

Services for Wind Plant Development and Operation

Addressing Wind Plant Design, Financing, Implementation, and Operation

Wind power is the fastest growing form of electric generation in the world. Environmental friendliness, proven turbine technologies, and dramatically declining costs of production are driving unprecedented growth in the industry. Wind generation is even reemerging as an important "hedge" against the uncertainties plaguing energy markets.

As wind plants grow in size and number, questions about their possible impacts on the electrical grid become more complex. In addition, the design and operation of the internal electric distribution systems connecting hundreds of turbines to the bulk transmission system are important factors in the availability and reliability of wind plants.

E³ International provides a range of technical and analytical services for assisting in the development and operation, including:

Resource Assessment and Turbine Siting - preliminary site identification, area wind resource evaluation, development/implementation of resource measurement programs, turbine performance simulation, and turbine micrositing. E³ maintains an extensive wind resource monitoring capability, including 30 and 50-meter towers, wind vanes, anemometers and other equipment to monitor and record, air temperature, solar radiation, wind speed and wind shear.

Bulk Transmission System Studies - evaluate the impacts of large wind plants on bulk transmission system operations, including steady-state and contingency analysis, impacts on interregional power transfer capability, network voltage stability, reactive power requirements, and transient stability.

Distributed Wind Plant Integration Studies - assess the influence of smaller distributed wind

plants on distribution feeders and local loads, including voltage flicker, harmonics, and protective system operation.

Design and Operations Analysis of Wind Plant Power Systems - evaluate intra-plant electrical systems within large wind plants, focusing on

- Reactive power management
- Voltage regulation
- System dynamics including capacitor operations and reactive power generation from advanced turbines
- Event analysis to determine root causes
- System and equipment performance validation and design improvements
- Investigations of equipment misoperation and failure

Technology Consulting - provide expert opinion and perspective on wind generation and electrical system technologies, including power electronics and electric machinery for wind turbines and transmission and distribution system equipment

Putting It All Together

As wind plants grow in size and sophistication, the technical challenges related to electric system design and transmission system integration will continue to grow more complex. At the same time, advanced wind turbine and wind plant technologies will offer new approaches and opportunities for innovative responses to these challenges. With our extensive engineering and analytical capabilities, and understanding of wind technologies and electric utility systems, E³ can help you move forward in these exciting times for the industry.

To learn more about E³ International, contact Robert Russo, Director, +1 703 231 6827; rvrusso@eeeinternational.com.



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