Machine Learning Optimization Trials: NS grid demand and firm, dispatchable offshore/onshore wind and the chaos of weather patterns; Two tall tales of data? Noise versus Signal.

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POSTER ABSTRACT

Our research completed machine learning model runs on the multidecadal onshore and offshore hourly wind and weather data, which integrated correlated provincial wide coordinates of building footprints, all alongside OASIS hourly load MW data. In regard to "Grid integration, and pathways to market" – We assessed a range of potential transmission and distribution dynamics that cost effectively power the grid with high levels of offshore wind power; we processed wind farm capacity factors and baseload factors and matched with grid forming big battery energy storage installations in different configurations for grid reliability. We evaluated the "social and economic effects of offshore wind" and well-known returns for household energy customers, and the positive economic benefits to all taxpayers from reduced healthcare costs from air pollution.

In parallel, to successfully help projects pass detailed EIA approvals, we processed the regional environmental impacts of offshore "Underwater noise" with Meridian's Kadlu OceanNoise python package on the 4 offshore wind reference case locations; successfully demonstrating that layered Bubble Curtains as one part of gold standard best practices will help gain public support from multistakeholder groups. Whales are centered in this research as they are a keystone species of the ocean and are valuable allies in fighting climate change and benefit the health of the ocean at large.

Positive changes of 100% decarbonizing the primary energy supply can theoretically halve global shipping traffic as most are fossil fuels shipments, this balanced with renewable energy exports of oversupply for global grid Peaker Plants relied on for only 10-20% of the year around the world can make us an energy superpower and revitalize the economy and bring great jobs home. "NSP is planning to build 150 MW at 600 MWh of grid battery capacity over next few years. NSP's Evergreen IRP scenarios plan to curtail upwards of 2.8 TWh of electricity annually over the next decade as wind and solar expand, this is nearly 800-1000MW at 32-40% capacity factor of wind power being ineffectively offline. In market terminology this is supply waiting for demand." (Thompson 2024). We finalized the updated ML optimized run of EnergyPLAN.