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User Group Initiative

Expansion of UWIG Member Services

The role of the UWIG is expanding from its previous one of self-education and sharing of utility wind turbine application experience to one of addressing research topics and implementation barriers of interest to members, and sharing results with the members and the industry. At a recent strategic planning session, the UWIG board identified the need for greater membership services, and particularly the dissemination of information in these areas to members and interested parties, as a high priority in meeting member needs and expectations.

This new role, which has been identified and supported by the UWIG Board in its strategic planning process, and ratified by the membership at the annual meeting in Denver, is a result of the UWIG being looked upon as a source of important knowledge and information for those interested in wind plant applications both large and small. This new role has created the need for a structure within the UWIG to gather, analyze, and disseminate information generated through the organization and its members, and do the same with similar information which is being developed in other organizations both domestically and internationally. This need for an expansion of the role of the UWIG can be met in a number of different ways, one of which is through establishing focused user groups to deal with the specific areas of interest. This expansion will be implemented as a joint activity with NREL.

User Groups

The idea of the user group is to gather together in one place all relevant information on the topic of interest, and make it easily available to members and interested parties. In the case of studies, it is necessary to compare and analyze the assumptions, methodologies, and data used to generate the particular set of results, and explain the similarities and differences between the studies. In the case of modeling, it is necessary to perform a similar function for the models in order to understand their applicability and limitations for any particular situation, and identify development needs for the future. In the case of an application area such as distributed wind, the user group will be able to build on the foundation of case studies, monitoring results, planning and analysis tools, and application guides developed under the UWIG research project to provide state of the art information for those undertaking new projects. In the area of market operation and transmission policy as related to wind generation, tracking best practices emerging in the newly formed RTOs under the SMD as it evolves will be a valuable service to members.

The scope of individual user groups can be expanded or contracted, and new ones created as future needs and interests arise.

Information dissemination is an important function of the user groups. There is currently no place where anyone can go to get good information about current topics of interest on the application of large or small wind plants on power systems. Moreover, there is a lack of understanding of the design and operation of wind turbines and wind plants, and how they affect the planning and operation of the power system. Power system planning and design practices have been developed over a long period of time based on the characteristics of conventional fossil fuel power plants, nuclear plants, and hydro plants. Regulatory practices have been built around the same set of characteristics and constraints. As a better understanding of these issues emerges, and a better picture of what works and what doesn't is obtained, the information needs to be digested and presented to a broader audience in order to help smooth the integration of larger amounts of wind energy into the nation's electric system. Outlines of user group initiatives built around topics of high interest to current UWIG members follow.

Wind Plant Modeling and Interconnection User Group

The size of individual wind plants has grown to the point where a single wind plant can be as large or larger than a conventional synchronous machine in a fossil plant (several hundreds of MW). Because of the effect a machine of this size can have on the system operation and performance, it is necessary to develop a set of models which is compatible with those built over a long period of time for similar purposes for conventional generators. This needs to be done to give the utility engineers responsible for planning and operating the system a level of confidence in the ability to predict and understand the performance of wind plants similar to that of conventional fossil and nuclear plants.

A variety of models need to be developed, documented, verified, and supported in order to generate a high level of confidence in those responsible for studying and maintaining system reliability. At the lowest level, wind turbine models for steady-state studies and dynamic simulations appropriate for engineering studies necessary for distributed wind generation applications are needed. Reduced-order models of entire wind plants for both steady state and dynamic studies are required. This need has become critical with the recent growth in the number and size of large wind plants. Modeling each turbine in a large commercial wind plant along with the medium voltage collector system is simply not practical for large bulk system studies. Operational models that accurately portray the real and reactive power injection from a wind plant at the point of interconnection to the bulk transmission system as functions of time, interconnect voltage, and wind speed are also required.

Operating Impacts and Interconnection Study User Group

The questions most often asked today in gatherings of those interested in expanding the role of wind power in the nation's electric system with those responsible for integrating the wind plants into the conventional system have to do with the impact of the wind plant on the short term planning and operation of the system. This is due to the variability in the output of the wind plant, which is driven by the wind, as compared to conventional

plants that are driven by fossil fuels. Those utilities who have not yet experienced the competitive markets brought about by deregulation are still looking at the world through the vertically integrated utility eyeglasses, while those operating in competitive markets may be thinking more in terms of the ancillary services which must be provided to accommodate this new form of generation.

The UWIG has sponsored the first comprehensive study of the cost of ancillary services associated with the operating impacts of wind plants on time scales up to and including unit commitment, i.e. from regulating duty on the order of seconds, to hourly scheduling up to a week in advance. Even so, this study was only able to look at a single snapshot for a single system. Significant sensitivity study needs to be done to understand how the costs change with wind penetration level, generation mix, and fuel cost. Additional studies of this issue have been undertaken both domestically and internationally, and the results are of great interest to those who have already added wind capacity, as well as those who are about to do so or those who are looking to add more. The assumptions, the models, and the results are of interest to a broad audience. The outcome of these studies and similar efforts undertaken in the next few years will play a significant role in the rate of adoption of wind technology in this country and abroad. A concerted effort is needed to gather, distill, and disseminate the results of this work.

Distributed Wind Application User Group

As a result of the distributed wind impacts project sponsored by the UWIG, a core body of knowledge on the impacts of distributed wind projects on distribution feeders is being obtained. This knowledge consists of a set of engineering software tools useful in studying the impact of the wind turbines on feeder voltage regulation, flicker, and overcurrent protection device coordination. In addition, knowledge in the form of a case study database, a monitoring database, and application guides will be produced. This body of knowledge can expand and grow with time for the benefit of all those interested in similar such projects in the future. An effort is required to develop and maintain this knowledge for the benefit and use of the members and other interested parties.

There are hundreds of small public power and rural electric cooperative utility systems, in addition to the investor owned utilities, who are anxious to better understand the issues associated with the planning, design, and operation of distribution systems with single or small clusters of wind turbines operating in them. Once this core base of knowledge and information has been developed by the UWIG through its distributed wind project, what will soon be needed is a structure to disseminate the results of this work. There will also be a need to maintain and expand on this work by incorporating new information as it is developed, and summarizing important findings for the use of a much broader audience.

Market Operation and Transmission Policy Best Practices User Group

Because of the fact that some of the best wind resources are located remote from load and major transmission line routes, new transmission to bring wind energy to market is a critical need. The issues of how to deal with wind forecast uncertainty, who gains access to existing congested lines, who pays for new transmission, and the tariffs for the use of the lines, are all highly contentious. These issues are unresolved in many areas of the

country, especially given the level of opposition to the siting of new transmission lines, and the current evolution of the RTOs with regard to tariffs in response to FERC Order 2000 and the Standard Market Design (SMD) NOPR.

Given the regional nature of market operation, transmission system planning and wind plant development, and the fact that new practices are developing at different rates in different parts of the country, a mechanism to track the new developments across the country, identify the best practices as related to wind energy, and make them known to members and interested parties, is a critical need. The range of policy issues which needs to be addressed includes:

- Transmission planning process
- Balancing markets
- Markets for transmission rights
- Interconnection standards and policies
- Congestion management
- Rate pancaking
- Flexible-firm tariff

UWIG can provide this tracking and information service for its members, along with a forum for discussion of related issues and, if appropriate, identification of concerns and development of recommendations.

User Group Operation

The user groups will serve their members and other interested parties through a variety of mechanisms, including:

- Web site for libraries and databases
- Presentations at UWIG meetings
- Published papers
- Fact sheets
- Seminars or workshops associated with UWIG general meetings
- Consultations in response to member requests

The user group services will be phased into operation and undertake activities as member interest and resources allow. The user groups will generally meet in conjunction with the semi-annual UWIG meetings. In addition, workshops may be held periodically on topics of high interest. Much of the web based infrastructure and format for the user group operation will be shared across the groups.

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