ERCOT Report

Mark Armentrout, Board Chair
Thomas F. Schrader, President and CEO
Sam Jones, COO

Senate Committee on Business & Commerce
April 25, 2006
Agenda

Emergency Curtailments
• April 17 chronology
  ▪ Communications improvements
  ▪ Other steps

ERCOT Issues
• Generation capacity
• Congestion management
• Transmission planning
• ERCOT Fee
• SB 408 compliance
April 17 Sequence of Events

• Sunday, April 16
  – Capacity out on planned maintenance – 14,000 MW
  – 2 pm: ERCOT purchased 1,250 MW of standby generating capacity for the peak period of Monday, April 17 (normal ancillary services market)
  – 4 pm: Monday peak load forecast -- 49,018 MW
  – 6 pm: ERCOT purchased 1,540 MW additional capacity for the 17th peak period in the replacement market
  – Peak capacity scheduled for Monday – 53,920 MW
April 17 Sequence of Events (continued)

• Monday, April 17
  – 1 am: New forecast for the day increased load estimate to 49,600 MW
    ▪ Scheduling system showed more than adequate reserves
  – 5 am: ERCOT manually increased the load estimate by an additional 2,000 MW to 51,600 MW
    ▪ Scheduling system continued to show more than adequate reserves
  – ERCOT ran updated load forecasts every hour as the day progressed
    ▪ All showed adequate capacity.
  – 11:58 am: A 500 MW generating unit tripped out of service
  – 12:23 pm: A 163 MW generating unit tripped out of service
  – 2 pm: ERCOT began to experience slow generation reserve response to control frequency
ERCOT Region Load & Frequency April 17

Load and Freq (04/17/2006)
April 17 Sequence of Events (see chart)

1 3:10 – 3:35 pm – A generating entity lost telemetry to ERCOT

2 3:25 pm – ERCOT experienced a decline in system frequency and declared Step 1 of the Emergency Electric Curtailment Plan (EECP)
   - Requires all generation to operate at maximum capability.
   - Provides notice to QSEs and TDUs that a short supply situation is occurring.

3 3:34 pm – Due to further decline in system frequency, ERCOT declared Step 2 of the EECP
   - Requiring all interruptible loads (loads paid for agreeing to turn off if needed) be curtailed.
   - System load at the time was 52,360 MW.
   - Returned frequency to normal levels.
   - Grid was near peak for the day and operation without reducing firm load would have been possible for the remainder of the day baring further contingencies.
April 17 Sequence of Events (see chart, continued)

4  3:51 – 4:17 pm – 5 generators with a total capacity of 1,680 MW tripped off line
   • Frequency dropped very rapidly toward an unreliable level that could have resulted in a major blackout.

5  4:13 pm – Due to low frequency ERCOT bypassed Step 3 of the EECP and went to Step 4, requiring reduction of firm load
   • 1,000 MW of firm load reduction ordered.
   • System load at that time was back up to 52,113 MW.
   • Load reductions returned frequency to acceptable levels.
April 17 Sequence of Events (continued)

• 4:25 pm: ERCOT declared Step 3 of the EECP
  – Issued media appeals for voluntary load reduction
• 5:15 pm: An 81 MW generating unit tripped out of service
• 5:31 pm: ERCOT began restoring firm load as peak load subsided on the system
• 7:20 pm: ERCOT canceled all alerts
NOTE

• The loss of 5 generating units (1,680 MW) in a very short period of time (26 minutes) during peak load conditions is an extremely unlikely event.

• Total of 7 generators lost in a little over 4 hours and 8 in one day -- also very unlikely
Communications during EECP

- ERCOT will incorporate lessons learned into its Crisis Communications Plan
- Communications automated to the extent possible
- 3 stages of communications:

<table>
<thead>
<tr>
<th>Stage 1 ALERT</th>
<th>PUC</th>
<th>Governor / SOC hotline</th>
<th>Legislative Leadership</th>
<th>Market Participants</th>
</tr>
</thead>
</table>
| Conditions indicate Step 1 of EECP may be necessary | --Commissioners
--Exec. Director
--Media relations
--Infra./Security
--Govt. Relations | -- City & County officials
-- Public safety
-- State agencies | | Load-serving entities |

| Stage 2 ALERT | | | | |
|---------------| | | | |
| Step 2 of EECP declared | | | | |
| | News media | All legislators | All market participants & other interested parties | Activate ERCOT.com web page for public updates |

| Stage 3: EECP | | | | |
|---------------| | | | |
| Step 3 or Step 4 of EECP declared | | | | |
Evaluation of EECP

• ERCOT’s Compliance Division is investigating incident

• Technical Advisory Committee (stakeholders) will analyze all aspects of the April 17 event
  – Identify market concerns
  – Review communications steps
  – Review the EECP
  – Operational analysis in detail by Reliability & Operations Subcommittee
Incident Command System (ICS)

• ERCOT will devise a response and recovery approach employing Incident Command System (ICS) structure

• ICS is widely used by governmental agencies to respond to crises such as fires, natural disasters, disease and pandemics, hazardous materials incidents, terrorist incidents, and other security situations

• ICS adopted by Department of Homeland Security for the National Incident Management System (NIMS)
ERCOT Issues

- Generation capacity
- Congestion management
- Transmission planning
- ERCOT Fee
- SB 408 compliance
• 554 total units (77,000 MW) includes:
  – 30 mothballed units
  – 11 units (729 MW) on RMR status
  – 3 active DC Ties
  – Switchable facilities
• 26,000 MW of new generation capacity added since 1998
Reserve Margins

Margin for 2005 was projected at 16.9%

2005 Report projected Reserve Margin for 2006 at 13.6%

New evaluation will be published prior to summer peak season
Planned Generation

Capacity in MW
Data as of March 29, 2006

<table>
<thead>
<tr>
<th>Fuel Source</th>
<th>Publicly Announced</th>
<th>Non-Public</th>
<th>Total</th>
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<tbody>
<tr>
<td>Natural Gas</td>
<td>2,850</td>
<td>3,350</td>
<td>6,200</td>
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<tr>
<td>Coal</td>
<td>4,450</td>
<td>3,209</td>
<td>7,659</td>
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<tr>
<td>Wind</td>
<td>2,353</td>
<td>9,297</td>
<td>11,650</td>
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<tr>
<td>Other</td>
<td>12</td>
<td>425</td>
<td>437</td>
</tr>
<tr>
<td><strong>TOTALS</strong></td>
<td><strong>9,665</strong></td>
<td><strong>16,281</strong></td>
<td><strong>25,946</strong></td>
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NOTE: Includes projects under consideration or in planning that may or may not be built.
Local Congestion Costs in ERCOT Market

<table>
<thead>
<tr>
<th>Years</th>
<th>OOMC</th>
<th>Unit Specific-Up</th>
<th>Unit Specific-Down</th>
<th>RMR</th>
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<tr>
<td>2003</td>
<td>$135.3</td>
<td>$52.2</td>
<td>$79.0</td>
<td>$138.7</td>
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<td>2004</td>
<td>$125.7</td>
<td>$55.4</td>
<td>$19.0</td>
<td>$279</td>
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<td>2005</td>
<td>$100.6</td>
<td>$46.5</td>
<td>$32.5</td>
<td>$262</td>
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</table>
Congestion Management

• A key component of ERCOT’s role in grid reliability and the wholesale market

• Local congestion cost uplift (including RMR):
  – Decreased 35% from 2003-05 ($405 million to $262 million)
  – Decreased 6% in 2005 while fuel index increased by 40%

• Some reasons costs have decreased:
  – Transmission system additions & upgrades
  – Dynamic ratings for line limits
  – Improved congestion analysis
New Transmission Investment

Major Transmission Additions Completed

Transmission Investment in the ERCOT Region

1999-2005 $2.2 billion
2006-2011 (projected) $2.8 billion
ERCOT Fee

- Proposed base Fee for 2006 is 8% lower than 2004
- ERCOT has become a more stable operating organization
SB 408 Compliance (Sunset recommendations)

- ERCOT fully acknowledges and is cooperating with PUC oversight authority
- Board meetings are open to the public
  - Agenda posted in advance
  - Materials distributed to email lists open to all
- Board chair now an independent member
- Independent Board Member additions
  - One new member already seated
  - Executive search underway for 2nd new member
- ERCOT Bylaws now conform to SB408 requirements
  - Conflict of interest provisions adopted
- Independent Market Monitor
  - ERCOT has worked closely with PUC on this issue
  - Substantive Rule implementing IMM approved by Commission April 13
ERCOT Mission

ERCOT’s Mission is to direct and ensure reliable and cost-effective operation of the electric grid and to enable fair and efficient market-driven solutions to meet customers’ electric service needs.

Questions?
Appendix A: ERCOT Quick Facts

Electric Reliability Council Of Texas

- Independent, not-for-profit organization since 1941
- **Intra-state electric interconnection**
  - 1 of 3 North American interconnections
  - Connected only by DC ties
- **Independent System Operator**
  - Grid operations
  - Administrator of the wholesale & retail markets
  - Neutral registration agent for retail customers
  - Supervisor of the transmission planning process
- **Public Utility Commission of Texas jurisdictional**
Appendix B: ERCOT Region Facts & Figures

- **200,000 square miles**
  - 75% of Texas (not including Panhandle, El Paso area, 2 areas of East Texas)
  - 85% of Texas load
  - 20 million end-use customers

- **38,000 miles of Transmission Lines**
  - Nearly 700 miles of 345 KV lines added since 1999

- **77,000 MW of total resources**
  - 583 generation facilities
  - 26,000 MW new generation capacity added since 1998

- **60,272 MW peak load (2005)**
- **16.9% reserve margin for 2005**
- **3 DC Ties**
- **Single point of control**