Hybrid Energy Forecasting and Trading Competition 2024

Final Results!

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Well done!
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Agenda

- Welcome
- Reaction from Ørsted and Rebase
- Results!
- Brief analysis
- What's next…

HEFTcom Organising Committee: Jethro Browell (Chair, University of Glasgow), Sebastian Haglund & Henrik Kälvegren (rebase.energy), Dennis van der Meer (Ørsted), Ricardo Bessa (INESC TEC), Yi Wang (University of Hong Kong)

Thanks also to: Edoardo, Alex, Chris and David (Ørsted), Pierre Pinson (Imperial College), Klimis Stylpnopoulos (University of Glasgow), Melissa and Alex (IEEE DataPort)

HEFTcom is bridging the gap between academic and industry expertise

30+ teams

continued to submit forecasts and bids – a testament to their commitment

3 scoring tracks

dedicated to forecasting, trading, and overall ranking

3.6 GW capacity

forecasted and traded daily

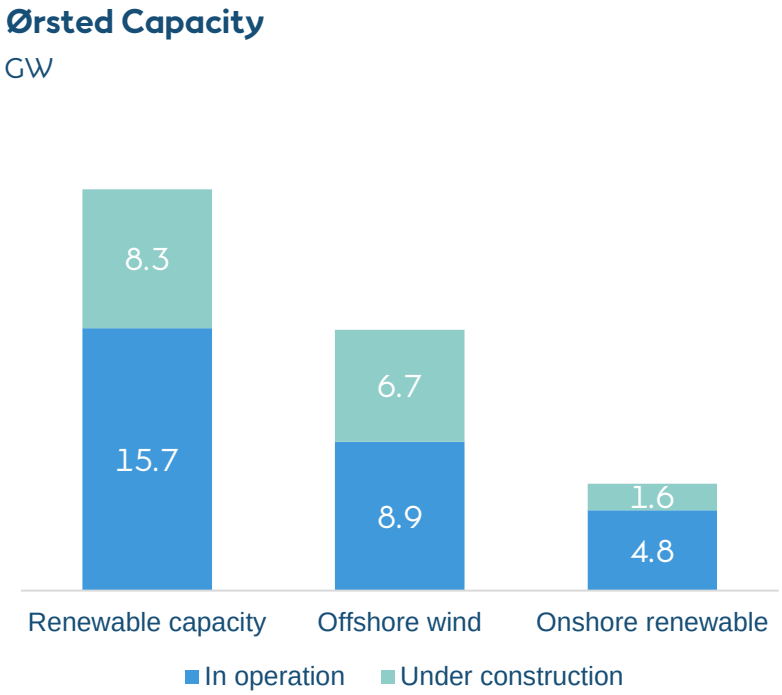
14 weeks

resulting in 4,000+ submitted forecasts and trades

US $21 k prize pool

and invited talks at the International Symposium on Forecasting in Dijon, France

What did we want to achieve?



Industrial relevance:

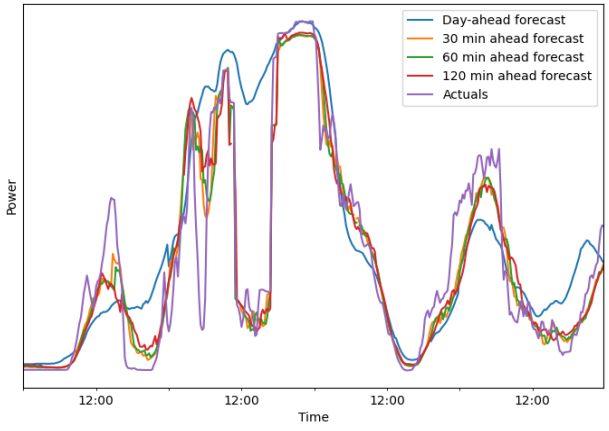
- Variability and intermittency make forecasting and trading challenging (as you've probably noticed).
- Other renewable asset operators experience similar weather → Accurate forecasts are crucial to avoid imbalances.

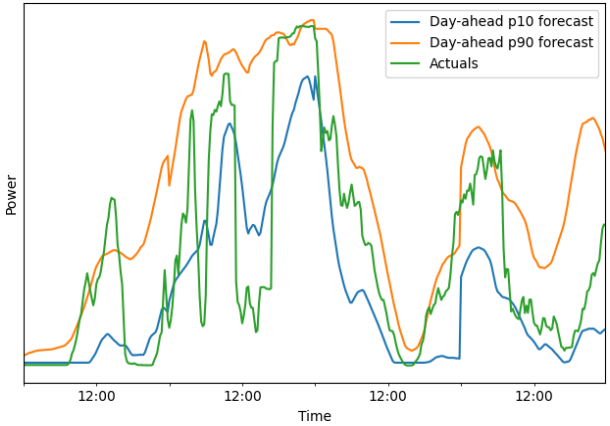
Societal relevance:

- Forecasting production from wind and solar power plants, and making effective decisions under forecast uncertainty, are essential capabilities in low-carbon energy systems.

Excellent competitions such as HEFTcom give Ørsted the opportunity to learn from and improve its operations.

...and why is this important?





- Point forecasts are not enough; traders and algos need to know how confident the forecaster is.
- Probabilistic forecasts allow for strategic bidding, e.g., when the probability distribution is asymmetric or when the spread is significantly wider/narrower than "usual."
- However, probabilistic forecasts can always be improved (i.e., "maximize sharpness subject to calibration").
- HEFTCom is important because Ørsted wants to:
  1. Decarbonize the power system
  2. Maintain the reliability of the power system
  3. Generate a strong business case so that others will follow

Community benchmark

- Same setup as HEFTcom2024
- Monthly leaderboard
- Open for anyone to participate


Results!
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Results: Combined Track

Combined Track Rank	Team	Pinball [MWh]	Revenue [£m]	Student Team?
1				
2				
3				
4				
5	BridgeForCast	25.34	87.67	
6	Sukantabasu	27.04	87.83	
7	Stochastic Parrots	27.50	87.53	
8	EnergiWise	27.65	87.43	
9	Ihubex	29.22	87.64	
10	LSEG Power Team	25.74	85.71	

Results: Combined Track

Combined Track Rank	Team	Pinball [MWh]	Revenue [£m]	Student Team?
1				
2				
3				
4	GEB	25.16	88.18	Student Team
5	BridgeForCast	25.34	87.67	
6	Sukantabasu	27.04	87.83	
7	Stochastic Parrots	27.50	87.53	
8	EnergiWise	27.65	87.43	
9	Ihubex	29.22	87.64	
10	LSEG Power Team	25.74	85.71	

Results: Combined Track

Combined Track Rank	Team	Pinball [MWh]	Revenue [£m]	Student Team?
1				
2				
3	UI BUD	23.18	88.07	
4	GEB	25.16	88.18	Student Team
5	BridgeForCast	25.34	87.67	
6	Sukantabasu	27.04	87.83	
7	Stochastic Parrots	27.50	87.53	
8	EnergiWise	27.65	87.43	
9	Ihubex	29.22	87.64	
10	LSEG Power Team	25.74	85.71	

Results: Combined Track

Combined Track Rank	Team	Pinball [MWh]	Revenue [£m]	Student Team?
1				
2	Rnt	24.64	88.29	
3	UI BUD	23.18	88.07	
4	GEB	25.16	88.18	Student Team
5	BridgeForCast	25.34	87.67	
6	Sukantabasu	27.04	87.83	
7	Stochastic Parrots	27.50	87.53	
8	EnergiWise	27.65	87.43	
9	Ihubex	29.22	87.64	
10	LSEG Power Team	25.74	85.71	

Results: Combined Track

Combined Track Rank	Team	Pinball [MWh]	Revenue [£m]	Student Team?
1	SVK	22.18	88.88	
2	Rnt	24.64	88.29	
3	UI BUD	23.18	88.07	
4	GEB	25.16	88.18	Student Team
5	BridgeForCast	25.34	87.67	
6	Sukantabasu	27.04	87.83	
7	Stochastic Parrots	27.50	87.53	
8	EnergiWise	27.65	87.43	
9	Ihubex	29.22	87.64	
10	LSEG Power Team	25.74	85.71	

Results: Full

Team	Pinball [MWh]	Forecasting Track Rank	Revenue [£m]	Trading Track Rank	Combined Track Score	Combined Track Rank	Student Team?
SVK	22.18	1	88.88	1	2	1	
Rnt	24.64	3	88.29	2	5	2	
UI BUD	23.18	2	88.07	4	6	3	
GEB	25.16	4	88.18	3	7	4	Student Team
BridgeForCast	25.34	5	87.67	6	11	5	
Sukantabasu	27.04	7	87.83	5	12	6	
Stochastic Parrots	27.50	8	87.53	8	16	7	
EnergiWise	27.65	9	87.43	9	18	8	
Ihubex	29.22	12	87.64	7	19	9	
LSEG Power Team	25.74	6	85.71	13	19	10	
NICE_Forecast	27.98	10	87.21	11	21	11	Student Team
Oracle	28.34	11	87.20	12	23	12	
RE-Cast	30.04	13	87.31	10	23	13	
GM Team Mannheim	33.92	15	85.55	15	30	14	
ʕ◕_◕ʔ	31.01	14	84.29	18	32	15	
Zzblu	35.04	16	84.41	17	33	16	
OLPZR	44.84	20	85.58	14	34	17	
tradRES	37.19	18	84.45	16	34	18	Student Team
Eguzkinet	36.68	17	83.83	21	38	19	
6340	47.37	21	84.09	19	40	20	
KittenKilowatt	41.67	19	83.71	22	41	21	
power_rabbit	53.96	23	84.03	20	43	22	Student Team
FCOR_BL	51.66	22	82.26	24	46	23	
Enerweb	55.13	24	83.22	23	47	24	
Benchmark	53.58		82.23	(Teams Associated with the Organising Committee)			
quantopia	25.38		87.96				

Results: Prizes

Team	Prize
SVK	$9,000
Rnt	$5,000
GEB	$4,000
UI BUD	$3,000

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Preliminary Analysis of Reports

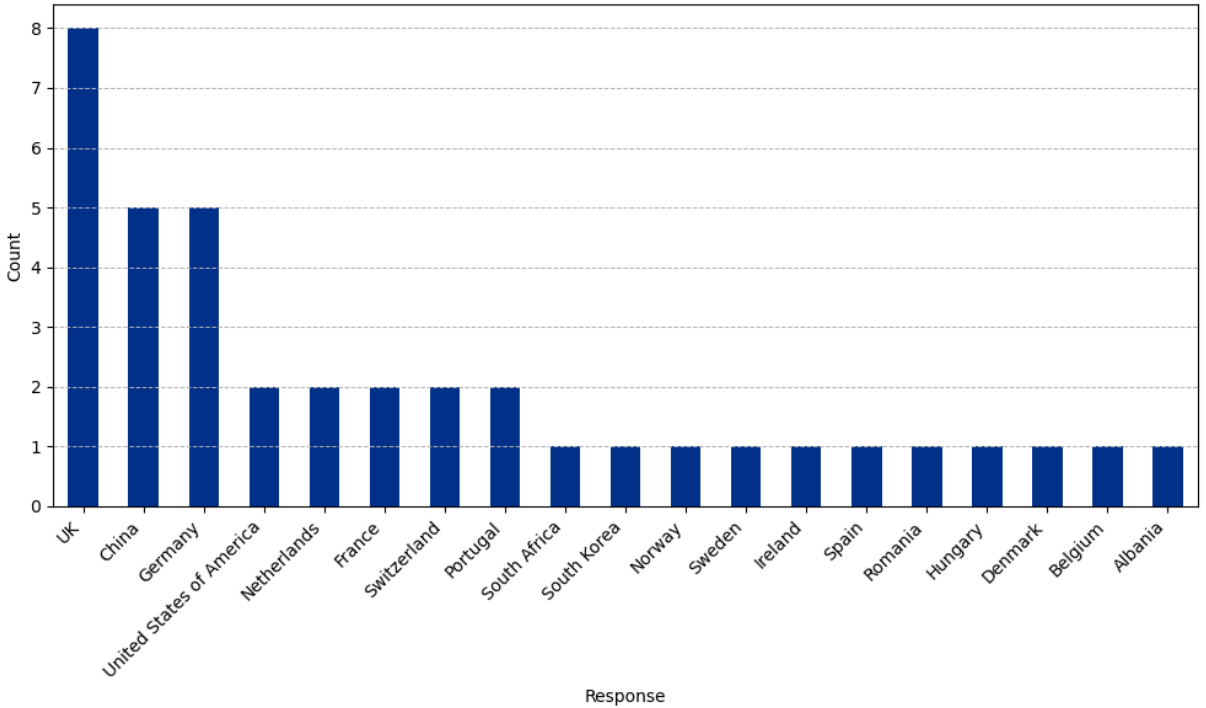
Completion of HEFTcom 2024:

- 66 teams participated
- 24 teams completed
- 4 of which are student teams

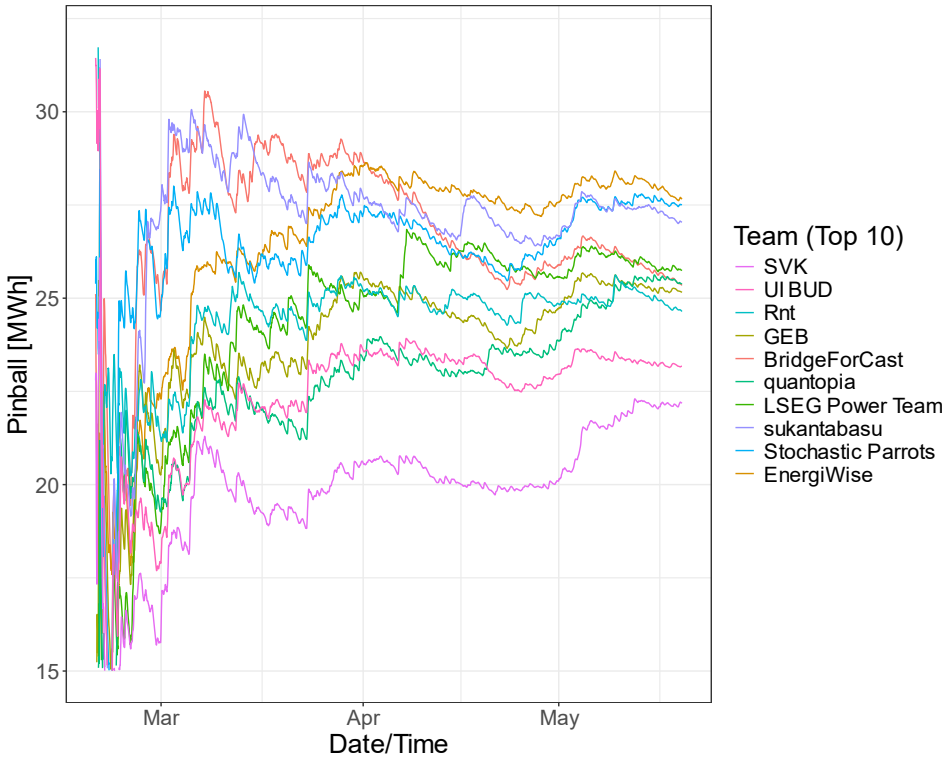
Team summary:

- 1 to 4 members was typical
- Mainly European; Asia, Africa and North America represented
- 75% automated their solution requiting only occasional intervention
- Around 1/3 teams used cloud computing

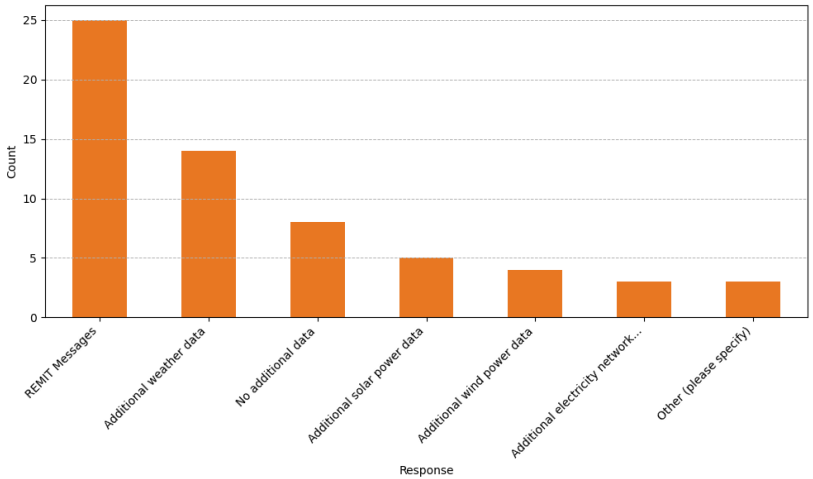
Preliminary Analysis of Reports



Preliminary Analysis: Forecasting



Preliminary Analysis: Forecasting Data



Several teams used additional NWP:

- Ensemble NWP
- One top 5 team used an in-house AI weather forecast
- Two of the top 5 used only HEFTcom data

REMIT was widely used

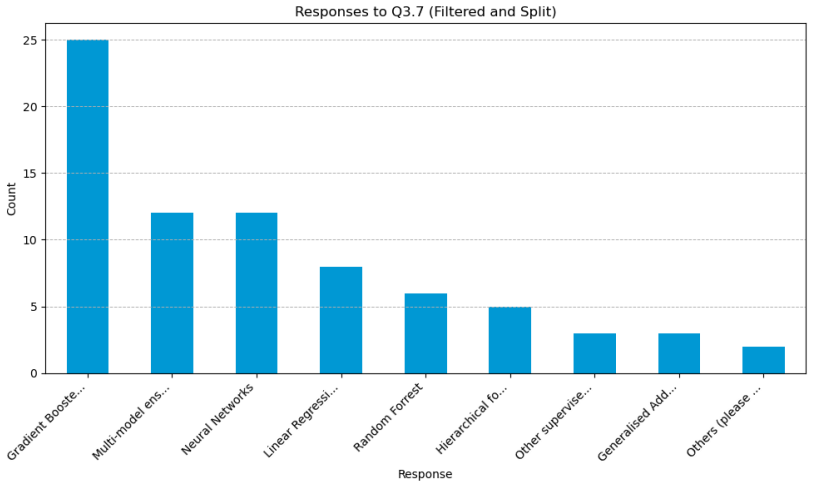
Preliminary Analysis: Forecasting Methods

Top methods:

- Gradient Boosted Trees
  - CatBoost, LightGBM, XGBoost all featured
- Multi-model ensembles
- *Consistent with past competitions*

Details make the difference:

- Quantile aggregation
- Feature engineering



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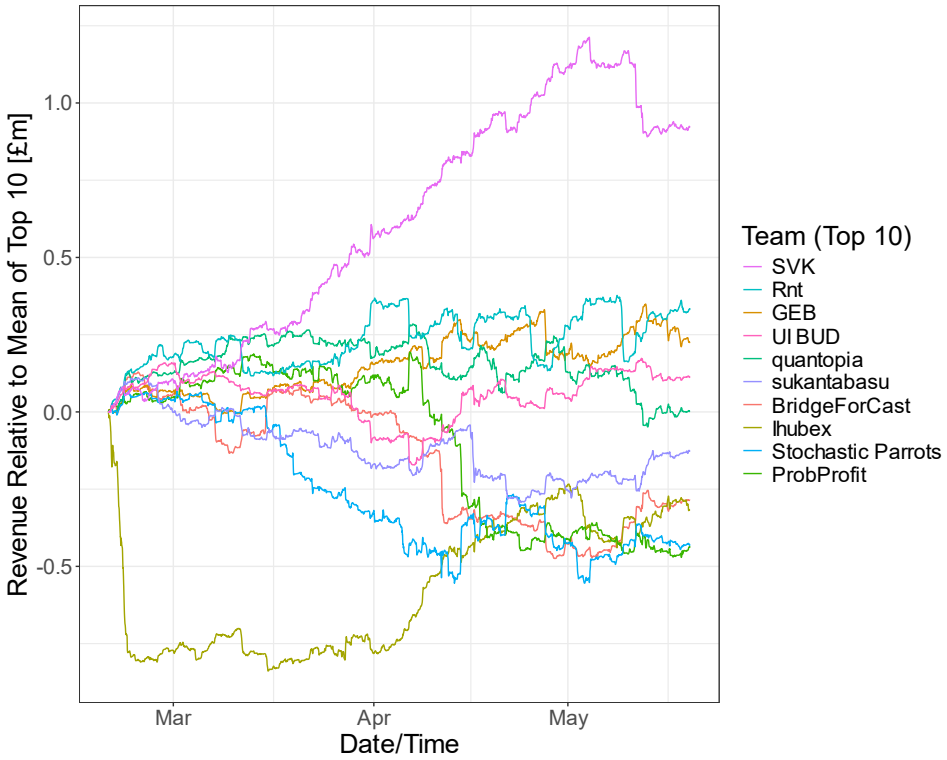
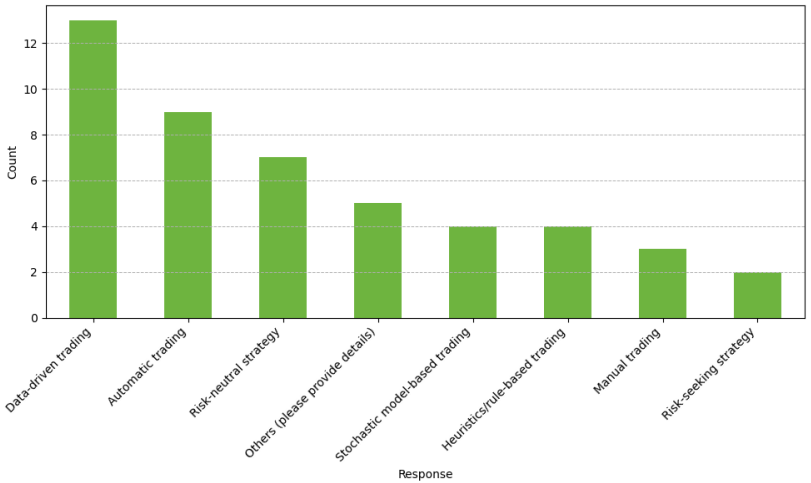
Preliminary Analysis: Trading



Preliminary Analysis: Trading



A wide variety of trading strategies, even among top performing teams:

- Optimal bid calculated from energy and price forecasts
- Directly predict optimal bid
- Trade deterministic forecast

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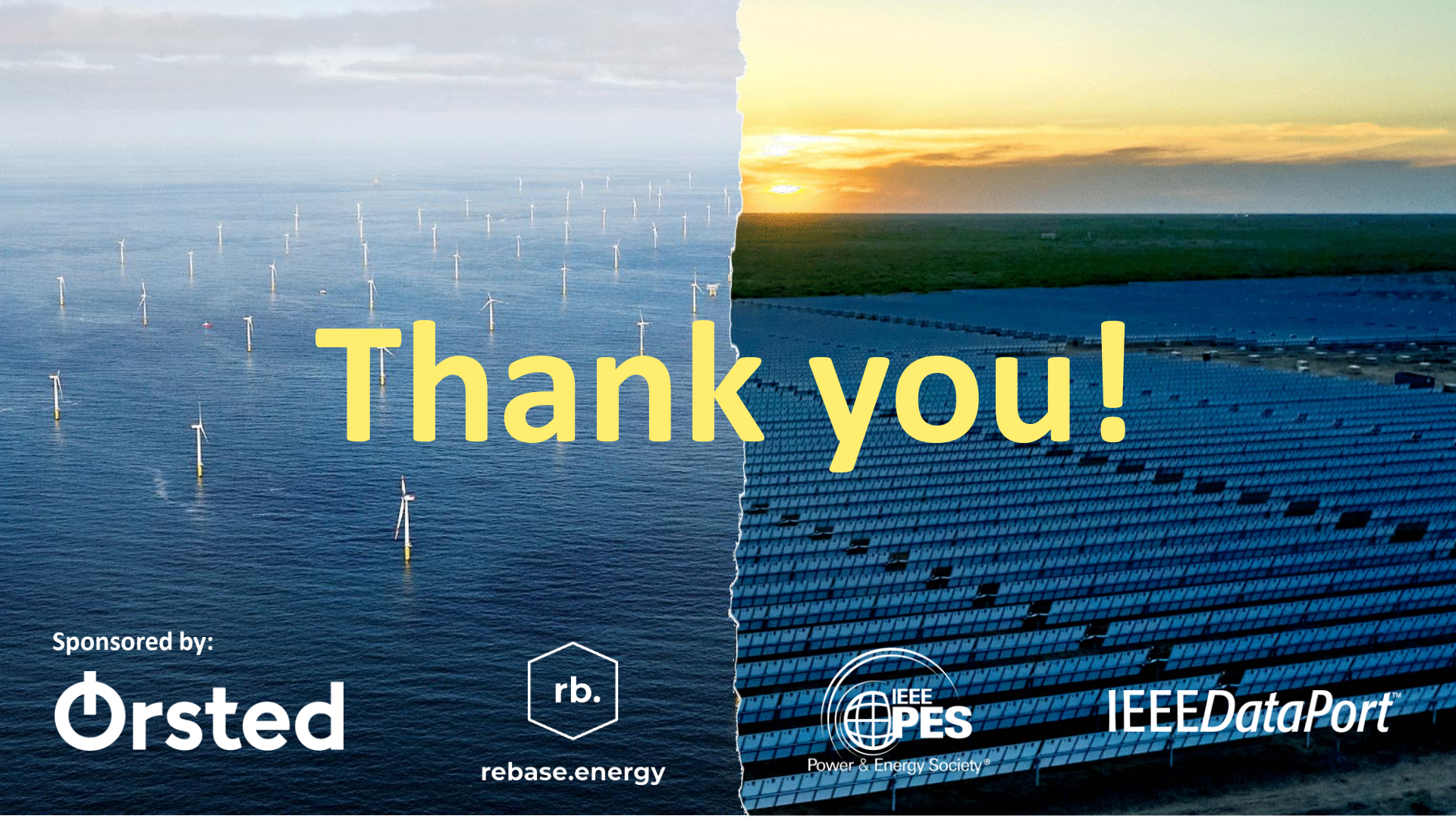
What's next…

- The competition data will remain on DataPort and be updated to cover the competition period
- The organisers will analyse the results and reports
  - An article will be posted on arXiv and submitted to IJF
  - Special session at the International Symposium on Forecasting
- Details of prize distribution will be emailed today
- A feedback survey will be circulated, and results shared to help inform future competitions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