

DATA ANALYTICS FOR DAY-AHEAD WIND & ELECTRICITY PRICE FORECASTING

COMPANY

SMARTPOWER

Founded in 2006 and based in Malahide, Dublin. SmartPower manage the process of obtaining and drawing down grants for energy upgrades. Additionally, they offer a cloud-based sub-metering system, with reports for ISO-50001 and energy credits. Through hedge forward energy prices directly with wholesale markets and power stations, it helps clients to get the lowest energy rates available.



 www.smartpower.ie

 info@smartpower.ie

GOAL

PROJECT GOAL

It is widely acknowledged or accepted that wind puts downward pressure on electricity prices. Thus, this research initially focused on investigating and demonstrating AI-based models that could be utilised to quantify the contribution from the wind to the overall energy mix in Ireland.

In the wholesale electricity market generators compete in daily auctions to deliver electricity. The bids made by generators reflect, to a large extent, their short-run marginal cost of electricity generation, which consists largely of fuel, carbon and variable operating costs. In these auctions generators with lower marginal costs will clear first, and the power price is set by the marginal generator, which is the generator with the highest marginal costs that is still needed to meet electricity demand. Put another way, the power price is set by the most expensive generator needed to provide the electricity to meet demand. Wind generation has a marginal cost of close to zero and virtually always clears the auction. Thus, wind has a significant effect on the day-ahead market (DAM) prices.

So, the second objective examined a machine learning approach to expand the prediction time horizon of their forward price model to actively trade within the day-ahead market (DAM) and balancing market (BM). Access to the model output is available on a subscription basis.

CHALLENGES

PROJECT CHALLENGES

Some challenges included establishing a mutually compatible development environment between Nimbus and Smart Power.



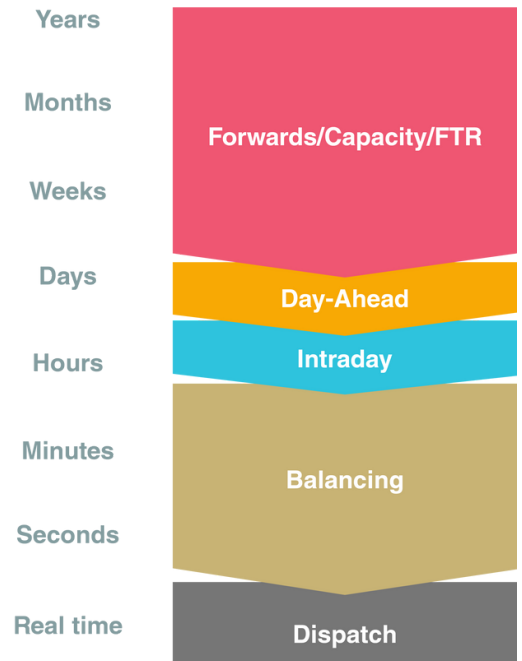
HOW

PROJECT SOLUTION

A calculation for the total cost of wind is complicated as there are many factors or variables to consider. To forecast the wind output at a national level, this project initially comprised a detailed statistical and data analytical approach to appraise the available data streams. Then, adopting an AI-based architecture, those features or candidate solutions which yielded acceptable correlations were assessed to derive best set to deliver a more accurate estimate of the wind generation capacity for Ireland. However, for our purposes as energy traders, we are more interested in the short-term effects of wind on the electricity prices i.e. how they affect marginal cost at the power station gate.

Thus, the next staged involved employing the developed wind model in conjunction with proprietary data from Smart Powers to expand the prediction time horizon of the day ahead electricity prices. From a detailed analysis, a machine learning based model selected with our recommendations for feature selection, timeframe evaluations and model tuning.

The result of this research reduced mean square error (MAE) for model forecasts to single figures for some of the most erratic power price months within 2020.



IMPACT FOR THE COMPANY

This exercise assisted with enhancing the current Smart Power DAM price prediction model presenting the company with the ability of offering a very competitive service to their clients.



Nimbus Research Centre,
Munster Technological
University Bishopstown,
Cork, Ireland

Researchers

Dr. Conor Lynch
conor.lynych@mtu.ie

Rose Bain
rose.bain@mtu.ie

Christian O'Leary
christian.oleary@mtu.ie

WHAT OUR CLIENT HAS TO SAY

CLIENT TESTIMONIAL

“The Nimbus Gateway gave us access to data analytics and machine learning expertise that we do not have at our disposal currently. They did a superb job and we are certainly interested in working with them again” Peter Brennan, Director & Business Development, Smart Power.

