Wind Integration Seminar
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ISO new england

About ISO New England

- Regional Transmission Organization for New England
  - Private, not-for-profit corporation created in 1997 to oversee the region's bulk electric power system
  - Independent of companies doing business in the market
  - Regulated by the Federal Energy Regulatory Commission (FERC)
  - Approximately 400 employees headquartered in Holyoke, MA

ISO-NE: Major Responsibilities

1. **Reliability**
   - Maintain minute-to-minute reliable operation of the region's bulk power generation and transmission system
   - Centralized dispatch of generation, activation of demand response
   - Coordinate operations with neighboring power systems

2. **Markets**
   - Administer and monitor New England's wholesale electricity markets
     - Energy, Capacity and Reserves
   - Internal and external market monitoring

3. **Planning**
   - System needs assessment
   - 10-year transmission plan to ensure a reliable and efficient bulk power system to meet current and future needs

New England's Electric Power Grid

- 6.5 million customer meters
  - Population: 14 million
- 350+ generators
- 8,000+ miles of high voltage transmission lines
- 12 interconnections to three neighboring systems:
  - New York, New Brunswick, Quebec
- 31,000 megawatts (MW) of installed generating capacity
- 300+ market participants
- Summer peaking system
  - Summer: 28,130 MW (8/06)
  - Winter: 22,818 MW (1/04)

Key Issues in New England

- **Forward Capacity Market (FCM) is designed to meet capacity needs through price signals**
  - Encourages supply and demand-side resources where and when needed
- **Developing additional resources**
  - Adding new resources to maintain supply/demand balance including renewable resources
  - Promoting and integrating demand-side resources into the markets
- **Meeting peak demand for electricity**
  - Peak demand is growing faster than overall demand
    - Creates need for additional power system infrastructure
    - Increased energy efficiency

Key Issues in New England

- **Meeting growing environmental requirements**
  - Air regulations (NOx, SO_2)
  - Regional Greenhouse Gas Initiative (CO_2)
  - Renewable Portfolio Standards

- **Balancing reliability and reasonably priced supply**
  - Transmission improvements
    - System needs have been identified throughout New England
    - Many projects have already been successfully implemented
  - Resource diversity as part of a risk management strategy

Renewable Portfolio Standard (RPS) Requirements in New England

State	Adopted/ Revised	Key Provisions source http://www.eere.energy.gov/states/maps/renewable_portfolio_states.cfm#chart
Connecticut	1998/2007	Class I: 3.5% in 2007 increasing to 20% in 2020
Maine	1999	Minimum of 30% must come from renewables New goal created in 2006 to increase this requirement by 10% by 2017 (excludes CHP and solid waste).
Massachusetts	1997	4% by 2009, increasing to 20% in 2025
New Hampshire	2007	Class I: 0.5% in 2009, increasing to 16% in 2025
Rhode Island	2004	3% in 2007, increasing to 16% by 2020
Vermont	2005 goals	Total incremental energy growth between 2005-2012 to be met through power purchase agreements with new renewable generators (10% cap)

Levels of Wind Penetration

- Currently no wind farms or individual wind units are represented in the ISO New England Energy Management System
- Only a few MW of Settlement Only Generators are settled in ISO systems
- To this point there has been no impact to the ISO or its systems related to wind integration
- However, we want to be ready and able to meet challenges before they arrive

In the Queue

- 1580 MW in the Queue
  - 460 MW offshore
  - 1120 MW onshore
- Of the 1580 MW, 722 MW have System Impact Studies Complete and 812 MW have I.3.9 processes complete
- At these current levels we do not see major operational or planning issues that would inhibit system operations
- But what is coming

Integration Challenges and Opportunities

- Load Following Requirements
  - Opposing ramps of load and wind
  - Ramp Rates
  - Impacts to other resources
- Automatic Generation Control Requirements
  - Meeting Control Performance Requirements CPS1 and 2
- Reserve Requirements and Contingency Coverage Requirements for loss of wind
  - Disturbance Recovery Standards
- All of these depend on geographic diversity, level of penetration and weather

Integration Challenges and Opportunities

- Low Voltage Ride Through
- Power Factor and ability of new technologies to control voltage
- Stability
- New technologies appear to have satisfied a lot of these concerns

Integration Challenges and Opportunities

- Forecasting
  - Who does it
  - Emergency monitoring tools
  - Approaching weather systems
  - Ensuring that we are forecasting accurately enough to displace more expensive resources or otherwise we have not achieved our goals
- Congestion Management
  - Competing for limited transmission
- Minimum Generation Emergencies
  - High wind, high hydro, low loads and limited transmission capacity

Integration Challenges and Opportunities

- Visibility to the System Operator
  - Real-time weather information
  - Metering and Telemetering
  - Real-time Control of Facilities (SCADA)
  - Cyber Security
  - Voice Communication
  - Outage Coordination

Looking To The Future

- ISO wants to collaborate with our peers to make sure that we are ready
- ISO is confident that working together we can effectively integrate significant quantities of wind into the New England footprint while maintaining reliability and market efficiency
- The level of development activity will determine how much process and technical work will be required in the future
- We are looking to work with all New England stakeholders to ensure this transition occurs smoothly
- Future planning and operational studies

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