



Financing European Renewables Summit

Managing your Market Risks to Enable Future Growth

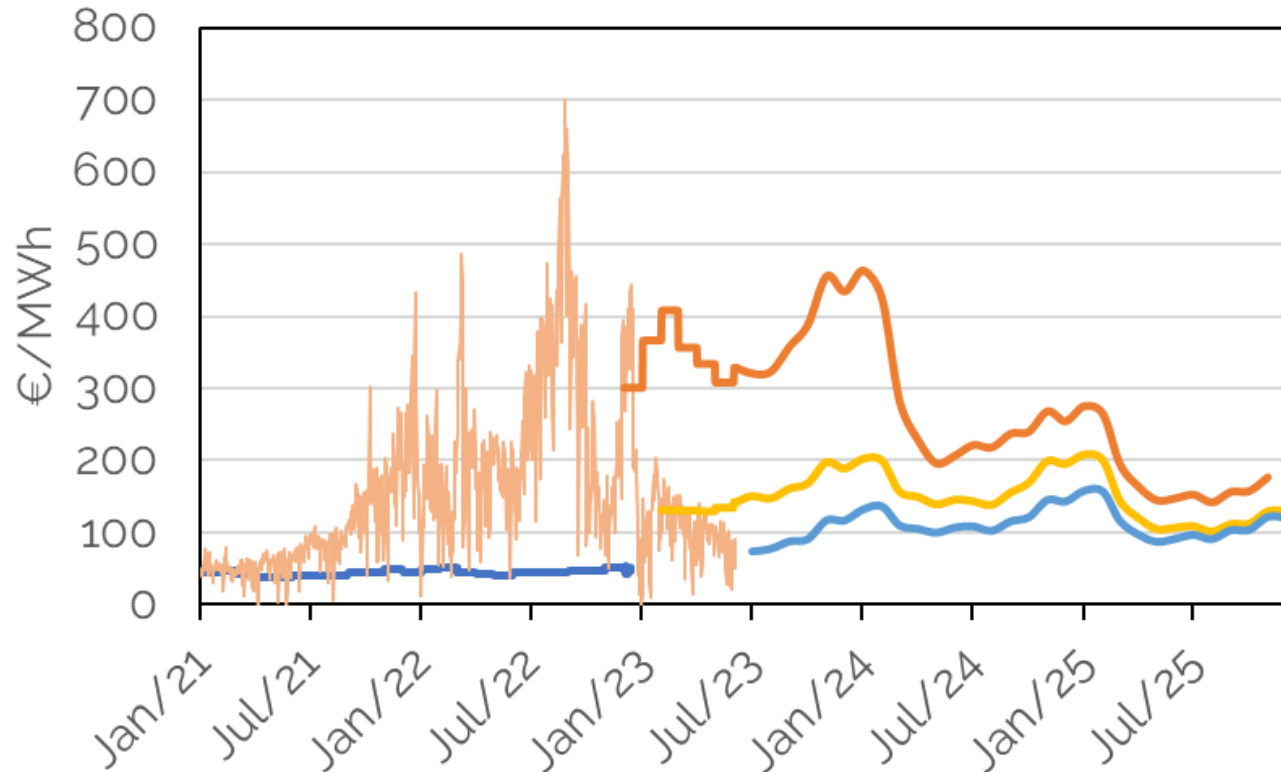
Ewout Eijkelenboom

Madrid - 7 June 2023



Why Risk Management?

German Price Forward Curve



Date	3-yr Baseload contract
Dec 2020	45.5
Dec 2022	270.8
Feb 2023	131.6
June 2023	101.1

Annotations: Blue arrows point from the Dec 2022 value to the Dec 2020 value (labeled x6), from the Dec 2022 value to the Feb 2023 value (labeled x0.5), and from the Dec 2022 value to the June 2023 value (labeled x0.75).

Electricity prices are extremely volatile -> proper risk management required!

Risk management

Players in renewable sector need to develop skills and tools already used by utilities/traders!

KYOS Energy Analytics



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 renewable energy services

KYOS supports all players in the renewable energy sector

	Project developer	Bank or investor	Utility or Aggregator	Corporate off-taker
Software	<ul style="list-style-type: none">• 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	<ul style="list-style-type: none">• Get valuation support during PPA negotiation and M&A activities• Get regular PPA valuations for accounting and trading purposes• Get support with arbitration cases, re-financing and re-powering			

KYOS Energy Analytics

- Some useful (free) publications



See: <https://www.kyos.com/knowledge-center/>

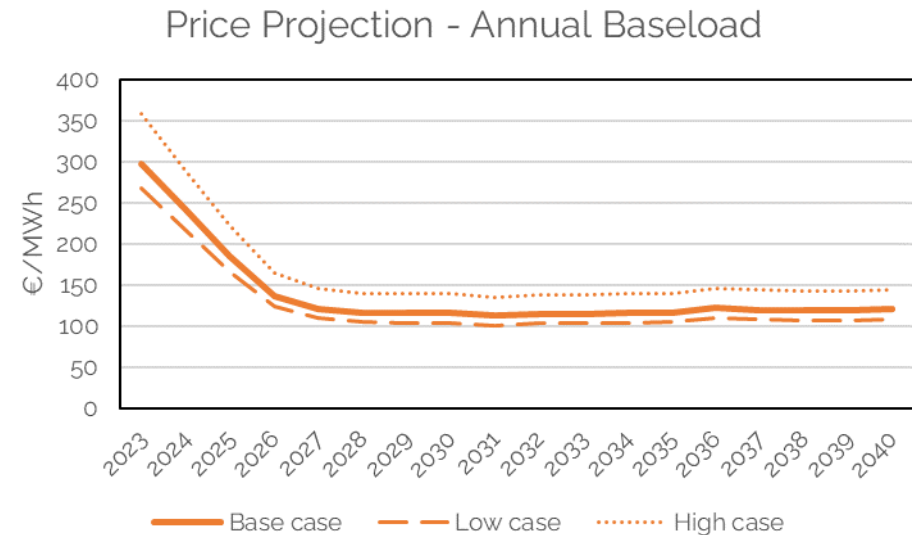
An analytical approach to measure market risks



How to quantify price risks of renewable project?

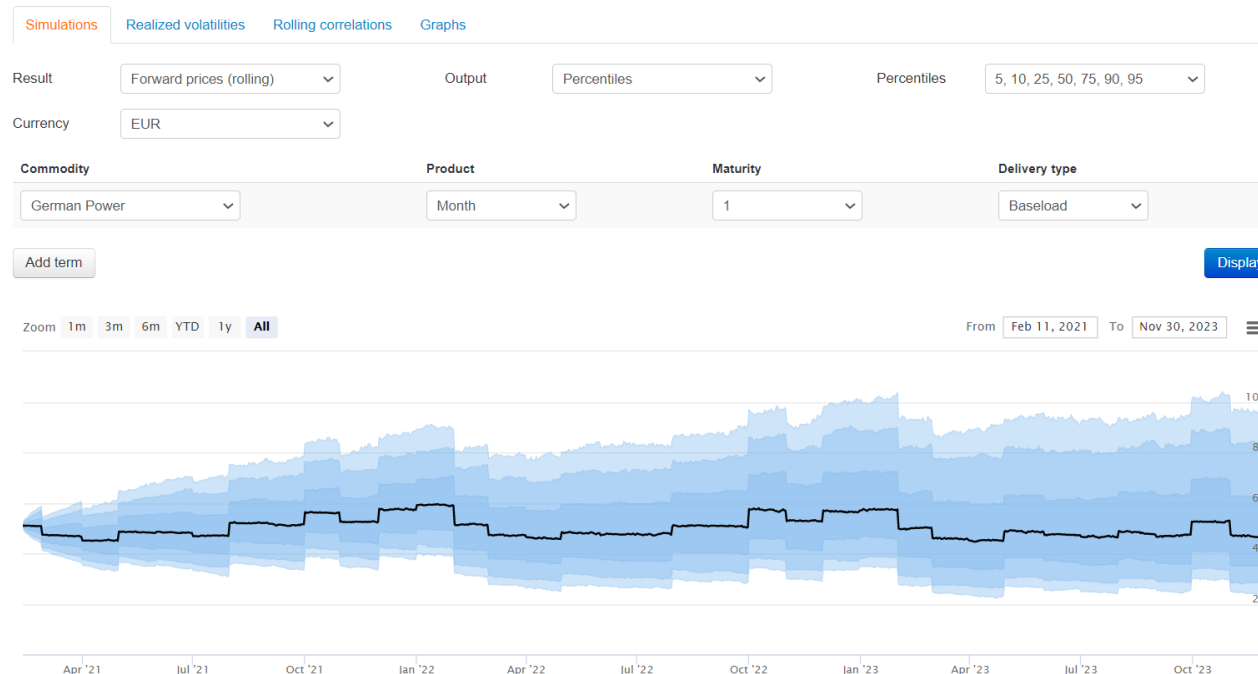
- Classical approach:
 - Use long-term price projections
 - Vendor A, B, C
 - Scenario X, Y, Z

- Disadvantages:
 - As good as the inputs
 - One or limited scenarios
 - Does not cover extreme/unexpected events (see current market)
 - Not easy to model cannibalization/shape risks



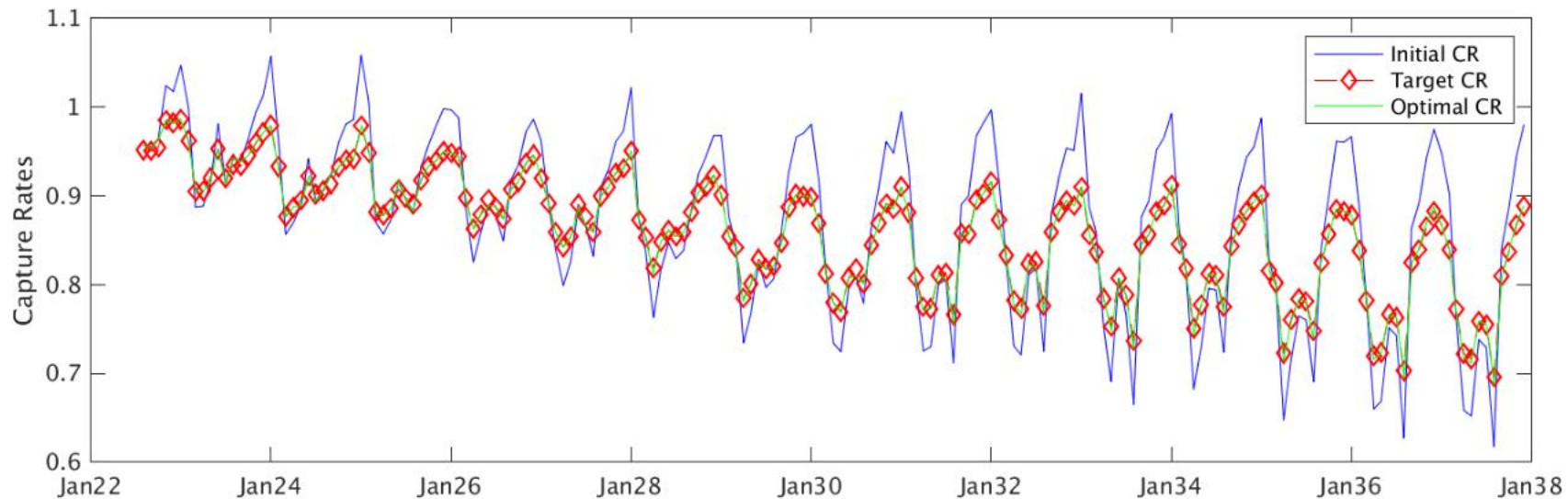
Combine LT price projections with simulations

- A single forecast of power prices is not enough
- Price simulations allow for large number of possible scenarios, also edge cases
- Monte Carlo simulations of power prices:
 - Forward prices and hourly spot prices
 - Arbitrage-free: on average equal to forward curve



Why simulate volumes too?

- A single scenario of production forecast is not enough
- Renewable generation is negatively correlated to power prices
- Simulate renewable generation with a systematic approach:
 - Smart historical sampling from historical years
 - Imposing a negative correlation with the power prices to meet the expected capture rates



Systematic risk assessment framework



- Historical data
- Expected P50
 - Given
 - Estimated by model
- Capture rate development
 - Given
 - Estimated by model

- Forward curve!
- Accurate model
- Calibration!
- Multiple commodities to portfolio view
- `Also volumes

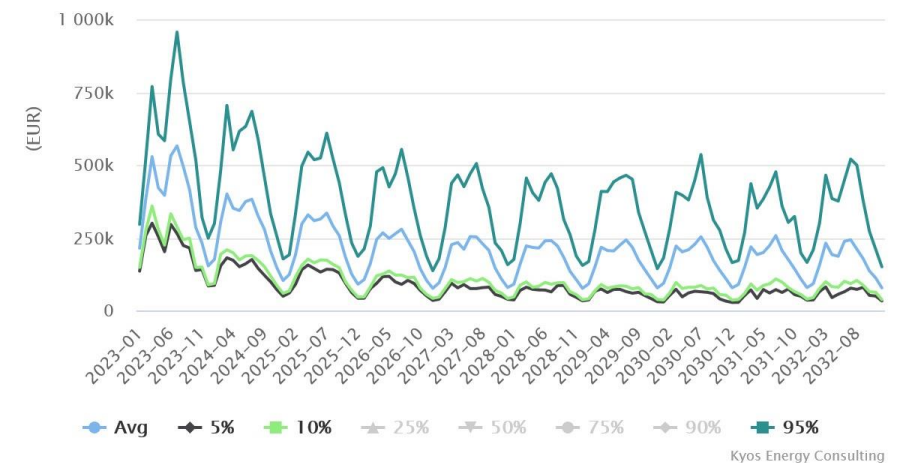
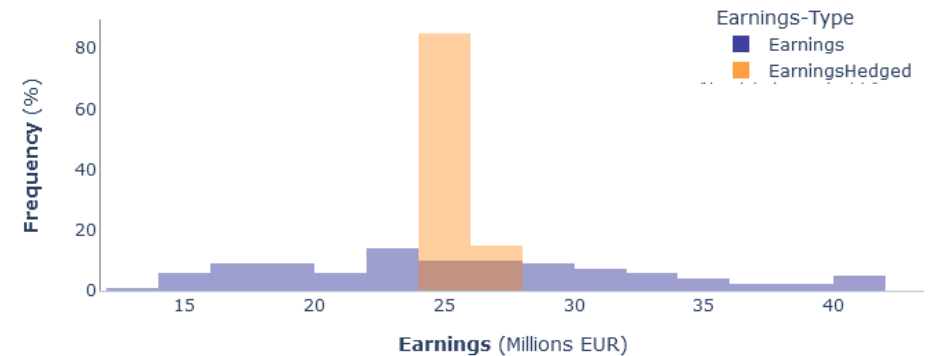
- Capture PPA details
- Standard contracts
- Flexible!



Risk analysis



- Cashflow/earnings distribution
 - Aggregated over longer time horizon
 - On monthly level
- Unhedged asset
- **Hedged asset**
- **Portfolio effect**
 - Assets in different locations/countries and technologies
- Clear metrics, e.g. EaR



Earnings at Risk Summary			
Commodity	Commodity	Currency	95% at Risk
	Total	EUR	54 419 254

How does this help you?

Pre-deal/FID

- Financing:
 - Monthly cashflow distribution gives view on worse case project cashflows
 - Help to assess DSCR
- Structure your PPA:
 - Change PPA parameters and see impact on risk distribution
 - Assess expected EBITDA distribution
- Holistic portfolio view
 - How does this asset change overall portfolio risk? (technology/location diversification)

Asset in operation

- Risk reporting
 - Continuous monitoring of expected revenues in changing markets
- Test portfolio adjustments
 - Assess effect of additional hedges on risk profile
- Implement portfolio adjustments



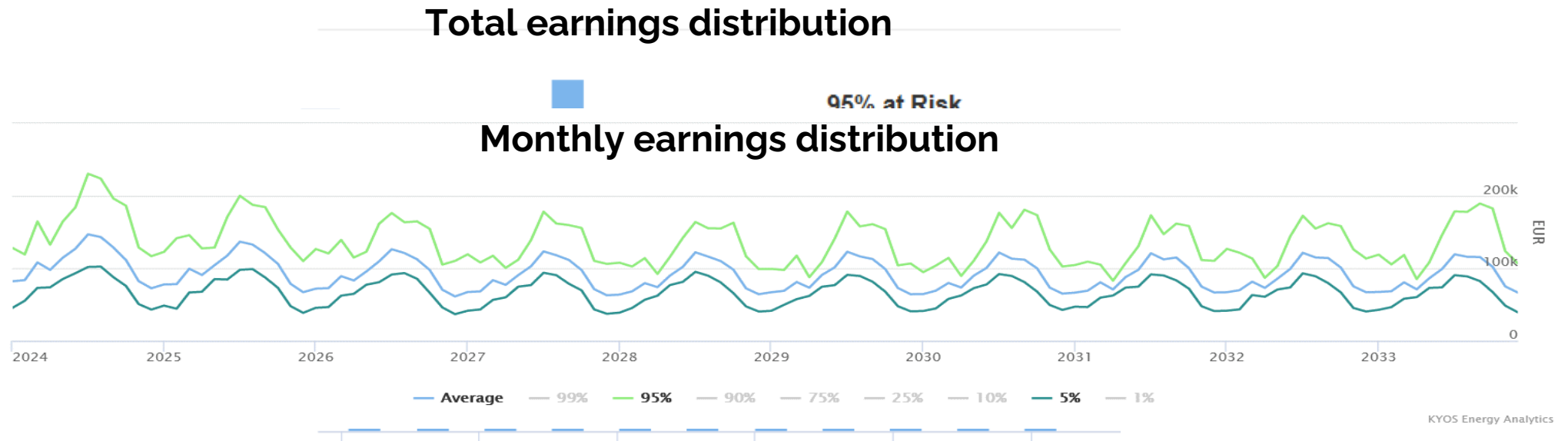
Example 1



Case: effect of adding additional assets

IPP with PV asset in Spain. Looking to expand into Italy – worried about EBITDA variations

- Step 1 – look at current risk profile.
 - Spanish PV asset hedged with 75% PaP PPA at fixed price

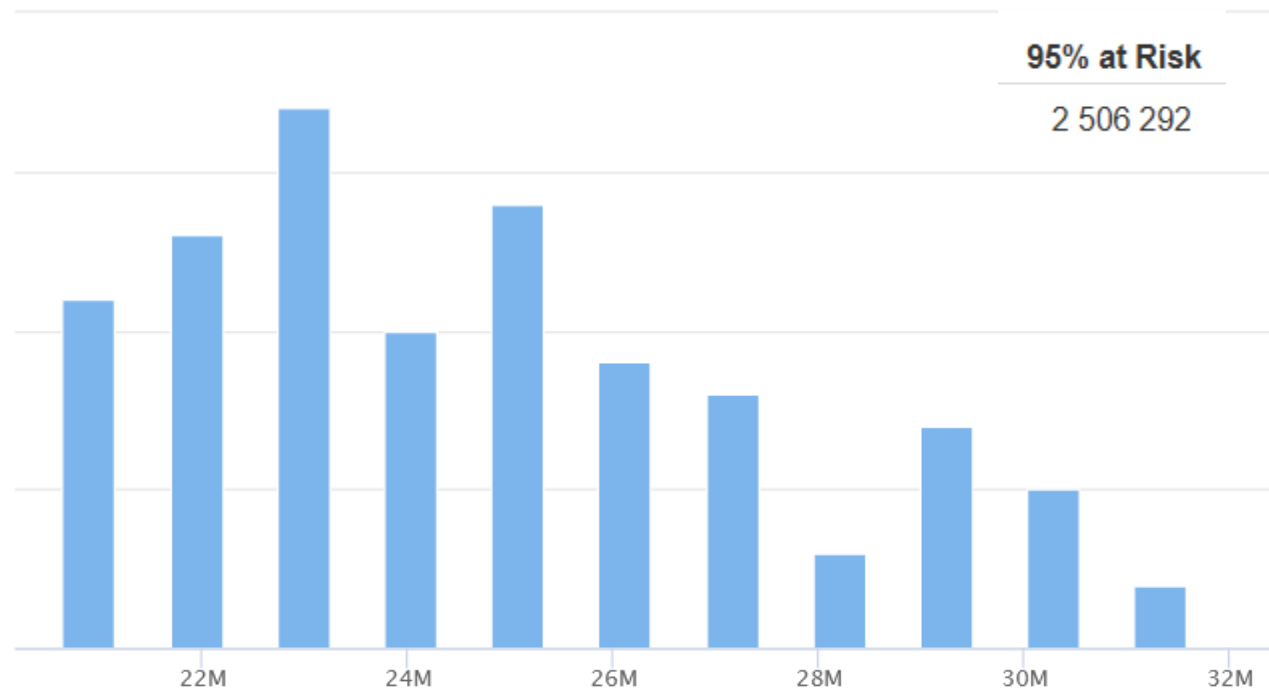


Monthly earning distribution: useful information for cashflow planning and debt sizing

There is a 5% probability that your realized earnings will be more than €1.9mln below current expected earnings

Analyse at new assets

- Step 2 – look at risk profile of planned Italian PV asset.
 - For simplicity also with 75% PaP PPA at fixed price
 - Same valuation logic
 - Take care of Italian zones...



EaR Spain: €1.9mIn

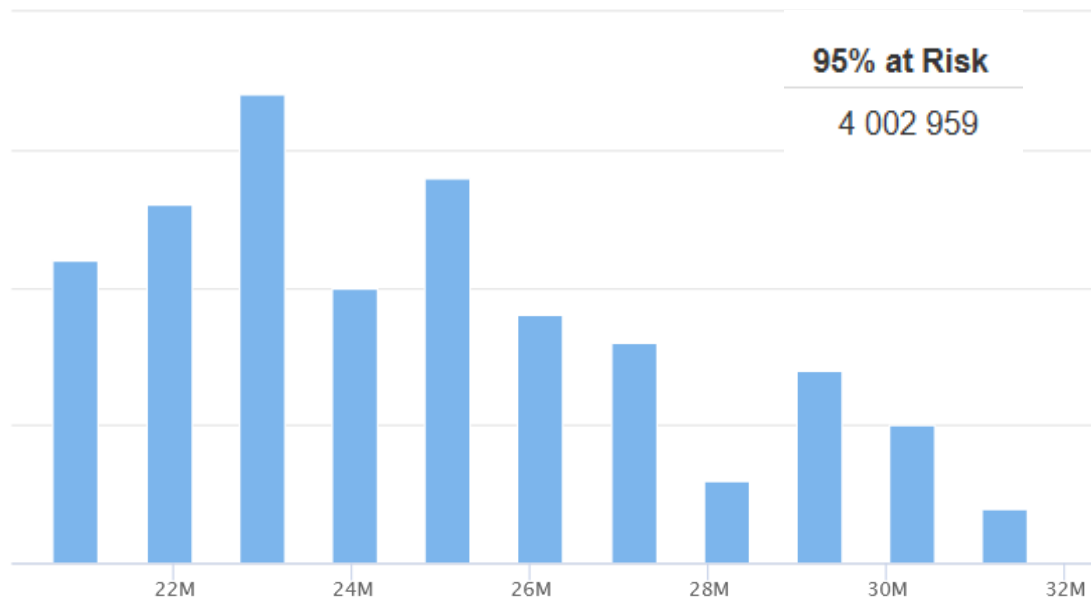
EaR Italy: €2.5mIn

Total EaR: €4.4mIn?



Combining portfolios

- Step 3 – Portfolio view
 - Combine both geographies in one risk assessment
 - Requires correlated set of price and volume simulations of both countries
 - Assess combined earnings distribution



EaR Spain: €1.9mln

EaR Italy: €2.5mln

Total EaR: €4.0mln
-> 10% portfolio effect!

In other words: actual risk of adding Italian PV asset is less than expected.

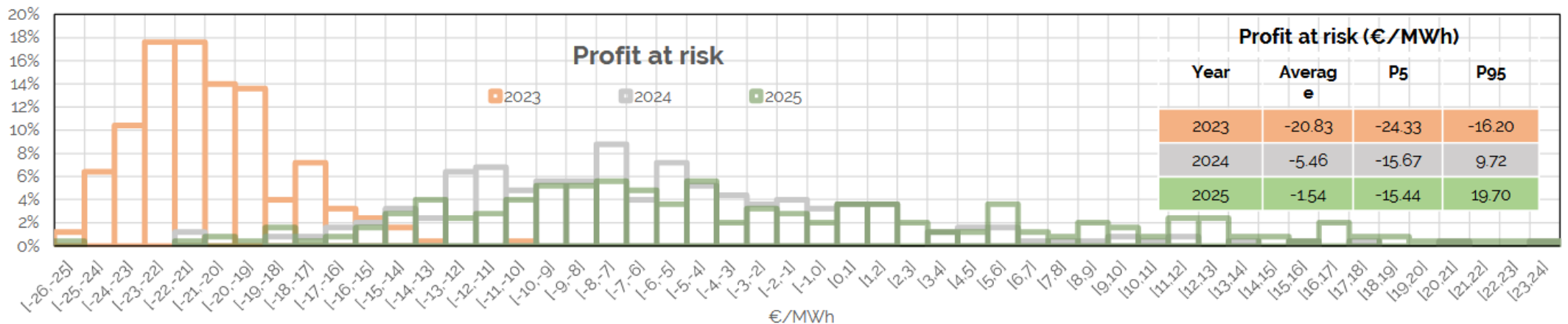
Allows for more investments!

Example 2



Price exposure in regulated Spanish assets

- Focus:
 - Spanish regulated assets (under Royal Decree RD-L 413/2014)
 - Final cashflows of subsidy linked to basket of forward and spot prices!
- This market basket leads to complex and hard to evaluate risk profile
 - Simulations make it possible to assess and quantify this revenue risk
- From our May 2023 Market Basket Report:
 - <https://www.kyos.com/wp-content/uploads/2023/04/KYOS-ES-market-risk-report-May-2023.pdf>



We look forward to supporting you with the right tools and advice!



Ewout Eijkelenboom
ewout@kyos.com

KYOS Energy Analytics
Nieuwe Gracht 49
2011ND Haarlem
The Netherlands

