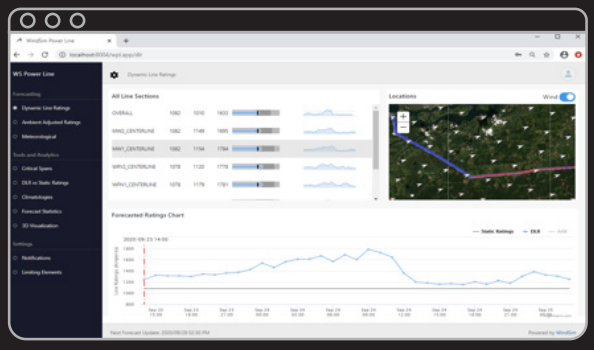
ENABLING FLEXIBLE, EFFICIENT TRANSMISSION OPERATIONS WITH ADVANCED SIMULATION

Increase Grid Reliability • Maximize Capacity Utilization • Deliver Operational Efficiency

As the power grid evolves in response to dynamic load and a seemingly ever-changing generation mix, transmission capacity remains underutilized, leading to poor grid reliability, suboptimal generation dispatch, and expensive operational inefficiencies. These issues eventually affect the consumer through higher costs and inconvenience. Though the grid is traditionally viewed as a relatively inflexible network, innovations in data availability and analysis offer a path to more flexible, efficient operations without investing in unnecessary infrastructure.

Dynamic line rating based on computational fluid dynamics (CFD) is a new methodology that provides more stable line ratings and can help enhance the capacity of existing transmission infrastructure. But because the methodology relies on accurate forecasting and real-time capacity, it depends on a rich supply of high-quality operational data. In order to meet the demands for high-quality data at scale, WindSim and Cognite are collaborating on next-generation data and simulation products that enable flexibility in grid operations.

WindSim Power Line



Full-Scale Dynamic Line Rating

Use CFD to calculate relative speed and direction from measured or forecasted locations to spans

- Estimate additional capacity relative to day-ahead time frame
- Solution can be deployed as a stand-alone application or fully integrated into customer EMS

Case Study: NYPA Pilot Project • Funded by NYSERDA

In 2020, WindSim used wind data from 15 sensors across approximately 72 miles of transmission line in NYPA's service territory to build a forecasted capacity model. The goal of the project was to demonstrate that a CFD-enhanced forecast could provide more stable line ratings and be used to unlock additional capacity in the system. Initial results validated that WindSim's approach to dynamic line rating was effective and could integrate well with the utility's operational environment, using available weather forecasts and CFD-enhanced weather analytics.

Leveraging Scalable Industrial Data Foundation for Scaled Deployment

As the technology becomes more commercialized and adopted, repeatability and scaling of the forecasting solution will become more critical. **Cognite Data Fusion** is the leading industrial data foundation that enables accelerated deployment at scale by reducing data silos, providing contextualization, and improving data quality so that WindSim can guarantee reliable, high-performance forecasts.

Cognite Data Fusion:

- Aggregate and contextualize big data from robotics and all available IT and OT data sources
- Empower data scientists, engineering, domain experts, and analyst workflows
- Enable operationalization and scaling of digital applications with open integrations (APIs/SDKs)
- Ensure data quality and lineage throughout the development pipeline and into the end application

WindSim Power Apps & Solutions

WINDSIM APPS & SOLUTIONS

CAPABILITIES

MAKING DATA VALUABLE

Increased capacity for renewables

Congestion relief in day-ahead markets

Resiliency and safety

Identification of critical span

Maintenance planning

Situational awareness

MAKING DATA USEFUL

COGNITE DATA FUSION

ISO 27001 INFORMATION SECURITY MANAGEMENT SYSTEM

ISO 9001 2015 CERTIFIED

MAKING DATA AVAILABLE

SOURCE DATA IT & OT

Terrain & line physical properties

Mesoscale weather forecasts

Metereological station data

Line section load data

SCADA

WS power line database