Case Study: Deploying BESS at Hepburn Wind Farm

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OUR CO-OPERATIVE BACKSTORY

Hepburn Energy

OUR COMMUNITY IMPACT

Hepburn Energy

Benefits of

Community Battery

Stage 1

Hepburn Energy

IMPROVED RESILIENCE

Storing and shifting generation during times of surplus generation from our wind farm, low voltage from localised peaks of rooftop solar on the low voltage line, and storms and bushfires.

FUTURE-PROOFING

Additional revenue from trading stored energy and participating in energy market services, enhances our business model, will underpin Stage 2: a 5MW solar farm and additional battery storage.

We are putting a battery here

INNOVATION

Our battery will deliver important learnings from the first combined wind and battery project on the distribution network in Australia.

INCOME SECURITY

We'll be able to avoid curtailment of our wind farm during negative pricing market events and enable more clean energy in the grid.

ENVIRONMENTAL OUTCOME

More mid-scale renewable energy in the local grid is a key step towards our community-wide goal of zero-net emissions for the Shire by 2030.

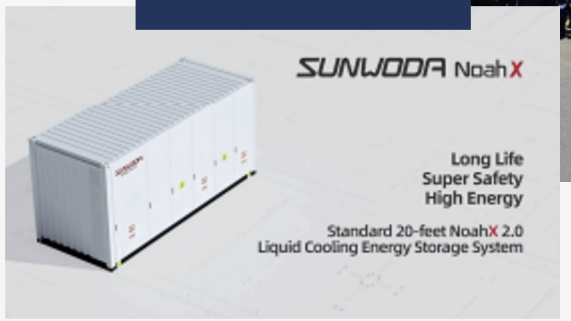
Hepburn Energy

Context: Project Background

- Working on concept of co-located Battery since 2021
- SMA inverter installed in 2021 for bushfire prevention is key asset to enable an affordable battery
- Planning permit secured for 5MW solar and 10MWh battery in 2022
- 2023 Co-op successful under Federal Government program Community Batteries for Household Solar for a grant of $500,000
- Project stage 1 will not trigger permit and will instead take Vic Gov exemption
- Adding a battery system to soak up wind energy during low prices and sell stored energy at higher times, and creating a new value stream (FCAS revenue).
- Increased volatility in energy market can be partially offset by battery on site
- Negative pricing has jumped from 1-3% in 2022-23 to ~12% in 2023-24
- Simultaneously pursuing LTE for wind farm to go to 30-35 years

Ecosystem of Delivery Partners

- **O'Brien Electrical** Engineering, Procurement and Construction (EPC), SCADA upgrade
- **Sunwoda** BESS
- **DNV** grid connection
- **OptiGrid** Energy Management System
- **Acacia Energy** NEM settlement
- **SMA** DC-DC converters
- **Flow Power** retailing
- **Kinelli Solar** and **Seed Advisory** DD support
- **BAL Legal**
- **Fulcrum 3D** Wind forecast



Context: ‘Bessie’ Project Overview

- Installed on site at the wind farm, connected to existing inverter, existing grid connection
- Capacity 2MW/5MWh
- CAPEX: $1.8m
  - $500k Federal Government grant
  - $120k CORENA zero interest community loan
  - $1.1m from 94 co-operative member debentures subscriptions

Business model results as per 2024

Conservative approach to limit future surprises

- 15 years to align with reasonable extended life of wind farm (economic life is 20 years in practice)
- No additional inclusions for peak power events
- No inclusion of import revenue (although co-op is aiming for import with grid connection variation)
- Aurora Forecasts - provide 3 potential scenarios: Low, Central and Messy

Business model

Scenario	Low	Central	Messy
Base case	$9,990,093	$12,404,628	$15,994,789
5010kWh BESS	$11,598,373	$14,574,432	$ 18,615,843

Business model results total project earnings

Low			Central			Messy		
IRR	NPV	Payback (years)	IRR	NPV	Payback (years)	IRR	NPV	Payback (years)
3%	-$94,433	12	10%	$239,371	10	20%	$524,036	8

Equity finance net of base case

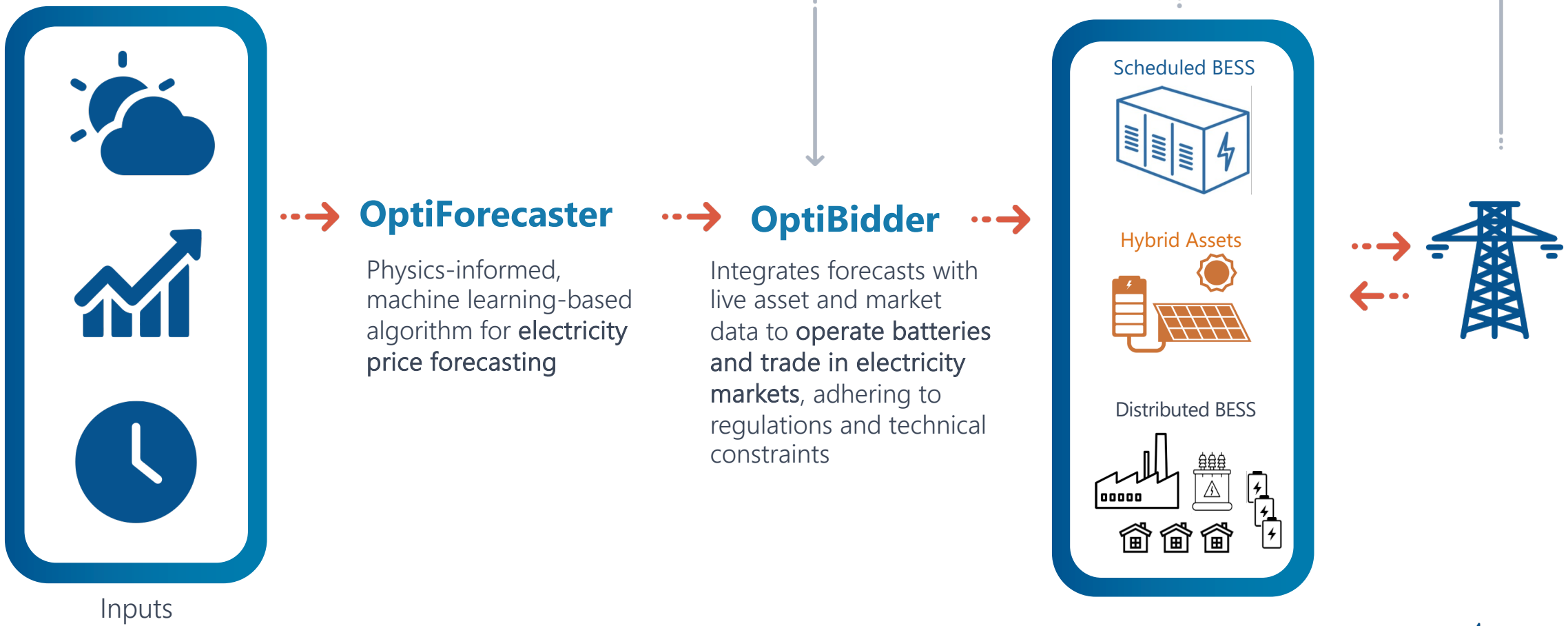
Low			Central			Messy		
IRR	NPV	Payback (years)	IRR	NPV	Payback (years)	IRR	NPV	Payback (years)
4.5%	-$30,364	11	9.7%	$342,483	8	16.3%	$719,750	5

Project finance net of base case

What we needed from operations/trading platform

- Soak surplus wind at low/negative prices and sell later; ability to participate in FCAS markets and earn FCAS revenue.
- Co-optimise hybrid wind + BESS set points and FCAS bids with high accuracy.
- A platform that integrates with the SCADA of hybrid wind + battery plant.
- Maximise combined revenues of wholesale, FCAS and PPAs, while meeting PPA terms, grid constraints, and operational limits.
- Delivered through a collaborative, flexible approach and genuine partnership.
- Ensure high-performance optimisation and ongoing support so the community asset consistently achieves its full potential.

OptiBidder helps maximise the value from **Scheduled** and **Non-Scheduled** BESS by optimising their trading, leveraging our market-leading price forecasts



We are on a mission to accelerate the transition by creating a market-leading battery optimiser that lets our clients contract, trade and grow with confidence

A flexible, performant optimisation platform....

Easily monitor key indicators across your BESS portfolio

Track performance in real-time, with manual over-ride capability for maximum control

...designed by a multi-disciplinary expert team...

Sahand Karimi
Co-Founder & CEO

Nam Dinh
Co-Founder & Data Scientist

Paul Howdle
Chief Commercial Officer

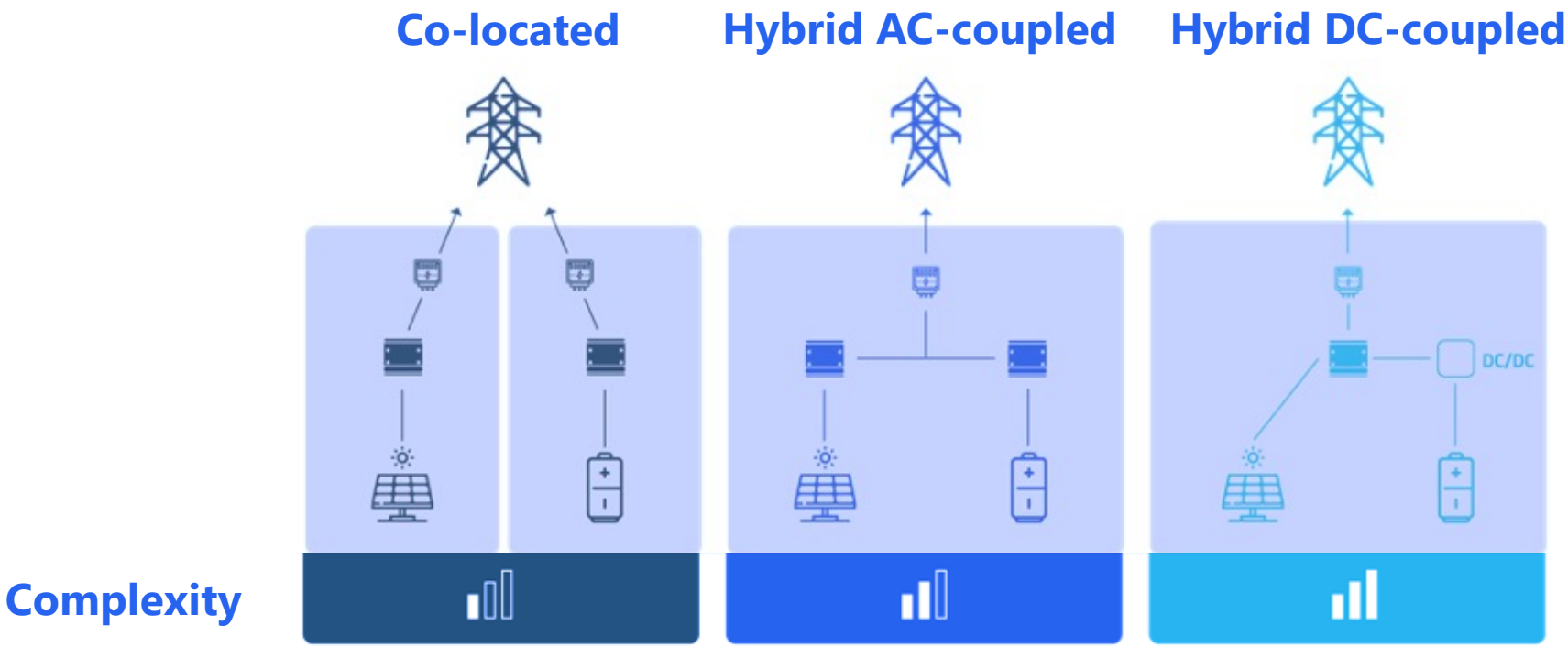
Henry Swisher
Director of Market Strategy

Owen Lamont
Lead Software Engineer

...with backing from trusted institutions.

cefc · HOSTPLUS · ip group visionary ventures · UNSW SYDNEY · THE UNIVERSITY of ADELAIDE · (Energy)Lab · Virescent Ventures · OPTIGRID

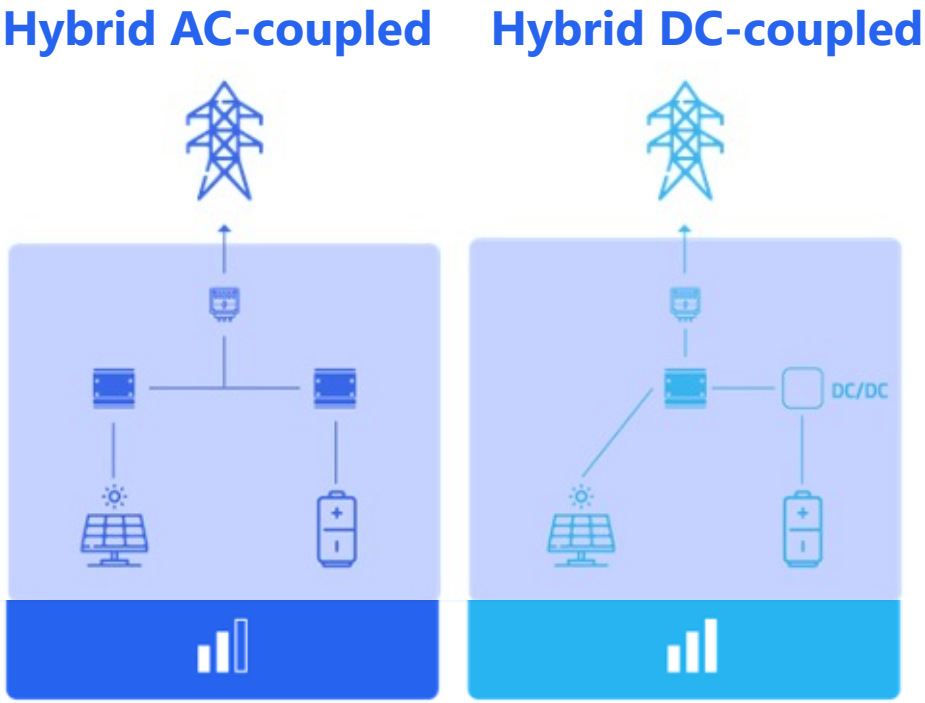
Hybrid ≠ Co-located



Hybrid ≠ Co-located

Some of the hybrid challenges:

- Renewable forecast error can materially impact the battery operations and revenue through its impact on the SoC projection
- Considering the capabilities of the power plant controller in the optimiser
- Variability of renewable power output during a trading interval should be modelled in the optimisation



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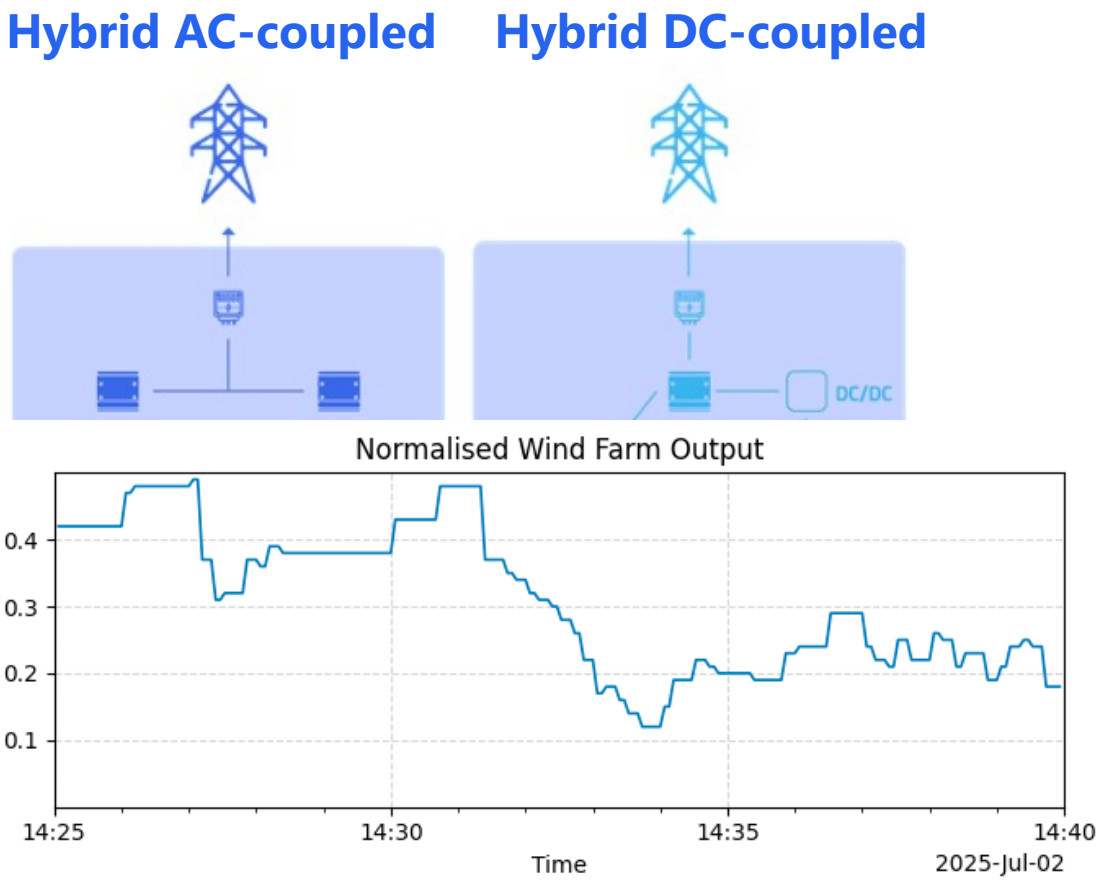

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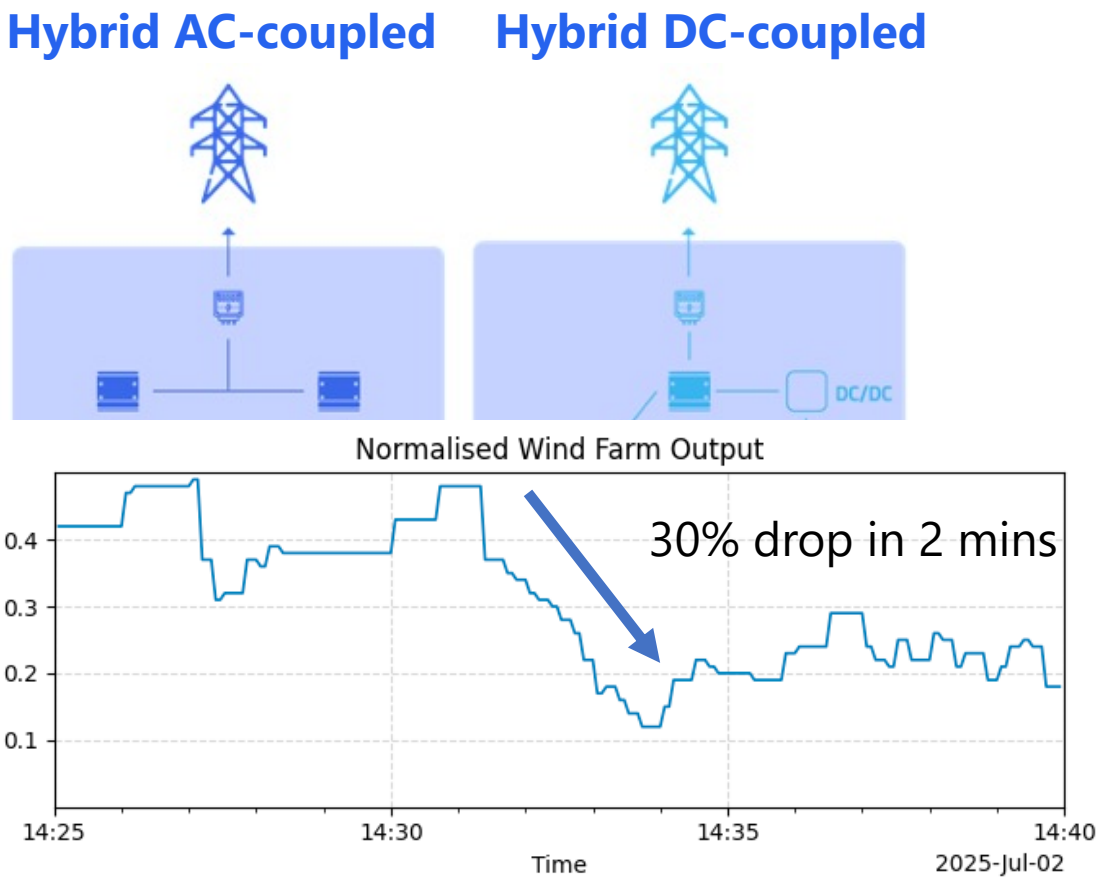


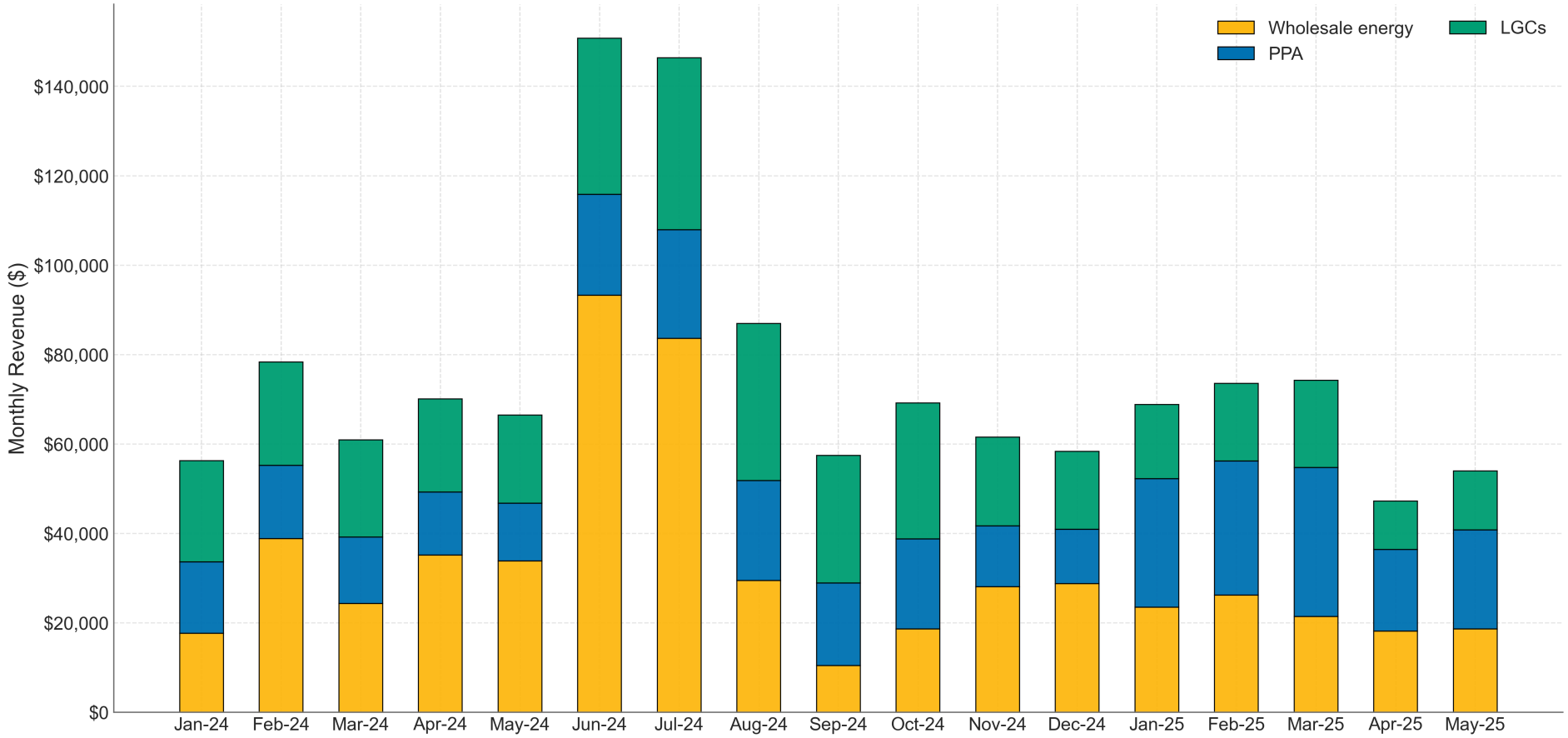
First step to deploy the optimiser: backtesting full end-to-end real-time operations

Objective: Maximise revenue from energy and FCAS markets + the power purchase agreement

What we considered:

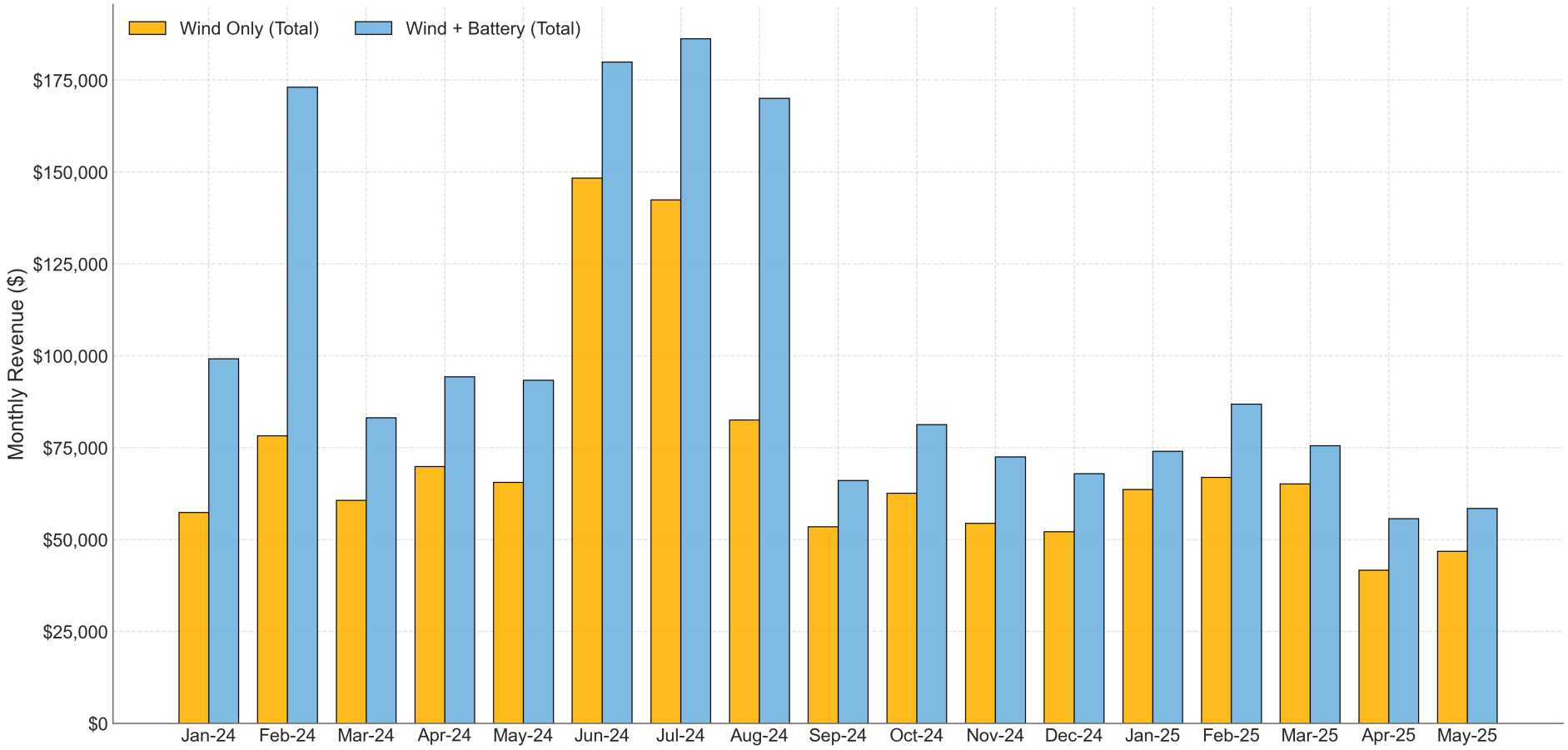
- PPA terms
- Historical wind generation + forecast uncertainty
- OptiGrid's historical price forecasts
- Control system capabilities
- Point of Connection limitations
- Efficiency curves and parasitic load

Revenue of Hepburn wind farm from Jan-24 to May-25

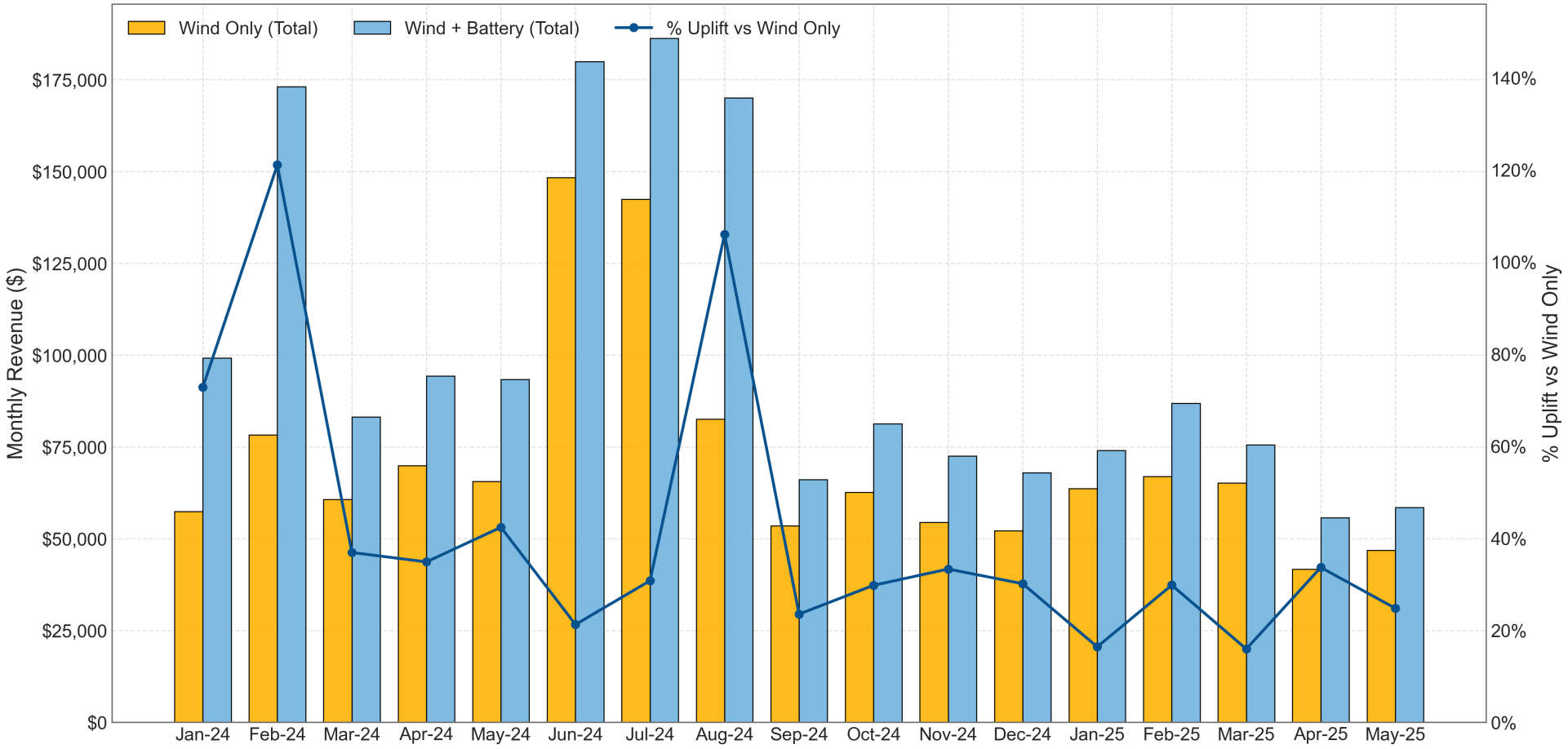


Backtesting how much revenue a 2MW BESS could add?

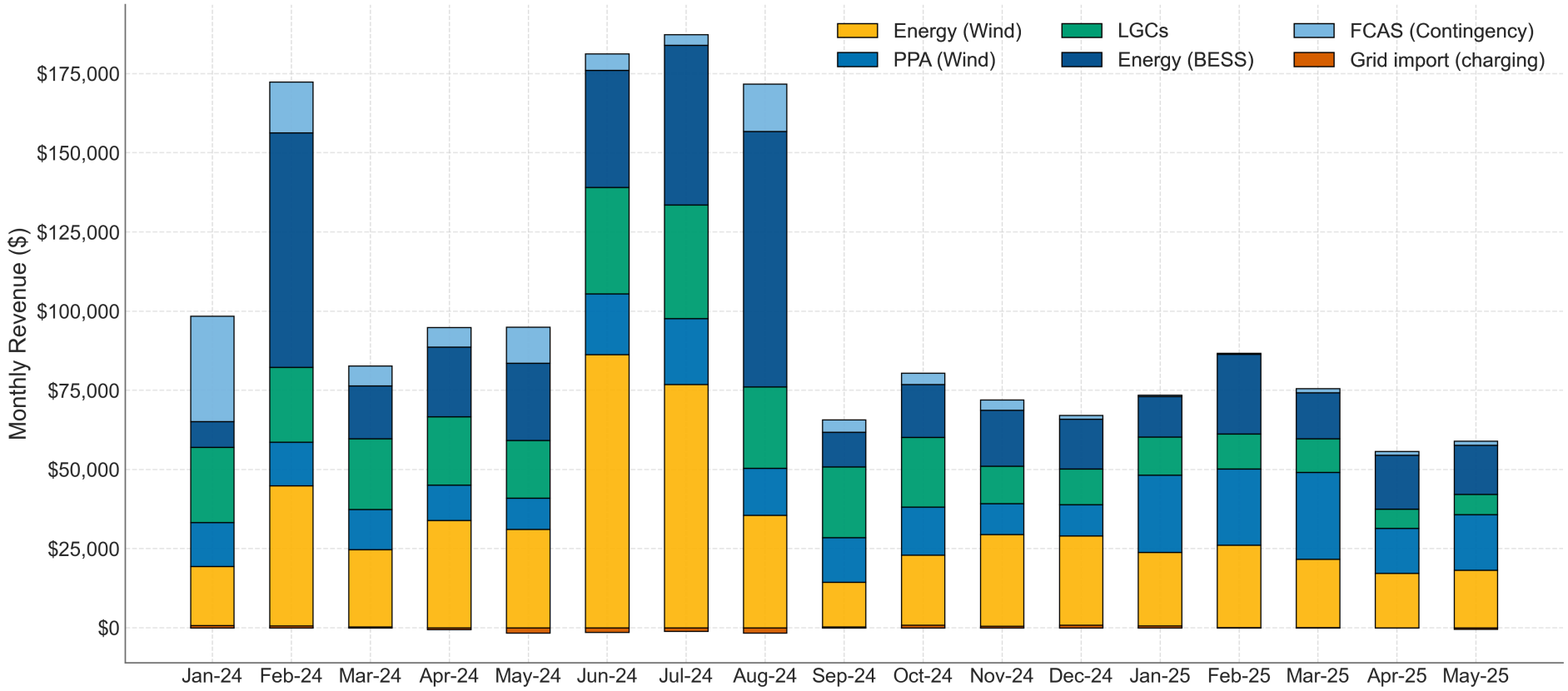
revenue streams: Energy, FCAS and PPA



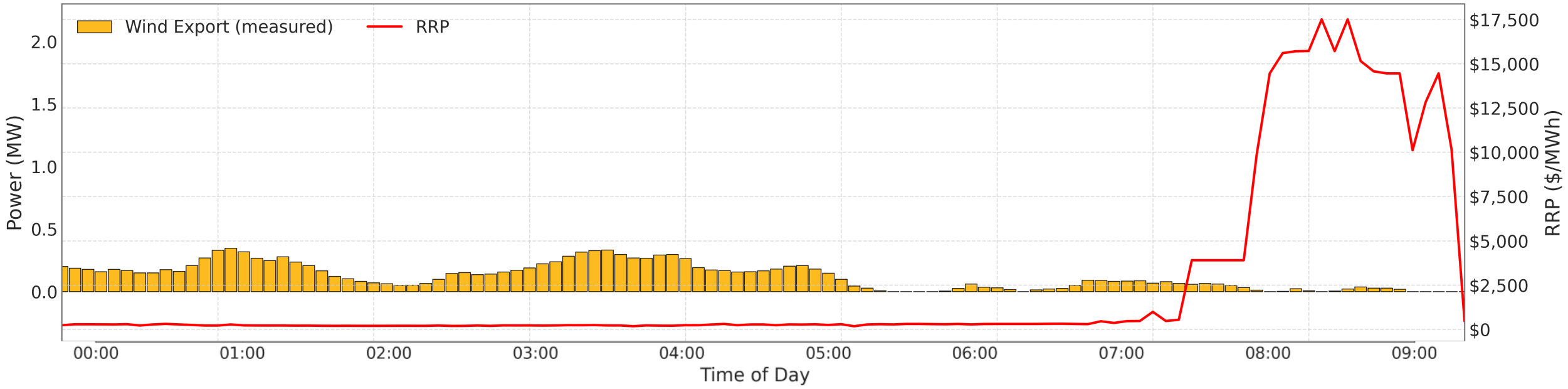
Revenue uplift with the hybrid vs stand-alone wind



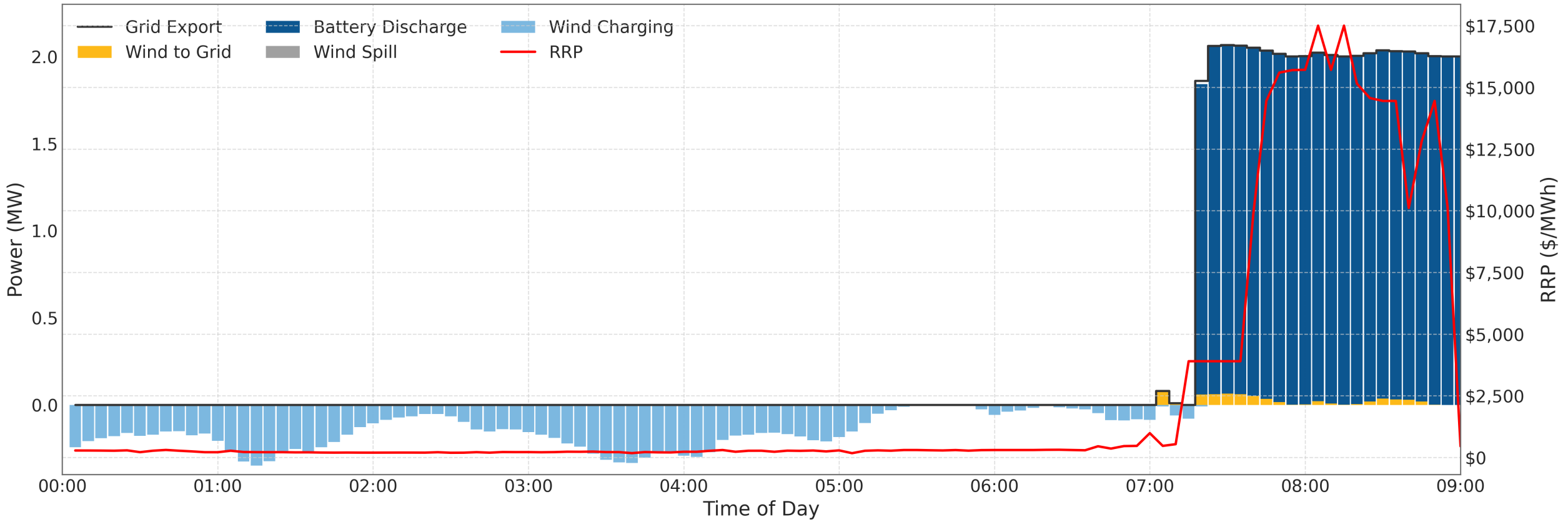
Hybrid wind-battery revenue stack



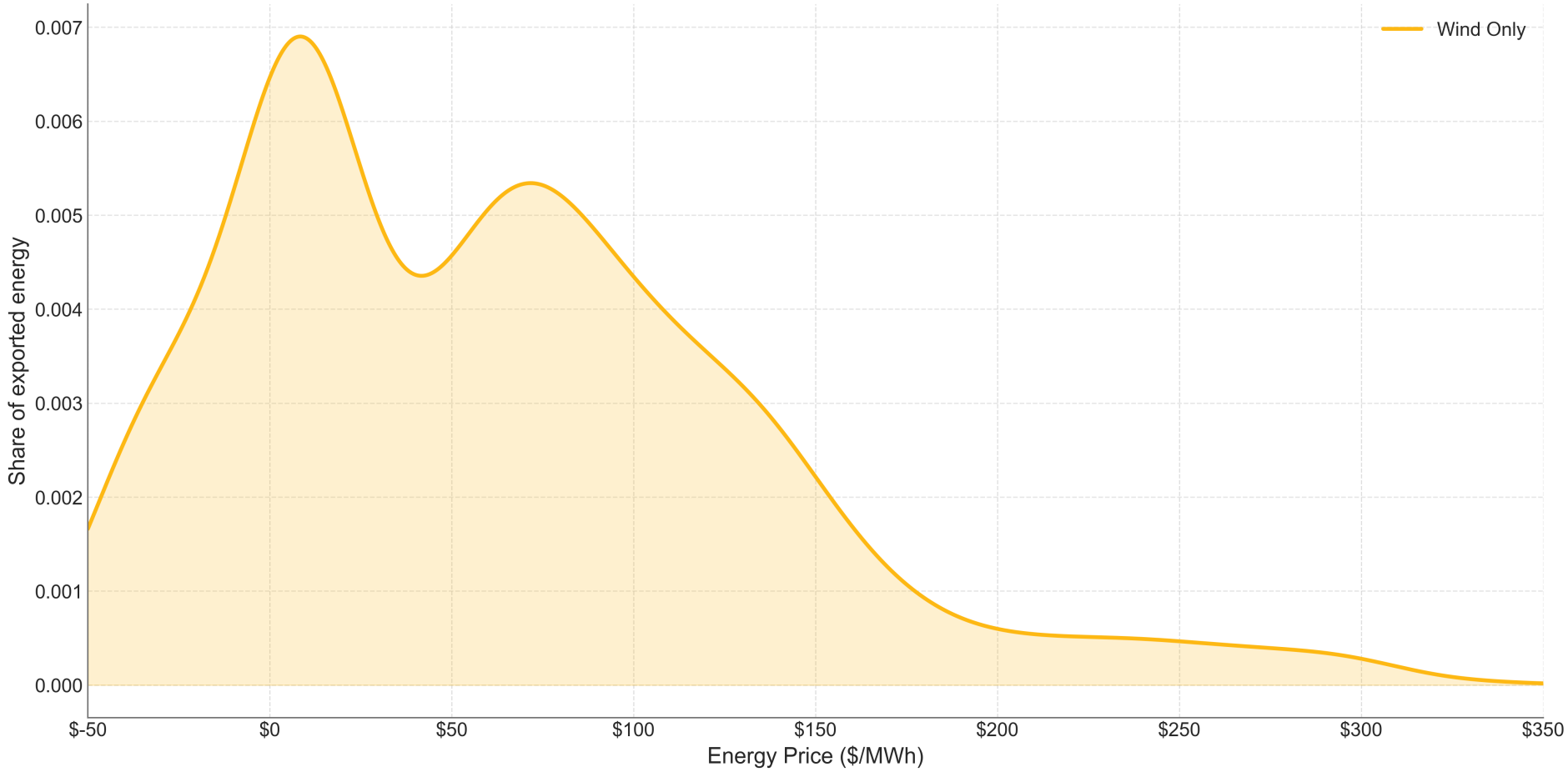
Plant Operations on 5th of Aug 2024



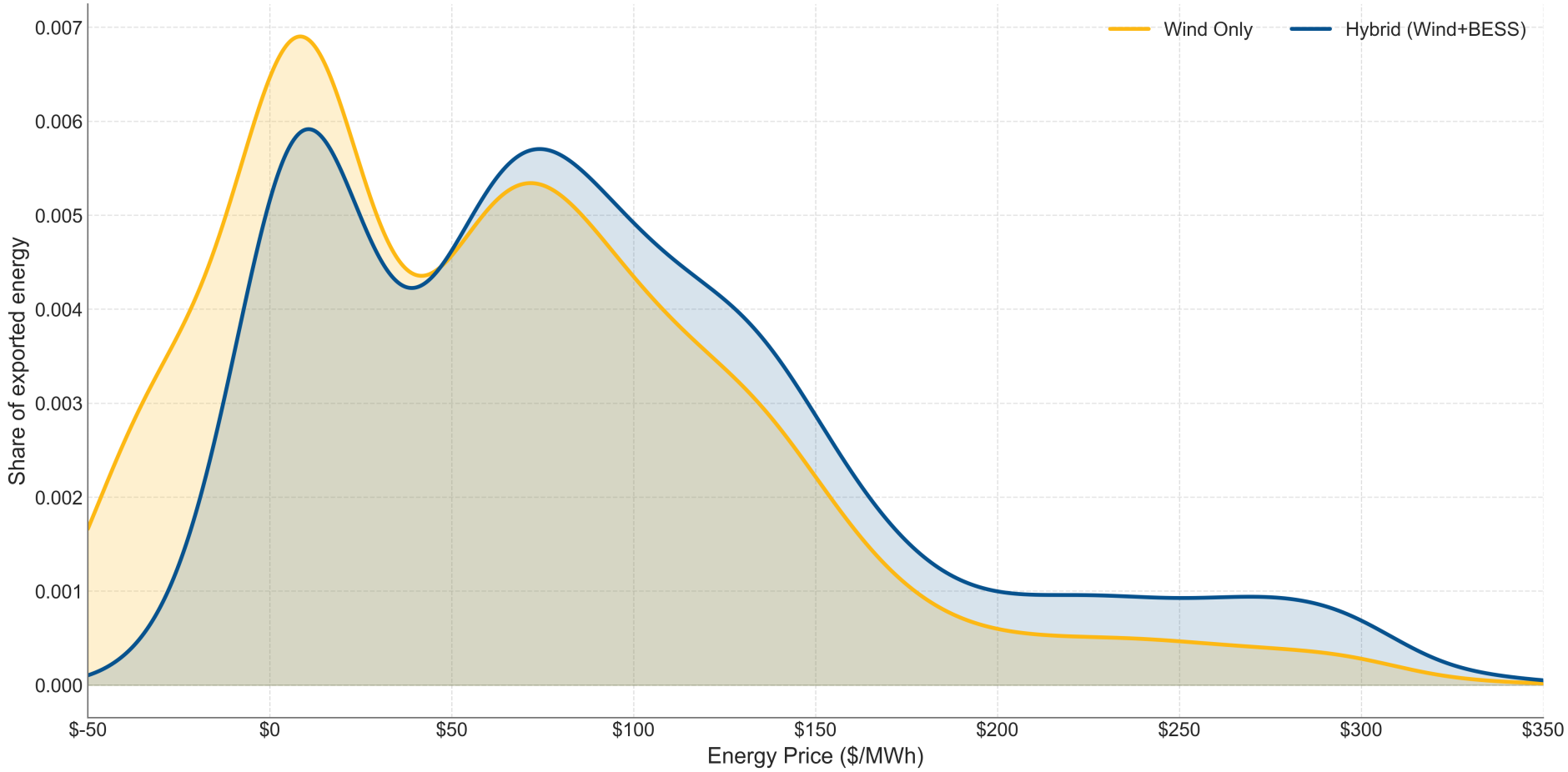
Capturing extreme price events on a low wind day



Distribution of wind generation across energy prices



Shifting exports towards higher prices



Take aways

- The future is hybrid, but hybrid operations are not simple - as an industry we need further collaboration between different project partners to ensure we solve them in the best way possible.
- Accurate renewable forecasting for 12-48 hours ahead and precise modelling of hybrid plant capabilities/limitations can significantly improve the performance of a hybrid BESS in operations and trading.
- Accurate forecasting and modelling for bid optimisation is also essential to meet AEMO conformance and compliance requirements, without under-utilising the hybrid BESS.

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Have a question? Reach out to Sahand (CEO, OptiGrid) at Sahand@OptiGrid.energy

Learn more at www.OptiGrid.energy