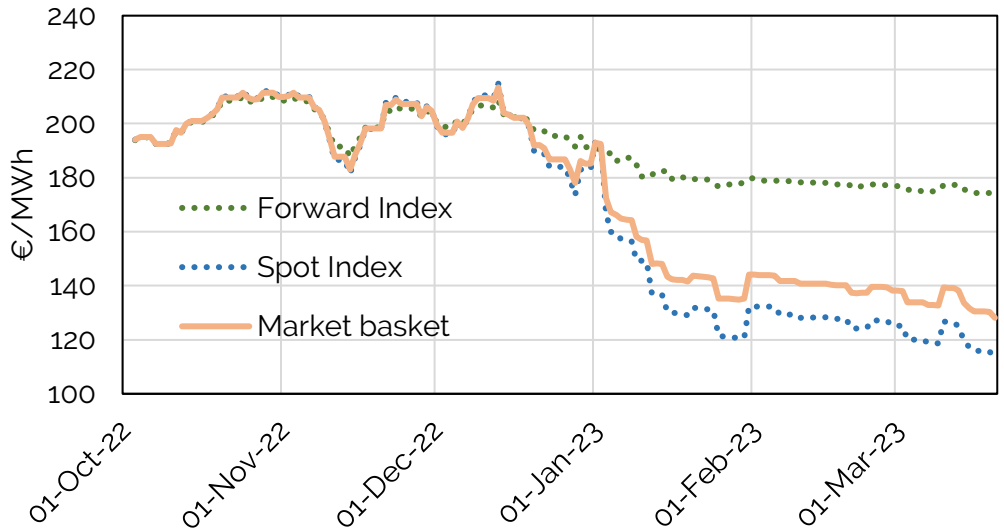
Introduction to market price risks



- Royal Decree (RD) 413/2014:
  - One of the key components in the scheme is the *Adjustments due to deviations in market prices*
  - Adjustments represent the difference between the market price and a government-estimated Fair price
  - In the first version of RD 413/2014, the market price was the average spot price
  - In its latest modification (following RD 10/2022), the market price is a *basket* of forward and spot prices. For 2023:

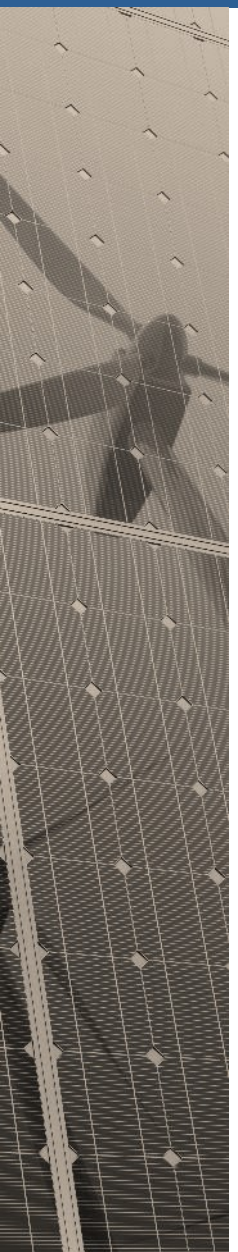
In our March report, we expect for 2023:

Market basket = 128.06 €/MWh



Market basket = 0.75 * Spot Index + 0.25 * Forward Index

Adjustments due to market deviations

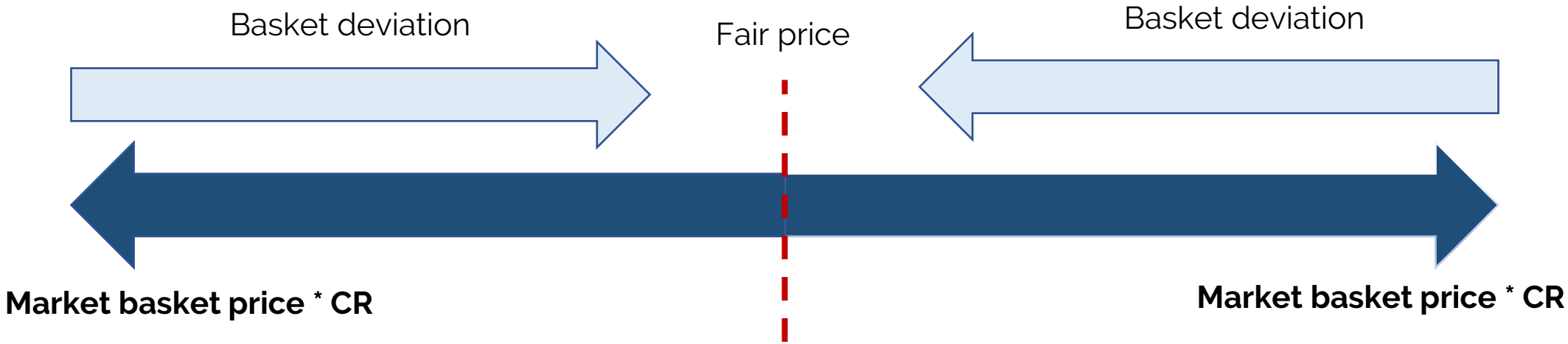


- Adjustments depend on the Fair price and Market basket price, but are also asset asset-specific:
  - Adjustment = Nh * (a + b * Market basket price * CR)

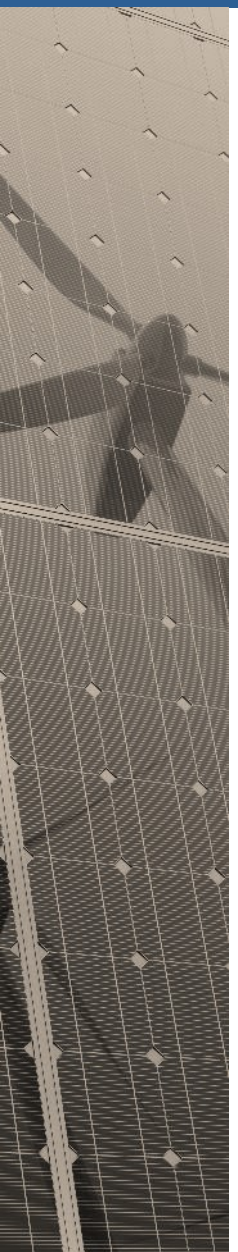
'a' and 'b' are a function of the Fair price

Basket deviation (EUR/MWh)

  - Number of operating hours (Nh) -> volume risk
  - Capture rate (CR) -> volume risk



Case study: Two regulated assets



- Consider the two 'type' installations:

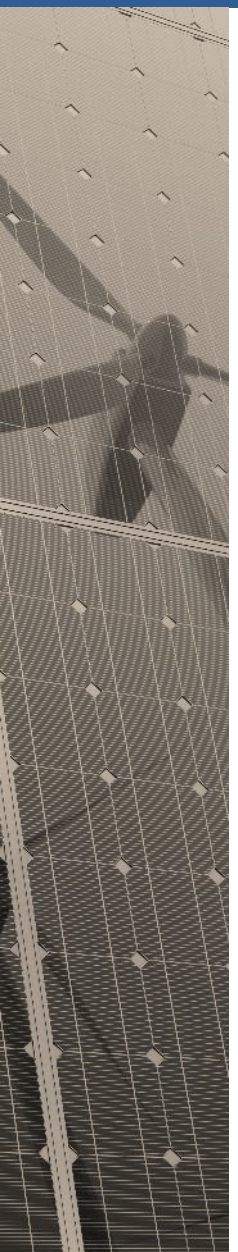
Ministerial Order TED 1232/2022

Technology	Capacity	'Type' installation	CR (2023)	Nh (2023)
PV	10 MW	IT - 00085	≈ 0.91	1,583 h
Onshore wind	25 MW	IT - 00665	≈ 0.93	2,818 h

- Expected Market basket price = 128.06 €/MWh in 2023, leads to **Market basket price * CR**:
  - Solar -> 116.53 EUR/MWh
  - Wind -> 119.10 EUR/MWh
- These prices are low in comparison to the Fair price in 2023 (207.88 EUR/MWh), so the **Basket deviation** is significant:
  - Solar -> 85.49 EUR/MWh
  - Wind -> 82.93 EUR/MWh

→ Basis for the subsidy calculation

Market price risks



- The basket mechanism can be summarized as follows:

  Basket deviation > 0, the government 'pays' the asset owner

  Basket deviation < 0, the asset owner 'pays' the government

- An installation will make a Profit if it does not get 'paid' the Fair price:

  Profit = Price – Fair price → If Profit < 0, it is actually a loss

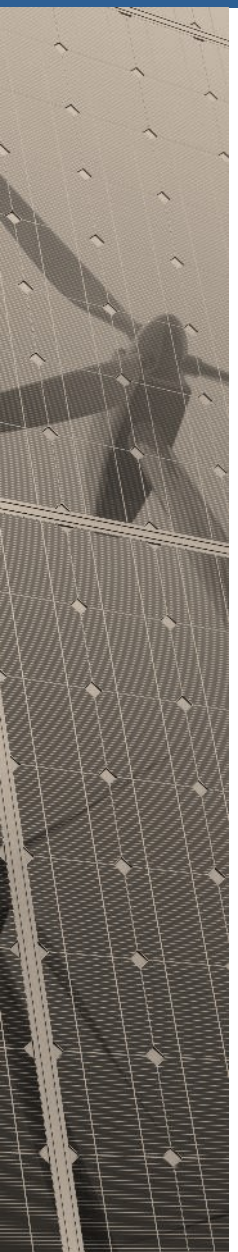
- Price is:

  Price = CR * Spot price + Basket deviation

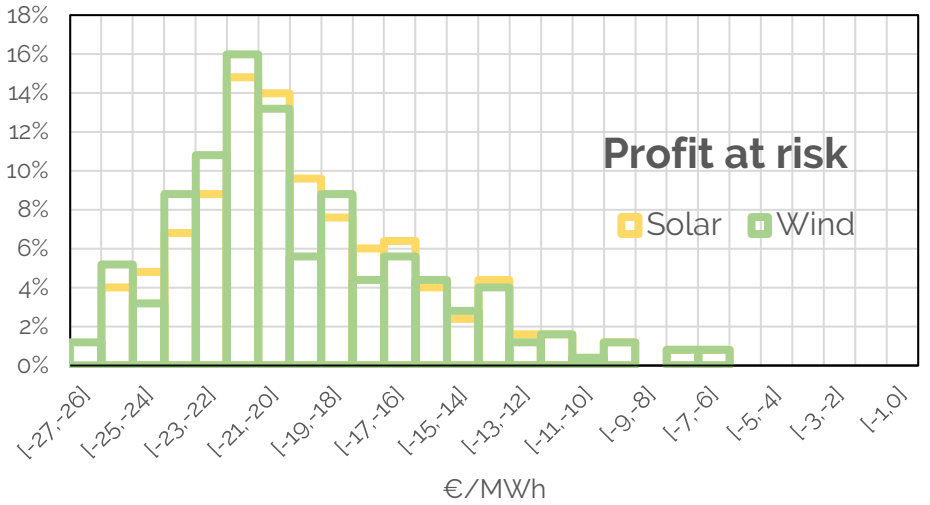
- Price risk: The installation gets 'paid' the spot price, but the Basket deviation (i.e. the price correction) is based on the Market basket price.

  Spot price ≠ Market basket price

Results – 2023 market price risk assessment



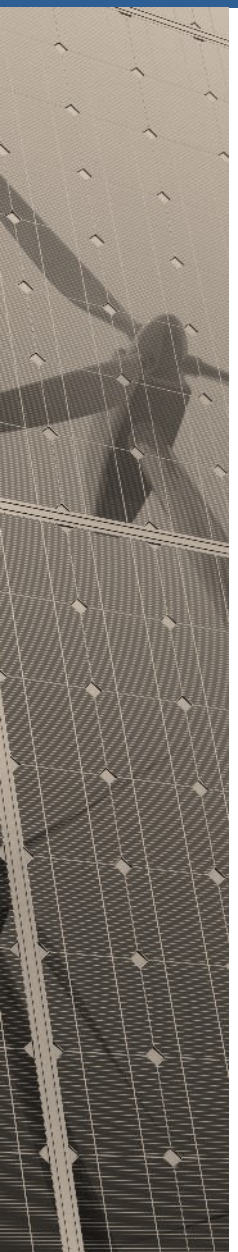
- Profit = (CR * Spot price + Basket deviation) – Fair price
- If Market basket price was only based on Spot Index, the lost Profit would be at most -5.86 €/MWh -> Inherent to Basket deviation
- <u>But there is an additional risk, because the Basket deviation also depends on a Forward Index!</u>
- The greater the influence of the Forward Index with respect to the Spot Index, the less the Basket deviation will make up to correct the price
- Although none of the Indices have started to materialize for 2024, the Forward Index weight is expected to be higher -> Higher Profit at risk!



2023 Profit at risk (€/MWh)			
Technology	Mean	P5	P95
Solar	-19.44	-24.79	-12.49
Wind	-19.74	-25.21	-12.64

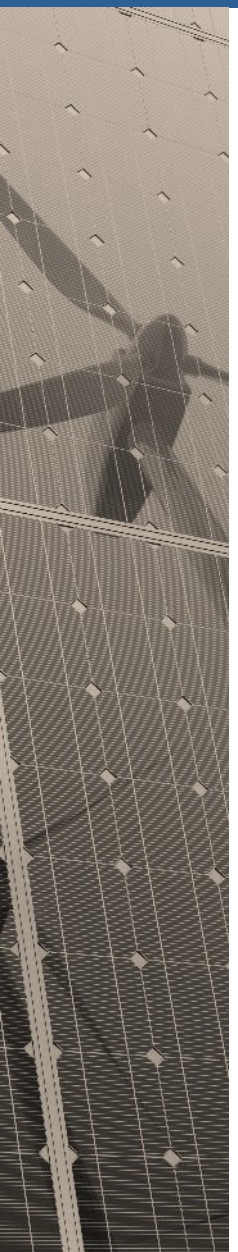
Solar Profit might end up being 5.35 €/MWh lower with a 5% probability -> reduce by forward hedging!

Conclusions



- Subsidy schemes can be complex
- Regulated renewable energy assets in Spain face risks
- Here we focused on market price risks
- Main driver: forward indexation in subsidy mechanism
- Monitoring this complex risk is important
- Forward hedging can reduce the risk

KYOS supports you with managing these risks!

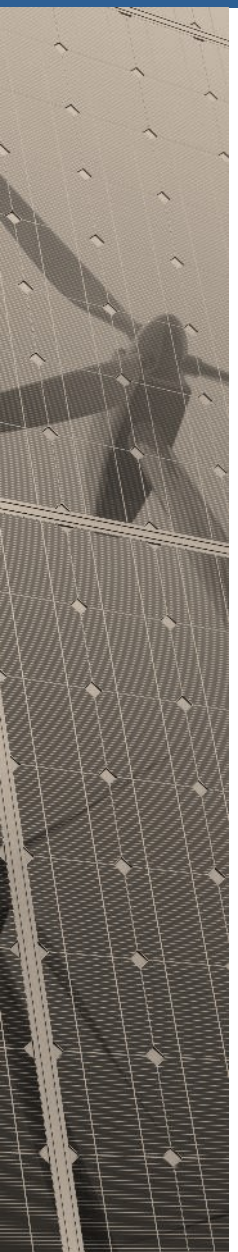


- For the basket mechanism, KYOS offers:
  - A powerful software to simulate: 1) the Market basket price every day and 2) volumes of your assets
  - A customizable software to track the Profit at risk (and other risks) of all your subsidized assets
  - Advice on how to hedge such risks
- In general we advice clients on quantifying and understanding the risks in their portfolio.

… please also see our new monthly reports!

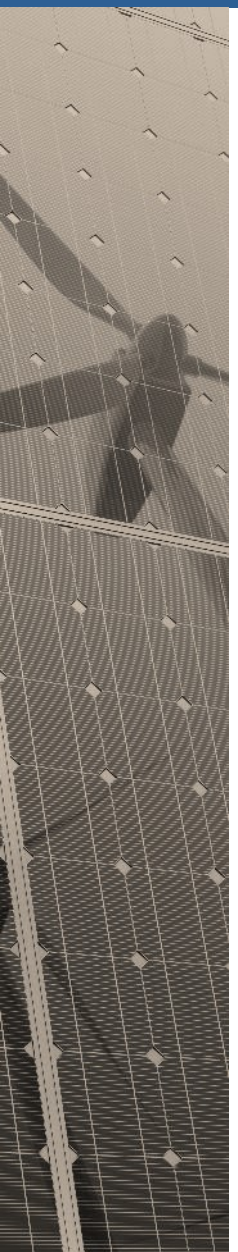
https://www.kyos.com/market-price-risk-assessment-spain/

Questions and answers



- Time for questions!

Contact details



We look forward to supporting you with the right tools and advice in the rapidly changing energy sector!

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