ERCOT’S CHALLENGES & OPPORTUNITIES

Trip Doggett
President & CEO
ERCOT

Association of Electric Companies of Texas
May 17, 2012
AGENDA

- Resource Adequacy
- Wind Growth
- Demand Response
- Drought Update
- Transmission Projects
RESOURCE ADEQUACY
Annual Energy & Peak Demand (2003-2011)

Total 9-year Growth
Energy – 17.5%
Peak Demand – 13.8%
AGE OF GENERATION FLEET

![Bar chart showing the age distribution of generation fleet by MW capacity and type of resource.](chart_image)

- **Wind**: Green bars.
- **Nuclear**: Purple bars.
- **Gas**: Blue bars.
- **Other**: Yellow bars.
- **Coal**: Brown bars.

**MW Capacity**
- Greater than 50
- 40 to 50
- 30 to 40
- 20 to 30
- 10 to 20
- Less than 10

**Age of Resource in Years**
- Greater than 50
- 40 to 50
- 30 to 40
- 20 to 30
- 10 to 20
- Less than 10
GAS GENERATION FLEET AGE COMPARISON – ERCOT & LOUISIANA

Gas Fleet Age - ERCOT & Louisiana

Fleet age weighted by capacity
Data Source: EIA (Energy Information Administration) Form 860
• Fuel Composition of Projects Undergoing Full Interconnection Studies - these projects may be cancelled or delayed beyond the indicated commercial dates shown
• ***Monticello 1&2 – 1130MW (as a result of a federal court’s order to stay EPA’s CSAPR)
## SARA Summer 2012 Final Report

<table>
<thead>
<tr>
<th>Item</th>
<th>Summer 2012</th>
<th>Base Case</th>
<th>Extreme Load &amp; Typical Gen Outages</th>
<th>Extreme Load &amp; Extreme Gen Outages</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Total Resources</td>
<td></td>
<td></td>
<td>73,853</td>
</tr>
<tr>
<td>2</td>
<td>Base Case Peak Demand</td>
<td></td>
<td></td>
<td>67,492</td>
</tr>
<tr>
<td>3</td>
<td>Uses of Reserve Capacity</td>
<td>3,790</td>
<td>7,371</td>
<td>9,438</td>
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<tr>
<td>4</td>
<td>Capacity Available for Operating Reserves* (1-2-3)</td>
<td>2,571</td>
<td>-1,010</td>
<td>-3,077</td>
</tr>
<tr>
<td>5</td>
<td>Demand Adjustment during Scarcity**</td>
<td></td>
<td></td>
<td>750</td>
</tr>
<tr>
<td>6</td>
<td>Adjusted Capacity Available for Operating Reserves (4+5)</td>
<td>3,321</td>
<td>-260</td>
<td>-2,327</td>
</tr>
</tbody>
</table>

*Less than 2300MW indicates risk of EEA1
**Represents effects of price responsive demand, conservation appeals, demand programs, etc., based on summer 2011 experience; does not include Load Resource or Emergency Response Service (ERS) activation
Recent Actions to Address Resource Adequacy Concerns

Completed

- Online Non-Spin standing deployment & offer floor
- Offline Non-Spin offer floor
- Responsive Reserve & Regulation Up offer floor
- Institutionalize the process to recall units for capacity
- Pricing of energy for Reliability Unit Commitment (RUC) units deployed for capacity at System Wide Offer Cap
- Expansion of Responsive Reserve with a corresponding reduction in Non-Spin

Work In Progress

- The proper magnitude and slope of the Power Balance Penalty Curve
- Raising the System Wide Offer Cap
- Low Sustainable Limit problem for units RUC’ed online for capacity
- Compensation for Reliability Unit Commitments made to provide local reliability and transmission relief and address the issue of whether and how RUC claw-back should be adjusted
- Review Peaker Net Margin Cap
- Demand Response & Load Management Initiatives
- Posting non-binding near real-time forward prices
- Brattle Group Study
**Brattle Group Study – Current Status**

- Completed 4 sector group interviews and 33 individual interviews from the full spectrum of stakeholders
- Characterized investor types and their investment criteria
- Completing simulation analysis of current and proposed rules for scarcity operations and pricing, expected generator revenues, potential investment, and resulting reliability
- Report will include Brattle’s evaluation of the pros and cons of a range of market design options for meeting a range of resource adequacy objectives

**Report to be released June 1**
CONSERVATION MESSAGES – ERCOT & PUCT

Conservation Needed Power Watch

On YELLOW days, extra conservation measures are urged by the peak usage hours. A YELLOW Alert will be declared for extremely hot, leading to record or near-record electricity demand and unexpected power plant outages can expected or actual declaration of Level 1 of ERCOT’s Energy additional generation. An inability to obtain additional general deployment of interruptible loads such as large industrial or use as much as possible during the peak electricity usage hours.

- Turn off all unnecessary lights, appliances, and electronic devices.
- When at home, close blinds and drapes that get direct sunlight into occupied rooms to make it feel cooler.
- When away from home, set air conditioning thermostats to 78°F and close blinds or drapes on windows that will get direct sunlight.
- Do not use your dishwasher, laundry equipment, hair dryers, or anything else that requires electricity.
- Cook in the microwave instead of the electronic range.
- Set your pool pump to run in the early morning or late at night.
- Check out other non- or low-cost conservation tips and resources by clicking on the links to the right.
- Go to www.powertochoose.org to see if you can save energy and choose a new electric provider does not affect the reliability of the time it will take to have your electric service restored.

Conservation Critical Power Warning

On RED days, conservation is critical to avoid Electricity Emergencies. Red alerts are declared when all interruptible load usage as much as possible to avoid outages during a RED Alert (REA) which includes the deployment of emergency actions.

PLUS

- News release
- Automated emergency notification message to major media
**AND INTRODUCING … ERCOT MOBILE APP**

**ERCOT Mobile App**
- First release (Android & Apple) scheduled for June 2012
- Pop up notifications
- Applications for first release
  - Conservation Spotlight
  - Load Forecast versus Actual graph
  - ERCOT Conservation Tips
  - ERCOT Quick Facts

**ERCOT Quick Facts**
- 85% of Texas electric load
- 40,530 circuit miles of high-voltage (138 kV/345 kV) transmission
- 550 generation units
- 73,600 MW peak capacity
- 68,376 MW record peak demand
- 335 billion kWh energy produced (2011)

**Primary responsibilities (from Texas Legislature)**
- System reliability (planning and operations)
- Open access to transmission
- Retail switching process for customer choice
- Wholesale market settlement for electricity production and delivery

**Wind power leader**
- 9,600 MW capacity (most in nation)
- 2,000 MW coastal wind power (on-peak availability)
Wind Growth
ERCOT Wind Installations by Year (as of April 30, 2012)

The data presented here is based upon the latest registration data provided to ERCOT by the resource owners and can change without notice. Any capacity changes will be reflected in current and subsequent years’ totals. Scheduling delays will also be reflected in the planned projects as that information is received.

This chart now reflects planned units in calendar year of installation rather than installation by peak of year shown.

- ERCOT is #1 in the U.S. in wind capacity.
- Our capacity is *three times* the amount of #2 (Iowa).
- If Texas were a separate country, we’d be #6 in the world.
Current Peak Demand Record for the Month: 68,294 MW @ 08/03/11 HE17:00
DEMAND RESPONSE
LOAD DURATION CURVES – 2006 TO 2011

<table>
<thead>
<tr>
<th>Hours Over</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
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<tbody>
<tr>
<td>55000 MW</td>
<td>249</td>
<td>109</td>
<td>230</td>
<td>344</td>
<td>426</td>
<td>849</td>
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<tr>
<td>60000 MW</td>
<td>38</td>
<td>8</td>
<td>17</td>
<td>76</td>
<td>113</td>
<td>382</td>
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<tr>
<td>65000 MW</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>75</td>
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</table>
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
Advanced meters give customers the data they need to make educated decisions about their electricity usage.

Today we’re settling over 5.0 million advanced meters.

Apr 2012
80.9% of the ERCOT Competitive Load settled with 15-min interval data (AMS and IDR)
DROUGHT UPDATE
ERCOT ACTIONS TO MANAGE DROUGHT IMPACT

- Surveyed generation entities in the state and reviewed drought concerns and possible mitigations
- Identified water resources used by electric generation that are at historically low levels
- Reviewed public sources regarding state and regional water plans
- Coordinated plans and activities with TCEQ staff and drought response teams
- Conducted a workshop on 27 February 2012 to share best practices relevant to drought conditions
• **Shared Challenges and Ideas**
  – Generation
    • Presented white paper on water conservation measures
    • Ideas to optimize usage of existing water supply
  – Transmission
    • Equipment contamination/flashovers & mitigation
    • Emergency coordination
    • Wildfire risk and the electrical grid

• **More than 200 participants including state and federal government staff, market participants, ERCOT staff and other stakeholders**
SURFACE WATER SUPPLIES AT 10 YEAR LOWS (Oct 2011)

SURFACE WATER RESERVOIRS AT 10 YEAR LOW
(as of Oct. 2011)
# Lake Levels Update – May 2012

<table>
<thead>
<tr>
<th>Surface Water &amp; (MW)</th>
<th>*Level @ Full Conservation Pool</th>
<th>*Level on Jan 1, 2011</th>
<th>*Level on Oct 7, 2011</th>
<th>*Level on May 01, 2012</th>
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</thead>
<tbody>
<tr>
<td>Lake Texana (56)</td>
<td>44.50</td>
<td>41.00</td>
<td>32.81</td>
<td>43.19</td>
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<tr>
<td>Bardwell Lake (312)</td>
<td>421.00</td>
<td>420.71</td>
<td>416.23</td>
<td>421.08</td>
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<tr>
<td>Lake Colorado City (407)</td>
<td>2,070.20</td>
<td>2057.33</td>
<td>2052.4</td>
<td>2051.23</td>
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<tr>
<td>Lake Ray Hubbard (916)</td>
<td>435.50</td>
<td>432.37</td>
<td>429.22</td>
<td>435.09</td>
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<td>Lake Granbury (983)</td>
<td>693.00</td>
<td>691.90</td>
<td>686.27</td>
<td>692.43</td>
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<td>Lake Houston (1016)</td>
<td>41.73</td>
<td>42.10</td>
<td>36.76</td>
<td>41.85</td>
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<td>Twin Oaks Reservoir (1616)</td>
<td>400</td>
<td>398.87</td>
<td>398.27</td>
<td>400.18</td>
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<td>Lake Limestone (1689)</td>
<td>363</td>
<td>359.03</td>
<td>354</td>
<td>362.62</td>
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<tr>
<td>Martin Lake (2425)</td>
<td>306</td>
<td>300.48</td>
<td>295.06</td>
<td>302.03</td>
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</table>

* In Feet above Mean Sea Level
U.S. Drought Monitor
Texas

Drought Conditions (Percent Area)

<table>
<thead>
<tr>
<th></th>
<th>None</th>
<th>D0-D4</th>
<th>D1-D4</th>
<th>D2-D4</th>
<th>D3-D4</th>
<th>D4</th>
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<tbody>
<tr>
<td>Current</td>
<td>0.00</td>
<td>100.00</td>
<td>100.00</td>
<td>99.16</td>
<td>96.99</td>
<td>87.99</td>
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<tr>
<td>Last Week</td>
<td>0.00</td>
<td>100.00</td>
<td>100.00</td>
<td>99.16</td>
<td>96.65</td>
<td>85.75</td>
</tr>
<tr>
<td>(09/27/2011 map)</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>3 Months Ago</td>
<td>2.41</td>
<td>97.59</td>
<td>95.73</td>
<td>94.39</td>
<td>90.21</td>
<td>71.30</td>
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<td>(07/05/2011 map)</td>
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<tr>
<td>Start of Calendar Year</td>
<td>7.89</td>
<td>92.11</td>
<td>69.43</td>
<td>37.48</td>
<td>9.59</td>
<td>0.00</td>
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<tr>
<td>(12/28/2010 map)</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start of Water Year</td>
<td>0.00</td>
<td>100.00</td>
<td>100.00</td>
<td>99.16</td>
<td>96.65</td>
<td>85.75</td>
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<td>(09/27/2011 map)</td>
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<tr>
<td>One Year Ago</td>
<td>75.57</td>
<td>24.43</td>
<td>2.43</td>
<td>0.99</td>
<td>0.00</td>
<td>0.00</td>
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<tr>
<td>(09/28/2010 map)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Intensity:
- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

http://droughtmonitor.unl.edu

Released Thursday, October 6, 2011
# U.S. Drought Monitor

**Texas**

**Drought Conditions (Percent Area)**

<table>
<thead>
<tr>
<th>Drought Conditions</th>
<th>None</th>
<th>D0-D4</th>
<th>D1-D4</th>
<th>D2-D4</th>
<th>D3-D4</th>
<th>D4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Current</strong></td>
<td>17.80</td>
<td>82.20</td>
<td>65.93</td>
<td>48.16</td>
<td>23.57</td>
<td>7.38</td>
</tr>
<tr>
<td><strong>Last Week</strong></td>
<td>17.09</td>
<td>82.91</td>
<td>69.59</td>
<td>49.70</td>
<td>24.72</td>
<td>8.70</td>
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<tr>
<td><strong>3 Months Ago</strong></td>
<td>4.93</td>
<td>95.07</td>
<td>90.05</td>
<td>77.46</td>
<td>64.96</td>
<td>23.12</td>
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<td><strong>Start of Calendar Year</strong> (12/27/2011 map)</td>
<td>0.01</td>
<td>99.99</td>
<td>97.83</td>
<td>84.81</td>
<td>67.32</td>
<td>32.36</td>
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<td><strong>Start of Water Year</strong> (09/27/2011 map)</td>
<td>0.00</td>
<td>100.00</td>
<td>100.00</td>
<td>99.16</td>
<td>96.85</td>
<td>85.75</td>
</tr>
<tr>
<td><strong>One Year Ago</strong></td>
<td>0.00</td>
<td>100.00</td>
<td>98.86</td>
<td>93.99</td>
<td>73.73</td>
<td>25.96</td>
</tr>
</tbody>
</table>

**Intensity:**
- D0 Abnormally Dry
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- D2 Drought - Severe
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http://droughtmonitor.unl.edu

**May 8, 2012**

Valid 7 a.m. EST

**Released Thursday, May 10, 2012**

Matthew Rosencrans, NOAA/NWS/NCEP/CPC
Drought Impact Status

- **Improved drought conditions in many river basins**
  - Reservoir levels not expected to affect power plant operations this summer
  - Potential risks to generation capacity continue while Texas remains under drought conditions
TRANSMISSION PROJECTS
First Interconnection Agreement for a CREZ Substation

- Transmission Plan designed to serve approximately 18GW:
  - ~4600 circuit miles of 345 kV
  - $6.7 billion project cost
- All line certification cases completed
  - Construction underway
  - All lines expected to be complete by end of 2013
- Lines are open-access; use not limited to wind

- Completed March 27, 2012, between Wind Energy Transmission Texas and Stephens Ranch Wind Energy
- Interconnection point is the Long Draw Substation in Borden County
- Wind farm will include 233 turbines for total of 377 MW
- Scheduled for commercial operations in November 2013
• Actual testing showed between 200 and 500 MW improvements in West to North transfers
• Estimated benefit was calculated using 200 MW as the maximum improvement and using average shadow prices and average limits for each hour
• IMM reported actual Congestion Rent for West to North constraint in 2011 was $95,000,000
Lower Rio Grande Valley Project

• Driver – Reliability Need

• Project Components
  – Lobo-Rio Bravo-N. Edinburg 163 mile single circuit 345 kV line on double circuit structures with 50% series compensation
  – Energized reconductor of Lon Hill-N. Edinburg and Lon Hill-Rio Hondo 345 kV lines
  – Reconfigure N. Edinburg and Rio Hondo series capacitors

• Cost Estimate - $527 million

• Expected in-service - 2016
**Cross Valley 345kV Project**

- **Driver – Reliability Need**
- **Project Components:**
  - New La Palma-Palo Alto 138 kV line (~12 miles) with a rating of at least 215 MVA
  - New North Edinburg-Loma Alta 345 kV line (double circuit capable with one circuit in place) routed in proximity to the existing South McAllen Substation (~106.5 miles)
  - New 345kV bus at the Loma Alta station with one 345/138kV autotransformer
- **Cost estimate = $274.7M**
- **Expected in-service - 2016**