ERCOT OVERVIEW

TEXAS WATER CONSERVATION ASSOCIATION
MARCH 9, 2012

Trip Doggett
President & CEO
ERCOT
• What is ERCOT?
  – ERCOT as a North American Electric Reliability Corporation (NERC) interconnect
  – ERCOT as an Independent System Operator

• Challenges
  – Demand Growth
  – Resource Adequacy
  – Drought

• Options
The ERCOT Region:
The interconnected electrical system serving most of Texas, with limited external connections
- 75% of Texas land; 85% of Texas load
- More than 40,000 miles of transmission lines
- 550+ generation units
- 68,294 MW peak demand (set August 3, 2011)

ERCOT Inc.:
A non-profit corporation designated the “Independent Organization” under state law and assigned these responsibilities [Texas Public Utility Regulatory Act (PURA) 39.151]:
- Maintaining System Reliability
- Ensuring Open Access to Transmission
- Facilitating the Competitive Wholesale Market
- Facilitating the Competitive Retail Market

Regulatory Characteristics:
- ERCOT is regulated by the Texas Public Utility Commission with oversight by the Texas Legislature
- ERCOT is not a market participant and does not own generation or transmission/distribution wires
ERCOT AS INDEPENDENT SYSTEM OPERATOR

- ERCOT is one of 10 North American ISOs/RTOs
  - ISOs/RTOs serve 67% of U.S. population
  - Goal: Reliability, Efficiency, Transparency & Impartiality
Pre-2002

Every utility was vertically integrated, from generation to customer service.

Integrated electric utility

Customer
TEXAS COMPETITIVE MODEL

<table>
<thead>
<tr>
<th>Generation</th>
<th>T&amp;D (&quot;Wires&quot;)</th>
<th>Retailers</th>
<th>End Users</th>
</tr>
</thead>
<tbody>
<tr>
<td>Competitive Production</td>
<td>Regulated Open Access</td>
<td>REP</td>
<td>REP</td>
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Competitive Sales
ERCOT ‘directs traffic’ on the grid to maintain reliability and ensure supply of electricity:

• Coordinates scheduling of power by market participants
• Analyzes grid conditions continuously in real-time
• Dispatches generation to ensure power production matches load at all times
• Secures available generation capacity to meet reliability requirements including contingencies
• Coordinates planned outages of generators and transmission lines
• Relieves transmission system congestion
• Coordinates emergency actions & recovery
• Operates markets to meet regional energy & capacity requirements not met through bilateral arrangements
ERCOT CAPACITY AND ENERGY BY FUEL TYPE

Installed Capacity, January 2012

~ 80,000 MW

- Natural Gas 57%
- Coal 23%
- Nuclear 7%
- Wind 13%
- Water/Other <1%

Energy Produced, 2011

335 billion kilowatt-hours

- Natural Gas 40%
- Coal 39%
- Nuclear, 12%
- Wind 8.5%
- Water/Other 0.5%
CHALLENGES
NEW RECORDS IN USAGE

New Peak Demand Record: 68,379 megawatts
- 68,379 megawatts (MW), Aug. 3, 2011
- The 2010 peak demand – 65,776 MW, Aug. 23, 2010 – was broken 3 consecutive days:
  - Aug. 1, 2011 66,867 MW
  - Aug. 2, 2011 67,929 MW
  - Aug. 3, 2011 68,379 MW

New Weekend Record
- 65,159 MW, Sunday, Aug. 28
  - 5 percent increase over 2010 previous record – 62,320 MW

Winter Peak Record
- 57,282 MW (February 10, 2011)
  - 3 percent increase over 2010 previous record - 55,878 MW

Wind Record
- A new instantaneous wind record of 7,599 MW occurred on March 7 at 20:41.
Competitive Renewable Energy Zones (CREZ) Transmission Optimization Study
Figure 5: Scenario 2
Target reserve margin for the ERCOT Region is 13.75% 

Defined as:
- Percentage difference between available generating capacity and forecasted peak system load

Ensures (but does not guarantee) adequate electric supply will be available in case of contingency need
- Unexpected weather extremes or loss of major generation units

Available capacity includes:
- Gas, coal and nuclear fuel units accounted at their season operating limit level (unless scheduled to retire or mothball)
- Hydro plants and wind farms at their “high confidence summer peak” level
- Planned units (with signed transmission interconnection agreements and required permits)
- Loads Acting as Resources - Large customers registered and bidding to provide capacity services in market-based load participation programs
- DC Ties - capacity that can be imported through DC links from neighboring grids
As of January 2012, reserve margin at 13.86% due to CSAPR stay. Reserve margin target 13.75%.
2012 CDR – LOAD FORECAST

- Updated economic forecast from Moody’s
  - Slower growth in near-term
- Updated assessment of normal weather profile
SUMMER PEAK SCENARIOS

Normal Weather – 63,898 MW
Drought
The 2011 Texas Drought

Excerpts from Oct 2011 Report by Office of State Climatologist:

- Large portion of Texas will likely endure a second summer of drought.
- 2011-12 La Niña is forecasted to be less intense than 2010-11.
- It is impossible to determine at this point whether the drought will last beyond a second year.
  - On rare occasions in the past, La Niña conditions were observed for 3 consecutive years.
- Texas precipitation is also influenced by Pacific Decadal Oscillation & Atlantic Multidecadal Oscillation.
  - During the past decade, both patterns have been in an unfavorable state.
- Global patterns tend to reverse themselves over time, possibly leading to an extended period of wetter weather for Texas, though this may not happen for another 3-15 years.
SURFACE WATER SUPPLIES AT 10 YEAR LOWS (Oct 2011)

SURFACE WATER RESERVOIRS AT 10 YEAR LOW
(as of Oct. 2011)
ERCOT ACTIONS TO MANAGE DROUGHT IMPACT

- Surveyed generation entities in the state and reviewed drought concerns and possible mitigations
- Identified surface water most impacted and projected impacts to generation for 2012
- Reviewed public sources regarding state and regional water plans
- Met with TCEQ staff and drought response teams
- Facilitated a workshop with generation and transmission entities to share best practices relevant to drought conditions
MANAGING DROUGHT IMPACT – GENERATION SECTOR ACTIONS INCLUDE …

- Generators are designed to
  - Conserve – minimize water usage
  - Reuse – Reuse water from one process for another
  - Recycle – Return clean water to the source after usage
- Generators regularly account for all water withdrawn to regulatory authorities
- Many generators utilize salt water or effluent, where practical
- Generators regularly maintain equipment to avoid water leakage/wastage
- A couple of generators have installed pipelines to access accumulated (from rain & seepage) water at mine sites
- Some generator resources are re-engineering their water intake structures to allow for deeper intake level conditions
• Increased insulator contamination incidents (salt, smoke, bird excrement, etc.)
• Fires, smoke implications, vegetation management, and risks to wooden h-frame infrastructure
• Potential issues associated with transmission system planning if there are significant generator de-rations
• Coordination with the local authorities (police, fire, etc.) requesting de-energizing of transmission facilities for safety to allow for aerial firefighting.
Drought Conclusions

- Persistent drought conditions are impacting electric generation resources, but are unlikely to cause significant generation shortfalls in 2012.

- If the drought continues into 2013, consequences to electric generation availability are likely to become more severe.

- ERCOT will continue to analyze survey results and will continue to keep regulatory authorities well-informed.
OPTIONS FOR HANDING THESE CHALLENGES
Wednesday March 9, 2011
5:15 PM
ERCOT Load: 31,262 MW
Temperature in Dallas: 64°

- Residential 27.4% (~8,500 MW)
- Small Commercial 28.9%
- Large C&I 43.7%

8/3/2011 IE 17:00
- Residential 51.2% (~35,000 MW)
- Small Commercial 25.2%
- Large C&I 23.7%

5:00 PM
ERCOT Load: 68,416 MW
Temperature in Dallas: 109°

- Customer class breakdown is for competitive choice areas; percentages are extrapolated for munis and co-ops to achieve region-wide estimate
- Large C&I are IDR Meter Required (>700kW)
Emergency Response Service

- Emergency Interruptible Load Service is transitioning to ERS
  - PUC Rule and ERCOT Protocol revisions in process
  - June 1 effective date for new provisions
- Service provided by electricity customers willing to reduce load or unregistered generators willing to supply energy during grid emergencies in exchange for payment
- An additional tool for ERCOT Operations to manage grid reliability, deployed only in declared emergencies (EEA)
  - Designed to help avoid rotating blackouts
- ERS Resources may be individual or aggregated loads or unregistered generators
- Procured 24/7/365
  - Not just a peak reduction program
  - Offers may vary by Time Period (different business & non-business hour blocks)
EMERGENCY RESPONSE SERVICE

• Qualifications/requirements:
  – Relationship with QSE that can receive Verbal Dispatch Instruction over the ERCOT Hotline
  – 15-minute interval metering
  – Capability reducing load or providing generation – minimum obligation of 100 kW -- within 10 minutes of ERCOT dispatch

• Payment to EILS Resources is subject to contractual agreement between the QSE and the EILS resource owner

• Participants are paid as-bid if procured

• Historically, reservation payments have ranged from approximately $6 to $11 per MW per Hour

• 430 MW under contract during 2011 summer peak hours
  – For 2012, estimating between 560 and 630 MW for peak
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