



Review of February 2, 2011 Energy Emergency Alert (EEA) Event

H.B. "Trip" Doggett
President and Chief Executive Officer

Special Board of Directors Meeting
February 14, 2011

ERCOT Public

Overview

- **Introduction**
- **Extreme Weather Conditions**
- **Chronology of Operating Events**
- **ERCOT Execution of Energy Emergency Alert Plan**
- **Generation and Fuel**
- **Load Resource and Emergency Interruptible Load Service**
- **Market Impacts**
- **Credit Impacts**
- **Next Steps**



Extreme Weather Conditions

Extremely Cold Weather Grips Texas

February 1, 2011
**Major Winter Storm Expected
to Develop Over Texas**

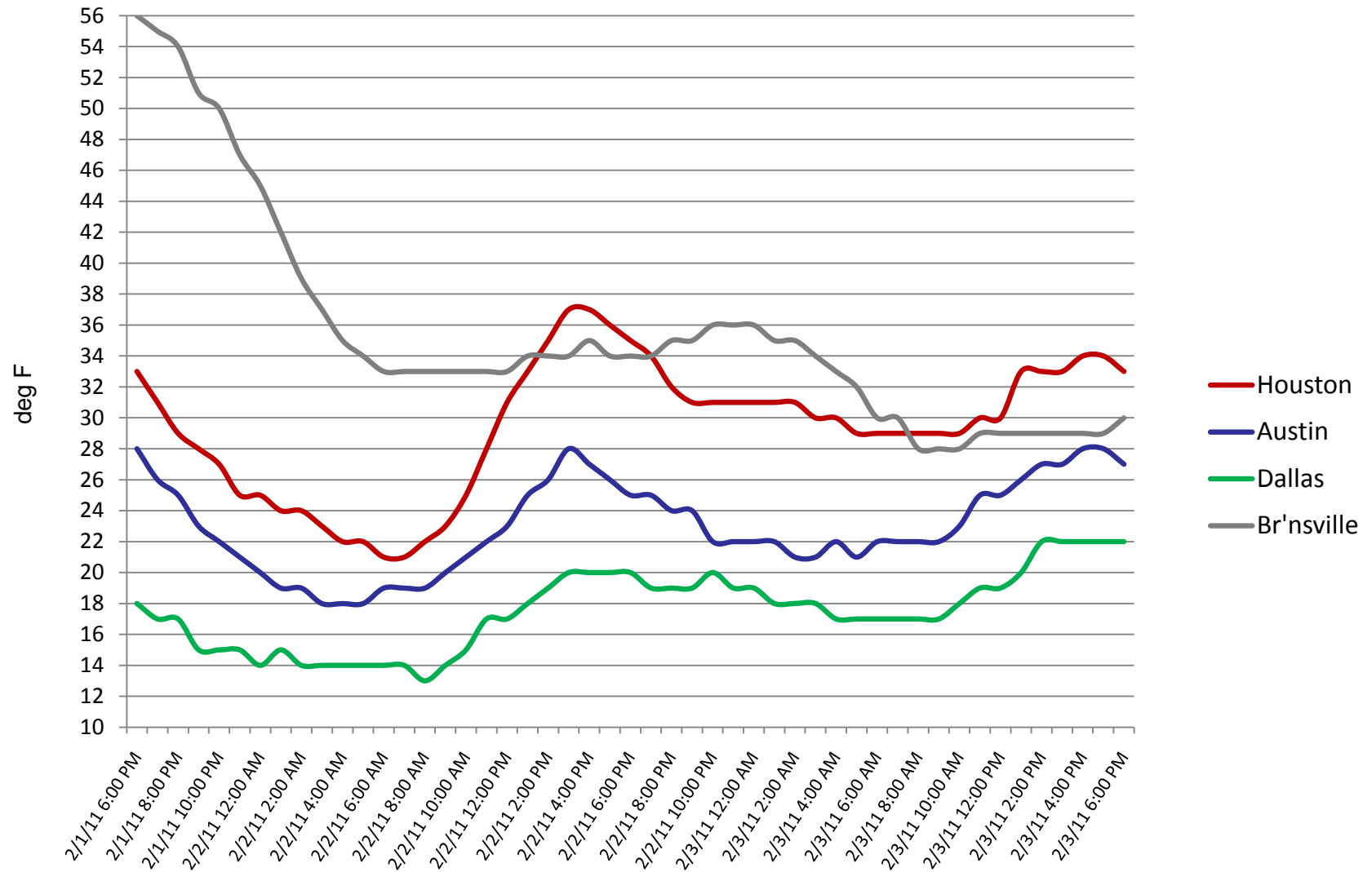
February 2, 2011
Winter Returns with Fury

February 1, 2011
**The Coldest Week for North
Texas in 22 Years**

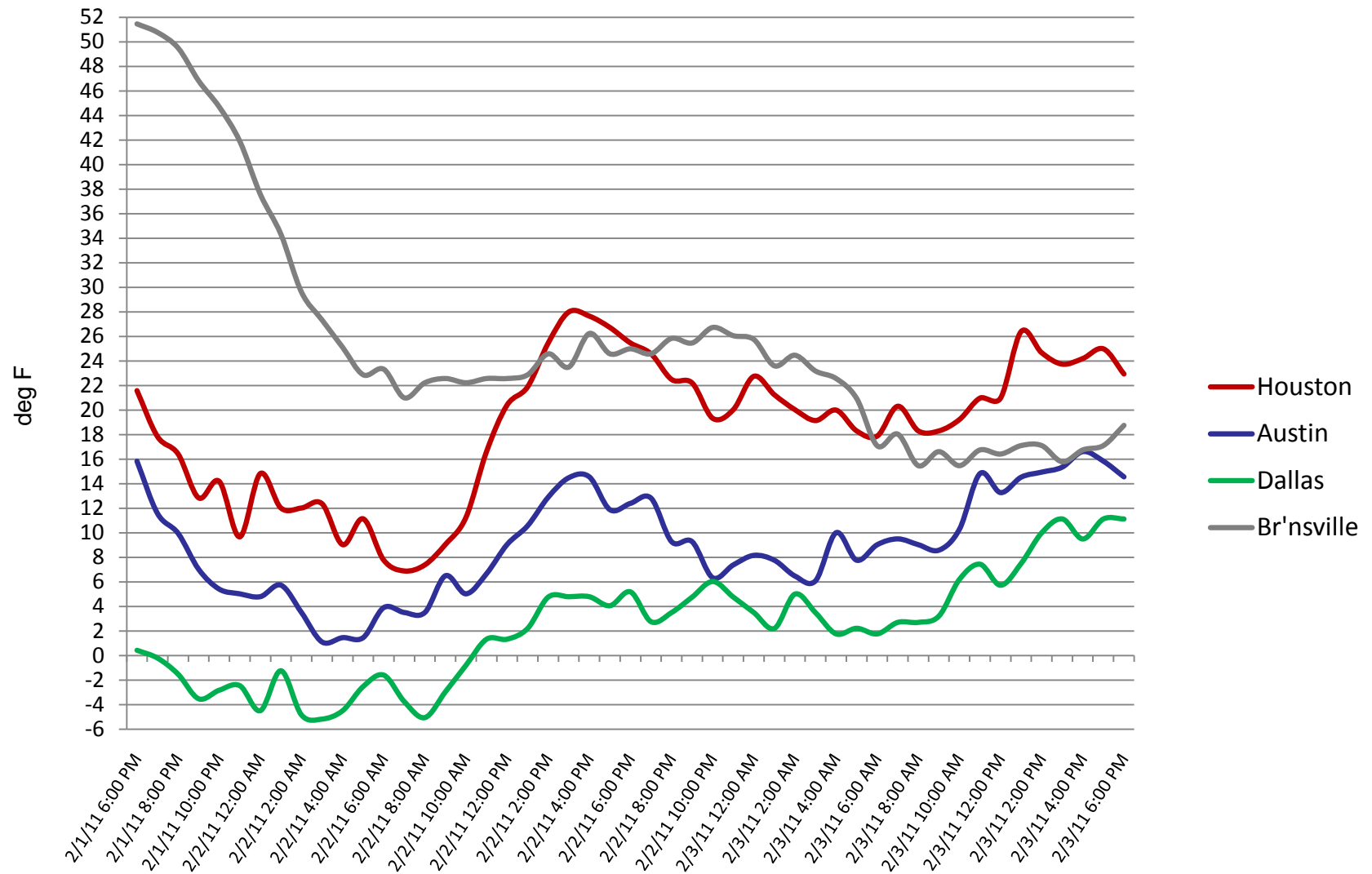
February 1, 2011
**A Strong Arctic Cold Front Will Move
Through Deep South Texas on Tuesday**

February 2, 2011
**Deep Arctic Air Entrenched
Across Texas**

Hourly Temperatures

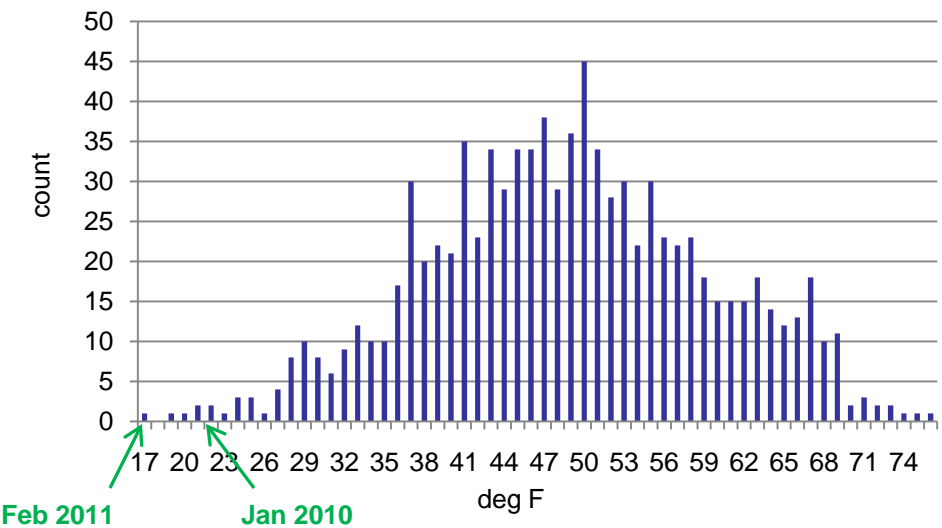


Hourly Wind Chill



Average Daily Temperatures - January & February, 1996 thru Feb 2, 2011

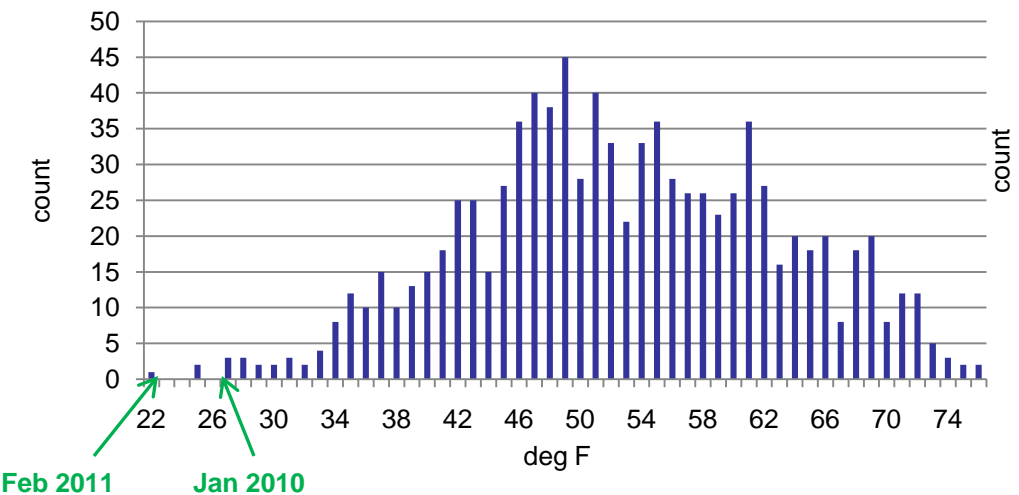
Dallas



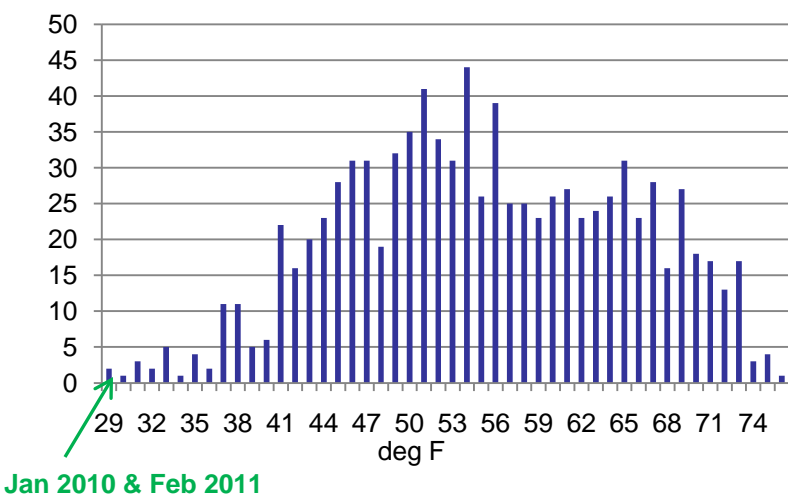
ERCOT Winter Peak Day

| | <u>2010</u> | | <u>2011</u> | |
|---------|-------------|-------------|-------------|-------------|
| | <u>Low</u> | <u>High</u> | <u>Low</u> | <u>High</u> |
| Austin | 15°F | 35°F | 18°F | 28°F |
| Dallas | 16°F | 30°F | 13°F | 20°F |
| Houston | 25°F | 32°F | 21°F | 37°F |

Austin



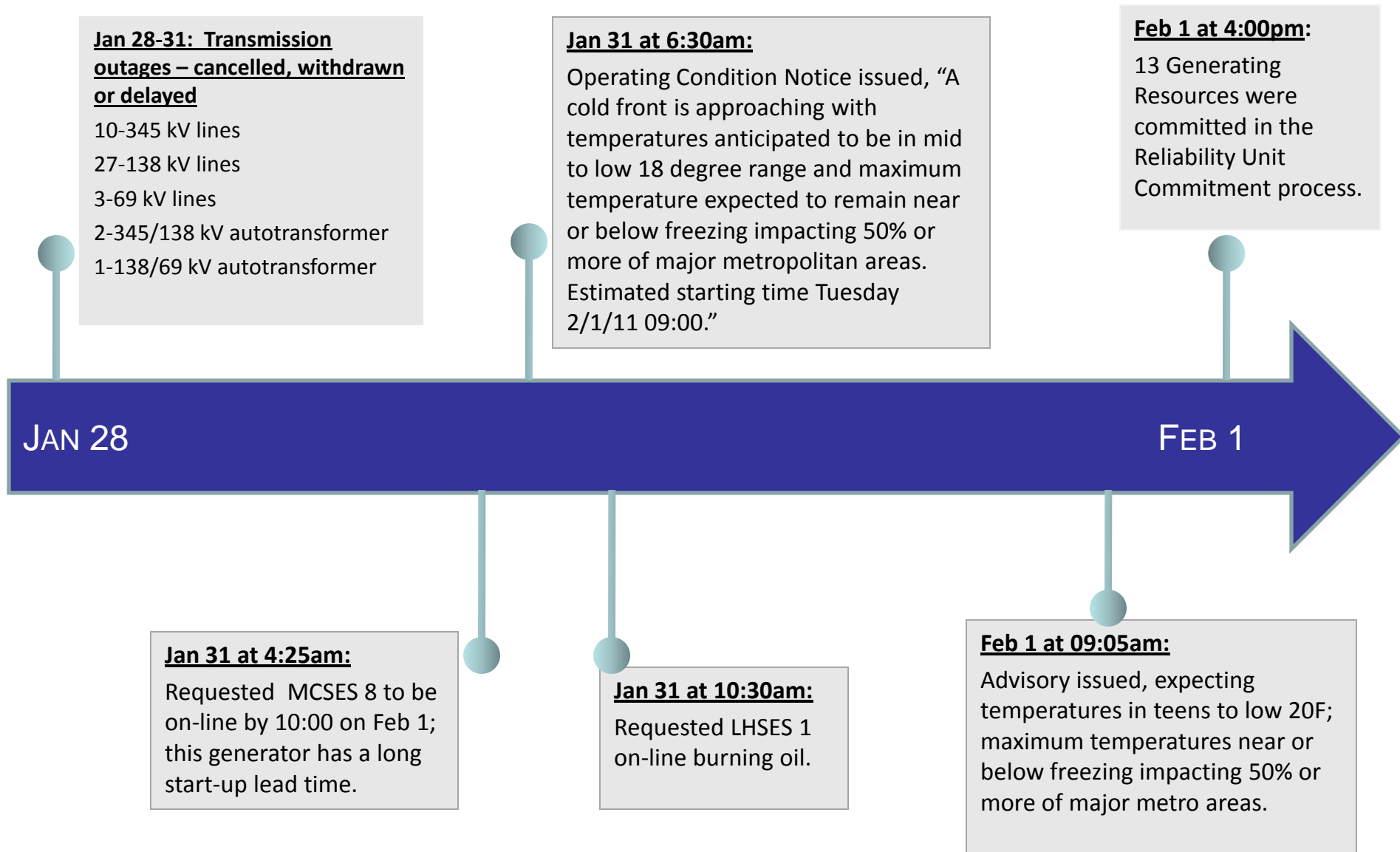
Houston

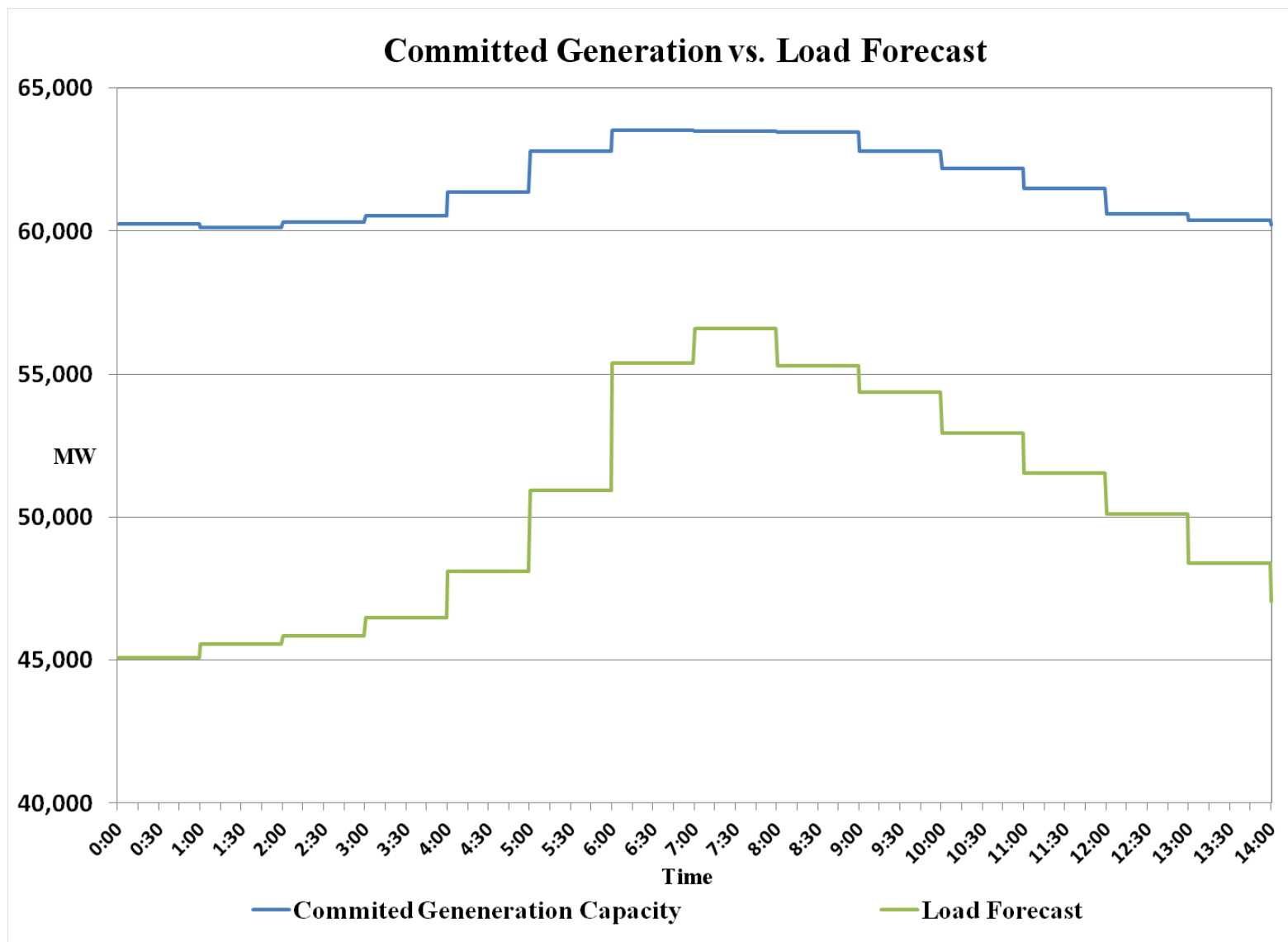




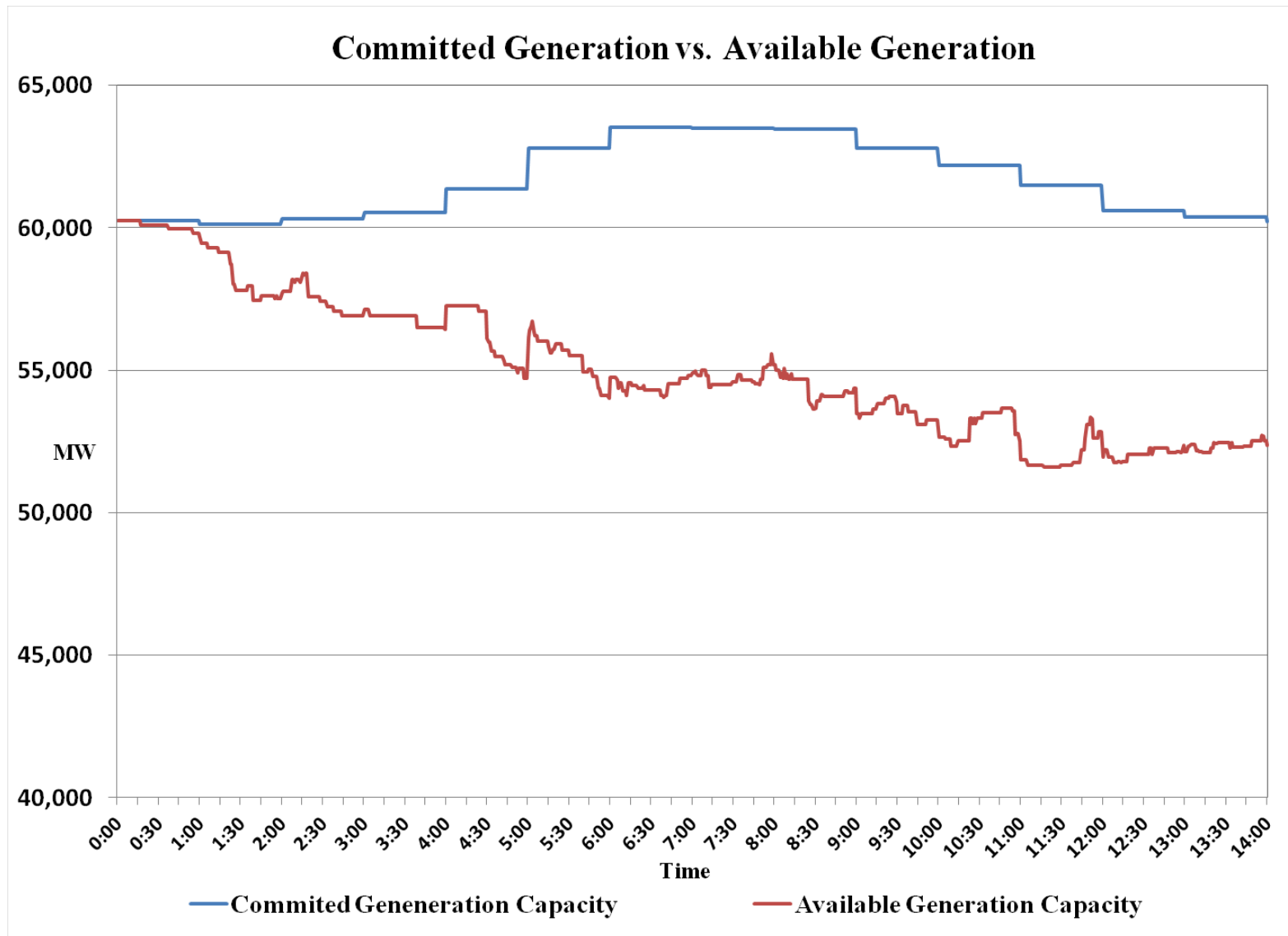
Chronology of Operating Events

ERCOT's Pre-Event Preparation

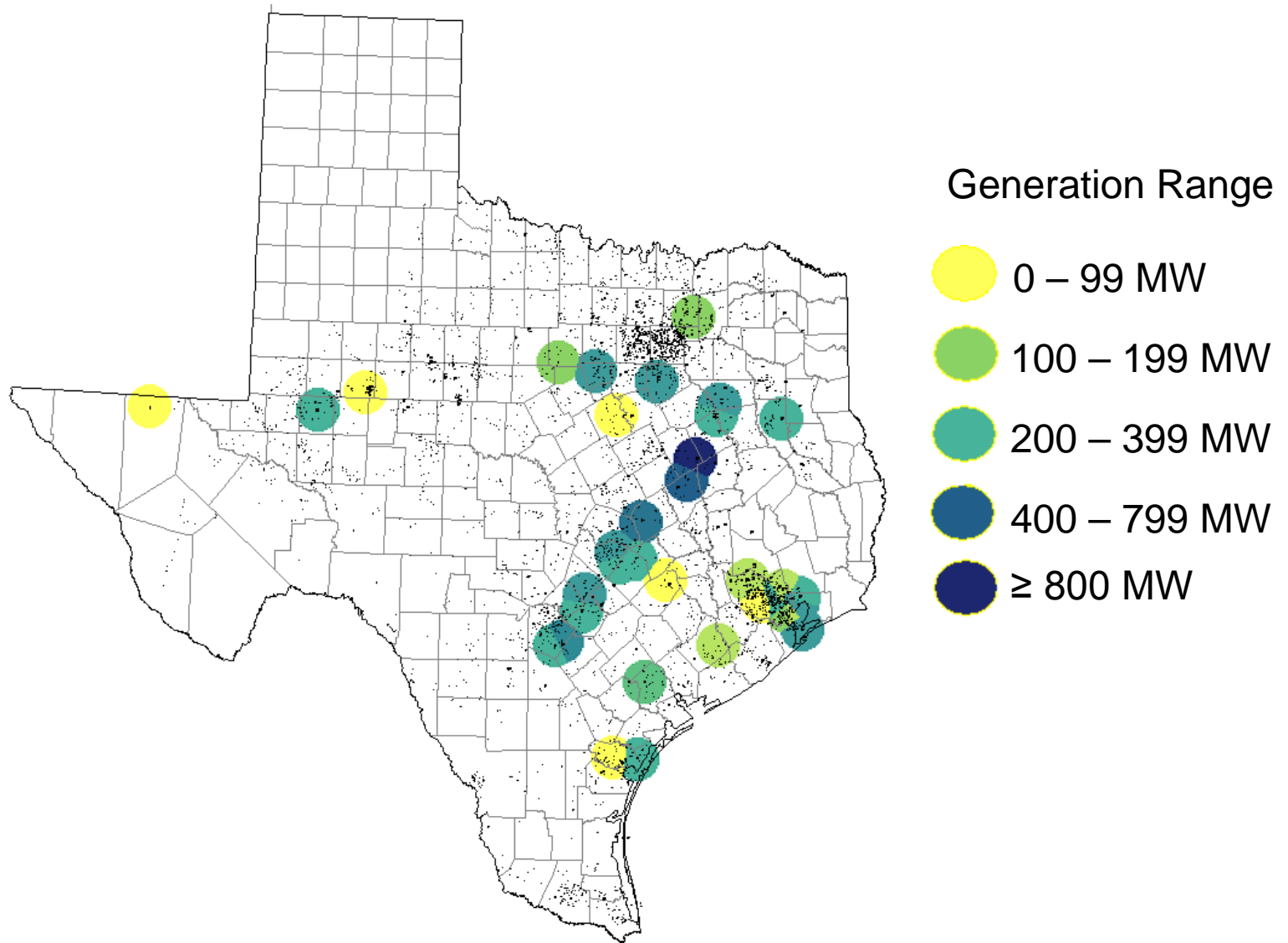




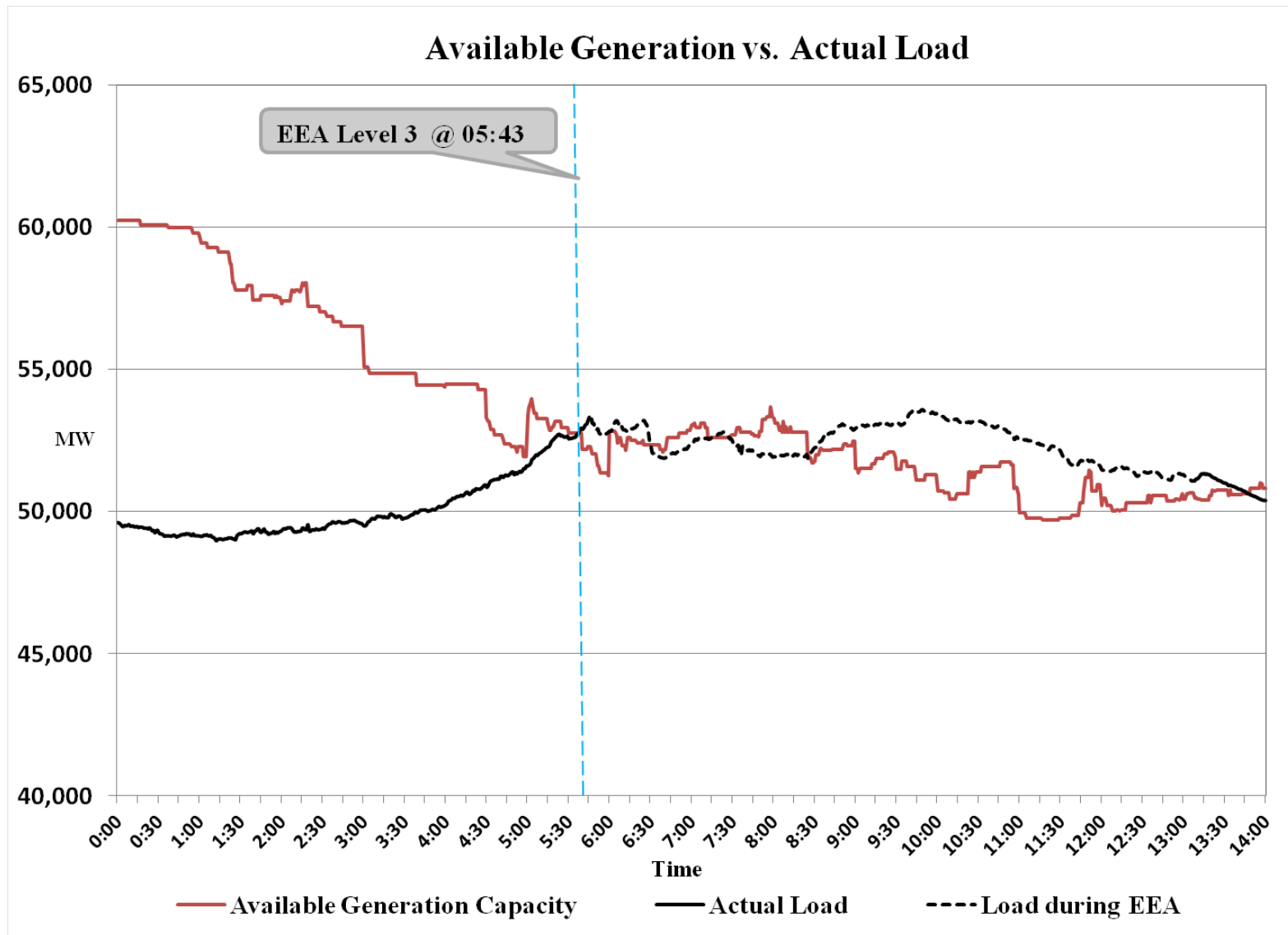
More than 8,000 megawatts (MW) of generation unexpectedly dropped offline overnight



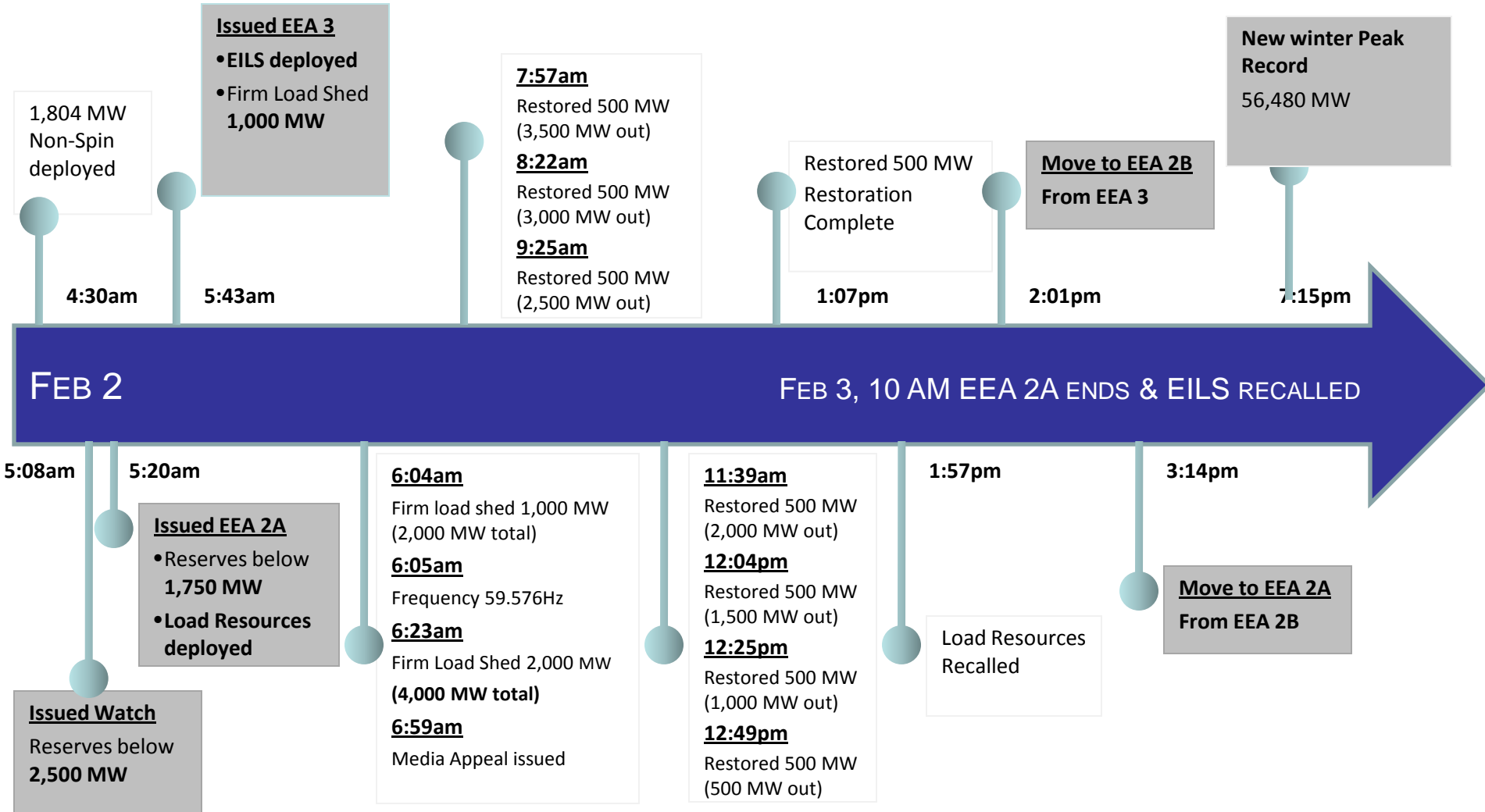
The generation loss was system-wide and covered units of all ages and multiple types of fuel



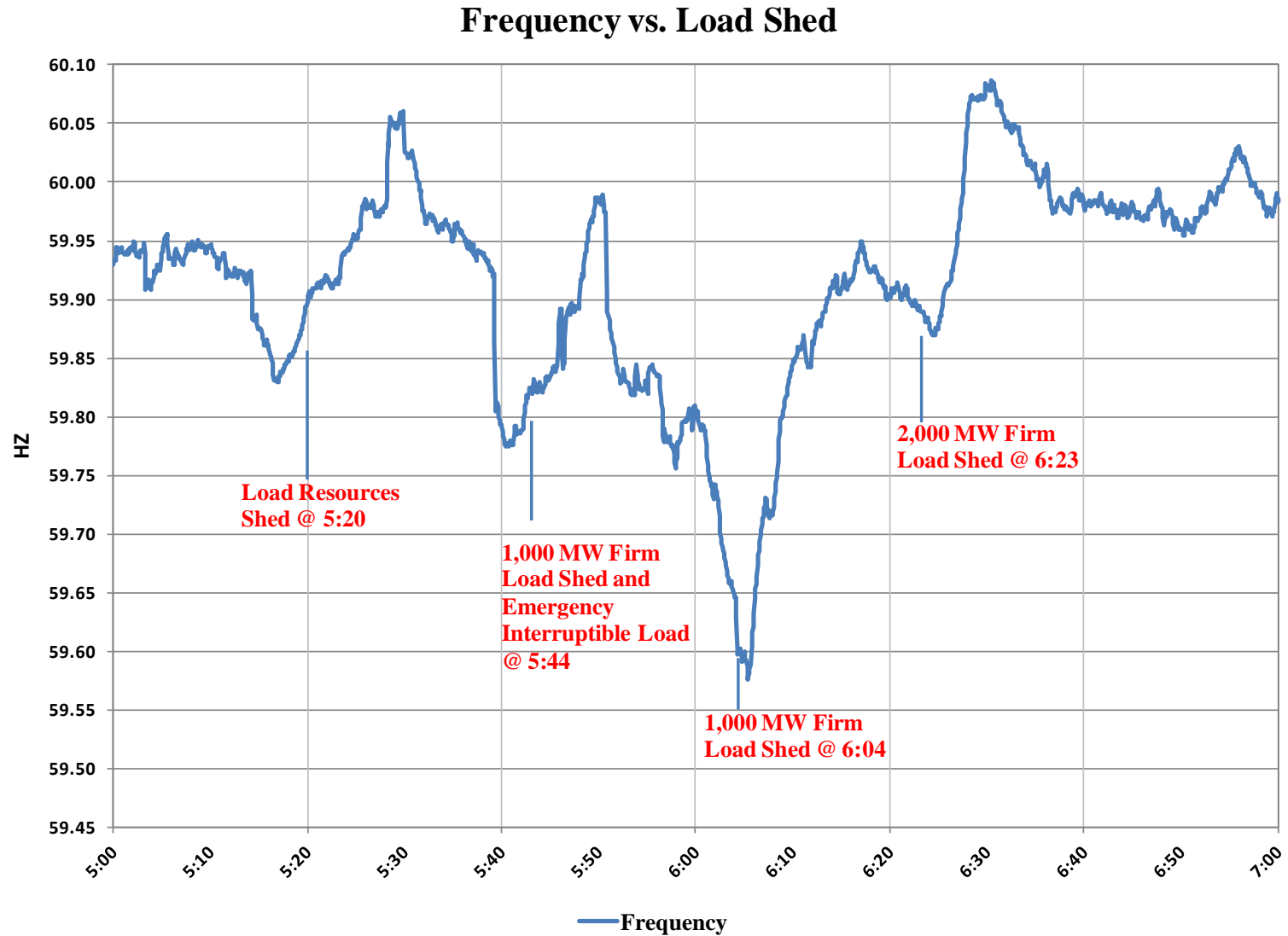
ERCOT implemented emergency procedures when available generation was no longer sufficient to serve the load



A timeline of the emergency steps that were taken leading to rotating outages in ERCOT



The ERCOT System responded as expected



Maximum Load Shed Ordered by Transmission Owner

| Transmission Owner | % Shed | MWs Shed |
|-------------------------------------|--------|--------------|
| Austin Energy | 3.96 | 158.4 |
| American Electric Power | 9.33 | 373.2 |
| Brazos Electric Power Cooperative | 4.62 | 184.8 |
| City of Bryan | 0.57 | 22.8 |
| CenterPoint | 26.56 | 1,062.4 |
| City of College Station | 0.29 | 11.6 |
| CPS Energy | 7.34 | 293.6 |
| Denton | 0.49 | 19.6 |
| City of Garland | 0.74 | 29.6 |
| Greenville Electric Utility Service | 0.17 | 6.8 |
| LCRA | 5.21 | 208.4 |
| Magic Valley EC/South Texas EC | 1.32 | 52.8 |
| Oncor | 35.55 | 1,422.0 |
| Public Utility Board of Brownsville | 0.43 | 17.2 |
| Rayburn Country EC | 0.93 | 37.2 |
| Texas New Mexico Power | 2.35 | 94.0 |
| Tex-La | 0.14 | 5.6 |
| TOTAL | | 4,000 |

Megawatts ordered shed by each of the Transmission Owners; location of specific load shed is determined by the TO.

The amount shed is based on the TO's load ratio share.



Execution of Energy Emergency Alert (EEA) Plan

An orderly plan to reduce load during a shortage of generation

- Procedures for reducing System Demand in emergency situations
- Provides for maximum possible continuity of service while maintaining the integrity of the ERCOT System
- Reduces the chance of cascading outages
- Outlines when and how demand (load) can be curtailed

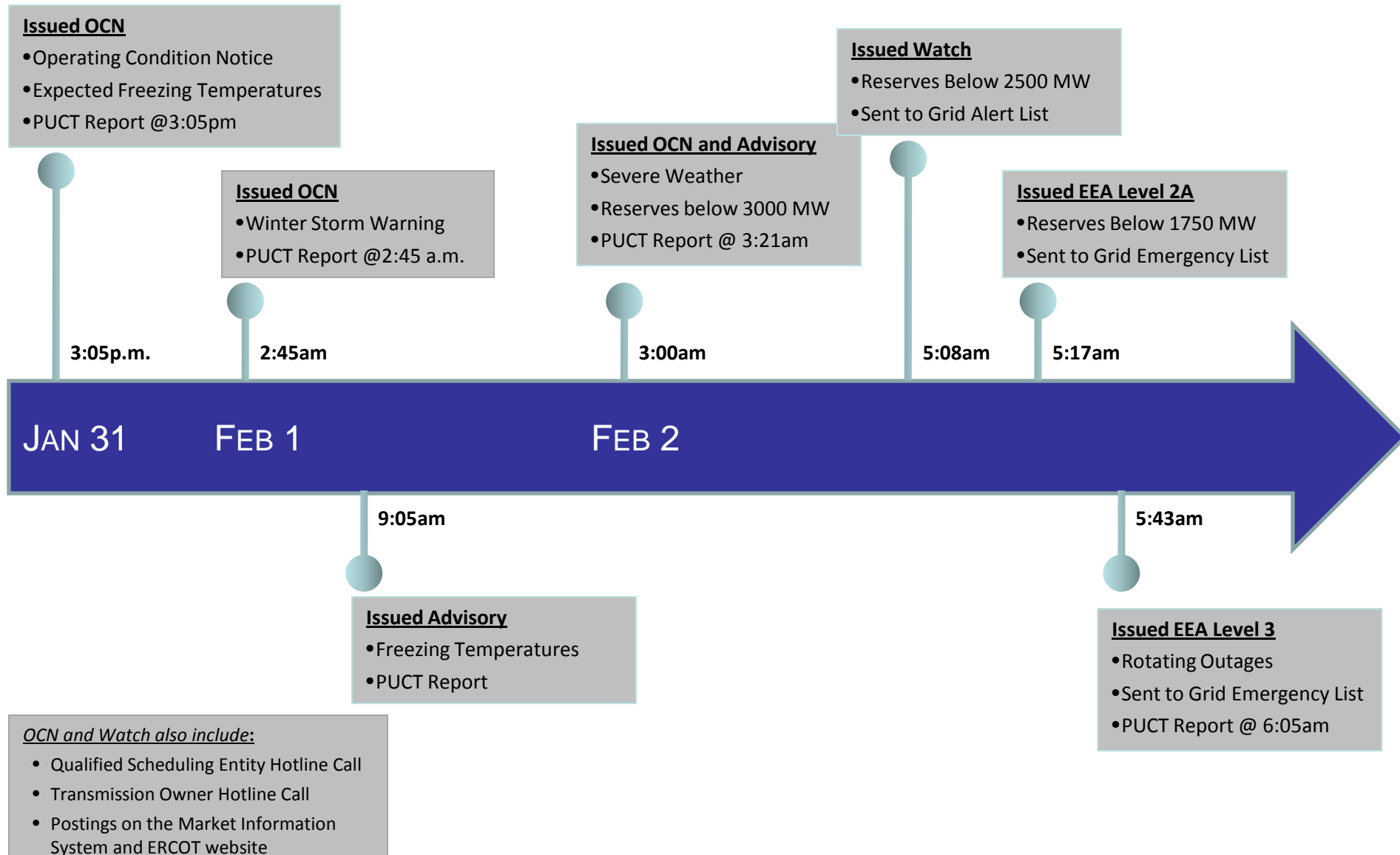
EEA procedure in the ERCOT Protocols defined by levels

- 1** Maintain 2,300 MW of on-line reserves
- 2A** Maintain 1,750 MW of on-line reserves. Interrupt loads providing Responsive Reserve Service.
- 2B** Interrupt loads providing Emergency Interruptible Load Service (EILS).
- 3** Maintain System frequency at or above 59.8 Hz and instruct TSPs and DSPs to shed firm load in rotating blocks.

Energy Emergency Alert (EEA) Communications Matrix

| Level / Event | Triggering Event | System Operations Actions | PUC Powerful Advice Web Site | Legal / Corporate Communications Actions | Media Notification (after PUC & others notified) |
|---|---|---|--|---|--|
| Advisory | < 3000 MW adjusted reserves | Note on "PUCT Daily Report" email (distribution: PUC, ROS listserv [open list]) | Conservation Encouraged - Normal Conditions | None | None |
| Watch | < 2500 MW adjusted reserves | Start RMR units; Instruct QSEs to suspend generation testing; Deploy non-spin reserves; Dispatch quick start capacity | Conservation Encouraged - Normal Conditions | Notify GridAlert list* if potential for emergency situation. | None |
| Peak demand expectation | Demand exceeding current records | Notify Corporate Communications of high demand expectations | Conservation Needed - Power Watch (optional) | Notify GridAlert list* if potential for emergency situation. | Release to media, if appropriate |
| Firm load shed | Grid operations requesting utility to drop load | Notify Corporate Communications of firm load shed via emergency notification system | Conservation Needed - Power Watch (optional) | Notify GridAlert list* with summary of situation | Release to media, if appropriate |
| EEA Level 1 | < 2300 MW adjusted reserves | Use capacity available from DC ties; Dispatch uncommitted units | Conservation Needed - Power Watch | Notify GridAlert list* with summary of situation | Release to media, if appropriate |
| EEA Level 2A -- MEDIUM potential for firm load shed | < 1750 MW adjusted reserves | Deploy interruptible loads (LAARs); Begin block-load transfers of load to neighboring grids | Conservation Needed - Power Watch | Notify GridEmergency list ** | Release to media, if appropriate |
| EEA Level 2B -- HIGH potential for firm load shed | To maintain system frequency at 60 Hz or adjusted reserves trending downward or not available | Deploy Emergency Interruptible Loads (EILS) if available | Conservation Critical - Power Warning | Notify GridEmergency list** - plus State Operations Center (SOC) with "High Priority" | Release to media, if not already done |
| EEA Level 3 | To maintain system frequency at 59.8 Hz or greater | Instruct transmission operators to shed firm load via rotating outages in blocks of 100 MW | Power Emergency - Rotating Outages | Notify GridEmergency list** | Release to media |
| Cancellation of EEA Level 3 | Frequency restoration | n/a | Conservation Needed - Power Watch | Notify GridEmergency list** | Release to media |
| Cancellation of EEA | Grid conditions normal | n/a | Conservation Encouraged - Normal Conditions | Notify GridAlert list** | Update media as needed |

ERCOT experienced communications challenges due to the rapidly-unfolding events



ERCOT experienced external communications issues during the event that highlighted the need for improved communication with a variety of audiences, including:

- **State Operations Center (SOC)**
- **Public Utility Commission (PUC)**
- **Board of Directors**
- **Media**
- **Market Participants**
- **Public**

The Executive leadership is undertaking a complete review of communications during grid emergencies and expects to report findings to the Board within a few weeks.

ERCOT has immediately implemented fixes to some of these issues, which include:

- The process to notify the SOC and the PUC of entry into emergency grid situations has been automated and SOC and PUC will receive notification of pending grid emergencies directly from the control room, rather than wait for that information to filter through a third-party.
- ERCOT will have a person inside the SOC going forward prior to and during emergency situations, to ensure emergency personnel have a contact and are getting the latest information.
- All Board members email addresses have been added to the "Grid Emergency" list, which is sent in the event of a grid emergency (this includes the period before rotating outages are implemented when it appears there is a high likelihood of their occurrence).
- ERCOT will ensure that all market participants are aware that the MIS Secure system allows them to receive real-time grid information directly.

As part of the Executive Review of communications, a full emergency communications plan is being developed that will include the use of at least the following:

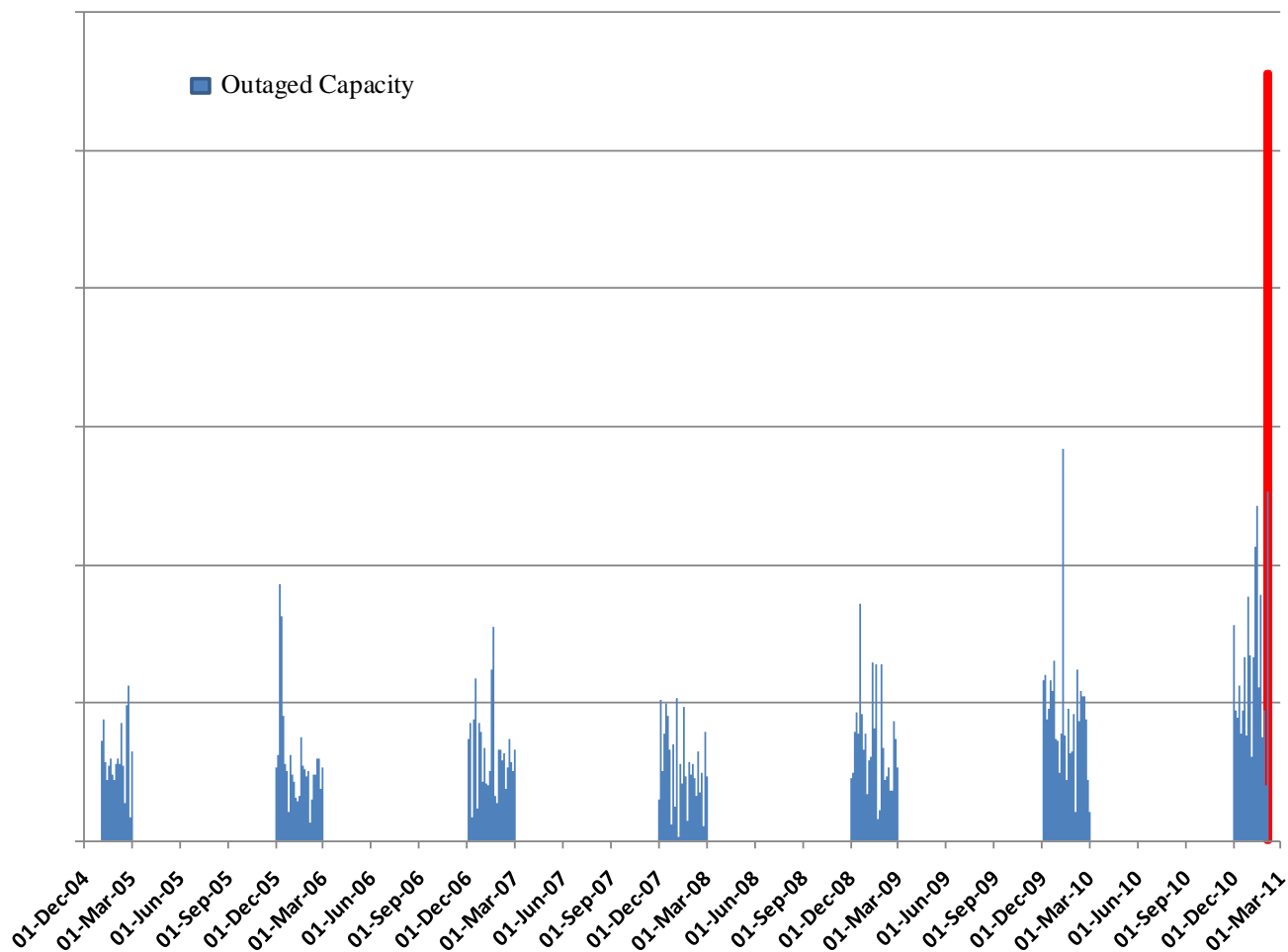
- The use of social-networking media to reach all audiences quickly.
- Implementing a phone bank during grid emergencies to ensure the public, media, market participants and others can get information related to a grid emergency in a timely manner.
- Changes to the media response policy to potentially include real-time interviews with radio/TV during grid emergencies.
- Additions to www.ercot.com, including real-time grid information on the homepage, so that audiences can keep themselves apprised of the grid's status easily



Generation and Fuel

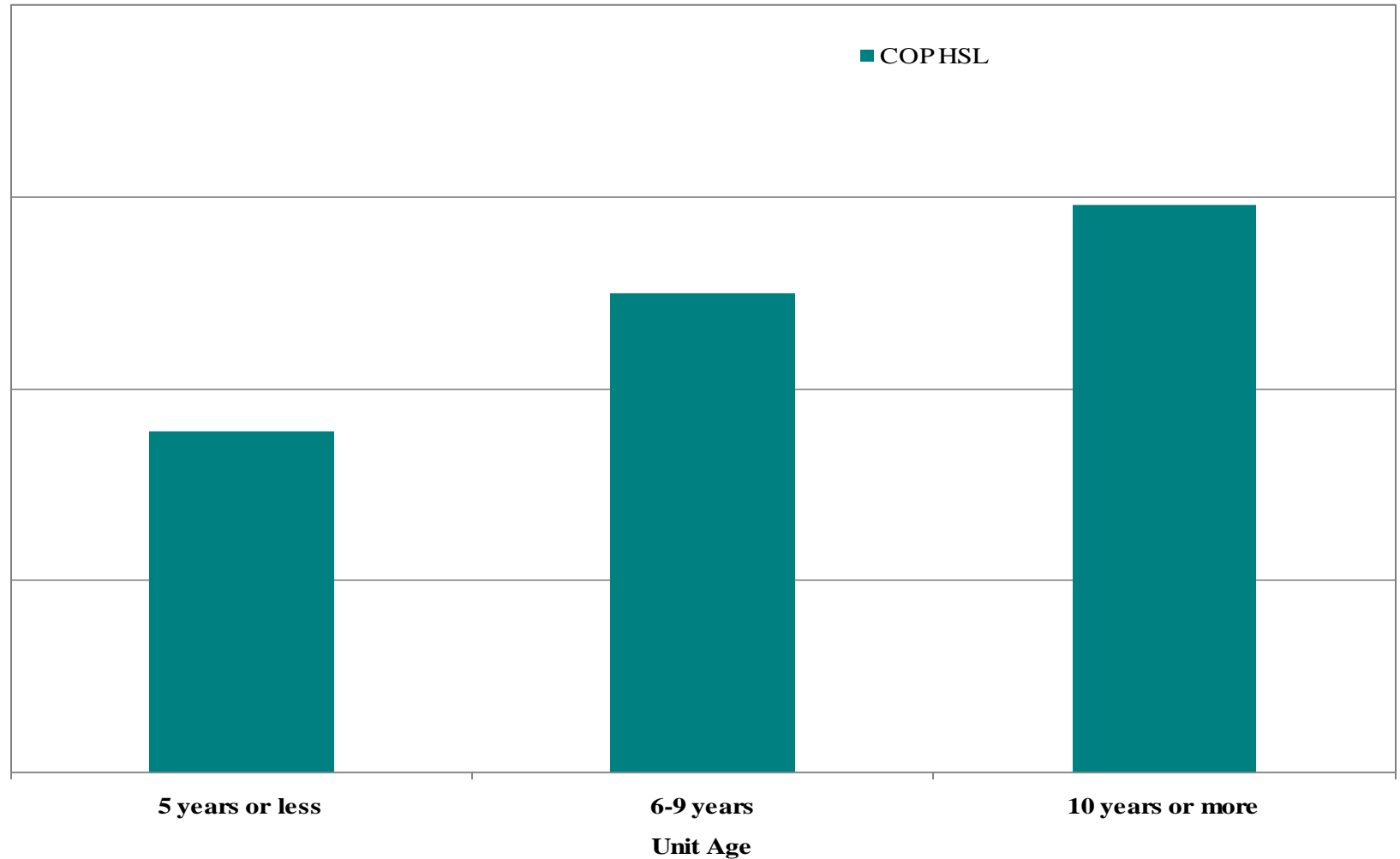
Forced Generation Outages by Season

Forced Generation Outage Capacity December-February for 2005-2011



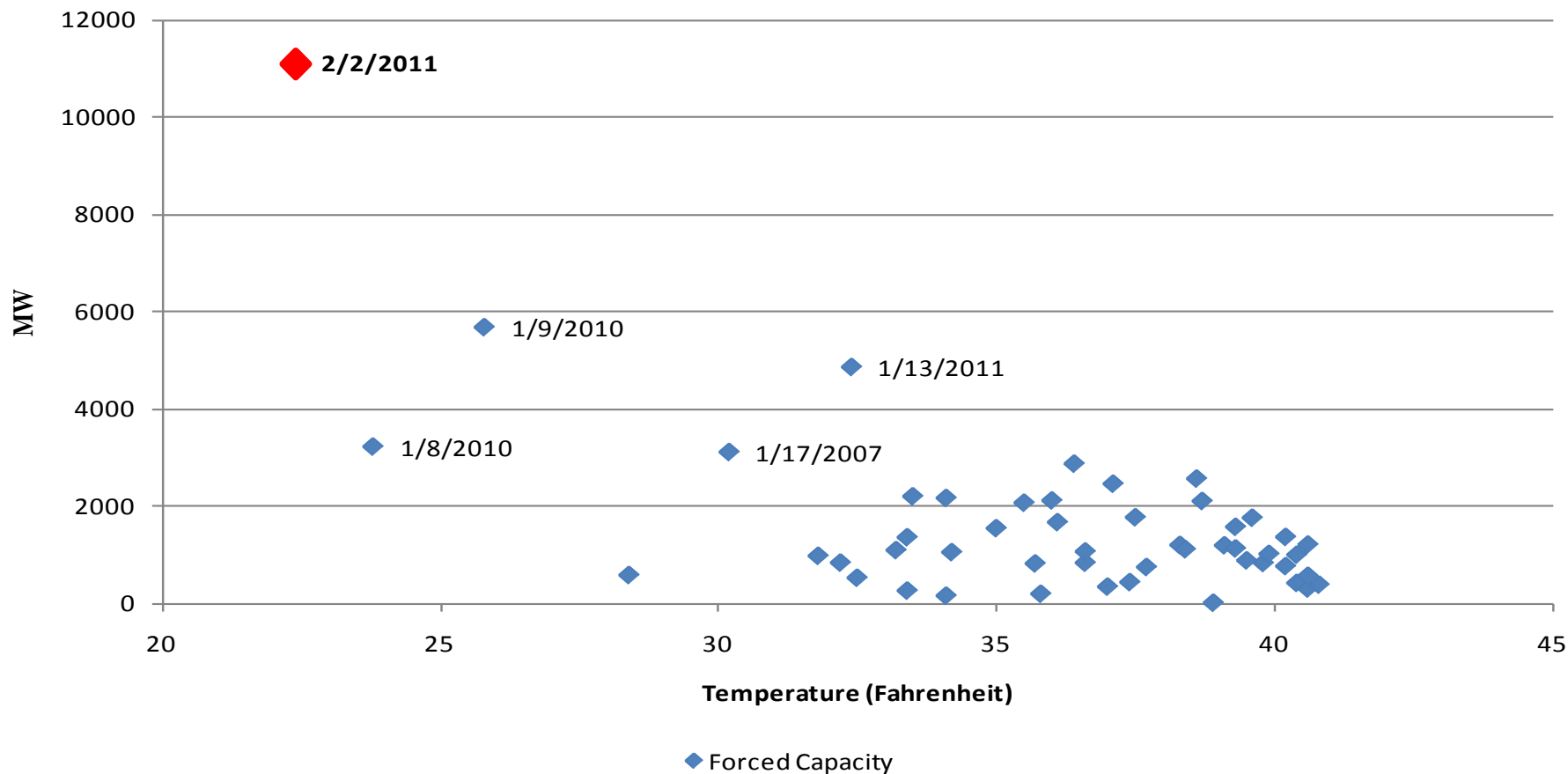
Note: Values represent cumulative forced outage capacity for each day.

Generation Outage Capacity by Unit Age



Note: Forced Outages on February 02, 2011

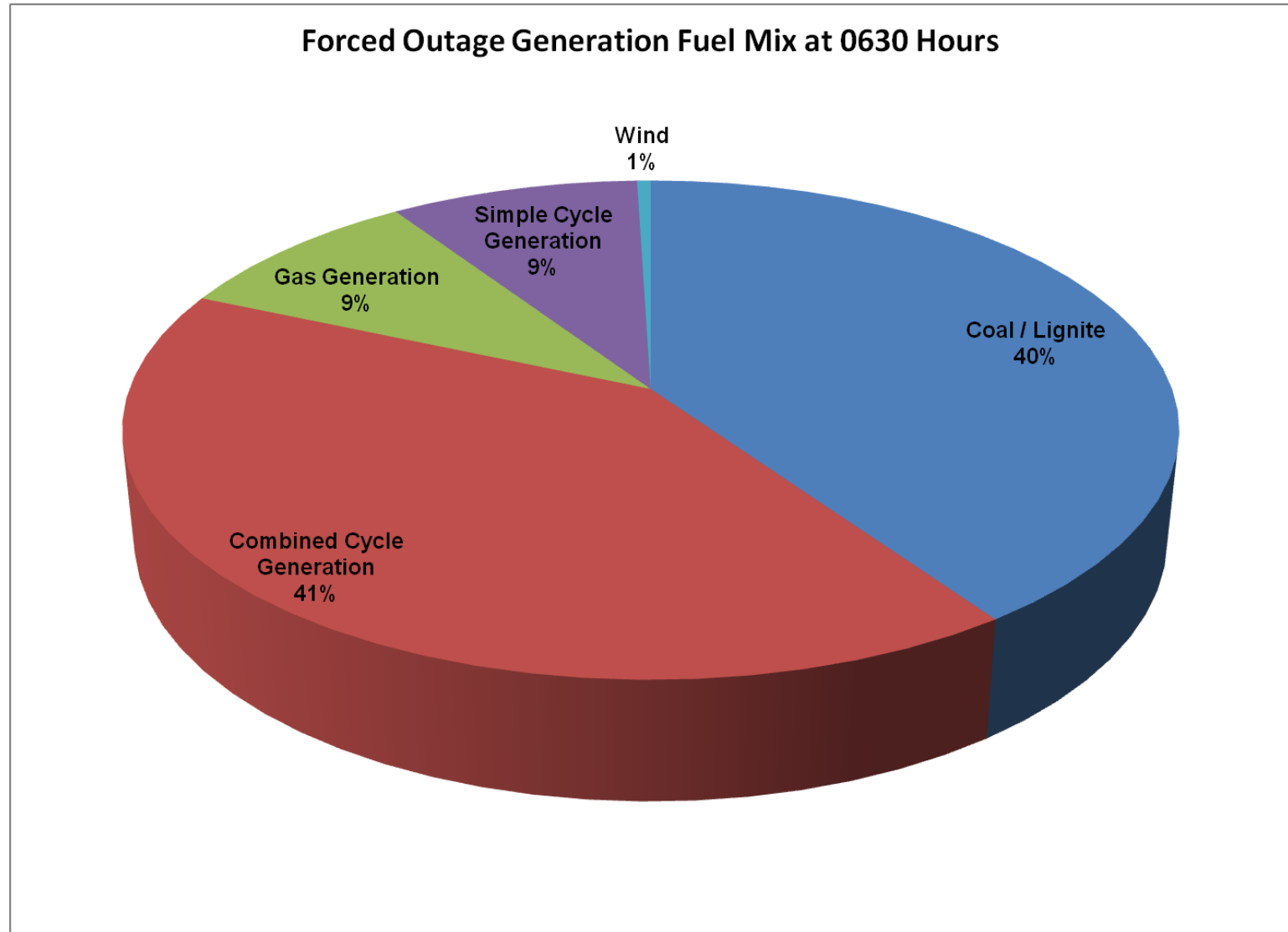
Forced Outage Capacity on 50 Coldest Days 2005 - 2011



Note:

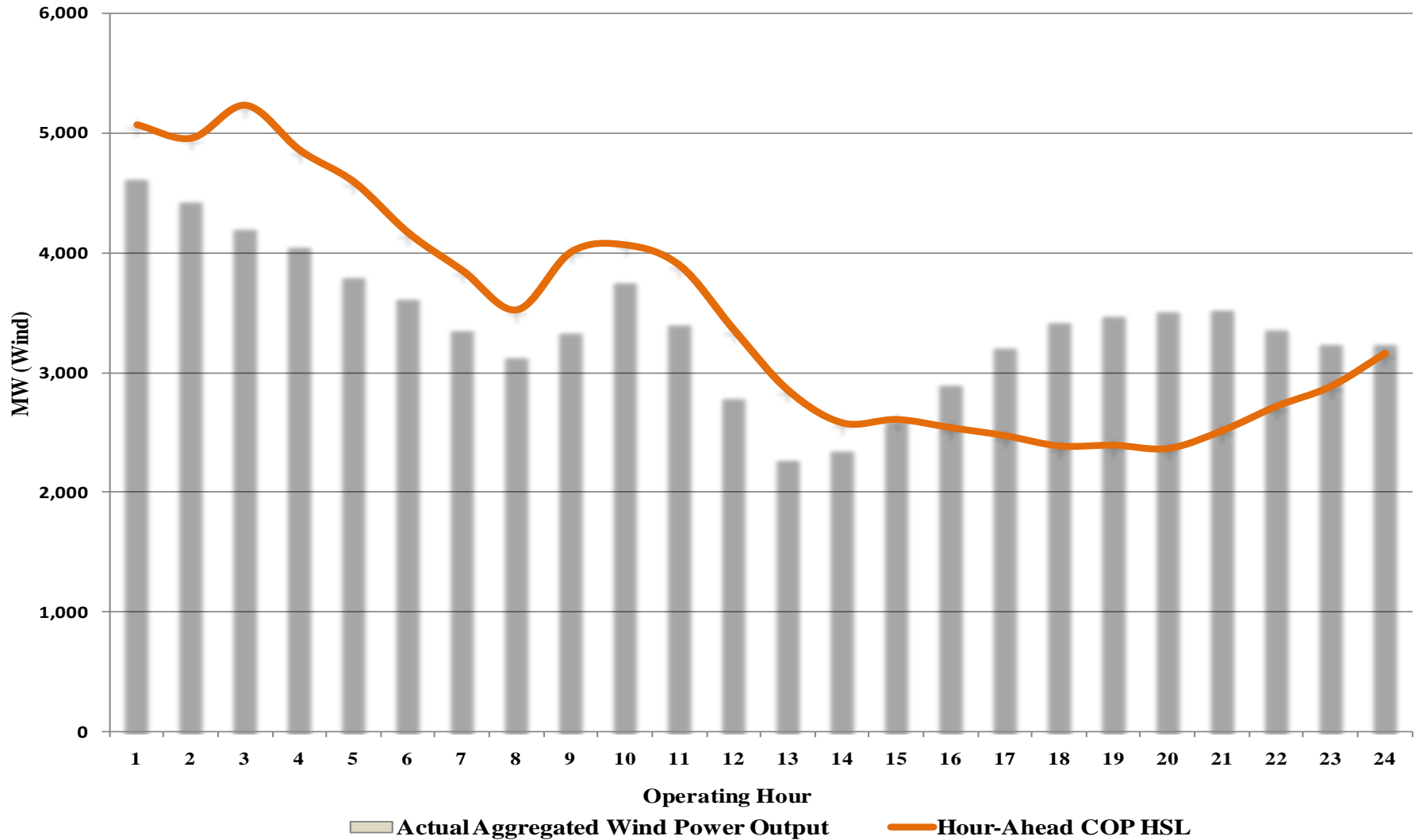
- Values represent cumulative forced outage capacity for each day.
- Temperatures are an average of the average daily temperatures from Dallas (DFW), Austin (AUS), and Houston (IAH).

Generation Forced Outages by Fuel Category



The role of wind

Actual Wind vs. Wind Day-Ahead COPs on February 02, 2011



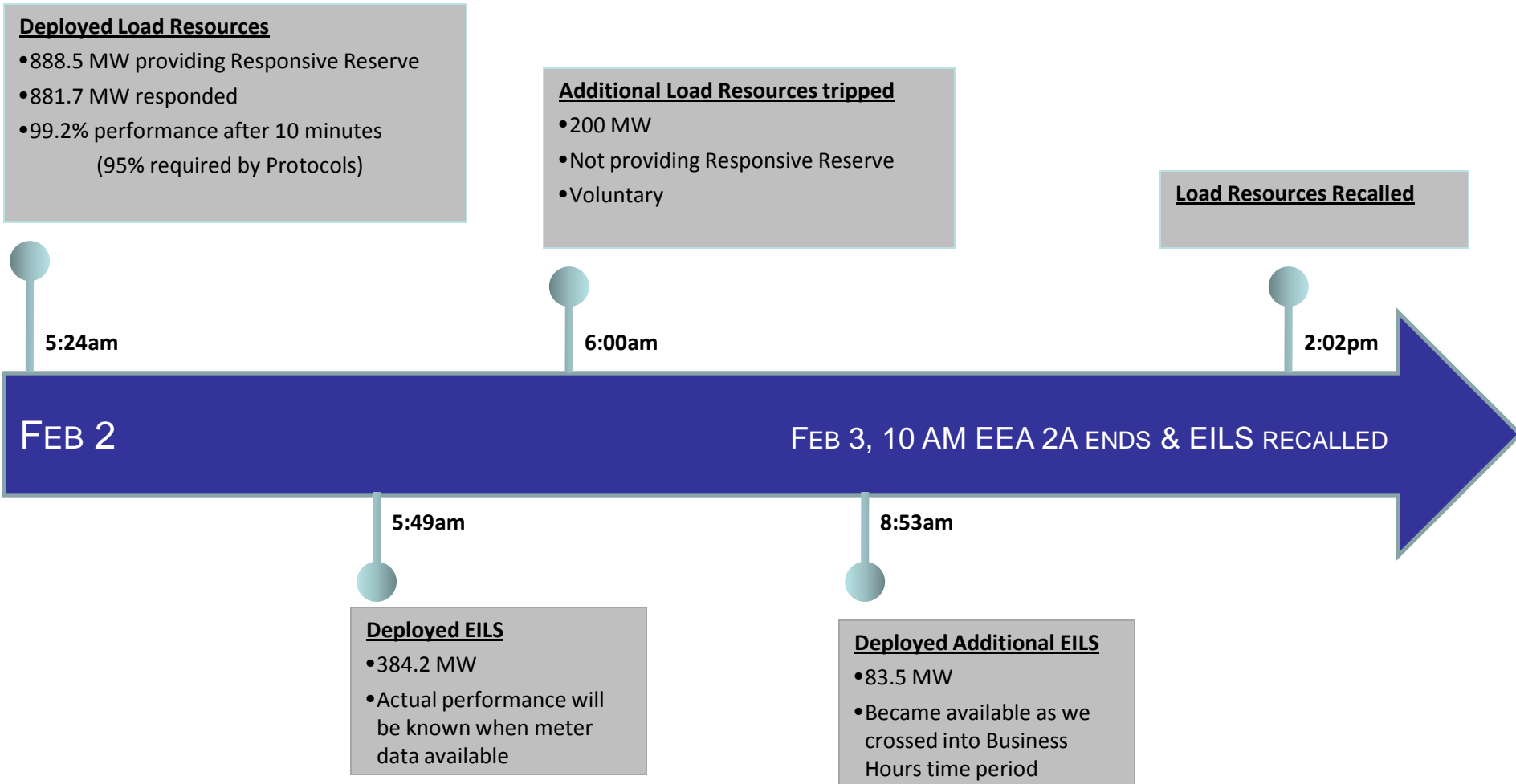
Note: All data are hourly averages obtained from COPs, and EMMS.

- ERCOT was advised that some units could generate more power if additional natural gas became available to the unit or if generators could temporarily surpass air emissions limits.
- PUC and RRC Commissioners and Staff worked cooperatively to assess specific situations and work with industry on natural gas issues.
- PUC and TCEQ Commissioners and Staff worked with ERCOT to develop a plan for encouraging addition of available generation resources to the ERCOT electric grid.



Load Resource and Emergency Interruptible Load Service

Load Resources and EILS Deployment



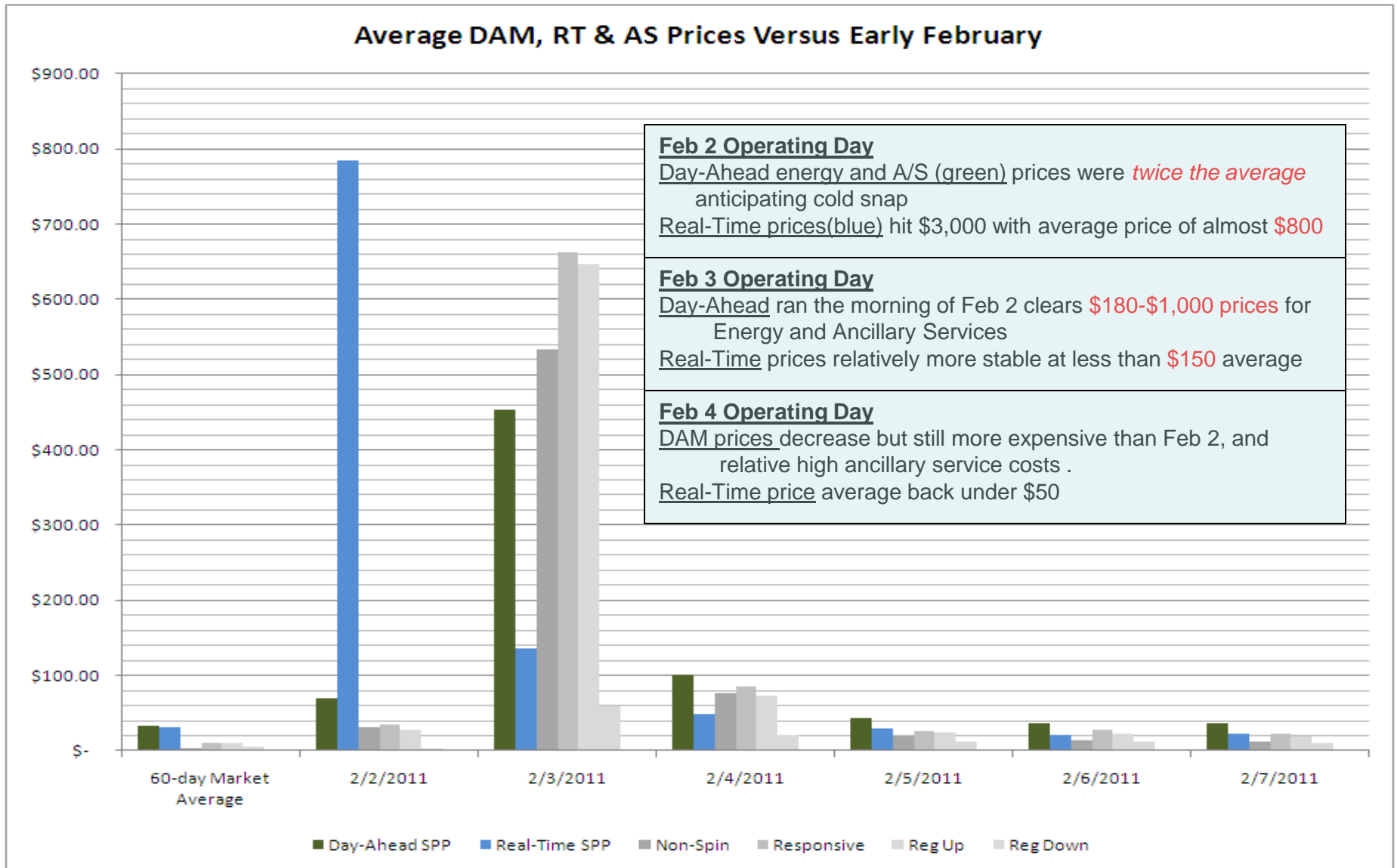
- **EILS is procured for 4-month Contract Periods**
 - 4 Time Periods within each Contract Period
 - 28-hour event occurred on 2nd day of Feb.-May Contract Period and crossed all Time Periods
- **Costs for Feb.-May 2011 Contract Period:**

| Time Period | MW Procured | Cost (\$/MW/Hr) |
|--|-------------|-----------------|
| Non-Business Hours (overnights & weekends) | 384.2 * | \$6.37 |
| Business Hours 1 (0800-1300) | 467.47 * | \$6.39 |
| Business Hours 2 (1300-1400) | 470.7 * | \$6.60 |
| Business Hours 3 (1400-2000) | 472.6 * | \$6.78 |



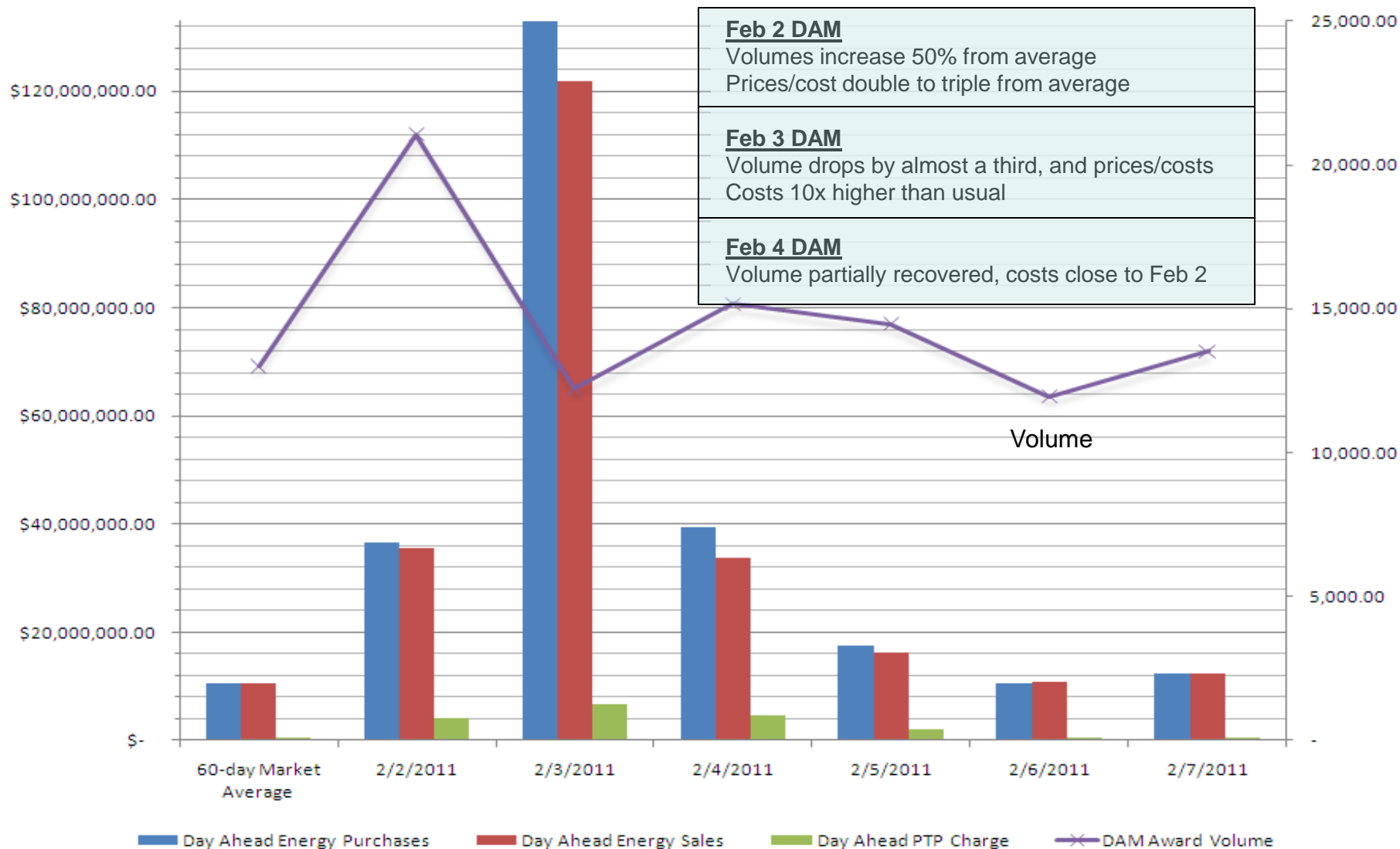
Market Impacts

Pricing Summary first week of February



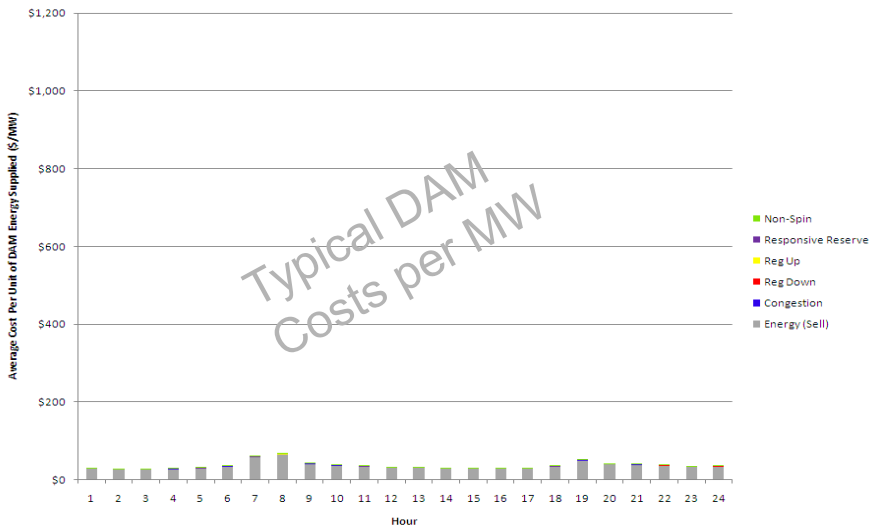
DAM Summary

Average DAM Energy Costs versus Early February DAM Energy Costs



DAM Cost Comparison during Feb 2&3

Day-Ahead Costs Per Unit of DAM Energy Flows for 26-Jan-2011

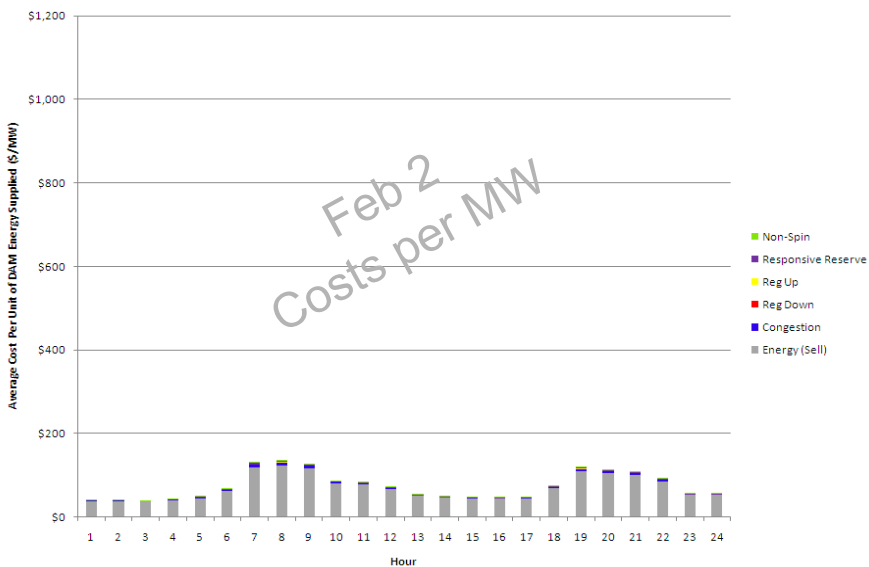


Left graphic shows typical \$20-60 costs MW in DAM (mostly energy)
 Feb 2 DAM prices/costs go to \$40-140 anticipating cold snap
 Feb 3 DAM reacts to real-time, costs for DAM jump to \$180-\$1,000

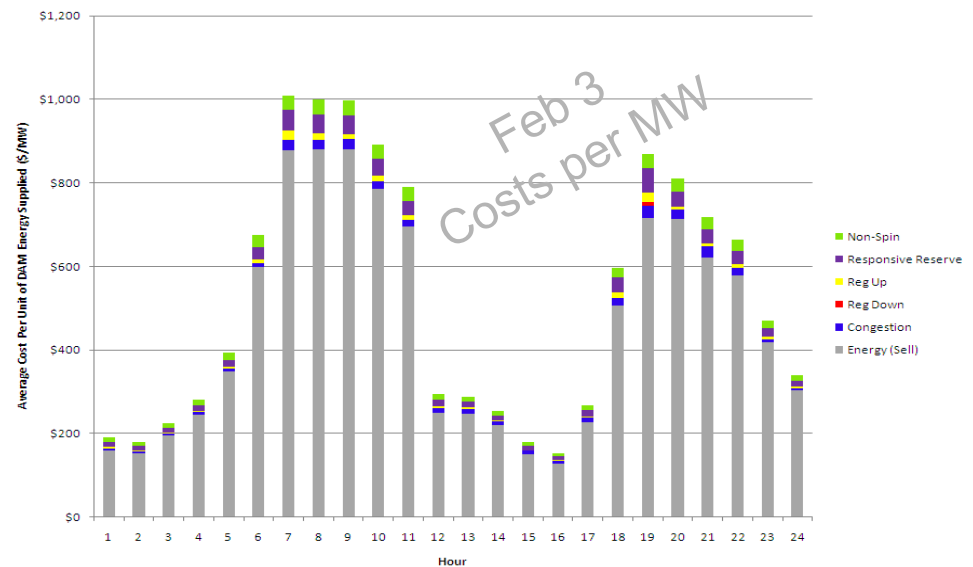
Cost trend the same, but doubles and then 10x for Feb 2, 3
 Feb 2&3 costs of A/S and Congestion higher proportion of costs
 A/S depleted and costs much higher (trade-off with energy)
 Congestion costs increase with price separation
 Price separation is typical, but prices high

Non-Spin Responsive Reserve Reg Up Reg Down Congestion Energy

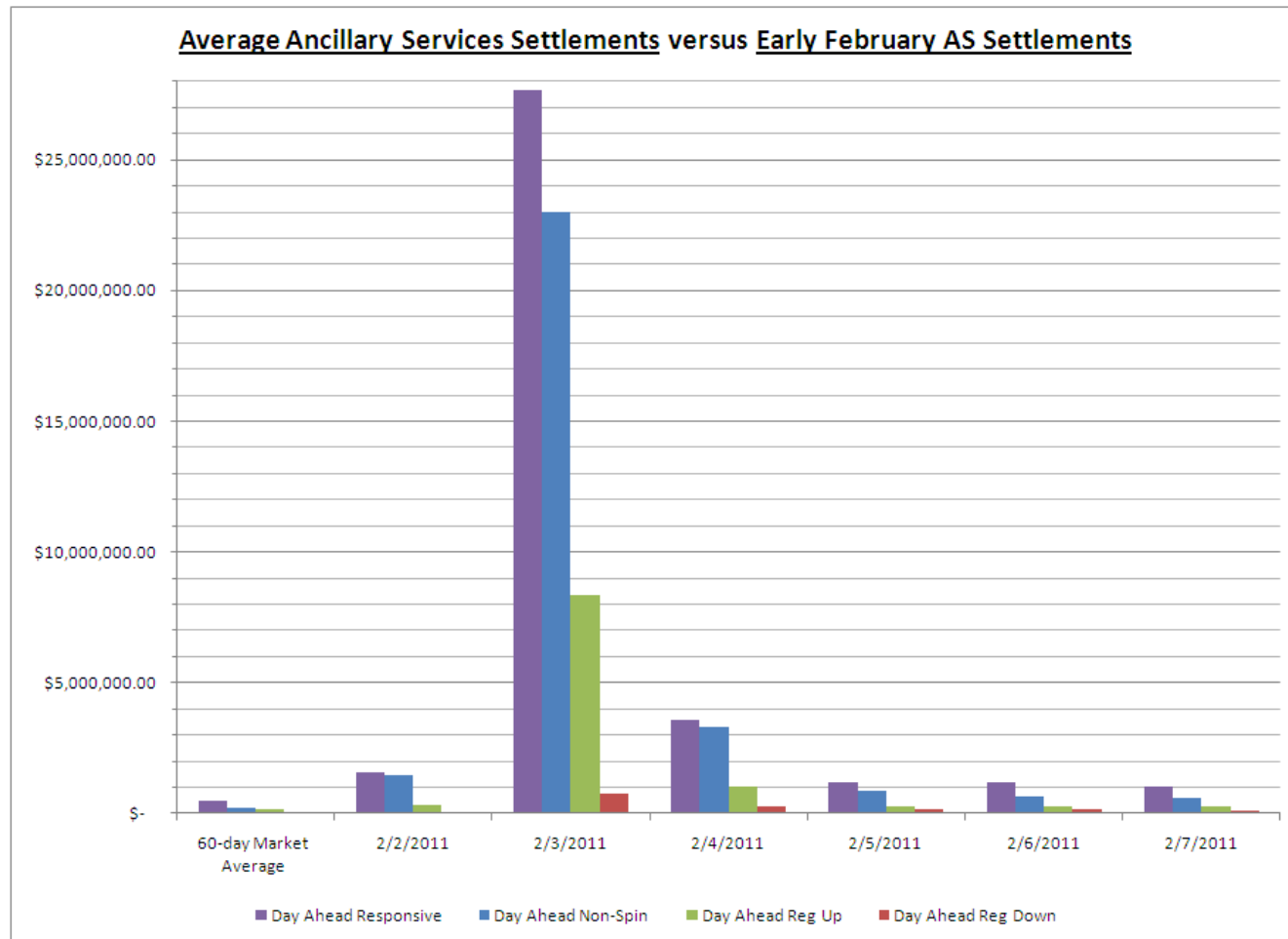
Day-Ahead Costs Per Unit of DAM Energy Flows for 02-Feb-2011



Day-Ahead Costs Per Unit of DAM Energy Flows for 03-Feb-2011

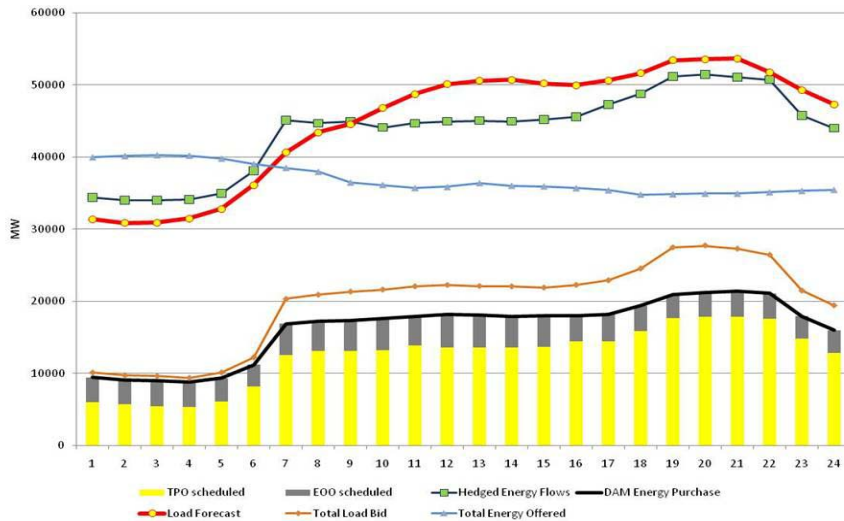


- High costs of Ancillary Services procured for Load (\$60 million)
 - DAM was insufficient in AS Offers for this day, which raised the clearing prices significantly, most notably for Responsive Reserve



DAM Bid/Offer vs Energy cleared Feb 2&3

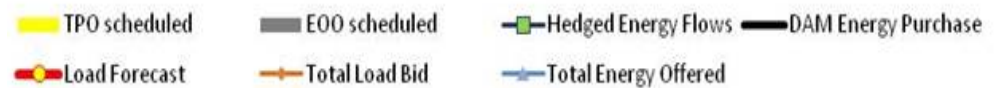
DAM Schedule Summary for 01-Feb-2011



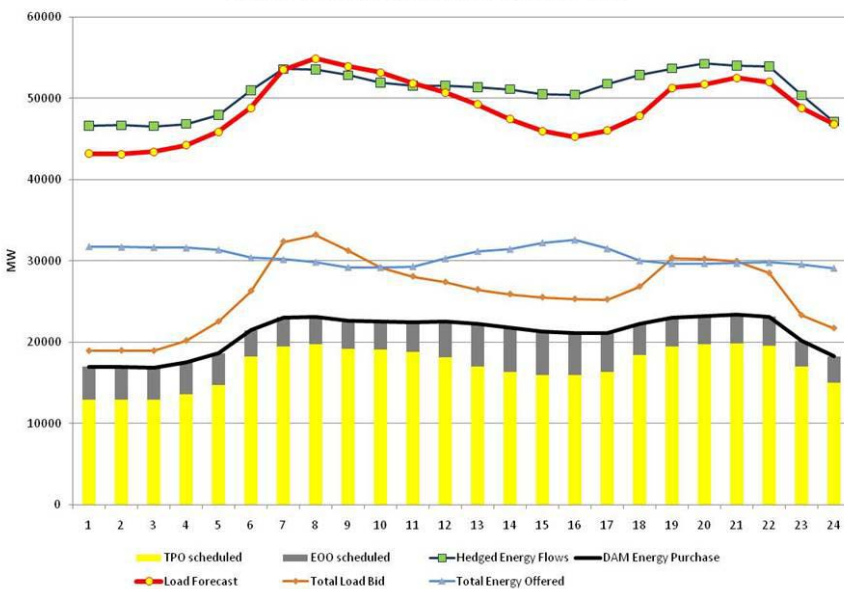
Feb 1 DAM large supply and most of demand met

Feb 2 DAM decreased supply but most of demand met

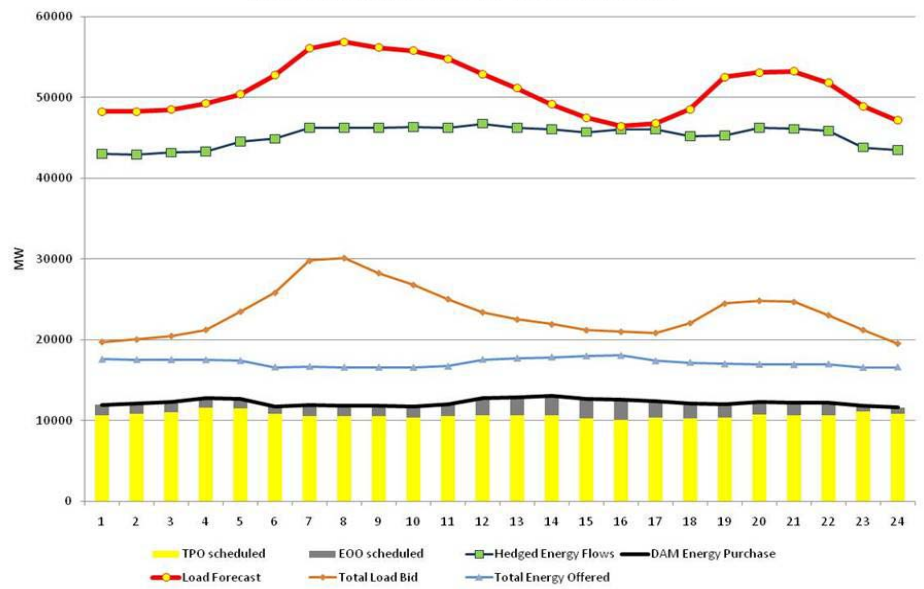
Feb 3 DAM further decreased supply, and very high demand not met



DAM Schedule Summary for 02-Feb-2011



DAM Schedule Summary for 03-Feb-2011





Credit Impacts

Impact of February 2, 2011 Energy Emergency Alert (EEA) Event on Credit

- **Certain portions of the credit calculations in the ERCOT Protocols use recent history to estimate forward risk**
 - While this generally produces reasonable results, the underlying assumptions were reviewed by ERCOT given the unusual activity beginning February 2nd
- **After its review, ERCOT made adjustments to collateral requirements to mitigate the impact of the EEA event beginning February 2nd on the estimates of forward risk**
 - The Protocols provide ERCOT with the discretion to adjust exposure calculations to address unusual situations as they arise
 - ERCOT ensured that an estimate of incurred activity (including the unusual activity on Feb 2nd) was collateralized while adjusting calculations to mitigate the impact of high prices on the estimation of forward risk

- **ERCOT took the following factors into consideration when determining what adjustments to make to the credit calculations**
 - Timing: The need to make changes in a rapid and timely manner since credit exposure calculation impacts the Counter-Party's (CP's) ability to participate in the Day-Ahead Market (DAM)
 - Different from Zonal
 - Transparency: The need to be transparent so that the market understood ERCOT's actions and could shadow
 - Global adjustments; issuance of market notices
 - Collateralization:
 - *Historical Risk*: The need to collateralize for an estimate of incurred activity

ERCOT's Use of Discretion – Considerations (Continued)

- Collateralization (cont) :
 - Forward Exposure: The need to reduce or eliminate the impact on calculations of forward exposure due to the unusual nature of:
 - Day-Ahead activity on February 3rd and 4th
 - » Day Ahead Market Extrapolated (DALE)
 - RT prices incurred on February 2nd and 3rd and
 - » Aggregate Incremental Liability (AIL)
 - » Average Daily Transaction Extrapolated (ADTE)
- **Total Potential Exposure (TPE) – market wide at February 3, 2011**
 - w/o adjustment \$686 million
 - w/ adjustment \$420 million

- Defaulted under its Agreement with ERCOT on February 9, 2011
- Qualified Scheduling Entity and Load Serving Entity
- 7,743 Retail Customers
- Load approximately 383 MWh per day

ERCOT is working closely with the PUCT and Market Participants to ensure an efficient transfer of customers from the REP to other Competitive Retailers.



Next Steps

- **ERCOT Compliance staff internal review**
- **Investigation regarding potential violations of state statutes, regulations, and ERCOT market rules initiated by the PUCT. Investigation will be conducted by the Independent Market Monitor (IMM) and Texas Reliability Entity (TRE).**
- **Investigations of ERCOT and market participants regarding potential violations of federal reliability rules are expected.**

ERCOT's next steps

ERCOT will continue to review the actions leading up to this event and the handling of event itself.

- ERCOT is providing information to assist in the investigations currently underway.
- ERCOT will be an active participant in the discussion related to the adequate weatherization of generation units.
- ERCOT will work with transmission providers to study the potential use of advanced meters in selective load reduction.
- ERCOT is reviewing all communications policies related to grid emergencies.
 - ERCOT has already implemented changes that will provide automated notice to the State Operations Center (SOC) and the PUC.
 - ERCOT will implement a “phone bank” that will temporarily increase staff during emergency situations to respond to incoming calls.