



Webinar: managing price risks of renewable assets

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Agenda

- Introduction
- Overview KYOS PPA system
- Hedging price risks of renewable assets
- Case study
- Q&A and discussion

Overview KYOS PPA system



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 Analytical Platform



Complete software solution for valuation and risk management of renewable assets and PPAs

Main elements:

- Long-term price curves (KyPF fundamental model)
- Volume and price simulation (KySim)
- PPA valuation (KyPPA)
- Portfolio risk management (KyRisk)



All delivered in a user-friendly, on-line platform

Used by asset owners, investors and PPA off-takers across Europe!

KYOS Analytical Platform – location based pricing

Price data | **Time series** | Curves | Assets & Contracts | Risk analytics

Production, Demand & Weather

Profile name *

Type

Granularity

Weather data import

The Platform can import weather data directly from [Meteoblue](#), based on the coordinates.

Import automatically ☒

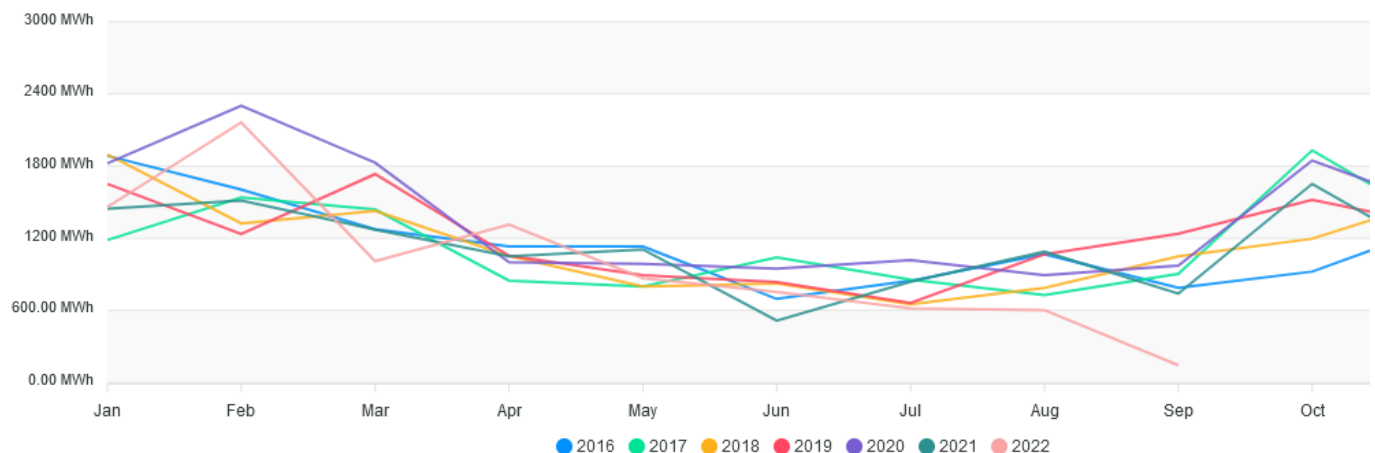
Latitude *
Min: -90 Max: 90

Longitude *
Min: -180 Max: 180

Turbine height *

- Get immediate insights in generation statistics

- Price a PV or wind asset at any location, based on:
 - Coordinates
 - Orientation
 - Power curve
 - P50 generation levels
- Create generation patterns of different weather years with historical weather data from Meteoblue
- Combine with fundamental power market model to estimate future capture rates

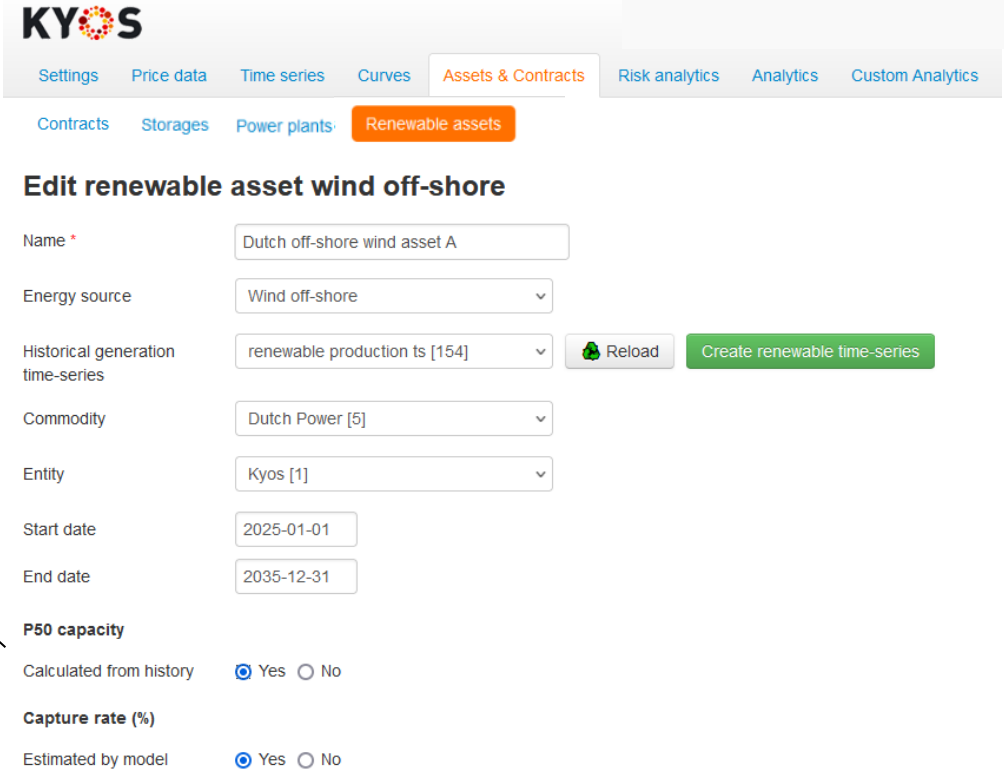


KYOS Analytical Platform – renewable assets

- Flexible way to create renewable assets
- Necessary to value any renewable asset or PPA contract
- Used to generate Monte Carlo simulations of future generation, correlated to spot price simulations
 - Similar to other assets in the platform (power plants, storage, contracts)
 - Fully integrated with KySim and KyPPA

Annual volumes based on historical data or as user input

Capture rates based on historical data and fundamental model, or as user input



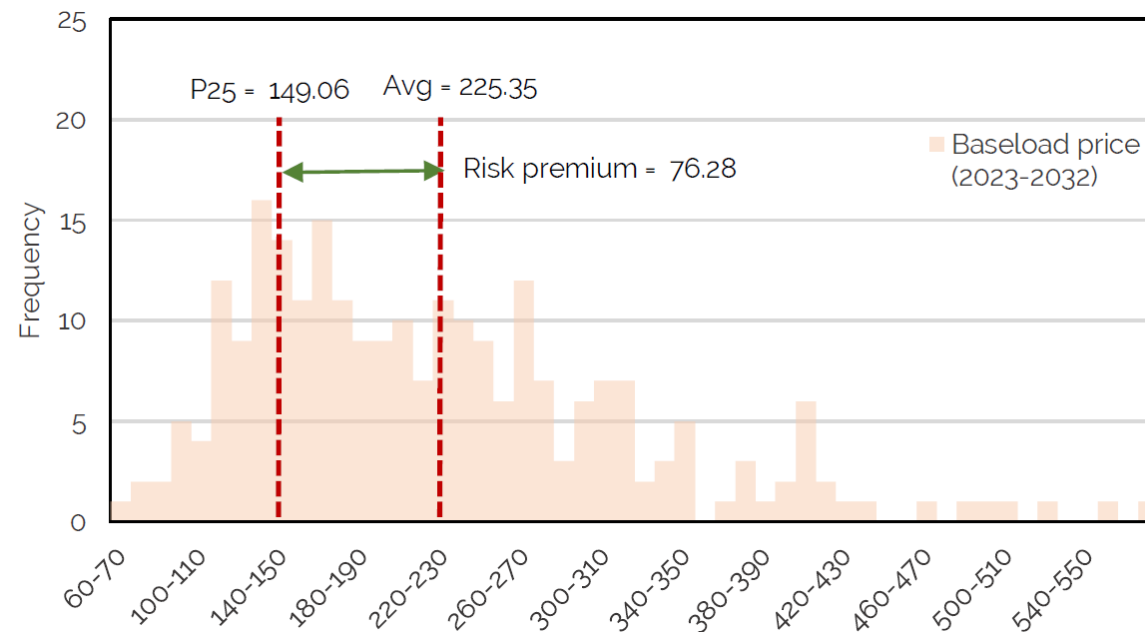
The screenshot displays the KYOS Analytical Platform interface. The top navigation bar includes tabs for Settings, Price data, Time series, Curves, Assets & Contracts (selected), Risk analytics, Analytics, and Custom Analytics. Below this, a sub-navigation bar shows Contracts, Storages, Power plants, and Renewable assets (selected). The main content area is titled 'Edit renewable asset wind off-shore' and contains the following fields:

- Name: Dutch off-shore wind asset A
- Energy source: Wind off-shore
- Historical generation time-series: renewable production ts [154]
- Commodity: Dutch Power [5]
- Entity: Kyos [1]
- Start date: 2025-01-01
- End date: 2035-12-31
- P50 capacity: Calculated from history (Yes selected)
- Capture rate (%): Estimated by model (Yes selected)

Buttons for 'Reload' and 'Create renewable time-series' are located to the right of the 'Historical generation time-series' field.

KYOS PPA Insights report

Report provides PPA assessments, covering almost whole of Europe
Includes a risk discount in the solar and wind PPA assessments (as of September issue)
Risk adjusted price = P25 price



<https://www.kyos.com/ppa-insights-european-solar-and-wind-power-prices/>

PPA Insights Price developments in Europe

KYOS Energy Analytics
September 2022 – Issue Nr. 5



Western Europe

	Baseload	Solar	Wind onshore
Netherlands	230.6	116.0	136.2
Belgium	240.1	133.0	146.9
Germany	240.8	135.9	143.8
France	218.4	124.2	133.4
Switzerland	253.9	143.9	169.5
Austria	255.5	147.6	166.4

Hedging price risks of renewable assets



Why hedging?

Asset owners

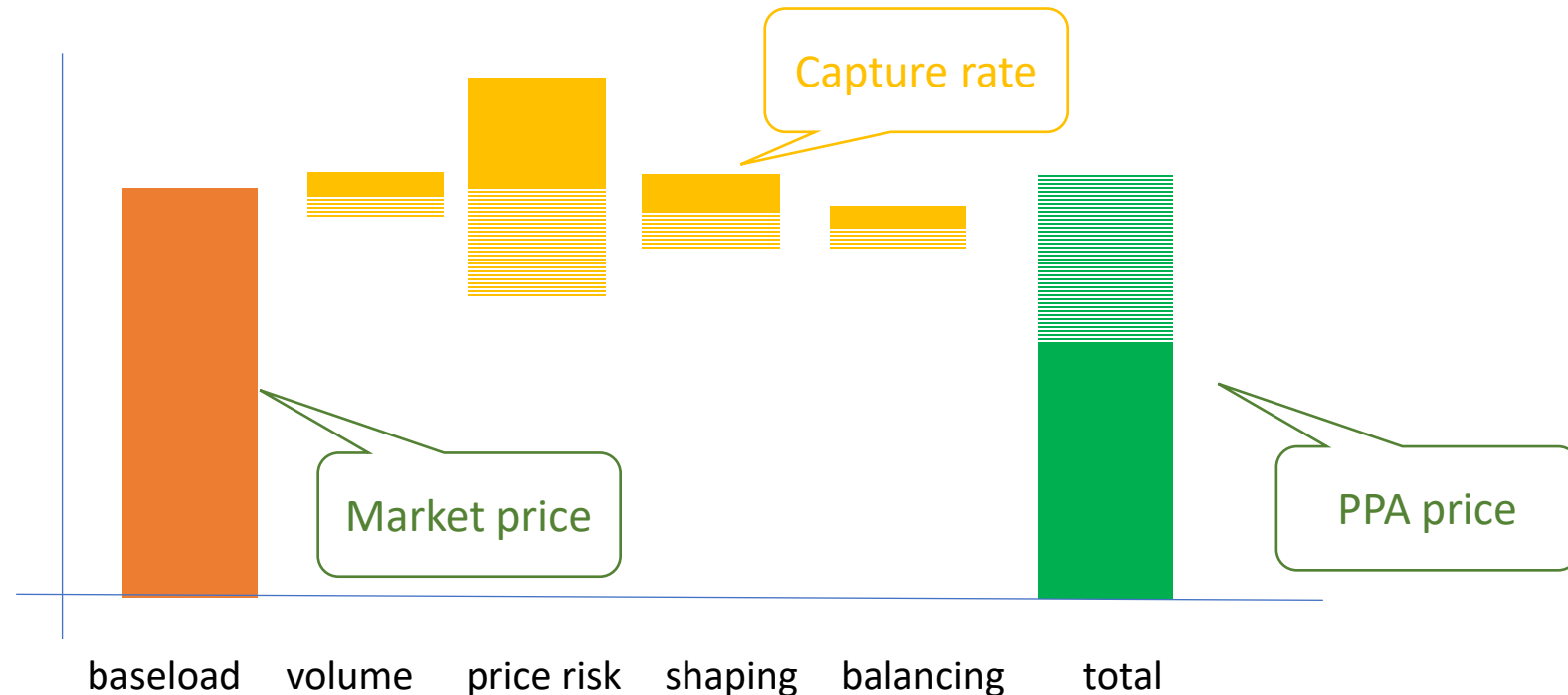
- Exposed to long-term price risk
- Investors require stable cash flows

PPA off-takers

- Long duration of PPAs leads to long-term price risks
- Ability to hedge price risks, makes you more competitive in PPA negotiations

PPA value components and risk

- Some risk components are easier to hedge.
- Power price risk is typically largest risk component:
 - Hedging strategies focus primarily on this component



Hedging - analysis

- Hedging lowers your risk
- But optimal hedge requires sophisticated valuation, including using Monte Carlo simulations
 - KYOS Analytical Platform comes with out-of-the-box functionality to easily test different hedging strategies

Hedging strategy

Optimise hedge volumes



Delivery type of delta positions in reports



Select to add

Select to add

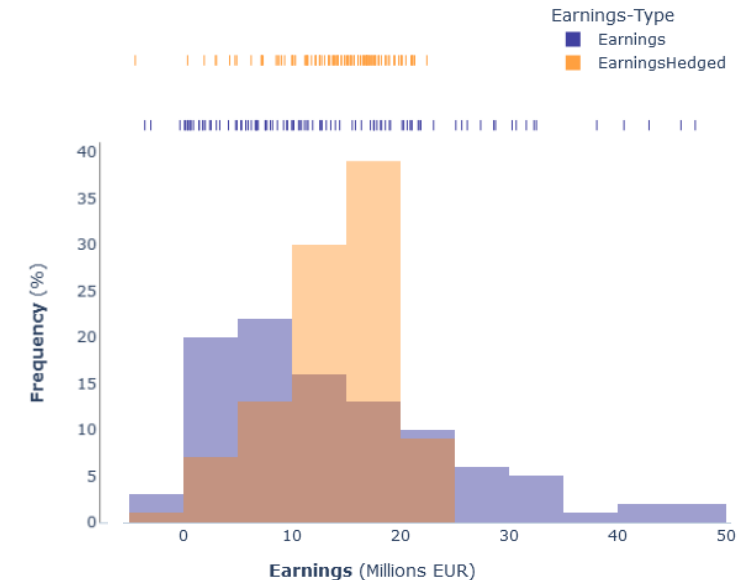
static-monthly-baseload [1]

static-yearly-baseload [2]

stack-and-roll [3]

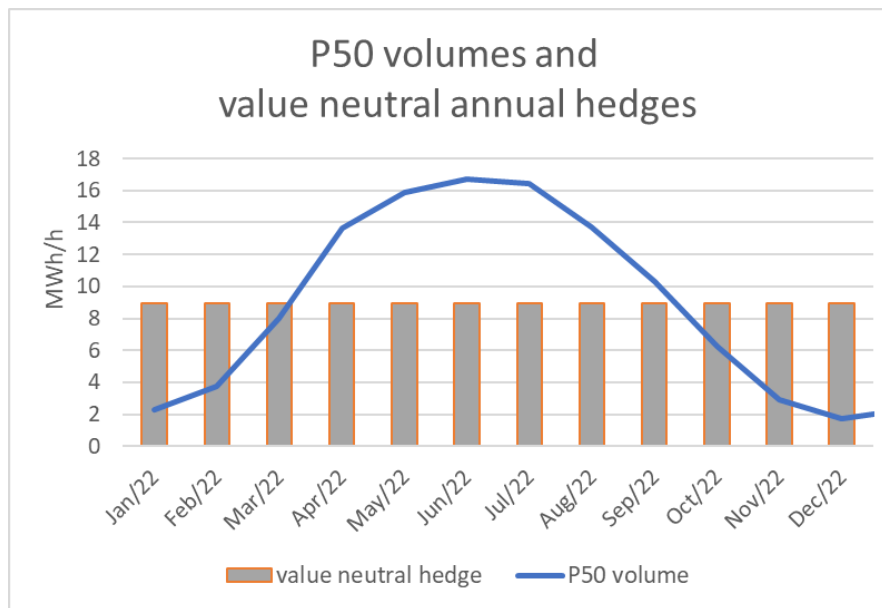
dynamic-yearly-baseload [4]

static-yearly-and-dynamic-short-term [5]

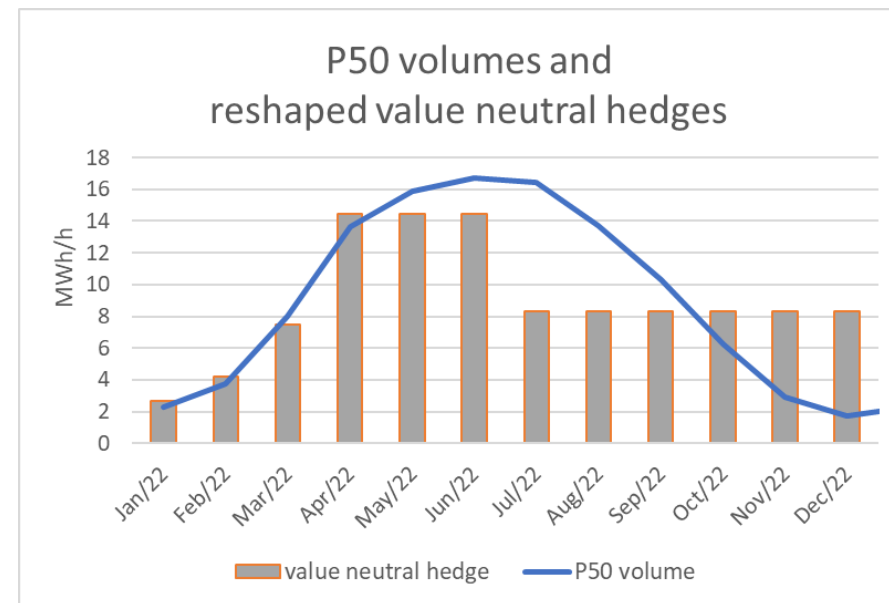


Dynamic hedging (1/2)

- Refine hedging
 - Rebalance hedge based on products becoming tradable
 - Example: initially only years tradable, later this can be reshaped using months and quarters



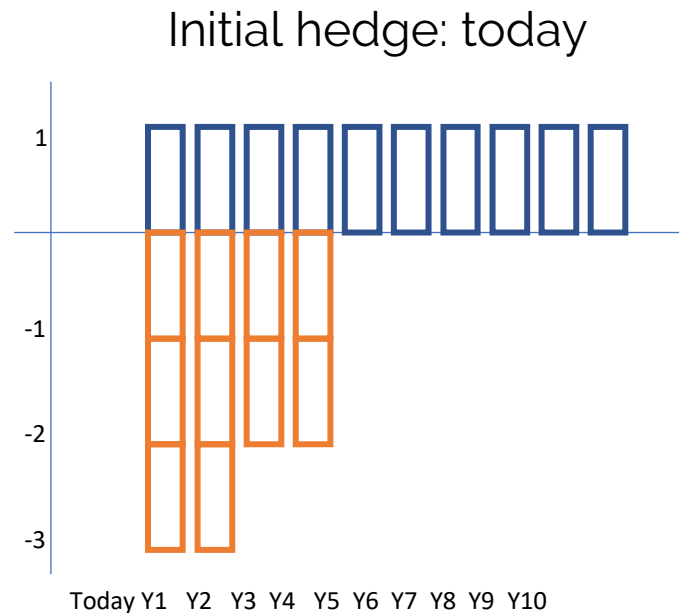
Initial annual hedge



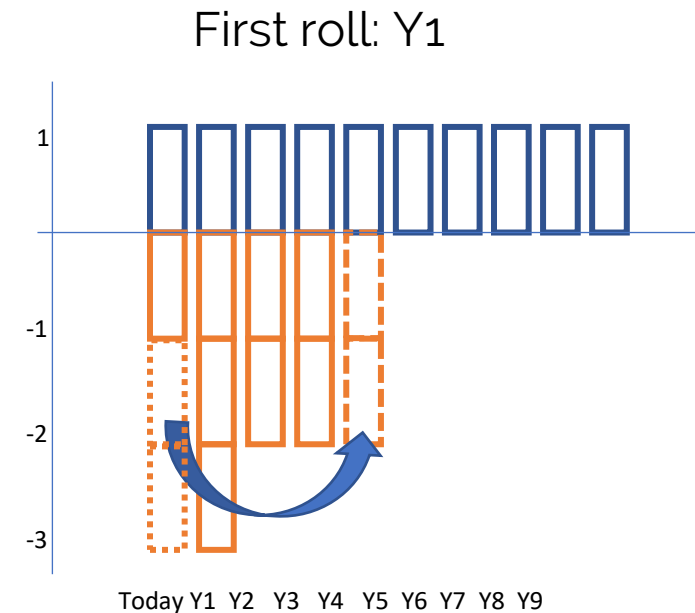
Reshaped hedge

Dynamic hedging (2/2)

- Stack and roll strategy
 - Hedge illiquid period with liquid periods
 - Roll position when they become tradable



Initial annual hedge



Reshaped hedge

Hedging - reality

- Dynamic hedging strategies require liquid forward market with low transaction costs
- Current (extreme) market condition make this difficult:
 - Low liquidity on forward market
 - High transaction costs -> margin costs
- Strong interest to sell long-term PPAs

Case study



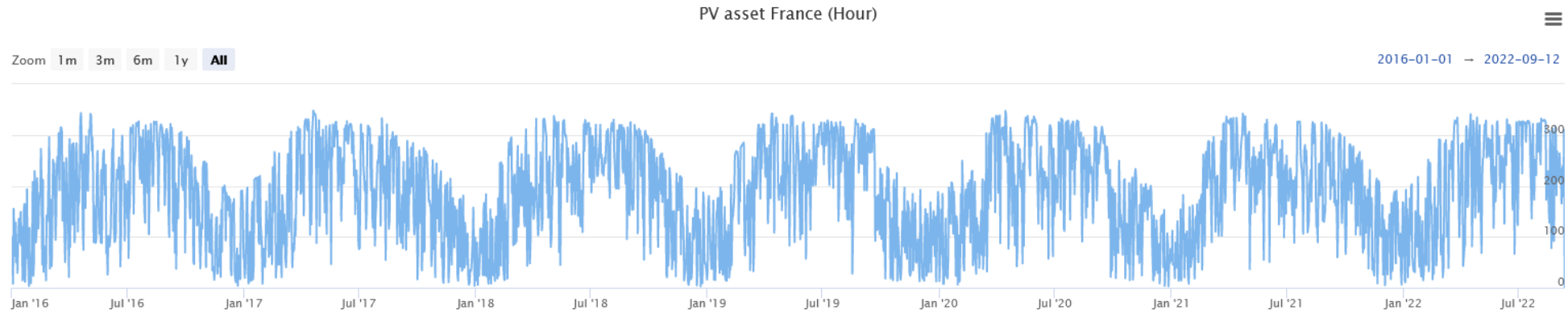
Case study - outline

- We analyse in this example how a proper PPA risk management system can support a renewable asset owner making informed decisions!
- PV asset owner
- New asset in France
 - 100MW_p
- Asset owner wants to assess effect of different off-take structures on debt service coverage ratio

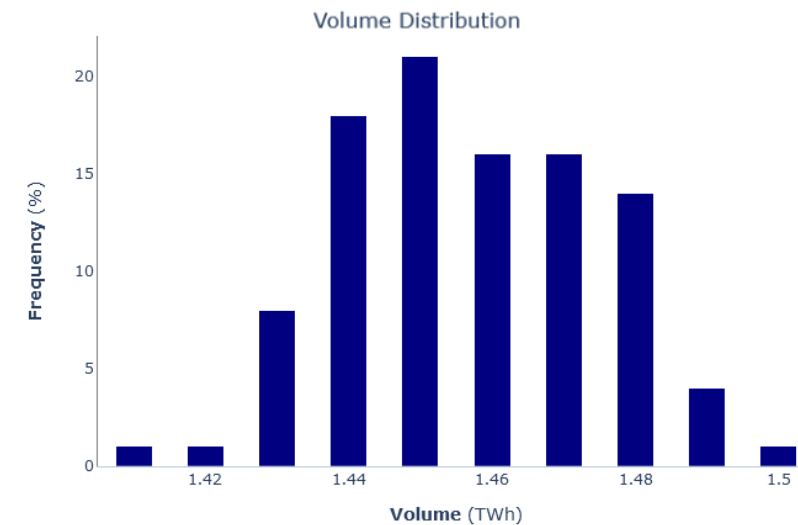


Set-up asset

- Import historical data of location

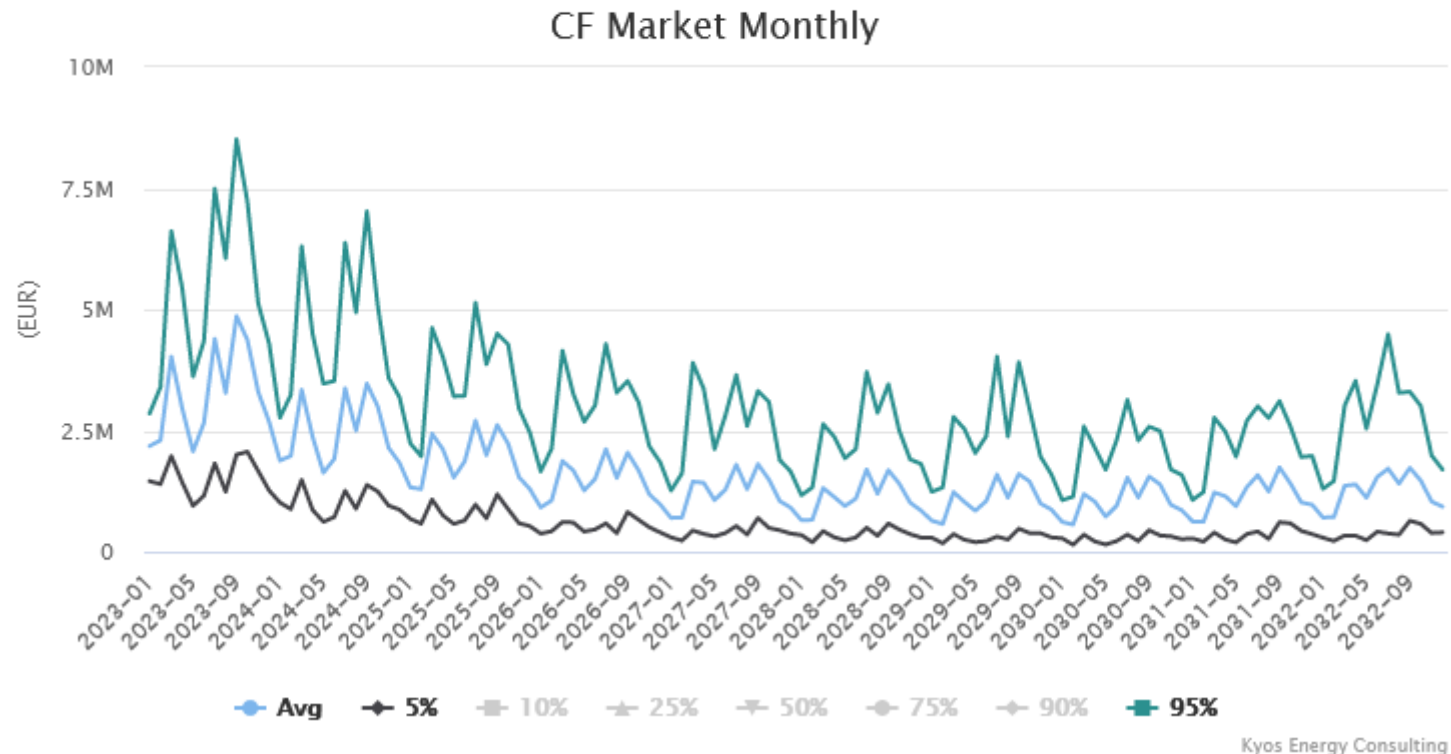


- Create volume simulations
 - Distribution over 10 year valuation horizon



Valuation asset in market

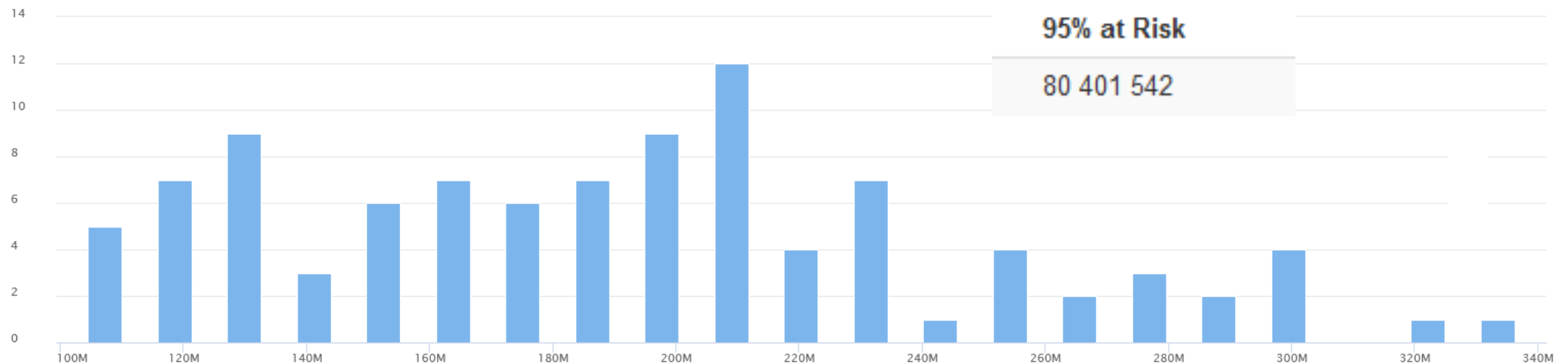
- In the first step we calculate (in KyPPA) the asset value in the (spot) market



- Wide distribution of possible cashflows -> large risks

Valuation asset in market

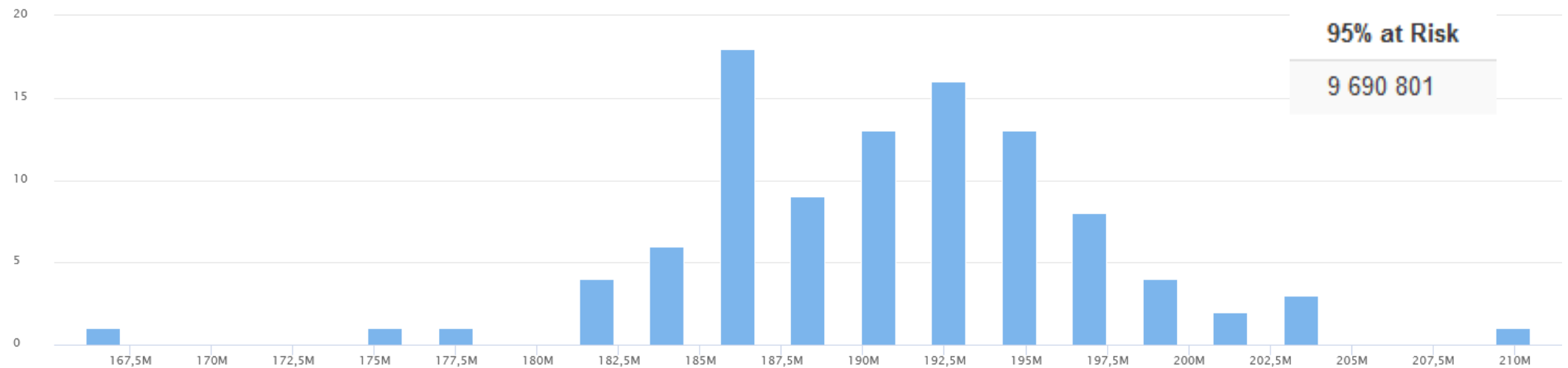
- High risk can also be seen when looking at distribution of cashflows over the 10-year valuation period



- Indicator for this risk is the Cashflow-at-Risk metric

Hedging

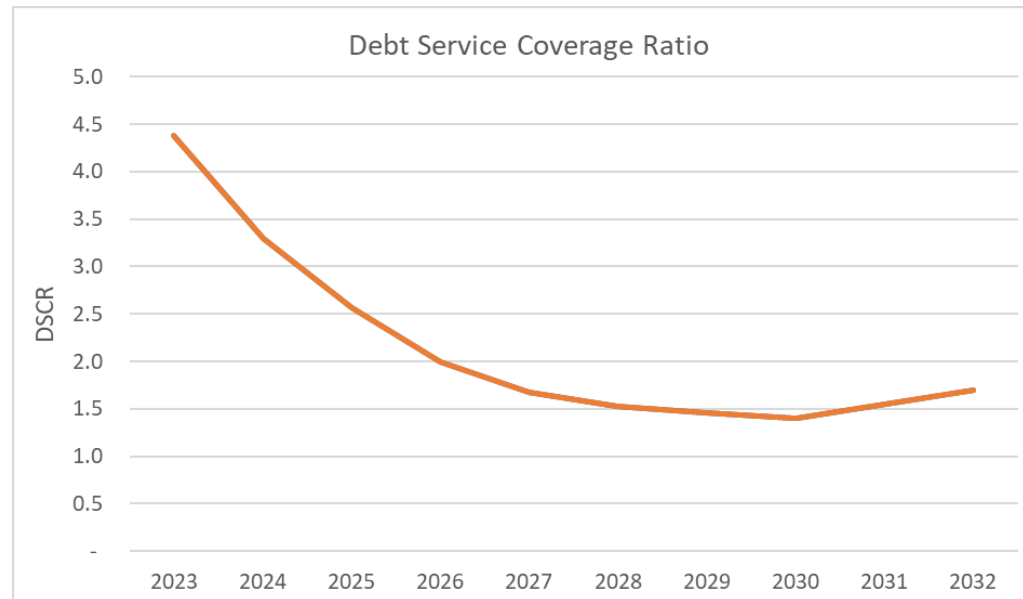
- We now introduce an annual baseload hedge
 - Using a value neutral hedge as calculated by KyPPA
- Much tighter risk distribution



- CfaR metric is now only €9.6mln (from €80mln of unhedged asset)

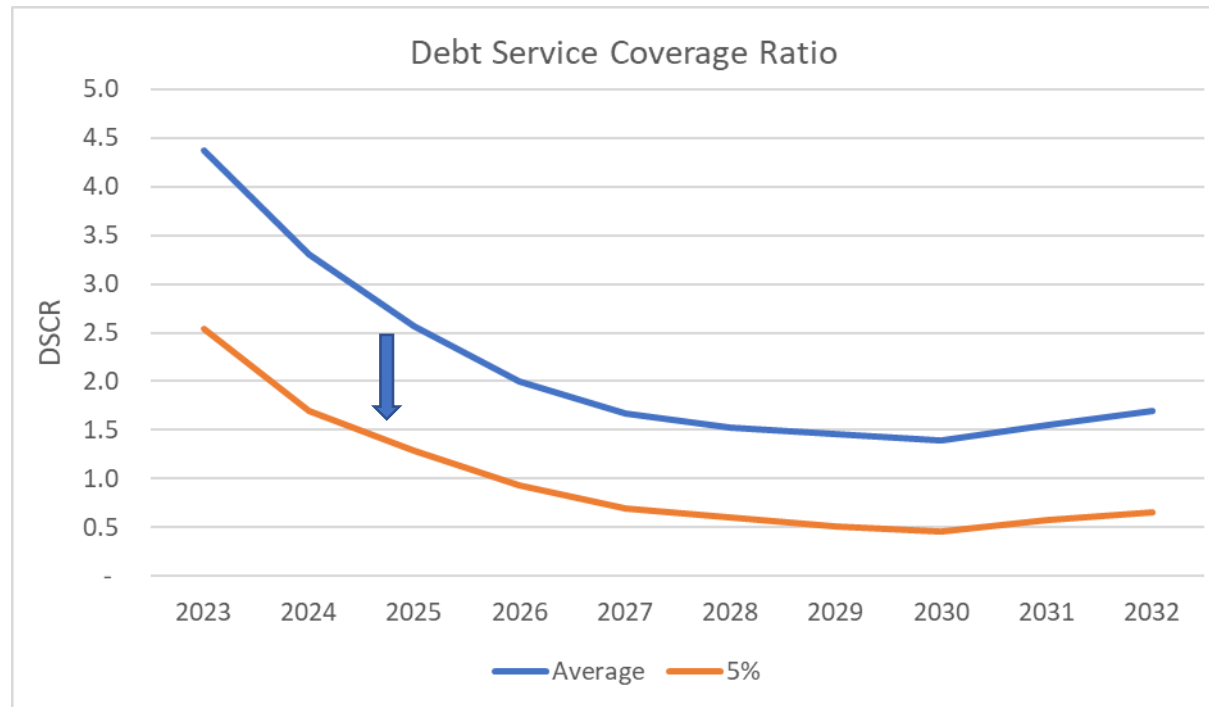
Supporting financing (1/3)

- Banks look at debt service coverage ratio (DSCR)
- Assume total investment around 800€/kW and debt repayment over 10 years
- Based on expected cashflows of the unhedged asset, DSCR looks healthy



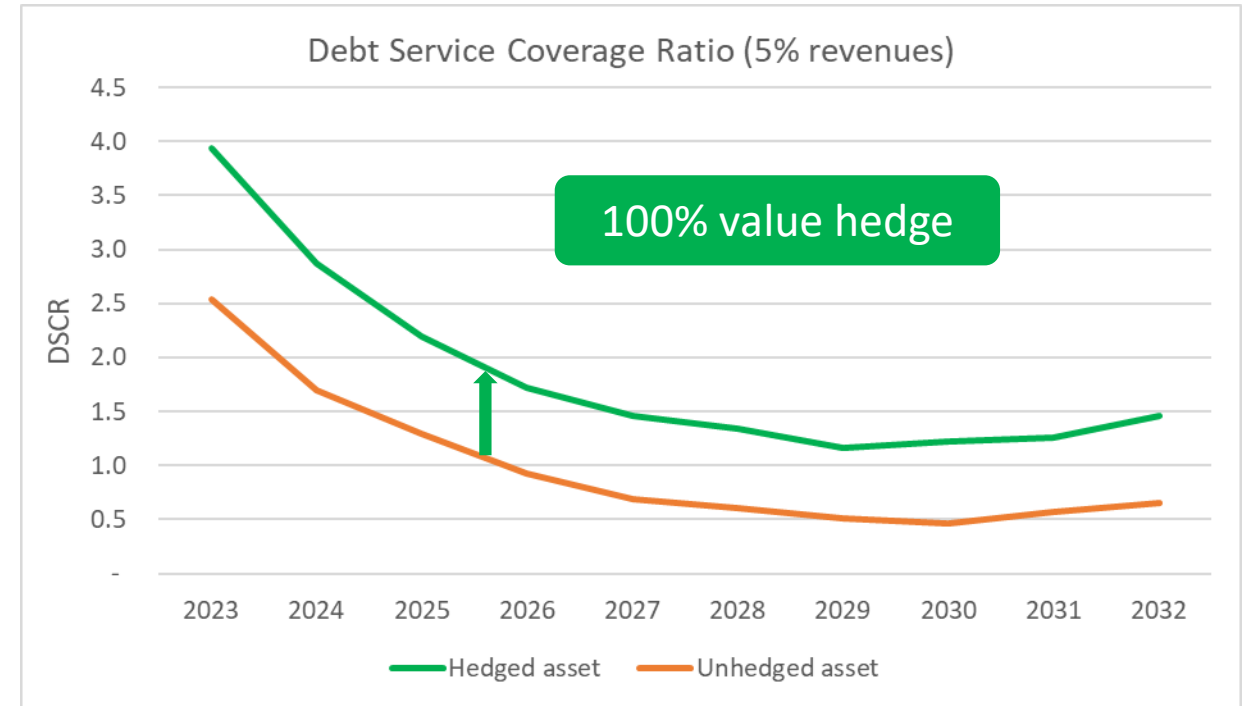
Supporting financing (2/3)

- But banks want certainty and will not look at expected revenues, but at worst cases
 - E.g. 5% worst case of cashflows
- DSCR of unhedged asset becomes very low, making financing difficult



Supporting financing (3/3)

- Same analysis with hedged asset
- Brings DSCR back to values close to “expected DSCR”
- KYOS software can be used to easily analyse different hedging strategies on DSCR.
- For example, hedging **91%** of the value neutral hedge maximizes the average DSCR.
- Or: if the DSCR should not go below 1 in any year, the minimum size of the hedge volume is **60%**.



Summary

- Simulation based valuation of renewable assets and PPAs is key to understand price and volume risks
- Valuable tool for
 - Pricing PPAs
 - Defining PPA strategies
 - Optimizing market hedges
 - Supporting financing/investment analysis
 - Daily risk management and reporting

Thank you

Time for Q&A

For a demo, please contact us on
info@kyos.com

E-book will be sent to you by e-mail

