User Group Initiative

UWIG Fall Meeting
October 23-24, 2003
Seattle, WA

J. Charles Smith
Senior Technical Advisor

Expanding UWIG Role

- Previously
  - Self-education
  - Sharing information and experience
- Currently
  - Addressing research topics of interest
  - Source of knowledge and information

Utility Wind Interest Group

Emerging Needs in New Role

- Gather information, develop if required
- Analyze information
- Disseminate information
- Internal and external information
- Domestic and international information

User Group Rationale

- Gather information into one place
- Make it easily available
- Allow the UWIG to take a more proactive role in addressing the ongoing industry challenges related to wind generation
  - Operating impacts and integration studies
  - Distributed wind application
  - Wind plant modeling and interconnection
  - Market operation and transmission policy

Operating Impacts and Integration Study User Group Needs

- Compare and analyze study assumptions, methods, and data
- Explain similarities and differences in study results
- Identify study methodology needs for the future
- Gather, distill, and disseminate results

Operating Impact and Integration Study User Group Scope

- Cost of ancillary services for wind plant
  - System regulation
  - Spinning reserve
  - Operating reserve
  - Unit commitment
- Sensitivity of ancillary service cost to
  - Penetration level
  - Generation mix
  - Fuel cost
- Capacity credit studies
- Domestic and international studies
- Assumptions and methodologies
- Information dissemination

Operating Impact and Integration Study User Group Plan

- Who's doing what in domestic studies
  - UWIG/Xcel Energy Phase 2
  - HECO IGAP
  - Great River Energy
  - We Energies
  - NYSERDA
  - BPA
  - Pacificorp
  - Avista
  - SPS
  - CEC

Operating Impact and Integration Study User Group Plan

- Who's doing what in international studies
  - NORDEL/ELTRA
  - Ireland
  - England
  - Cyprus

Operating Impact and Integration Study User Group Plan

- UWIG Tech Briefs – Summary of Results
- Summary of applicable tools and techniques
- Discussion of market approaches vs. cost-based methodologies
- Bibliography with links
- Seminar plans
- Other studies
  - Capacity value – literature, methods, results
  - Wind/hydro integration
  - Storage and hydrogen

Operating Impact and Intetegration Study User Group

- Recommendations for future work
  - Modeling tools and methodology
  - Limitations
  - Practical experience from operators
- What would you like to do – priorities and preferences
- Options for participation

Distributed Wind Application User Group Needs

- Provide planning and analysis tools
- Provide application guides
- Provide case study and monitoring results
- Provide current information to members

Distributed Wind Application User Group Scope

- Engineering software tools
  - Voltage regulation and flicker
  - Overcurrent protective device coordination
  - Economic screening
- Application guides for P1547 and flicker
- Case study library
- Measurement database
- Maintain and disseminate information

Distributed Wind Application Initial Plan

- Updates of application guides with new information
- Expand case study database
- Expand measurement database
- Availability of DW software
- Support for DW software
- Tech brief when project is completed
- Bibliography with links

Distributed Wind Application

- Recommendations for Future Work
  - Examine suitability for use in studies under FERC small generator NOPR
  - Summarize new findings
  - Identify need for new tools/info
  - Develop new tools/info
  - Guidance for national and regional programs
- What would you like to do – priorities and preferences
- Options for participation

Wind Plant Modeling and Interconnection UG

- Background
  - Growing awareness of need for wind models
    - Interconnection studies
    - Assumptions and consequences
  - Formal step by ERCOT in 2003
  - Platform Questions
  - Ongoing Needs

Wind Plant Modeling and Interconnection UG Needs

- Wind plant size approaching conventional fossil unit with similar modeling needs
- Understand, compare, and analyze modeling assumptions, methods, and data
- Understand applicability and limitations in a specific situation
- Identify future development needs

Wind Plant Modeling and Interconnection UG Scope

- Advance state of the art in modeling wind turbines and plants for power system studies
- Develop, document, verify, and support model and techniques for planning and operating studies
- Generate confidence in those studying power system performance, stability, security, and reliability

Wind Plant Modeling and Interconnection UG

- ERCOT Project History
  - Discussions of need for better wind plant models in system studies at least as far back as August, 2001
  - Project scope developed in early 2002
  - RFP issued April, 2002
  - Project awarded June, 2002
  - Project kick off August 1, 2002
  - Project completion September, 2003

Wind Plant Modeling and Interconnection

- ERCOT Project Objectives
  - Develop models for four categories of commercial wind turbines appropriate for:
    - Steady state analysis (power flow)
    - Transient stability
    - Small signal stability
    - Stability studies including long and short-term dynamics
  - Validate models with available event data from field measurements
  - Document and deliver as “User Models” for PSS/E

Wind Plant Modeling and Interconnection UG Status

- Initial set of computer models available for
  - Current fleet of commercial turbines
  - Single platform (PSS/E)
- Challenges
  - Limited validation
  - Limited application experience and knowledge

Wind Plant Modeling and Interconnection UG

- Unaddressed or Ongoing Needs
  - Model application expertise
  - Turbine and plant model validation
  - Keeping up with new wind energy technology developments
  - Addressing related issues
    - Short-circuit behavior
    - Advanced wind turbine technologies
    - Advanced wind plant designs
    - Turbine and wind plant requirements/standards

Wind Plant Modeling and Interconnection UG Initial Plan

- Create and maintain wind generation modeling information – new and existing turbines
- Develop new information when required by members – models, validation, assessments, application expertise
- Be platform, vendor independent
- Evaluate new tools and techniques for wind generation studies
- Disseminate data and information to members
- Participate in and stay abreast of industry developments in this area

Wind Plant Modeling and Interconnection UG: Other Activities

- Coordination
  - Distributed Wind UG
  - Operating Impacts UG
  - AWEA “best practices”
  - IEEE PES
  - IEA
- Wind plant design issues
  - Requirements
  - Opportunities
- Interconnection studies evaluation (FERC Order 2003)
- Turbine and plant requirements and standards

Wind Plant Modeling and Interconnection UG

- Recommendations for Future Work
  - New model development and updates
  - Wind turbine and wind plant monitoring and measurement data base
  - Wind speed models for studies
  - Case studies and benchmarks
  - Identifying new research requirements

Wind Plant Modeling and Interconnection UG

- Who would benefit
  - Transmission organizations and utilities
  - Wind turbine manufacturers
  - Wind project developers
  - A/E firms, consultants doing wind generation studies
- What would you like to do – priorities and preferences
- Options for participation

Market Operation and Trans Policy Best Practices User Group Needs

- Wind resources often remote
- Transmission expensive and difficult to permit
- Market operation and transmission planning in transition with RTOs and SMD
- Transmission pricing critical to wind energy
- Need to identify best practices for wind energy as RTO/SMD markets evolve

Market Operation and Transmission Policy Best Practices UG Scope

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

Market Operation and Transmission Policy Initial Plan

- Track new wind related developments in RTO/ISO organizations with input from NWCC, AWEA, NREL
- Identify best practices for wind generation
- Areas of interest
  - Transmission planning process
  - Interconnection practices
  - Congestion management
  - Tariff issues
  - Markets for balancing, transmission rights, ancillary services, energy, capacity

Utility Wind Interest Group

Market Operation and Transmission Policy

- Recommendations for future work
  - Flexible-firm and beyond
  - Financial risk assessment
- What would you like to do – priorities and preferences
- Options for participation

Other User Group Topics of Interest

- Wind turbine operation and performance
  - Individual turbines
  - Wind plants
- Economics
  - Project Cost
  - Contracts/PPAs
  - O&M
- Anything else??

Utility Wind Interest Group

User Group Operation

- Service to members through a variety of mechanisms
  - Communication methods
  - Outreach and education
  - Co-sponsorship
- Common web based infrastructure
- Services will be phased into operation
- User groups will undertake activities as member interest and resources allow

User Group Operations

- Communication Methods
  - Web site with electronic databases and libraries
  - Presentations at UWIG meetings
  - Published technical papers
  - Fact sheets

User Group Operation

- Outreach and Education
  - Seminars and workshops at UWIG meetings
  - Periodic seminars or workshops on topics of high interest
  - Reports to the UWIG membership on topics of general interest
  - Participation in industry activities (IEEE, AWEA, …)
  - Consultations in response to member requests
  - Provide guidance to national and regional programs

Utility Wind Interest Group

User Group Operation

- Co-sponsorship
  - User groups will be co-sponsored jointly with NREL, serve as a vehicle for making results of government sponsored work available to the industry
  - Co-funding of special activities will be sought

User Group Funding Requirements

- Some startup investment required (~$100k)
  - Finish model libraries
  - Review and analyze studies
  - Build web site
  - Initial outreach materials
- Ongoing operation of User Groups
  - app. $100k/yr at min level
  - app. $250k/yr at expanded level

User Group Funding Sources

- Startup and annual funding
  - Member dues
  - DOE/NREL and EPRI
  - Turbine vendors and RTOs
  - Sustaining members
  - Other interested parties