2014 Cold Weather Event
Lessons Learned

Mark Henry,
Director of Reliability Services
New Generating plants should be designed to operate at the lowest recorded temperature for the region where they are located.

Temperature design parameters of existing generating units should be assessed.

Balancing Authorities should plan ahead so that emergency enforcement discretion regarding emission limitations can be quickly implemented in the event of severe capacity shortages.
Additional FERC Recommendations

- Conduct adequate maintenance
- Inspect and maintain heat tracing equipment
- Inspect and maintain thermal insulation
- Erect adequate wind breaks and enclosures
- Develop and conduct annual training
- Ensure winterization supplies are in place
- Ensure that adequate staffing is in place
- Ensure preventative action in a timely manner
January 6, 2014 Winter Event – Key Facts

Planned Outage
2468 MW
Forced Outage
2938 MW

9:00 a.m.

Load Forecast Error
2500 MW

EEA

9355 MW of generation lost prior to EEA declaration

Midnight

6:52 a.m.

Wind Generation
7018 MW

Wind Generation
2130 MW

0:00 a.m.

Wind Generation
Generation Outages by Cause

GW Outage by Cause

*Number of units offline.

- **Emissions**
  - 2011: 5*
  - 2014: 5*

- **Fuel Restriction**
  - 2011: 10*
  - 2014: 0*

- **Failed Equipment**
  - 2011: 18*
  - 2014: 9*

- **Frozen Equipment**
  - 2011: 32*
  - 2014: 22*

- **Human Error**
  - 2011: 5*
  - 2014: 1*

- **Other**
  - 2011: 23*
  - 2014: 7*

- **Protection System**
  - 2011: 1*
  - 2014: 3*

- **Low Temperature Limit**
  - 2011: 23*
  - 2014: 33*
Cumulative GW Unavailable

Freeze-Related GW Outage

EEA issued 6:52 a.m.
Forced Outage Capacity during Coldest Days

Forced Outage Capacity on Coldest Days
2005-2014

Temperature (Fahrenheit)

MW

2/2/2011
1/9/2010
1/6/2014
1/13/2011
1/8/2010
1/17/2007

Generator Winter Preparedness Workshop
September 10, 2014
Winter 2014 – Other Freezing Issues Reported

- **12/6/2013**
  - Air line on forced draft fan

- **1/30/2014**
  - Drum level transmitter

- **3/02/2014**
  - Cooling pump transmitter
  - Fuel gas auxiliary stop valve

- **12/07/2013**
  - IP Drum
  - Inlet air

- **2/06/2014**
  - Air line
  - Low boiler drum level due to DA level transmitter
  - Steam supply sensing line

- **3/03/2014**
  - Transmitters
  - Steam supply sensing line
Lessons Learned – Unit Trips after January 6, 2014

- **Major freezing issues continued in spite of weatherization of plants:**
  - Air lines at inlet of the CT
  - Transmitters
  - Steam supply sensing lines

- **Recommendations:**
  - Address best practices recommended by ERCOT during site visits
  - Increase regular inspections of the insulation and heat tracing
  - All contractor work should be properly inspected and corrected
Lessons Learned – Emissions
Grid Reliability and Emissions Control

ST1 tripped on loss of vacuum

Reported outage to ERCOT

Notified ERCOT of CT1 removal for NOx emission limits

Attempted to obtain emissions violation waiver from TCEQ (ERCOT also attempted to reach)

Notified ERCOT and removed CT1 from service

Result: Generation reduced > 100MW during EEA2
Lessons Learned – Emissions – Successful Grid Reliability and Emissions Control

Unit de-rated for environmental compliance; maximum de-rate ~ 330 MW

Received enforcement discretion from TCEQ

De-rate removed at ~ 07:29 a.m.

After EEA, unit entered environmental compliance de-rate at ~ 10:04 a.m.

Result: Generation available during EEA
QSE contacts ERCOT about emissions limitations

ERCOT contacts TCEQ* to notify of emergency

ERCOT receives TCEQ’s response

ERCOT makes Hotline call to all QSEs

ERCOT advises QSE to request discretion from TCEQ

QSE contacts (call or email) TCEQ


* Homeland Security Coordinator or Director of Critical Infrastructure
More Information


**February 2011 Southwest Cold Weather Event**

On August 16, 2011, FERC and NERC released a staff report with recommendations to help prevent a recurrence of rolling blackouts by customers in the Southwest during extreme cold weather the first week of February 2011. Concluding a six-month inquiry, the outages and gas shortages were due to weather-related causes. In total, approximately 1.3 million electric customers did not have power on February 2, and a total of 4.4 million were affected over the course of the event from February 2 through February 4. Natural gas curtailments of service during the event. These curtailments were longer in duration than the electric outages because reliability was accomplished manually at each customer’s location. Local distribution companies (LDCs) interrupted gas service to more than 50,000 customers in Texas. New Mexico was the hardest hit with outages of over 30,000 customers. On May 9, 2011, FERC and NERC announced that they combine their separate inquiries. This report is a product of that effort.

**February 2011 Southwest Cold Weather Event**

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<tr>
<th>Type</th>
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<td>Lessons Learned - Southwest Cold Weather Event (13)</td>
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**Cold Weather Training Materials**

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<td>Survey to Assess the Effectiveness of Severe Winter Weather Preparation materials</td>
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<td>Winter Preparation for Severe Weather Events - Webinar Q&amp;A</td>
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<td>Extreme Winter Weather Events - Instructor’s Manual</td>
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<td>Extreme Winter Weather Events - Training Presentation</td>
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Morning’s Agenda

- ERCOT Meteorologist Winter Outlook
- Lessons Learned and Best Practices – Wise County Power Company
- Lessons Learned and Best Practices – Gregory Power Plant
- Break
- Wind Generation Experience and Preparations – AES Buffalo Gap
- Observations from Previous Spot Checks and Focus for Upcoming Spot Checks – ERCOT
- Q & A
Questions?
## Glossary

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<tr>
<th>Acronym</th>
<th>Definition</th>
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<tr>
<td>CT</td>
<td>Combustion Turbine</td>
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<tr>
<td>DA</td>
<td>De-aerator</td>
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<tr>
<td>EEA</td>
<td>Energy Emergency Alert</td>
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<tr>
<td>ERCOT</td>
<td>Electric Reliability Council of Texas</td>
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<tr>
<td>FERC</td>
<td>Federal Energy Regulatory Commission</td>
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<tr>
<td>IP Drum</td>
<td>Intermediate Pressure Drum</td>
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<td>NOx</td>
<td>Nitrogen Oxide</td>
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<td>QSE</td>
<td>Qualified Scheduling Entity</td>
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<td>ST</td>
<td>Steam Turbine</td>
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<td>TCEQ</td>
<td>Texas Commission on Environmental Quality</td>
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