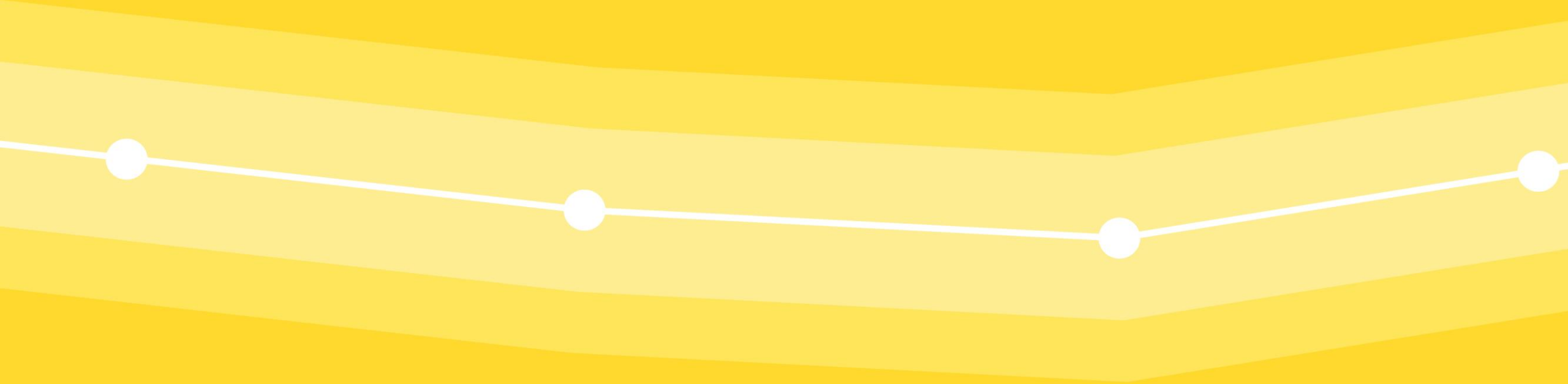




Scenario Analysis – Simulation of portfolio value

Making better-informed hedge decisions - Quantitative methods for understanding portfolio value, risk and diversification effects

Johan Claesson

Bodecker Partners' Nordic Investment Seminar, Malmö

May 7th, 2024

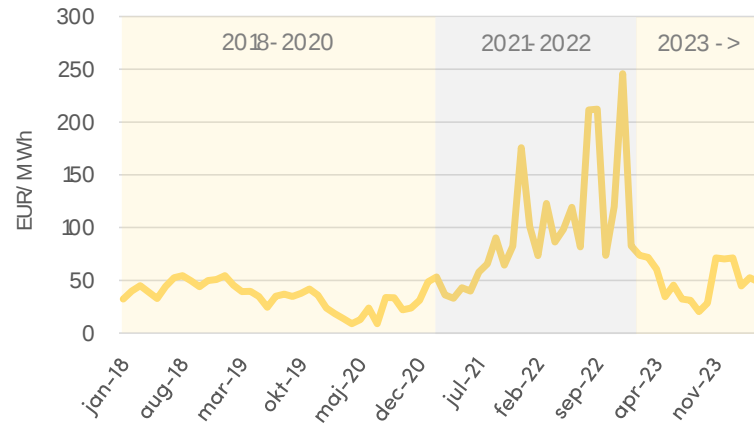
Risk-free investments

Infrastructure → a Risk-Free investment

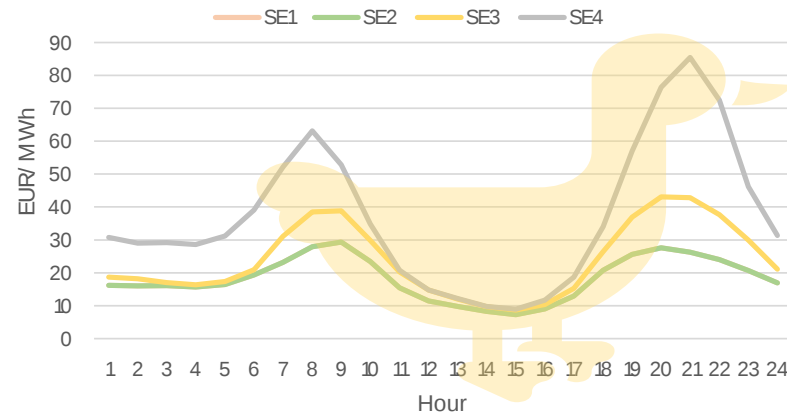
When it comes to renewable power production, that's not really true, is it?

Quite some volatility...

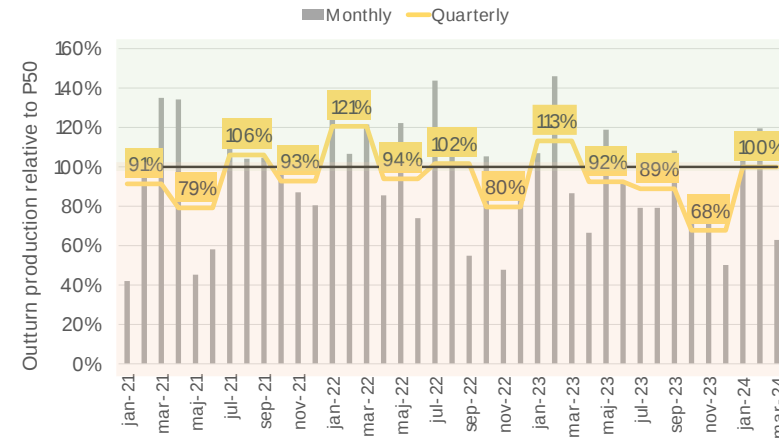
Monthly Avg. Spot Price SE3



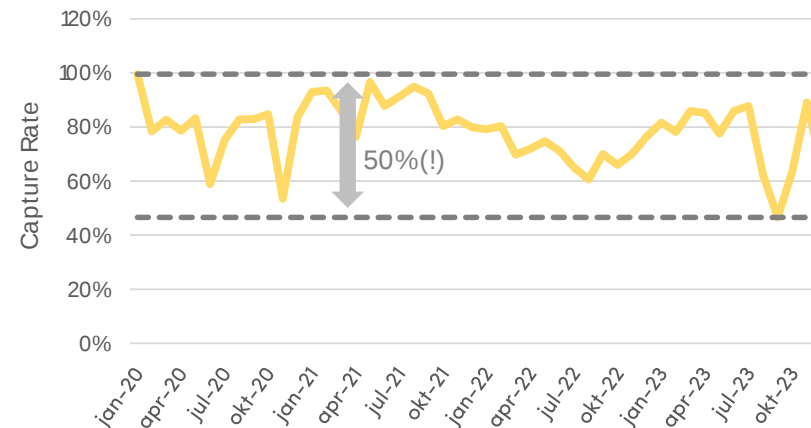
Hourly Avg. Spot Price 1-20th May 2024



Production Outturn vs. P50



Outturn Capture Rates for Wind in SE3



So, “hedge-and-forget” is not possible anymore?

No. And generally, that has never really been a good long-term alternative



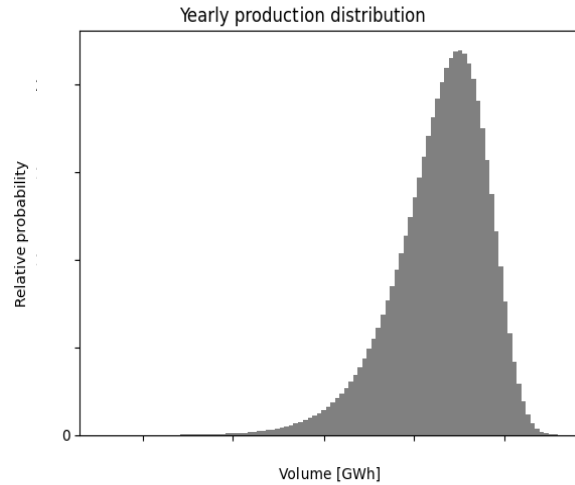
But what to do? ~~Active~~ **Risk Management** of the assets is required!

First step: Understand your exposure and commodity risk profile.

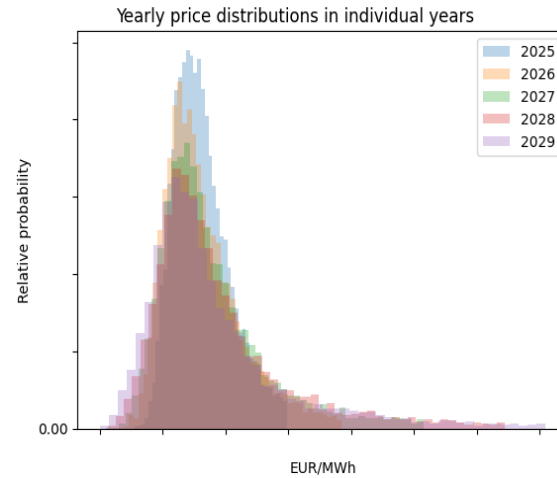
THERE IS A WAY
TO DEAL WITH IT!

Quantifying risk through simulations

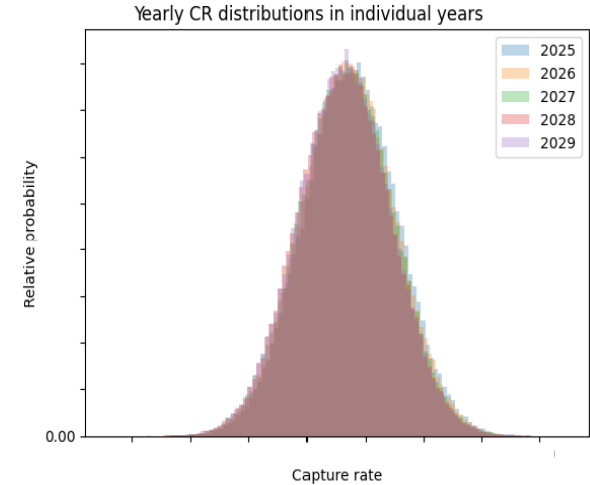
Production volume



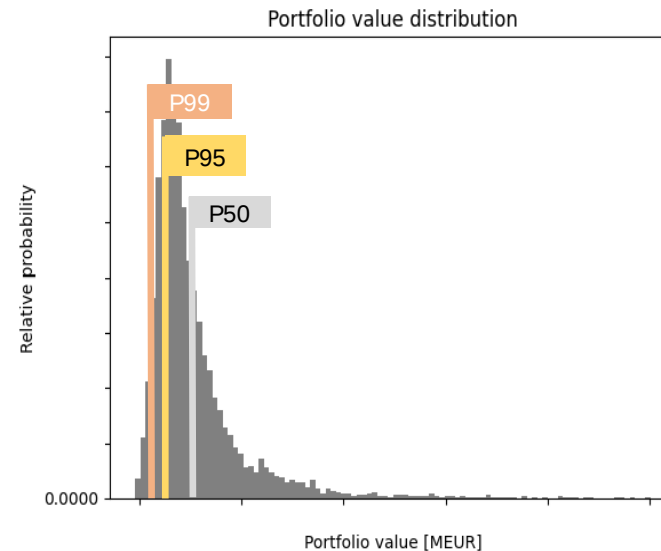
Spot price



Capture rates



Simulations provide a risk profile of the asset.
in EUR, with probabilities.

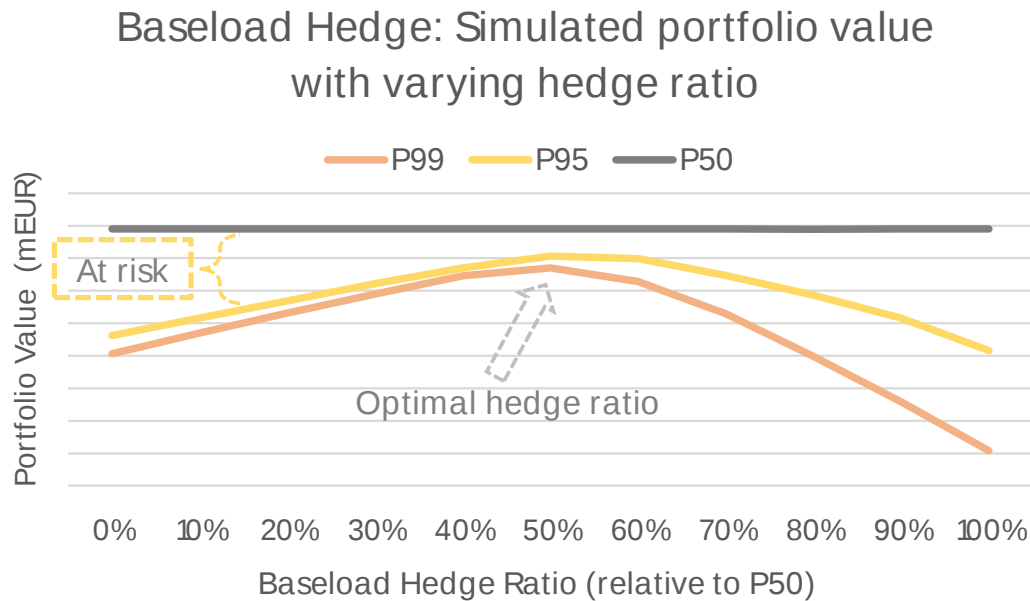


*“Nice graph, nice colors.
But what should I do with it?”*

Optimal hedge

Base load hedges:

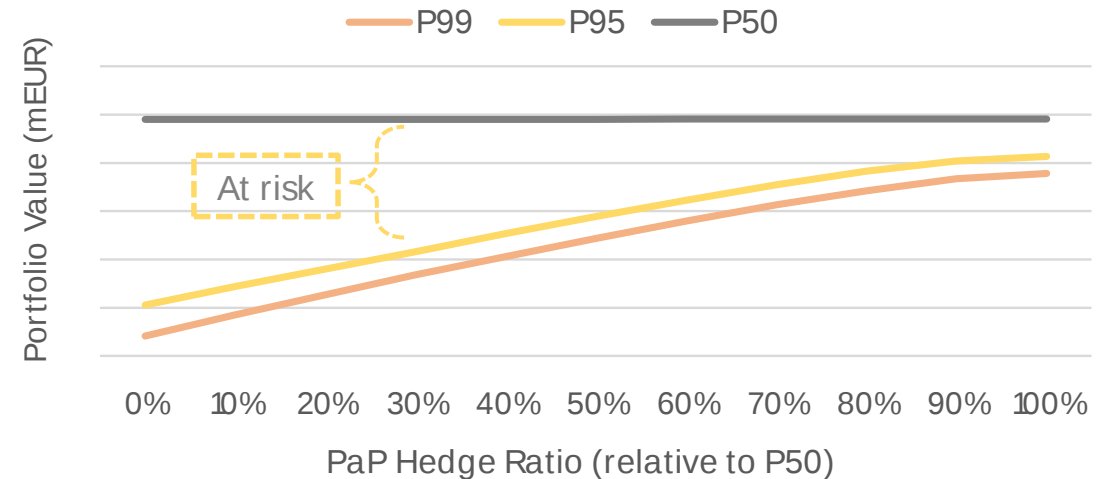
What is the optimal hedge ratio?



Pay-as-Produced PPA:

Which discount* to Baseload?

PaP Hedge: Simulated portfolio value with varying hedge ratio



*Discount that will result in a flat P50-graph, i.e. a risk-neutral pricing on profile, volume, and price risk

Diversification effects

Next step: Analyse diversification effects

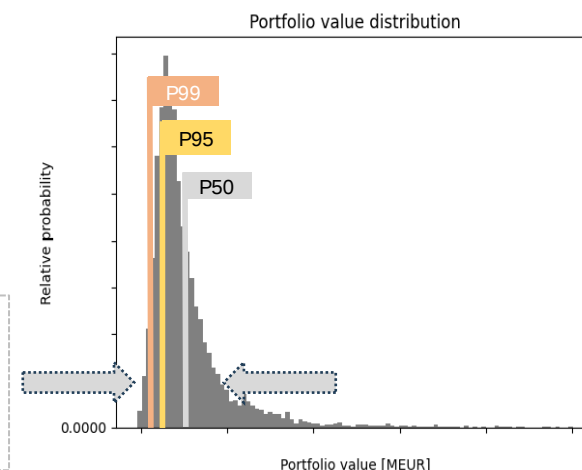
Are there any? Simulating portfolio values for current portfolio and “New Asset” stand-alone and then together:

(mEUR)	Simulated assest values:		Risk Sizing (P95)
	P50	P95	
Current Portfolio Value	10,0	6,3	-3,7
"New Assest" Value (stand alone)	3,0	1,5	-1,5
Aggregated (no diversification effects considered)	13,0	7,8	-5,2
Simulated combined portfolio	13,0	8,5	-4,5
Delta (Simulated Combined vs. Aggregated)	0,0	0,7	0,7

The P50 values are the same in P50, but the more adverse scenarios indicate less value impact for the combined portfolio

There are diversification effect when combining the assets!

Another way to explain it: A more “pointy” risk distribution with positive diversification effects



Summary

- ***Investments in intermittent power production are seldom risk free.***
*Therefore, it is crucial that **risk is assessed and understood** in order to **be able to make informed decisions** about how to manage and mitigate them*
 - ***Scenario simulations*** *is one approach for assessing and quantifying risk.*
 - ***Diversification effects*** *should not be underestimated! Some risk may be hedged away with additional assets added to the portfolio and **scenario simulations can help you figure out** which ones.*
-

Disclaimer

In reality, there are of course more aspects, opportunities, and risks that need to be looked after, for example:

- Icing on turbine blades
- Grid maintenance
- Ancillary services potential
- Interest rates
- Wake losses
- Grid tariffs
- etc..

However, scenario simulations are a way to understand and manage **the commodity-related** opportunities and risks of intermittent power production.

Thank you!

