ERCOT

CEE – UT Annual Meeting
December 8, 2011

Mike Gent
Vice Chair, ERCOT Board of Directors
PRIMARY ISSUES OF INTEREST

• Wind Integration & Related Operational Challenges

• Resource Adequacy & Regulatory Uncertainties
  – Cross State Air Pollution Rule (CSAPR)

• Advanced Metering & Demand Response – Growing Opportunities
Wind Integration & Related Operational Challenges
ERCOT is #1 in the U.S. in wind production.
Our capacity is three times the amount of #2 (Iowa).
If Texas were a separate country, we’d be #5 in the world.
**Challenges Related to Increased Wind Resources in ERCOT**

- **Wind is not as controllable or predictable as traditional generation**
  - Highly dependent on weather conditions
  - Cannot be dispatched (with exceptions)
  - Voltage control and reactive coordination are difficult

- **Works best in conjunction with other generation in same area**
  - Conventional resources available to provide regulation & responsive reserve services
  - Possible ancillary service impacts

- **Creates new challenges in system design & operation**
  - Difficultly in coordination of transmission outages and construction, *i.e.*, system off peak = wind peak production
  - Development of standard software stability models for operations & planning environment
COUNTY LOCATION OF PLANNED GENERATION WITH INTERCONNECTION REQUESTS (WIND) SEPTEMBER 2011
SCENARIO 2 TRANSMISSION PLAN (18GW)
Daily Wind Graph at Peak

Current Peak Demand Record for the Month: 68,294 MW @ 08/03/11 HE17:00

- Actual Wind Output
- Coast Wind Output
- West Wind Output
Resource Adequacy
&
Regulatory Uncertainties
RESERVE MARGIN, WITH POTENTIAL RESOURCES FROM QUEUE

- Installed Capacity and Planned Units are included in the CDR (top of light blue bar)
- Uncommitted Projects are not included in CDR

Fuel Composition of Projects Undergoing Full Interconnection Studies - these projects may be cancelled or delayed beyond the indicated commercial dates shown.

Potential in-service dates for suspended projects shown as the later of 2013 or the date provided by the developer in their last update prior to suspension; may not reflect feasible in-service dates.
Prior to September 2008, Category "Other" included "Solar" and "Biomass"
Projects in all phases of interconnection study are reflected in this graph
Project cancellation tracking by month began in March 2008

Note: Suspended Projects are not included in this chart
Cross State Air Pollution Rule
CSAPR Rule Requirements

- The CSAPR affects generating units in most of the eastern US (depicted on next slide).

- Under the CSAPR, generating units must have CSAPR allowances to match annual emissions of SO$_2$ and NO$_X$ and separate allowances for peak season (May – Sept.) NO$_X$ emissions.

- Units are allocated a number of allowances based on historical generation. These unit allocations have been published.

- Trading of allowances within a state is unlimited. Interstate trading of allowances is allowed, but net state-wide imports of allowances are capped at approximately 18% of a state’s total allocation.
For SO₂ allowances, owners of resources in Texas will be allowed to trade with owners of resources in the “Group 2” states: Kansas, Nebraska, Minnesota, Alabama, Georgia, and South Carolina.

However, based on information obtained to date, ERCOT does not anticipate the emergence of an active market for trading of Group 2 SO₂ allowances.
Scenario 1 – Successful implementation of compliance plans
   – Mothballs and peak output reductions to ensure compliance
   – Extended outages during lower price periods
   – 1,200 to 1,400 MW capacity reduction during peak months
   – 3,000 capacity reduction during off-peak months (Mar, Apr, Oct, Nov)

Scenario 2 – Plus Additional daily dispatching of base-load coal units
   – Additional maintenance requirements due to increased ramping and starts/stops
   – Capacity reduction in Oct & Nov increases to 5,000 MW

Scenario 3 – Plus Limited availability of low sulfur coals
   – Output restrictions to ensure compliance
   – Capacity reduction in Oct & Nov increases to 6,000 MW
ERCOT is analyzing the reliability impacts of the proposed revisions to the CSAPR rule announced by the EPA on October 6, 2011.

The changes proposed:
- Did not alter the rule’s January 1, 2012 implementation date
- Did not revise modeling errors that ERCOT has reported do not reflect actual conditions on the ERCOT electric grid
- Have not been finalized, and may be altered or withdrawn by the EPA

The announced revisions to the rule arise from changes to model input assumptions in emissions rates of existing units in Texas. These changes lead to a 30% increase in the number of SO$_2$ allowances given to plants in Texas.

The proposed changes also delay implementation of limits on interstate trading of allowances until 2014.

ERCOT is gathering information from generators regarding changes to their compliance plans reported to ERCOT after the initial adoption of CSAPR.

Resource Adequacy predictions become quite challenging in the light of Regulatory Uncertainties
Advanced Metering
&
Demand Response
**Advanced Metering & Demand Response**

- Part of “Smart Grid” efforts
- Remote meter reading
- Informed Customers
- Dynamic pricing – limited approach
- Demand Response Programs
  - Decrease Consumption
  - Need programs to Increase Consumption

Demand Response presents a great opportunity to address both Wind Integration and Resource Adequacy issues
SUMMER PEAK DAY LOAD SHAPE WITH FUEL MIX

August 3, 2011

- Natural Gas
- Wind
- Nuclear
- Hydro
- Other
- DC Imports
- Coal

Energy Price

$0 - $3,500

0:00 - 23:00

$25 - $75

$3001

DECEMBER 8, 2011

CEE – UT ANNUAL MEETING
Demand Response Potential in ERCOT

- FERC estimates >18 GW of DR potential in Texas by 2019
  - Attributed to high peak demand
  - This would represent 20-25% of total ERCOT peak

Source: FERC 2009 National Assessment of DR, page 42
**Off-peak vs. On-peak Load**

- **21,000 MW of residential summer peak load**

**Moderate day, low A/C load**

10-11 AM, March 31, 2010

- 20% Business IDR Required
- 34% Business non-IDR Required
- 46% Residential

**Hot day, high A/C load**

4-5 PM, Aug. 4, 2010

- 48.33% Business IDR Required
- 25.97% Business non-IDR Required
- 25.70% Residential

- Both days were Wednesdays
- Customer class breakdown is for competitive choice areas only
- IDR meters are required at >700kW
Today we’re settling about four million advanced meters

Advanced meters give customers the data they need to make educated decisions about their electricity usage.
QUESTIONS?
# Changes That Affect Reserve Margin Since June 2011 CDR (for Summer 2012)

The Peak Demand forecast has been updated (increase in Firm Load Forecast of 738 MW for 2012)

<table>
<thead>
<tr>
<th>Additional Mothballed Units</th>
<th>Capacity (MW)</th>
<th>Planned Units</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Greens Bayou 5</td>
<td>-406</td>
<td>09INR0001-Sandy Creek 1</td>
<td>-925 Delayed</td>
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<tr>
<td>Midlothian 5</td>
<td>-225</td>
<td>09INR0029-CFB Power Plant Units 11&amp;12</td>
<td>-260 In-service, but zero net capacity to grid</td>
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<tr>
<td>Monticello 1</td>
<td>-565</td>
<td>11INR0086-RRE Austin Solar</td>
<td>-60 Delayed</td>
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<tr>
<td>Monticello 2</td>
<td>-565</td>
<td>08INR0011-Senate Wind Project</td>
<td>-13 Delayed 150 MW Unit at 8.7%</td>
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<tr>
<td>Sam Bertron 3</td>
<td>-230</td>
<td>Misc DG Units</td>
<td>25 New</td>
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<tr>
<td>Sam Bertron 4</td>
<td>-230</td>
<td></td>
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<tr>
<td>Sam Bertron T2</td>
<td>-13</td>
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<td>Change in Prob. Of Return %s</td>
<td>717</td>
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<td></td>
<td><strong>-1517</strong></td>
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<table>
<thead>
<tr>
<th>Mothballed Units Returned to Service</th>
<th>Capacity (MW)</th>
<th>Net Change</th>
<th>Change to PUN Available Generation based on Aug 2011 Actuals</th>
<th>Net Change</th>
<th>Total Change in Resources Available</th>
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<tbody>
<tr>
<td>Spencer 4</td>
<td>61</td>
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<td>-681</td>
<td>-2623</td>
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<tr>
<td>Spencer 5</td>
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<tr>
<td>Sam Bertron 1</td>
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<tr>
<td>Sam Bertron 2</td>
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-1% reserve margin impact

-4% reserve margin impact

Jack County 2 (565MW) and Sherbino Mesa Wind 2 (150MW with ELCC of 13MW) moved from Planned to Installed

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**Notes:**
- Changes to Unit Maximum Sustainable Limits reported in RARFs
- Changes to PUN Available Generation based on Aug 2011 Actuals