

PEXAPARK

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# 24/7 CFE Hedging Analysis

24/7 approach improves the effectiveness of renewable  
PPAs as a price hedging tool

European **24/7** Hub



# What? Why? How?

## What?

- **24/7 procurement:** A high-impact corporate energy sourcing strategy that matches clean energy demand with supply on an hourly and locational basis.
- **Going beyond traditional annually matched PPAs** to ensure energy is sourced sustainably every hour of every day.

## Why?

- **Enhanced Price Certainty:** Hourly matching reduces exposure to volatile spot markets and ensures greater control over energy costs.
- **Sustainability:** 24/7 procurement increases renewable energy consumption, enhancing company's green credentials and sustainability targets.

## How?

- **Hourly matching analysis:** Establishes what level of 24/7 matching is effective for a 10 MW baseload demand profile in Germany and Finland, using a combination of onshore wind, solar PV and co-located Li-Ion battery in 2020, 2021 and 2022 representing low, medium and high prices respectively.
- **Forward-looking hedging benefit:** Using Pexapark's PPA price benchmarks and stochastic modelling techniques comparing the performance of different 24/7 PPA portfolios.
- **Retrospective hedging benefit:** Establishes how each of the 24/7 portfolios would perform against realised power prices in 2020, 2021, and 2022.



# 1

## Hedging is an effective way to manage risk and decrease price volatility

- Hedging provides improved price certainty against volatile wholesale market prices, but has a cost.
- The cost of hedging should not be higher than the benefit.
- Hedging benefit is determined by the market price vs. the hedge price and its comparison to other hedging methods.

1. Renewable PPAs: Growing tool for C&I energy buyers for hedging energy costs.
2. PPAs need to align with the buyer's energy consumption.
3. Any deviation between PPA production and buyer's consumption leads to market exposure.

### Realised monthly baseload prices in Germany

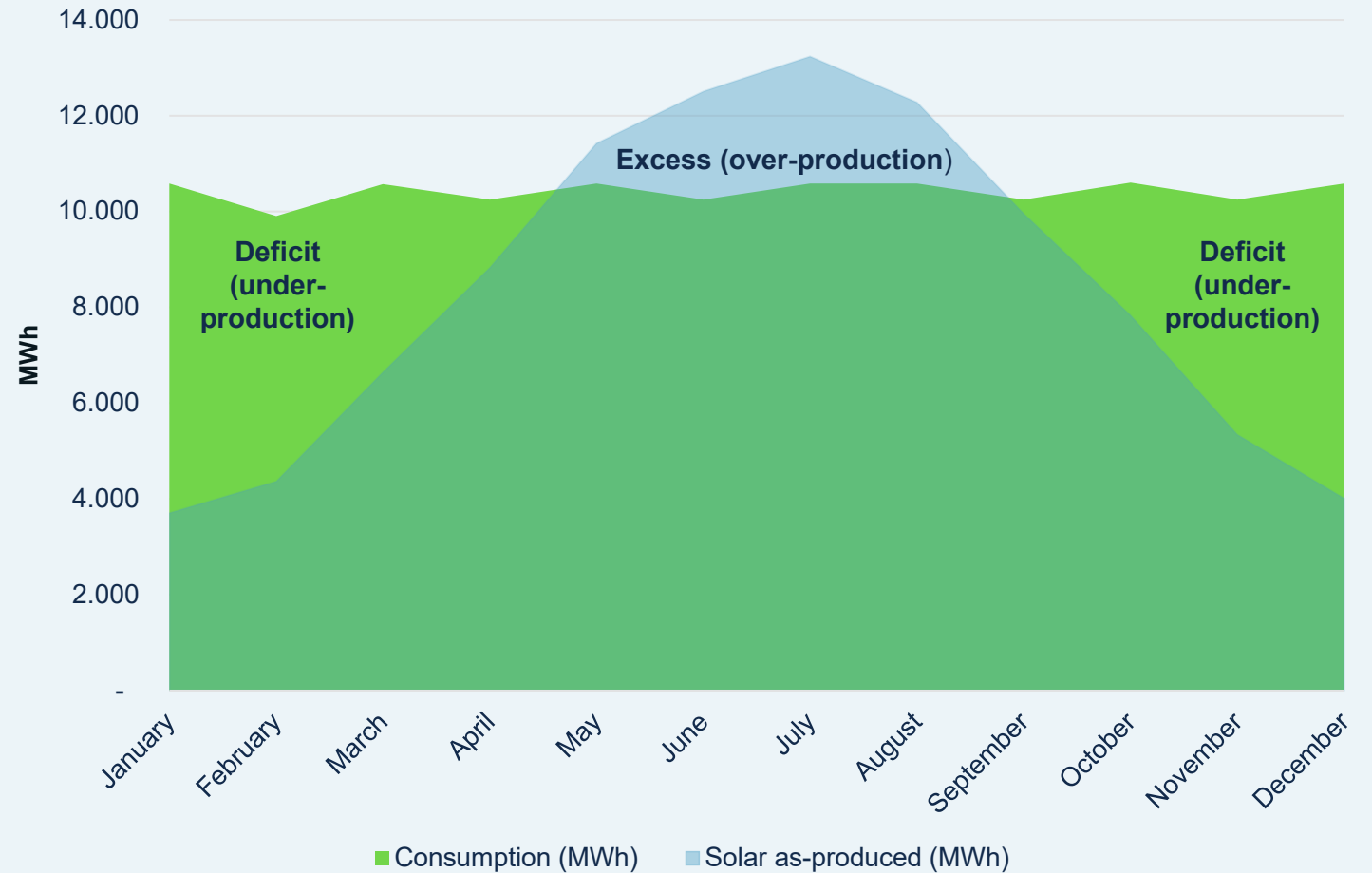


# 2

## Any deviation between PPA production and buyer's demand leads to market exposure

- Volumes and prices at which a PPA buyer has to procure (deficit) or sell power (excess) are unknown and define the main drivers for the cost uncertainty.
- The consumption/PPA volume mismatch depends on the consumption profile, PPA sizing, PPA delivery structure, and PPA asset.
- Non-baseload delivery structures such as pay-as-produced foster the risk consumption/PPA volume mismatch as solar show daily and seasonal production pattern.
- A 24/7 approach to better match the PPA production with the consumption profile is key to managing this mismatch and securing the required price certainty.

### Consumption & Solar Pay as Produced PPA (monthly granularity)

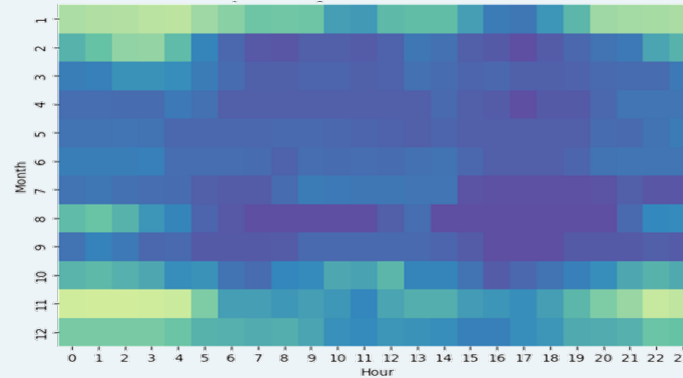


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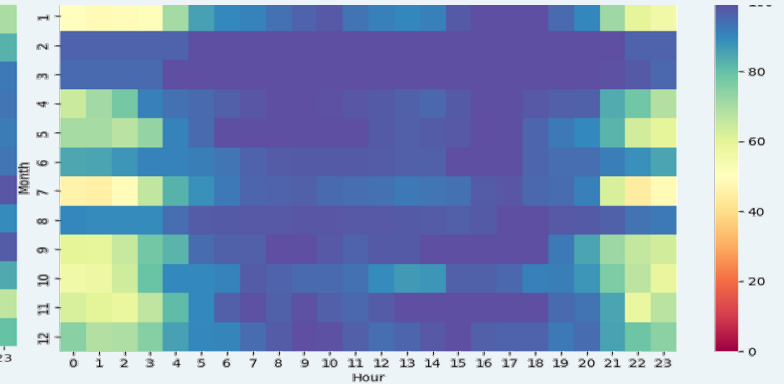
## Up to 90% hourly matching can be obtained with minimal oversupply in dissimilar markets and in the absence of baseload technology

- With advancements in technology and innovative PPA products (Hybrid PPAs), **90%** hourly matched CFE portfolios are possible.
- This can be achieved without going beyond a 20% oversupply (on an hourly level) and without baseload tech using only solar PV, onshore wind and co-located energy storage.
- Without energy storage: Up to 75% matching in the Finnish example and 67% in the German case can be obtained by combining onshore wind and solar PPAs for a supply better aligned with hourly generation-demand dynamics.

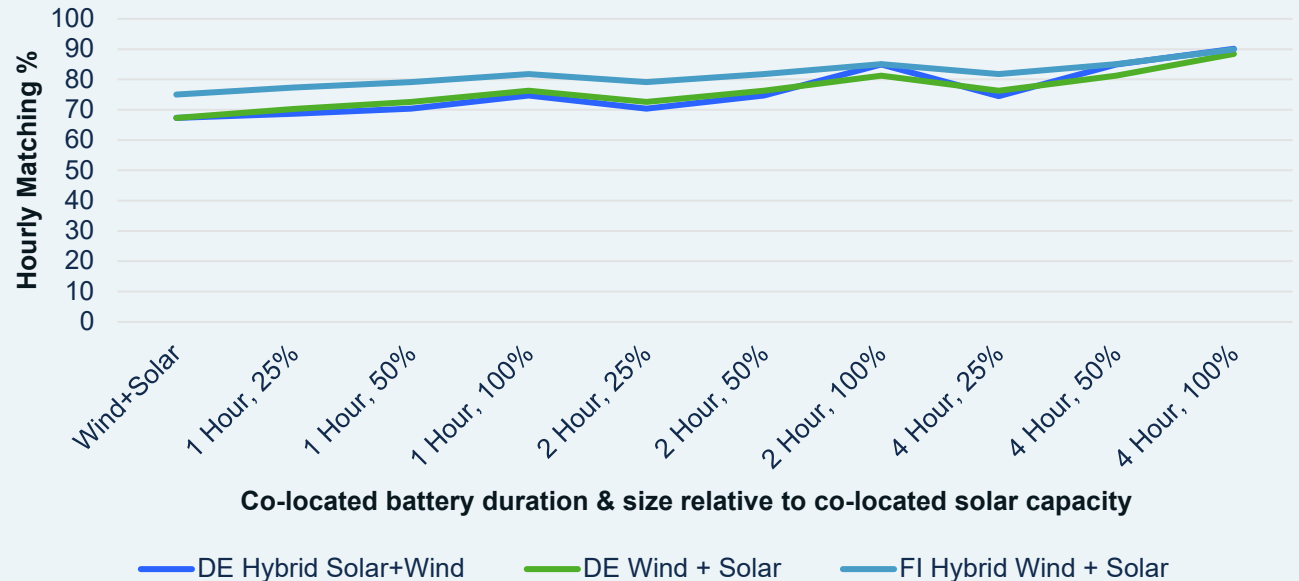
Germany highest hourly matching of 90.16% with hybrid solar + wind



Finland highest hourly matching of 89.91% with hybrid wind + solar



Preliminary results of hourly matching for Germany & Finland



# 4

## 24/7 hedging approach provides clear hedging benefits

24/7 PPA portfolio hedging optimises energy demand matching around the clock delivering a positive hedging benefit.

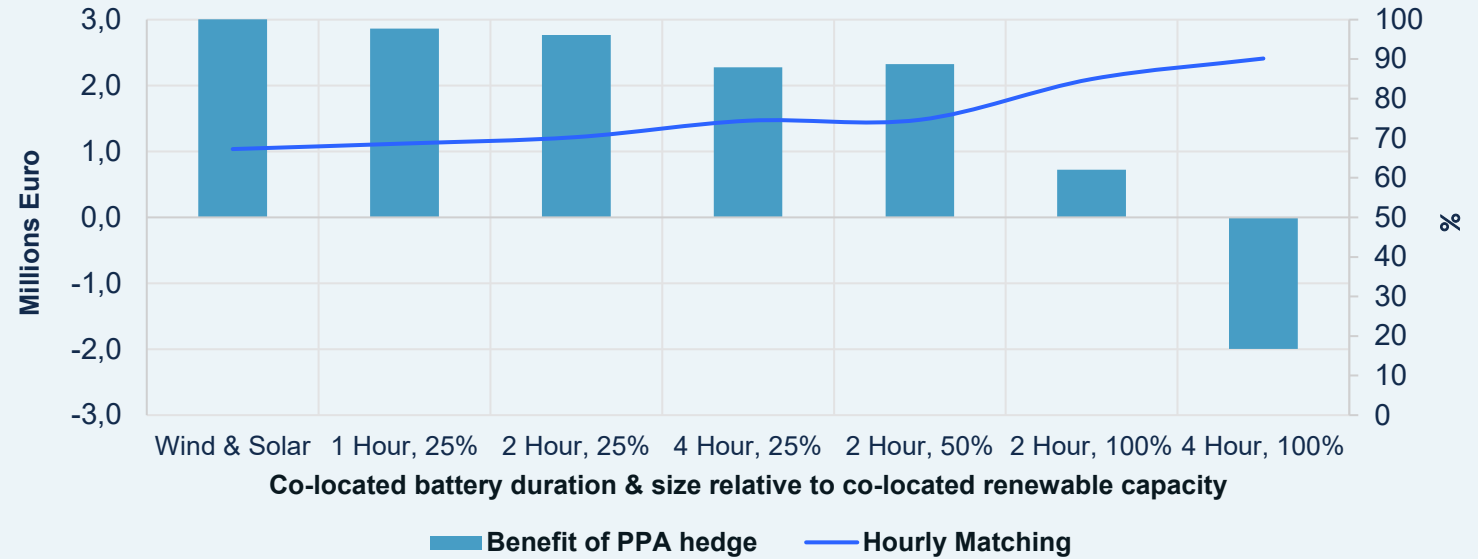
The hedging benefit for each portfolio reflects the impact of the wholesale market exposure for excess and deficit volumes and the PPA Cost compared to unhedged baseline.

Both German and Finnish 24/7 portfolios indicate positive hedging benefits.

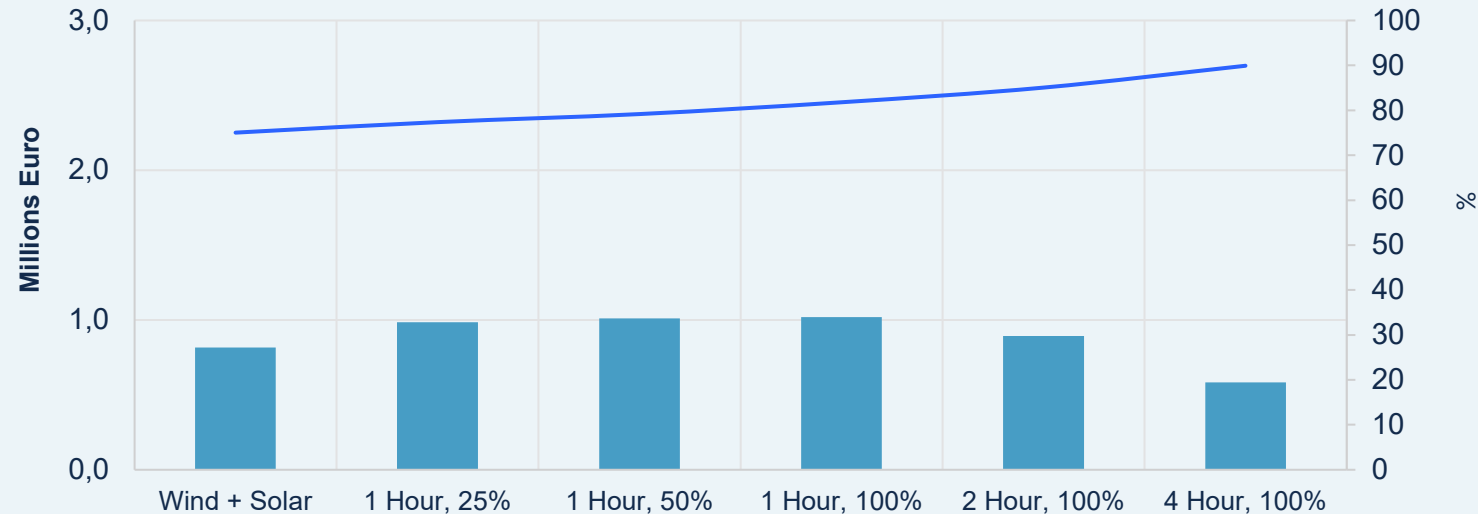
The notable exception being the German hybrid solar portfolio utilising the largest battery configuration due to the high PPA cost of that portfolio.

Finnish hybrid portfolios maintain consistent positive hedging outcomes, even with the largest battery configurations.

### Preliminary results of the German Hybrid Solar + Wind forward-looking analysis



### Preliminary results of the Finnish Hybrid Wind + Solar forward-looking analysis





# 5

## Back testing the 24/7 approach also confirms positive hedging benefit

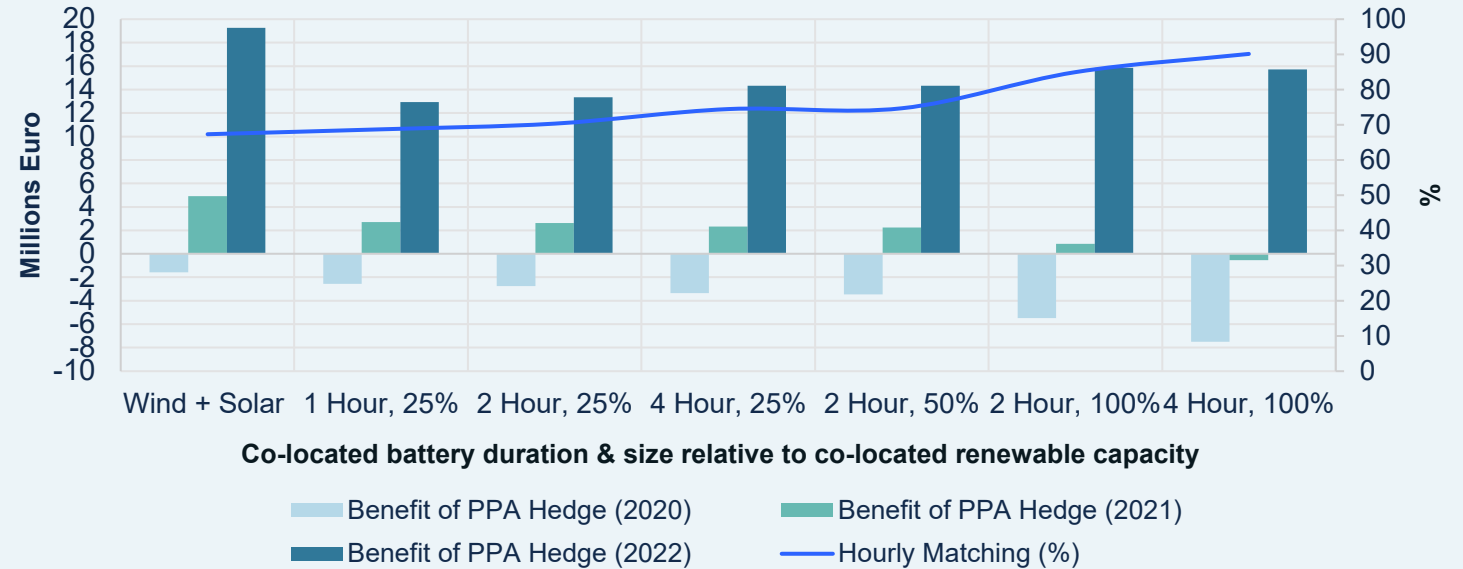
The bars represent the difference in cost in the hedged versus unhedged scenarios (“Benefit of PPA Hedge”).

Consistent hedging outcomes observed with higher hourly matching across all cases assessed.

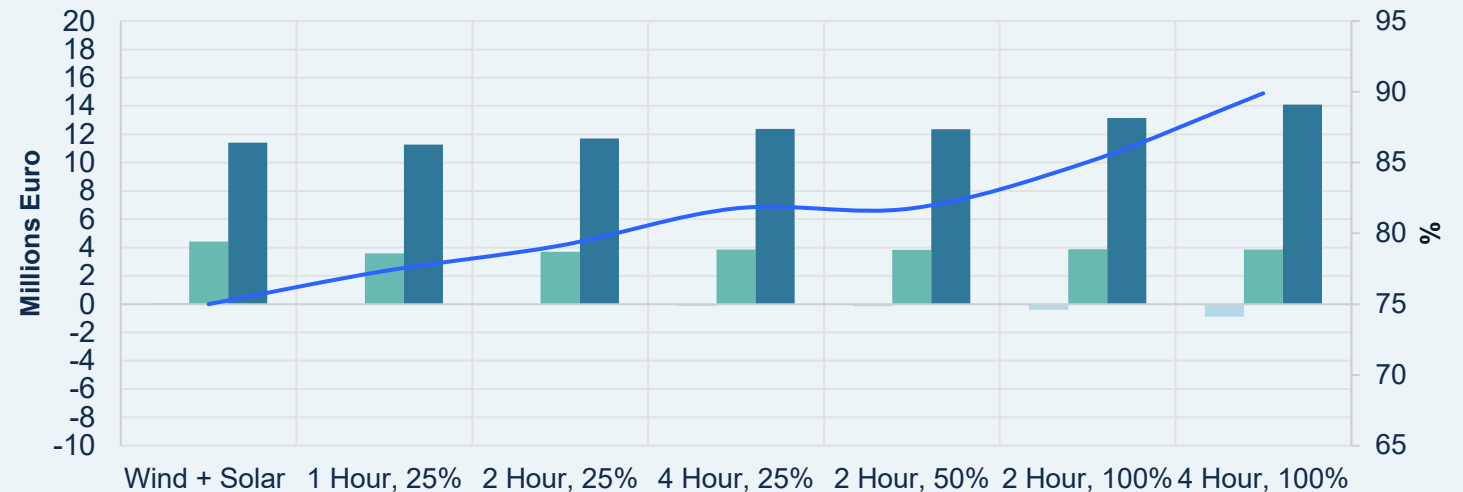
The differences in hedging benefit observed can be largely explained by the higher PPA hedging costs in Germany compared to Finland.

Factors contributing to the higher PPA hedging costs in Germany include the higher wholesale prices and larger portfolio sizes.

### Preliminary results of the German Hybrid Solar + Wind retrospective analysis



### Preliminary results of the Finland Hybrid Wind + Solar retrospective analysis



# Conclusions

Where previous studies have established the link between increased hourly matching and cost, the Pexapark study has also quantified the benefit of a 24/7 hedging strategy:

**Strategic hedging** - A 24/7 approach improves the effectiveness of renewable PPAs as a price hedging tool, delivering expected positive hedging benefits under a range of price scenarios. Hedging against the risk of higher spot market prices, as witnessed in 2022, provides benefits in insulating energy users from market volatility. Hedging cost benefit during periods of high prices compensates for periods of low prices where the hedging cost benefit is lower.

Particularly significant benefits are shown **in Finland in 2022 where the consumer would have avoided up to 14 million euro of losses if it had been 90% hourly matched**. In the lowest price scenario, 2020, the consumer would have incurred no or slight negative benefits, but it's important to note that they would have been 10x smaller than potential gains in a high price scenario.

Pursuing high levels of hourly matching **is feasible with current technologies** and innovative PPA structures. However, reaching levels above 90% hourly matching, while minimising excess generation, requires higher load factor renewables and storage to better match consumption.

Overall, **high levels of hourly matching bring considerable financial benefits**, but the effectiveness depends on how high the market prices are and the price structure of the PPA. In this case the price of the PPA is driven by Li-Ion batteries which highlight an opportunity for more clean-firm/ dispatchable generation or Long-Duration Energy Storage technologies to make hedging more attractive.