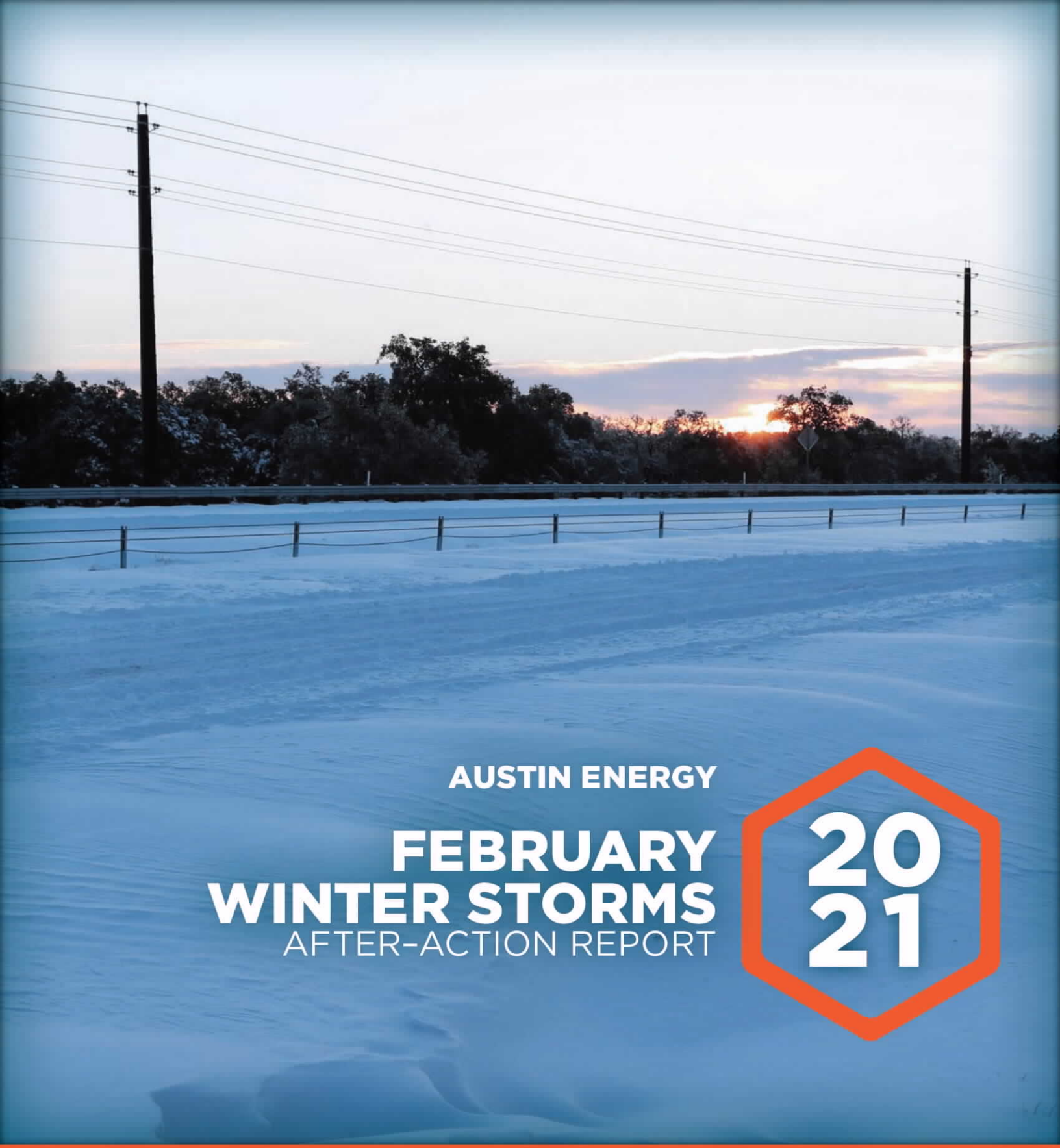


AUSTIN ENERGY

# FEBRUARY WINTER STORMS AFTER-ACTION REPORT

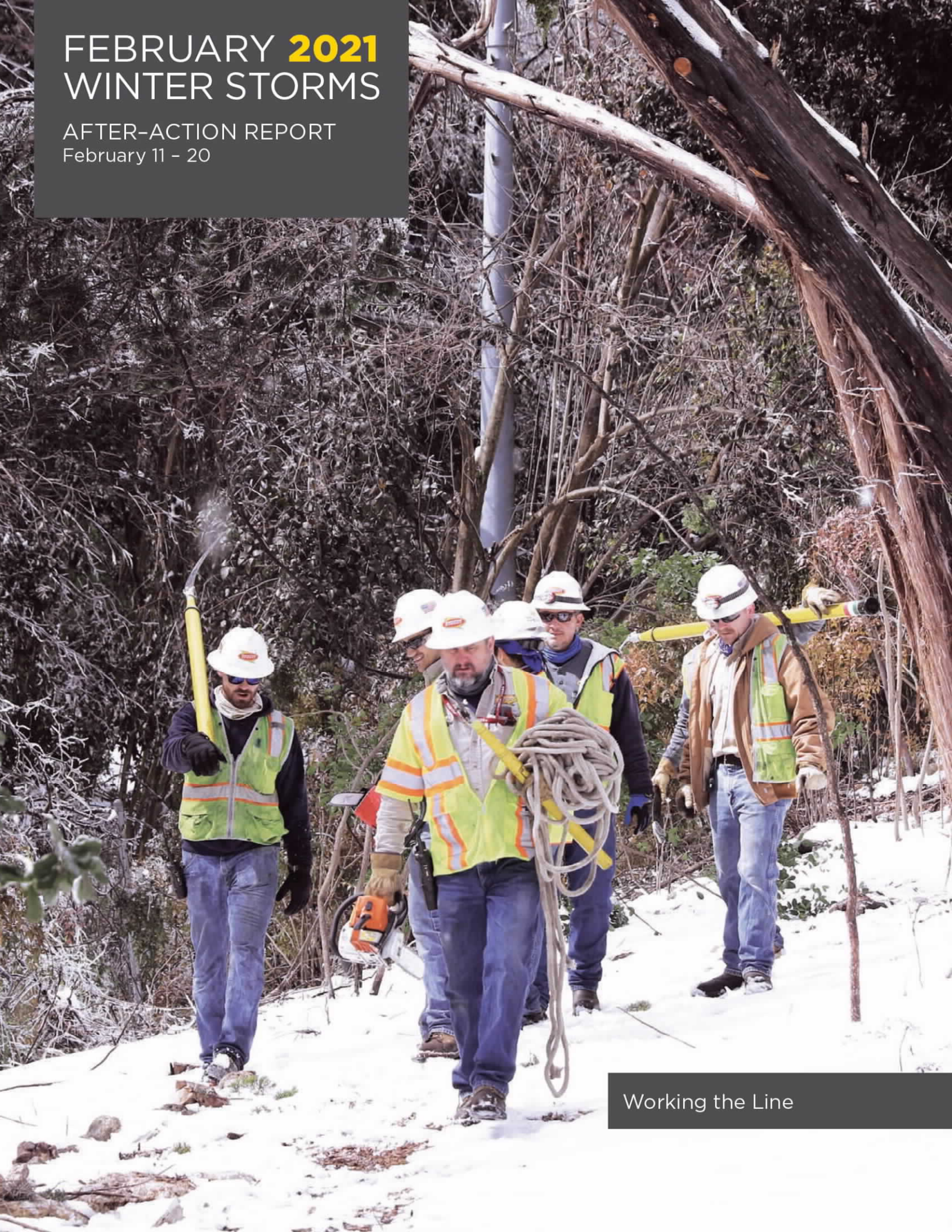
2021

October 2021

# FEBRUARY 2021 WINTER STORMS

## AFTER-ACTION REPORT

February 11 – 20



Working the Line

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# 1. INTRODUCTION

The mission of Austin Energy is to safely deliver clean, affordable, reliable energy and excellent customer service. The utility is a not-for-profit enterprise of the City of Austin (COA), working to meet the needs of those it serves. In carrying out this mission, Austin Energy operates in a highly regulated environment and must also adhere to rules imposed by various State and Federal regulatory agencies. These requirements include those imposed by the Federal Energy Regulatory Commission (FERC), North American Electric Reliability Corporation (NERC), Texas state law, Public Utility Commission of Texas (PUCT) and the Electric Reliability Council of Texas (ERCOT). These regulations include planning functions, cooperation and real-time operations to maintain the electric grid during normal and emergency operations.

This After-Action Report addresses the observations and actionable improvements Austin Energy has made and continues to make following the February Winter Storms. This report follows the "**Austin Energy February Storm Briefing: Event Overview and Communications, March 3, 2021**".

In February 2021, the Polar Vortex destabilized and descended from the North Pole bringing sub-freezing temperatures into central Canada, the central US and northern Mexico. During the period of February 11 – 20, 2021 (referred to in this report as the "Winter Storms"), the region served by Austin Energy experienced below-freezing temperatures from the Polar Vortex coupled with severe wind gusts, record snowfall, torrential freezing rain and a series of ice storms. Austin Energy was able to draw on many decades of storm restoration experience; however, the situation greatly worsened when ERCOT, the market operator for a large portion of Texas, was unable to meet electric demand and directed a series of Load Sheds that spanned from February 15 – 18. Austin Energy faced these challenges, along with hazardous and sometimes impassable roads, and kept critical facilities energized while providing local generation that helped prevent a catastrophic grid failure in the ERCOT region of Texas. Approximately 220,000 Austin Energy customers were without power at different points, including some for several days.

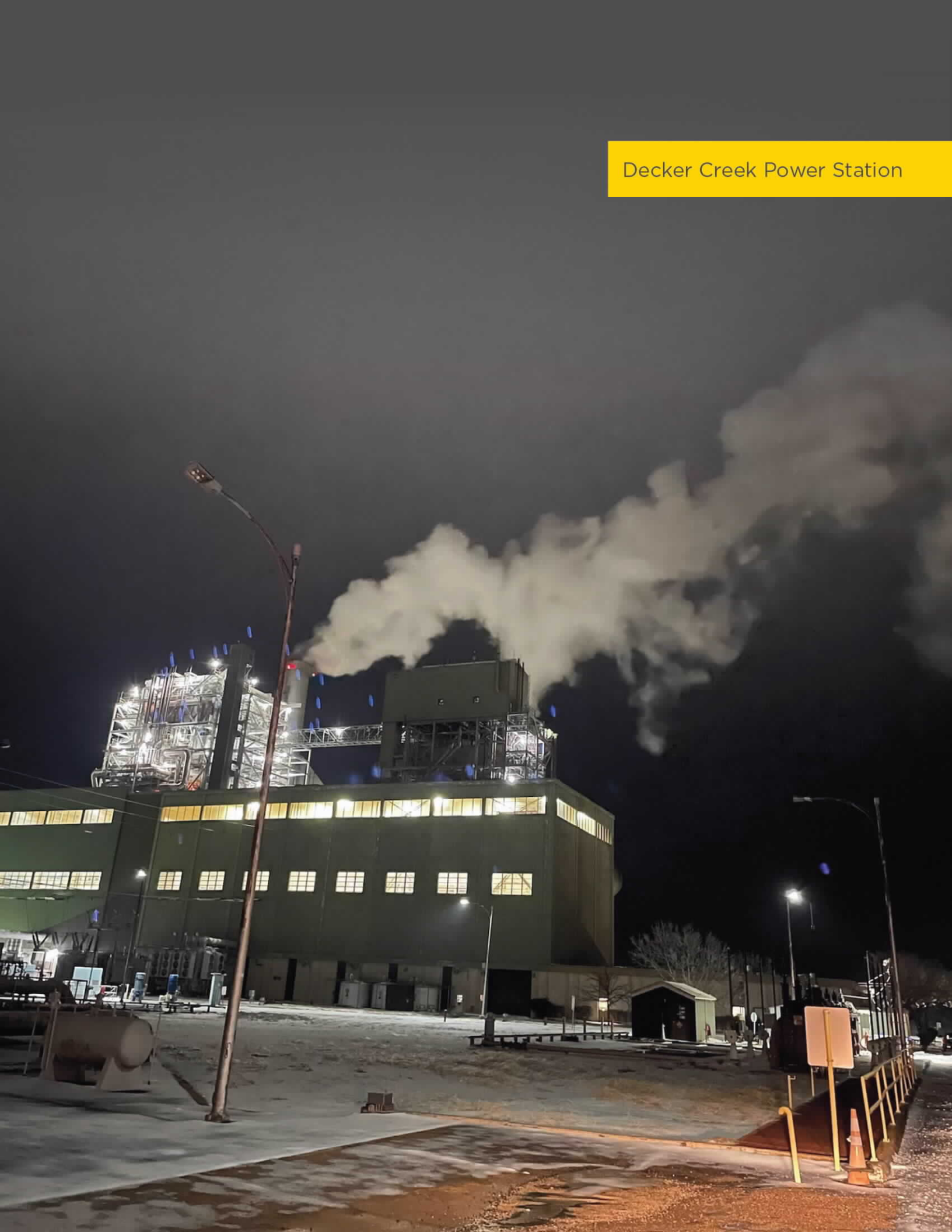
Especially challenging were events that started on the night of February 14 into the early morning of February 15, when the already low temperatures plunged further and ERCOT had insufficient generation to meet electric demand. ERCOT mandated utilities across the state to shed load to prevent a total grid collapse in the portion of Texas served by ERCOT. The ERCOT-mandated Load Shed event ultimately lasted four days. A failure by electric utilities to respond would have likely led to a grid failure lasting weeks or months. Such a complete ERCOT-wide blackout would have also impacted all critical facilities such as hospitals, Emergency Management Services (EMS), Police stations, and water and wastewater treatment plants.

At the onset of the Winter Storms, Austin Energy's established Emergency Management and Incident Command structure was already activated and led the actions of utility staff and emergency response teams that worked around the clock for the duration of the Winter Storms. Essential and support personnel were stationed at Austin Energy facilities, in the field restoring power, housed in temporary facilities, continuously operating its generation facilities or working remotely to allow for a continuous and fully staffed storm response.

Austin Energy had an emergency communications plan in place for ERCOT Energy Emergency Alerts (EEAs) and worked to keep the public updated on the most current information possible. However, providing an adequate level of information to customers without power was not feasible. In addition, information from ERCOT was extremely limited, such that Austin Energy was unable to deliver information that met the expectations of the public pertaining to the scale and duration of the mandated outages.

During the Winter Storms and immediately thereafter, Austin Energy began the process of identifying and implementing actions that will help us better prepare for a similar type of extreme and prolonged climate event and grid operator event in the future. This report contains observations, each observation consisting of multiple topics related to Austin Energy's preparations, response and ongoing actions, including power plant weatherization, managing Load Shed requirements, communications and outage map, vegetation management and collaboration with other City Departments and utilities.

Federal and State regulatory agencies are also evaluating many of the effects of the Winter Storms that caused hardship to Texans, and Austin Energy is actively engaged in the change process that will result from these evaluations.


Decker Creek Power Station

# 2. AFTER ACTION REPORT DEVELOPMENT

This After Action Report (AAR) reviews the response of Austin Energy to the February 2021 Winter Storms, summarizes what took place during the Winter Storms, analyzes the actions taken by Austin Energy and identifies strengths to be grown and maintained as well as areas needing improvement.

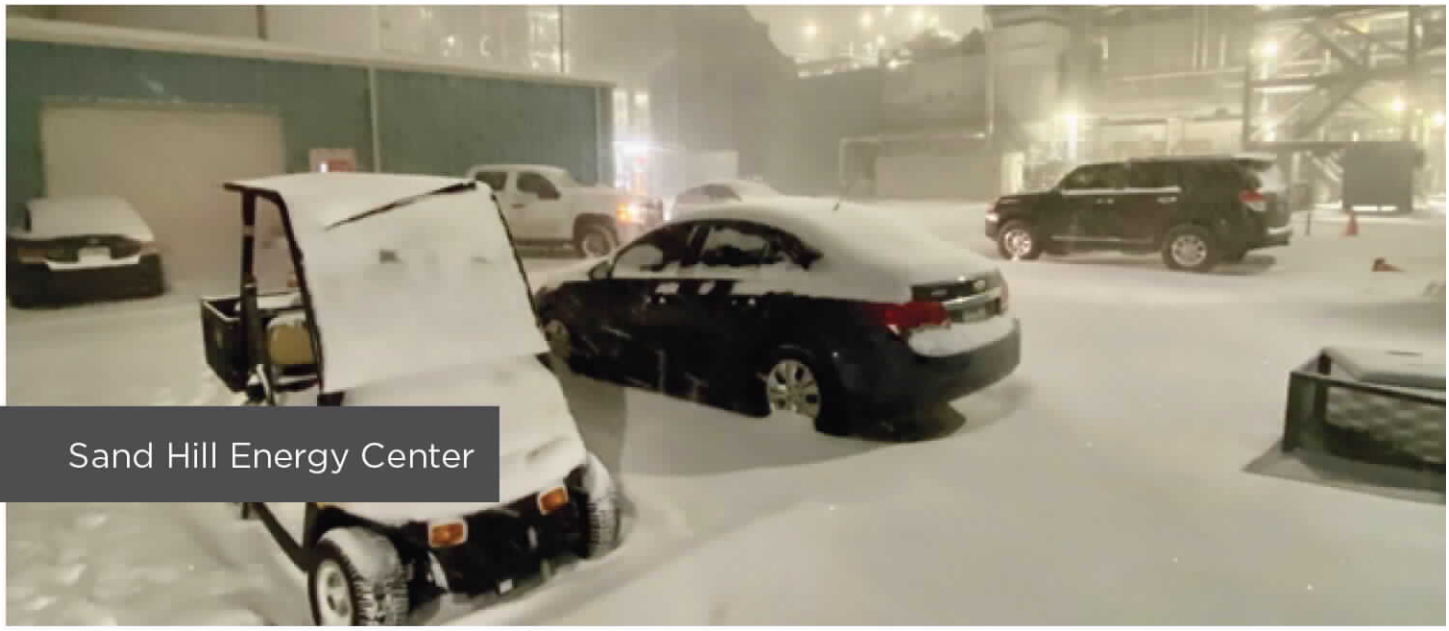
In preparing the report, Austin Energy gathered information from personnel throughout the organization, including the Incident Command Team managing Austin Energy's storm response efforts, staff working at the power generation plants, field crews on the ground restoring power and staff in the contact centers providing information to the residents and businesses in the Austin area. The information gathered was validated and consolidated into observations related to Austin Energy's Winter Storms response.

Austin Energy began addressing its observations immediately after the Winter Storms and one of its first steps was to seek expertise on operating in extreme winter weather and responding to large-scale "super" storm and climate events. Austin Energy also sought information on new and emerging technologies that can be leveraged to improve overall electric system resilience. Accordingly, Austin Energy reached out to the Electric Power Research Institute (EPRI) of which Austin Energy and most electric utilities in North America are members. EPRI made available to Austin Energy subject matter experts spanning all aspects of planning, designing, and operating electric grids and customer experience, and with extensive knowledge of electrical equipment technology and performance. EPRI also helped to identify technical material that was used to inform follow-up actions, and Austin Energy will continue to look for ways to leverage its EPRI membership and partner with others in the sector to accelerate adoption of technologies that improve our ability to withstand and respond to extreme weather events.

The information in this AAR is organized into three parts:

- High-level observations that describe the issues associated with the Winter Storms.
- Background information for each observation to provide context.
- Follow-up actions planned or completed.

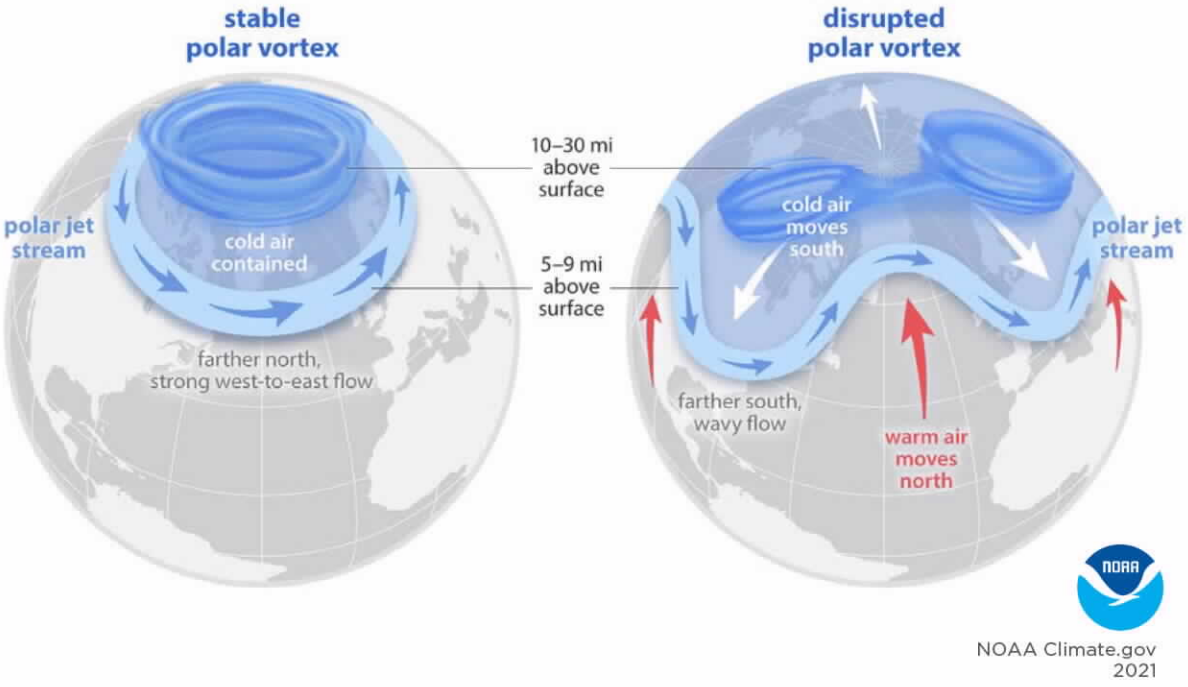
Explanations or external references for electric utility terminology are provided, where possible, to provide clarity. A glossary of acronyms is available in Appendix A (page 47).



Sand Hill Energy Center

# 3. DETAILED EVENT DEVELOPMENT

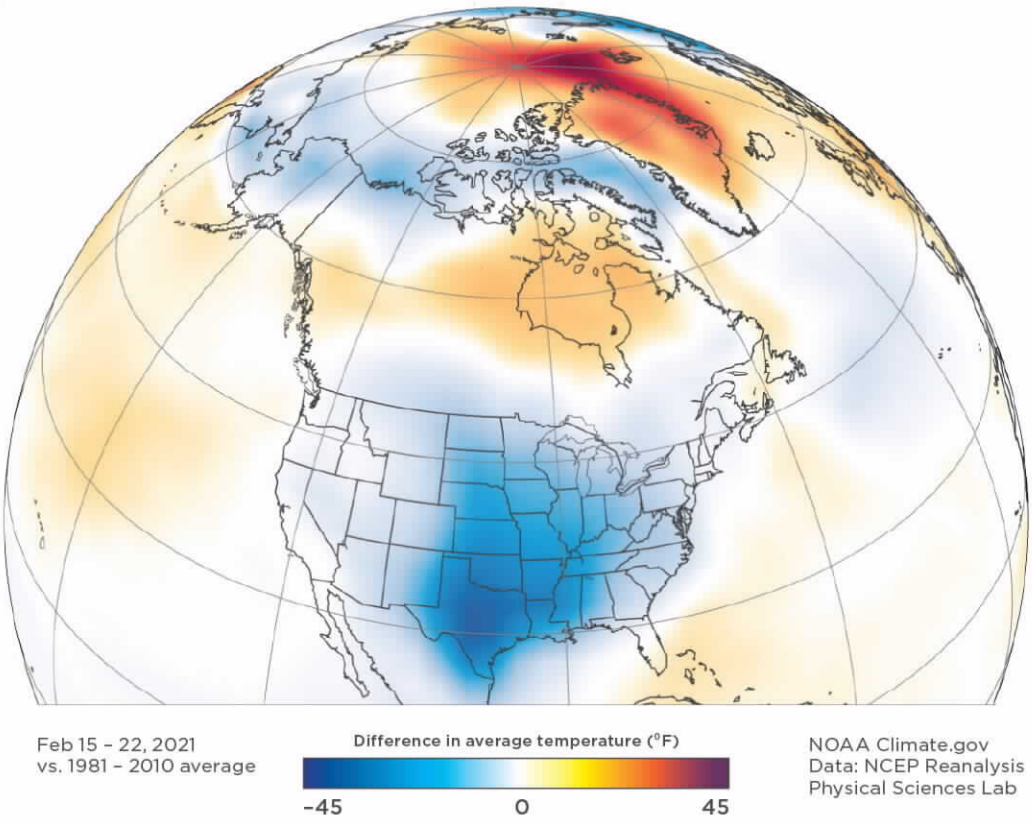
The Winter Storms brought record cold temperatures to a significant portion of Canada, the central United States and parts of northern Mexico during the first half of February 2021.[1] The cold wave was caused by disruption of the polar vortex. Extremely cold air, which normally circles the North Pole, descended into Canada, the central United States and northern Mexico.




NOAA Climate.gov
2021

Many states within the Southern Plains such as Oklahoma, Arkansas and Texas reached low temperatures not seen in decades or even a century. In Central Texas, the temperatures were consistently below freezing during the period of February 11 – 20.

[1] The information in this section has been compiled from various sources including the National Weather Service (NWS), StormGeo (a subscription-based weather service used by Austin Energy) and NOAA (National Oceanic and Atmospheric Administration).




The Winter Storms and the associated ERCOT emergency events were unprecedented as freezing temperatures combined with multiple precipitation events over several days. For portions of Central Texas, the precipitation included multiple ice storms and torrential freezing rain. Each precipitation incident added new layers of accumulating ice to trees and branches. When close to power lines, this heavy ice-laden vegetation often brought down power lines and poles.

The Winter Storms affected the entire state of Texas. The Federal Emergency Management Agency (FEMA) declared a state of disaster for the "Texas Severe Winter Storms" (4586-DR-TX) that included all 254 counties and defined the start of the event as February 11, 2021.[2]

Several compounding factors resulted in widespread impacts on the electricity grid, including an exceptionally high number of Austin Energy residential and commercial customers without power for an extended period and exceptionally high wholesale power prices for multiple days. These factors included:[3]

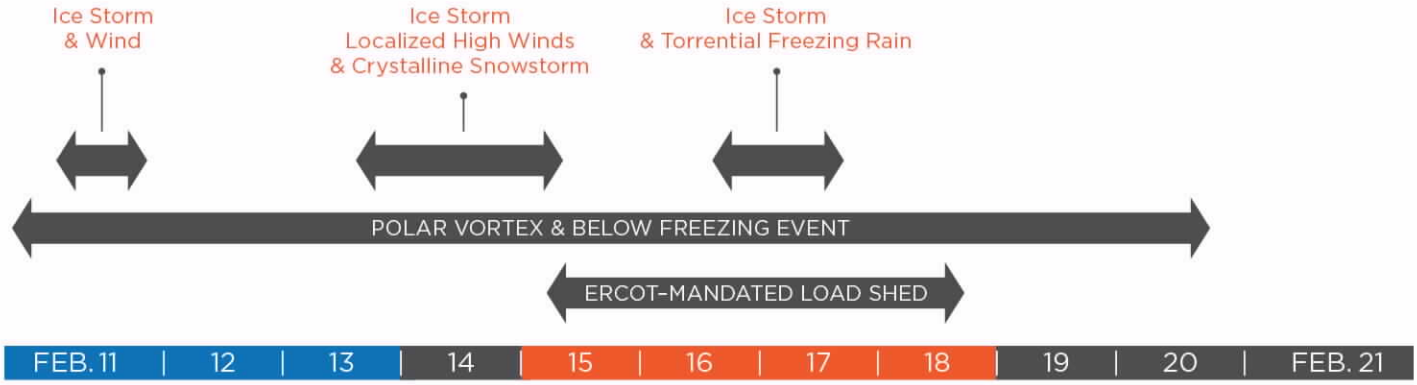
[2] FEMA 4586-DR-TX: (https://www.fema.gov/disaster-federal-register-notice/4586-dr-tx-initial-notice)
[3] The information that follows has been compiled from various sources including:

- NOAA February 2021 Historical Winter Storm Event South Central Texas (https://www.weather.gov/media/ewx/wxevents/ewx-20210218.pdf)
- ERCOT Demand and Energy 2021 (http://www.ercot.com/content/wcm/lists/219737/DemandandEnergy2021.xlsx)
- FERC February 2021 Cold Weather Grid Operations: Preliminary Findings and Recommendations (https://www.ferc.gov/february-2021-cold-weather-grid-operations-preliminary-findings-and-recommendations)

- The City of Austin and its surrounding areas experienced record below-freezing temperatures for 144 consecutive hours (six days) at Camp Mabry, with six and a half inches of snow on the ground for five days.
- For many generation facilities across the state, precipitation in the form of fine, light, crystalline snow clogged air intakes for power plants and other electric facilities that draw air for cooling.
- Some areas also had high, localized winds that resulted in galloping (oscillation) of some ice-encrusted transmission lines.
- Extreme weather caused outages and reductions in output at generation facilities, which reduced the overall electric generation capacity within ERCOT.
  - » Natural gas production, storage and distribution issues reduced the quantity of natural gas supplied to electric generation facilities, which in turn decreased electric generation.
  - » Wind turbine and solar generated power experienced availability issues during the Winter Storms due to ice and snow accumulation caused by freezing precipitation.
- NERC reported that extreme cold weather during February 2021 throughout Texas and the midwestern states resulted in the largest, controlled firm Load Shed event in United States history. In ERCOT, power outages affected millions of Texas electric customers during the Winter Storms.
  - » Generation capacity during the Winter Storms was 20 percent less than planned for in the most extreme outage scenario in the ERCOT issued winter Seasonal Assessment of Resource Adequacy (SARA) for the ERCOT Region.
  - » The ERCOT region experienced unprecedented demand for electricity during the Winter Storms, with an actual peak demand over 10 percent higher than ERCOT's most extreme peak scenario in its winter SARA.
  - » Over 48 percent of ERCOT generation was forced out at the highest point during the Winter Storms due to the impacts of various extreme weather conditions.
  - » Controlled outages were implemented to prevent statewide complete loss of power (also known as blackout). ERCOT instituted nearly three consecutive days of progressive firm Load Shed, culminating in 20,000 MW of total Load Shed on February 15, 2021.
  - » ERCOT has produced materials explaining the progression and magnitude of the Load Shed that was required of Austin Energy and other utilities in the ERCOT System. ERCOT has also produced presentations in response to the Winter Storms event detailing information about the causes of generator outages that were the underlying cause for the system-wide outages that affected most Austin Energy customers.[4]

- The University of Texas at Austin Timeline of Events of the February 2021 Texas Electric Grid Blackouts (https://www.puc.texas.gov/agency/resources/reports/UTAustin_(2021)_EventsFebruary2021TexasBlackout_(002)FINAL_07_12_21.pdf)
- ERCOT Review of February 2021 Extreme Cold Weather Event – ERCOT Presentation (http://www.ercot.com/content/wcm/key_documents_lists/225373/2.2_REVISED_ERCOT_Presentation.pdf)
- Austin Energy February Storm Briefing: Event Overview and Communications (https://www.austintexas.gov/edims/document.cfm?id=355922)

[4] February 2021 Extreme Weather Event (http://www.ercot.com/news/february2021)




**Winter Storms Timeline**

Austin Energy has an established Emergency Response and Incident Command structure involving participants from throughout the utility with defined roles and responsibilities. This structure follows the National Incident Management System (NIMS) framework and participants are trained and experienced in the activation and execution of incident response. Before the Winter Storms, Austin Energy had an active Incident Command Team related to the COVID-19 pandemic response (initiated on March 9, 2020). In addition, Austin Energy was ready for the possible EEAs with prepared communications, operating protocols for rotating outages and crews on alert, while continuing to restore service from the ongoing forced outages caused by the extreme weather.

Incident Command related to the Winter Storms was officially activated by Austin Energy at 15:53 on Thursday, February 11, 2021, which in accordance with the established process included:

- Establishment of regular communications between operations and the Incident Command structure to ensure awareness of anticipated hazards and impacts. This protocol involves pre-identified individuals who serve as liaisons with the COA's Emergency Operations Center.
- Activation of communications planning and logistics teams to support the overall response.
- Continuous exchange of information from all levels within Austin Energy Incident Command and Austin Energy management to ensure accurate and consistent understanding of the event and to ensure the ability to relay this to the public and City leadership.

During the Winter Storms, the demands on the active Austin Energy Incident Command Team increased as storm conditions worsened. To respond to the deteriorating and long-lasting storm conditions and in anticipation of the need for a significant restoration effort, the team identified and added members as needed to support the response effort.

At its peak, the Incident Command Team included 50 Austin Energy staff in designated positions, with hundreds of additional employees supporting these efforts. The team's success in adding staff was particularly noteworthy given the fact that many of them were also without power throughout the event, the difficulty of travel in extreme cold weather conditions, the negative impacts of extreme weather on some methods of communication and the limited accommodation options available during and after the Winter Storms.


Balcones Restoration Event

# 4. OBSERVATIONS AND FOLLOW-UP ACTIONS

This section of the AAR summarizes what took place during the Winter Storms, analyzes the actions taken by Austin Energy and identifies strengths and areas needing improvement. The identified follow-up actions are planned or completed to leverage best practices or to address identified opportunities.

## Observation 1 — Community Communications

**Austin Energy provided information to the public under extreme circumstances and used various inclusive forms of public messaging, both during and immediately after the Winter Storms. Communications with customers, Austin Energy staff and management, City departments and City Council offices were impacted by the reduced availability of internet and cell phone service. Other challenges included the impact of power loss on standard communication tools, other technological challenges and language barriers. Opportunities to collaborate on communications with other public entities were identified.**

### Media and Communication

#### Background

At the onset of the Winter Storms, the Austin Energy team had an operational emergency communications plan and a specific strategy in place for ERCOT-issued EEAs. In addition, utility staff conduct crisis media training to ensure various teams understand the needs and demands of today's media and the public, so that the utility can deliver messages clearly and with credibility.

ERCOT has a series of emergency procedures that may be used when operating reserves drop below specified levels. There are three levels of EEA, depending on the capacity of operating reserves that are available to meet the electric demand on the system.

**EEA Level 1**
When operating reserves drop below 2,300 MW and are not expected to recover within 30 minutes, grid operators can call on all available power supplies, including power from other grids, if available.

**EEA Level 2**
When operating reserves are less than 1,750 MW and are not expected to recover within 30 minutes, ERCOT can reduce demand on the system by interrupting power from large industrial customers who have contractually agreed to have their electricity turned off during an emergency. ERCOT can also use demand response resources that have been procured to address tight operating conditions.

**EEA Level 3**
An EEA3 is declared if operating reserves cannot be maintained above 1,375 MW. If conditions do not improve, continue to deteriorate or operating reserves drop below 1,000 MW and are not expected to recover within 30 minutes, ERCOT will order transmission companies to implement controlled outages.

Austin Energy's strategy includes communications specific to each EEA level, building up to the following EEA messaging tactics used in this event:[5]

- News releases (English and Spanish)
- NewsFlash emails to Key Account customers

[5] Austin Energy February Storm Briefing: Event Overview and Communications, March 3, 2021 (https://www.austintexas.gov/edims/document.cfm?id=355922)

- Social media messaging (English and Spanish)
- Website messaging update — both austinenergy.com and coautilities.com websites
- Outage map messaging
- Warn Central Texas alerts (English and Spanish)
- Mayor and City Council communications
- Coordination with other COA departments
- Daily press conferences extending through Friday, February 19

Austin Energy Communications team members are included in Incident Command activities and worked to keep staff, customers and external stakeholders updated on the most current information available. Information from ERCOT was limited and Austin Energy, like other utilities within ERCOT, primarily learned about the statewide grid conditions during ERCOT press briefings provided to the public. Despite this challenge, Austin Energy facilitated quick access to information and real-time sharing to the greatest extent possible. Documented pre-planning for emergencies was critical for responding to the unforeseen prolonged outages.

Beginning on February 11, 2021, Austin Energy began issuing winter storm communications that included live media interviews, social media messaging and website updates that provided information on the incoming storm, conservation and outage preparation. These communications included outage and emergency communications in English and Spanish. Since the storm, the Communications team has expanded outreach to include information in Simplified Chinese and Vietnamese.

During the Winter Storms, Austin Energy provided news releases, responded to hundreds of media requests and provided daily press briefings with other COA officials, which were carried by several media outlets. It is challenging, however, in this modern era to communicate with customers who are without power. Many customers rely on their cell phones not only for phone communication, but also for internet access and information. If customers have difficulty charging up their phones or powering up other devices, then communication opportunities are limited. Additionally, many customers no longer have battery-powered radios for access to local news and weather information.

The Winter Storms showed how essential it is for Austin Energy's staff and customers to have backup communications tools. Understanding how power outages affect essential services during a disaster is extremely important. When digital communication is limited, preparation is key.

Immediately after the Winter Storms, Austin Energy staff developed information pertaining to Austin Energy's response. This information included:

- Emergency Preparedness and Response
- Vegetation Impact to Power Lines
- Performance of Austin Energy's Diverse Generation Resource Portfolio
- Outage Reporting
- Notice of impact to COA Utility Bills
- Austin Energy participation in statewide Policy and Regulatory Activities

### Follow-Up Actions

OA 1.1 – Engage with the COA Communications and Public Information Office and Homeland Security and Emergency Management (HSEM) to determine communication tools and resources for non-digital outreach. (Ongoing)

OA 1.2 – Identify budget resources to secure backup resources for Austin Energy Communications Team. (power packs, weather radios, mobile Wi-Fi hotspots, etc.). (Qtr. 1, 2022)

OA 1.3 – Work with the COA's Communications and Public Information Office to develop a plan or protocol for the involvement of City Council offices. (Ongoing)

OA 1.4 – Continue conducting media training with the Austin Energy Executive Team and Communications staff. (Qtr. 1, 2022)

OA 1.5 – Engage in the PUCT rulemaking on statewide emergency messaging. (Ongoing)

OA 1.6 – Provide emergency materials in other languages besides English and Spanish. (Completed Qtr. 3, 2021)

OA 1.7 – Coordinate with Customer Care and provide a pool of trained representatives to help respond to social media messages during an emergency. (Qtr. 2, 2022)

OA 1.8 – Continue to encourage customers to monitor news and emergency broadcasts, charge phones, laptops and tablets if a storm is coming, create a household emergency communication plan and sign up to receive alerts and warnings. (Ongoing)

## Outage Map

### Background

The Outage Map allows customers to report an outage and provides a real-time graphical view of outage status. During the Winter Storms, customers experienced situations where the Outage Map did not accurately reflect the outages. Density and overlapping of the shaded outage areas on the Outage Map resulted in customer confusion, as some customers could not discern which outage was affecting them. Additionally, with cold weather, unsafe icy road conditions and a large number of outages, it took longer than standard storm-response time to restore power, leading to long periods with no new updates for customers.

### Follow-Up Actions

OA 1.9 – Resolve technical issues for outages not reflected on the map. (Completed Qtr. 3, 2021)

OA 1.10 – Disable outage map elements that display shaded outage areas, which are not an industry practice in most dense metro areas. (Completed Qtr. 3, 2021)

OA 1.11 – Retrain all personnel managing the Advanced Distribution Management System (ADMS) on internal processes to ensure outage information is entered in a timely and accurate manner, thus reflecting correctly on the outage map. (Completed Qtr. 3, 2021)

## Outage Map Text Alerts

### Background

Outage Map Text Alerts are available to enrolled Austin Energy customers for updates on the status of power following an outage. Austin Energy customers rely on these alerts for timely updates regarding the timeframe for power restoration. With widescale and prolonged outages during the Winter Storms, Austin Energy could not provide an accurate estimated time to restore power to its customers. As many outages resulted from ERCOT-mandated Load Shed, Austin Energy was not provided information when ERCOT would issue instructions to restore load. Accordingly, Austin Energy was not able to provide prompt accurate assessments of the time of restoration. As such, Austin Energy experienced long periods without new information to report to customers. This lack of updates resulted in negative customer experiences.

When a smaller outage within a restored area (referred to as a "nested outage") occurs, feedback from customers is important to confirm if an additional outage or issue exists. When Austin Energy believes power is restored, a text alert is sent to update customers and provide them an opportunity to reply if the outage at their premise still exists. Austin Energy relies on this customer feedback to address nested outages.

### Follow-Up Actions

OA 1.12 – Improve Austin Energy website messaging to better educate the public regarding outages. (Completed Qtr. 2, 2021)

OA 1.13 – Update the 'outage restored' text message to clarify the status and expectation to respond if a nested outage exists. (Completed Qtr. 3, 2021)

OA 1.14 – Resolve ADMS issues that caused messaging to be inconsistent with the customer's incident experience. (Completed Qtr. 3, 2021)

OA 1.15 – Continue delivery of the next Outage Map and Text Alert Application, scheduled to be upgraded in 2022. Expected benefits include features such as natural language processing, a highly configurable interface to create new map views on-demand, low-impact change product configuration updates, social media integration, a solution for displaying the magnitude of master metered properties on the outage map, and an improved graphical outage history tracking and improved user interface. (Qtr. 2, 2022)

## Austin 3-1-1 Service

### Background

The Austin 3-1-1 Contact Center provided information to the constituents of Austin regarding power outages, access to warming centers and other critical COA services in response to the sustained impacts throughout the City and Travis County during the Winter Storms. Austin 3-1-1 customer service representatives were activated in preparation and response to the increased call volume related to the Winter Storms.

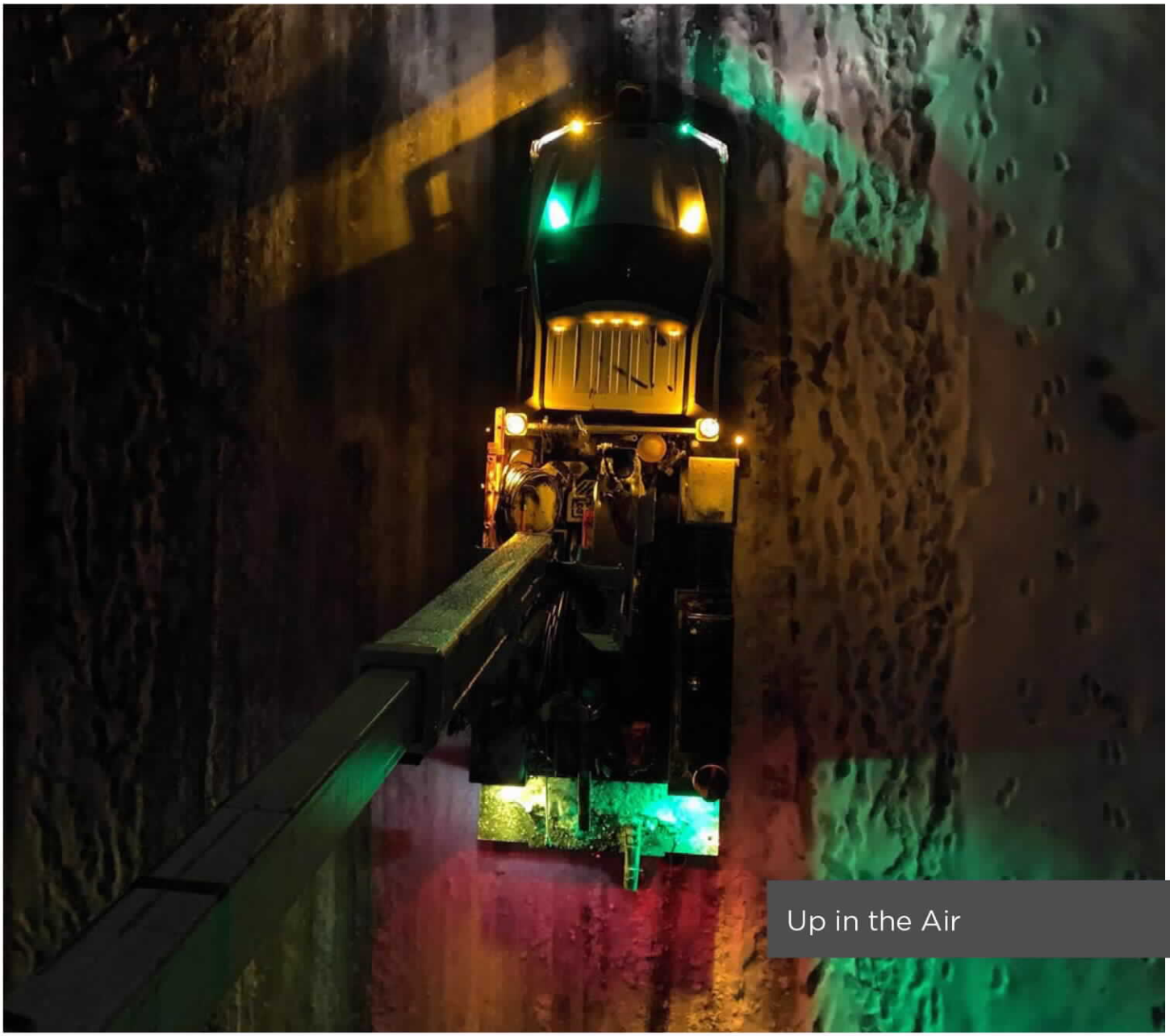
As a result of the Winter Storms, Austin 3-1-1 experienced multiple power outages and the failure of the on-site generator backup resulted in residents being unable to report outages or obtain information on services during the event. A loss of power and lack of an on-site backup generation unit to support the City Communication Ring disrupted the Austin 3-1-1 phone services and critical City communication facilities.

## Follow-Up Actions

OA 1.16 – Work with the COA's Communication and Technology Management Office (CTM) to designate all Austin 3-1-1 offices as Critical Load Customers to safeguard against power outages during Load Shed events. (Completed Qtr. 3, 2021)

OA 1.17 – CTM to purchase and install portable generators for the two sites that complete the power requirements for the City Communication Ring. The permanent generator build for these two sites is planned for 2024. (Qtr. 2, 2024)

OA 1.18 – Implemented SIP Trunking (a method of sending voice and other unified communications services over the internet) at Austin 3-1-1 to provide CTM the ability to reroute calls to an alternate location when a communications site failure occurs. (Completed Qtr. 3, 2021)



Up in the Air

# Observation 2 — Other Utilities and COA Departments that Provide Public Services

**Numerous area utility companies and COA departments that provide utility and other public services were highly impacted by multiple days of intermittent outages.**

### Background

Austin Energy customers include utilities and COA departments that provide utility services and other public services. These entities include Texas Gas Service (TGS), Austin Water (AW), Austin Transportation Department (ATD) and approximately 30 Austin area communication companies.

## Texas Gas Service

### Background

Texas Gas Service (TGS) provides end-use natural gas service to many Austin-area homes and businesses. TGS relies on electricity to support and operate its gas infrastructure. Personnel from TGS and Austin Energy have met since the Winter Storms to discuss critical TGS facilities and to review actions taken before, during and after the Winter Storms and related ERCOT events.

### Follow-Up Actions

OA 2.1 – TGS and Austin Energy shared information pertaining to critical infrastructure as necessary for storm response while continuing to protect sensitive and critical infrastructure information that also possibly falls under Federal Electric or Gas Line regulatory agencies. (Completed Qtr. 3, 2021)

OA 2.2 – TGS and Austin Energy worked collaboratively during the storm to address power supply issues that negatively affected TGS's ability to distribute gas. (Ongoing)

OA 2.3 – Austin Energy will continue to work with TGS to identify TGS's critical facilities, so that during storm events, key natural gas distribution facilities are prioritized for receiving power and for power restoration following outages. This work will allow TGS to better maintain gas supplies and address pressure challenges within affected areas in its service territory. (Ongoing)

## Austin Water

### Background

The Ullrich Water Treatment Plant (WTP) is electrically fed by the Austin Energy Bee Creek Substation and two dedicated circuits with an additional backup circuit in reserve for the switchover. Falling vegetation debris caused the loss of both dedicated circuits. Austin Energy remotely closed the first of the dedicated circuits, thereby restoring connection. Austin Energy also dispatched crews to investigate the fault on the second dedicated circuit and was prepared to manually switch to the backup circuit if needed. Both AW and Austin Energy crews were working other outages and were adversely impacted by road conditions. Travel time for the crews to the site ranged from one and a half hours to three hours. It took an additional hour to perform electrical switching. AW electricians energized Ullrich WTP completely on the first dedicated circuit. At about that same time, Austin Energy restored the second dedicated circuit; however, AW staff elected to remain on the first dedicated circuit to return the plant to operation as quickly as possible and opted not to shut down the plant again to transfer any load. Ullrich WTP returned to its normal operating scenario, utilizing both dedicated circuits after production levels were stabilized.

Longhorn Dam is fed by one Austin Energy circuit, which was damaged by vegetation during the Winter Storms. As a result, AW personnel manually operated the facility including the lift gates.

AW also has several lift stations and pump stations that lost power due to the rolling electrical outages as well as storm-related outages throughout the City. When power was out, AW crews were required to move a limited number of portable generators between sites to power the facilities. Travel was difficult due to a combination of several factors, such as inaccessibility of some sites, treacherous road conditions and towing portable generators.

## Follow-Up Actions

Under normal weather and road conditions, AW and Austin Energy crews can be quickly dispatched to sites and are trained to promptly perform electrical switching between circuits. Further improvements are underway through a joint Austin Energy and AW team that is working on automatic operations and hardening.

OA 2.4 – The following actions are underway at Ullrich WTP:

OA 2.4.1 – AW and Austin Energy — Evaluate improved utilization of Bee Creek Substation circuits as well as the Ullrich WTP electrical system and develop an action plan. (Qtr. 4, 2021)

OA 2.4.2 – Austin Energy — Implement auto switch for the backup circuit at Ullrich WTP for automatic operations after loss of either of the primary circuits. (Qtr. 2, 2022)

OA 2.5 – The following actions are underway at Longhorn Dam:

OA 2.5.1 – Austin Energy — Initiate a project to build a second electric circuit to Longhorn Dam. This is a challenging, multi-year project involving multiple COA departments as well as siting challenges for the circuit and electrical facilities. This project is funded. (Estimated 2023)

OA 2.5.2 – AW — Evaluate the installation of backup generators at Longhorn Dam to safeguard the facility while the second circuit is being constructed. (Qtr. 1, 2022)

OA 2.6 – The following actions are underway for resilience improvements at lift stations:

OA 2.6.1 – Austin Energy — Provide AW a list of lift stations that are currently on a Critical Load circuit. This action will assist AW to plan for future outage contingencies and help determine locations most and least likely to lose power in a similar event. (Qtr. 4,2021)

OA 2.6.2 – AW — Strategically site and increase the pool of available backup generators (either on-site or portable). (Qtr. 4, 2021)

OA 2.7 – The joint AW and Austin Energy team will identify, explore and recommend electrical improvements at the following sites to improve resiliency. (Qtr. 1, 2022)

OA 2.7.1 – Davis Water Treatment Plant.

OA 2.7.2 – Walnut Creek Wastewater Treatment Plant.

OA 2.7.3 – South Austin Regional Wastewater Treatment Plant.

OA 2.7.4 – Handcox Water Treatment Plant.

## Austin Transportation Department

### Background

ATD traffic light operations were highly impacted by multiple days of intermittent electric outages from ERCOT-mandated Load Shed as well as by circuits impacted by severe weather. The Winter Storms demonstrated the need to develop a process or processes that can be used during large- scale electric outages for Austin Energy and ATD to mitigate the impact of traffic light outages.

### Follow-Up Actions

OA 2.8 – Austin Energy and ATD are collaborating to develop methods to mitigate the impacts of electric outages on traffic light operations. (Ongoing)

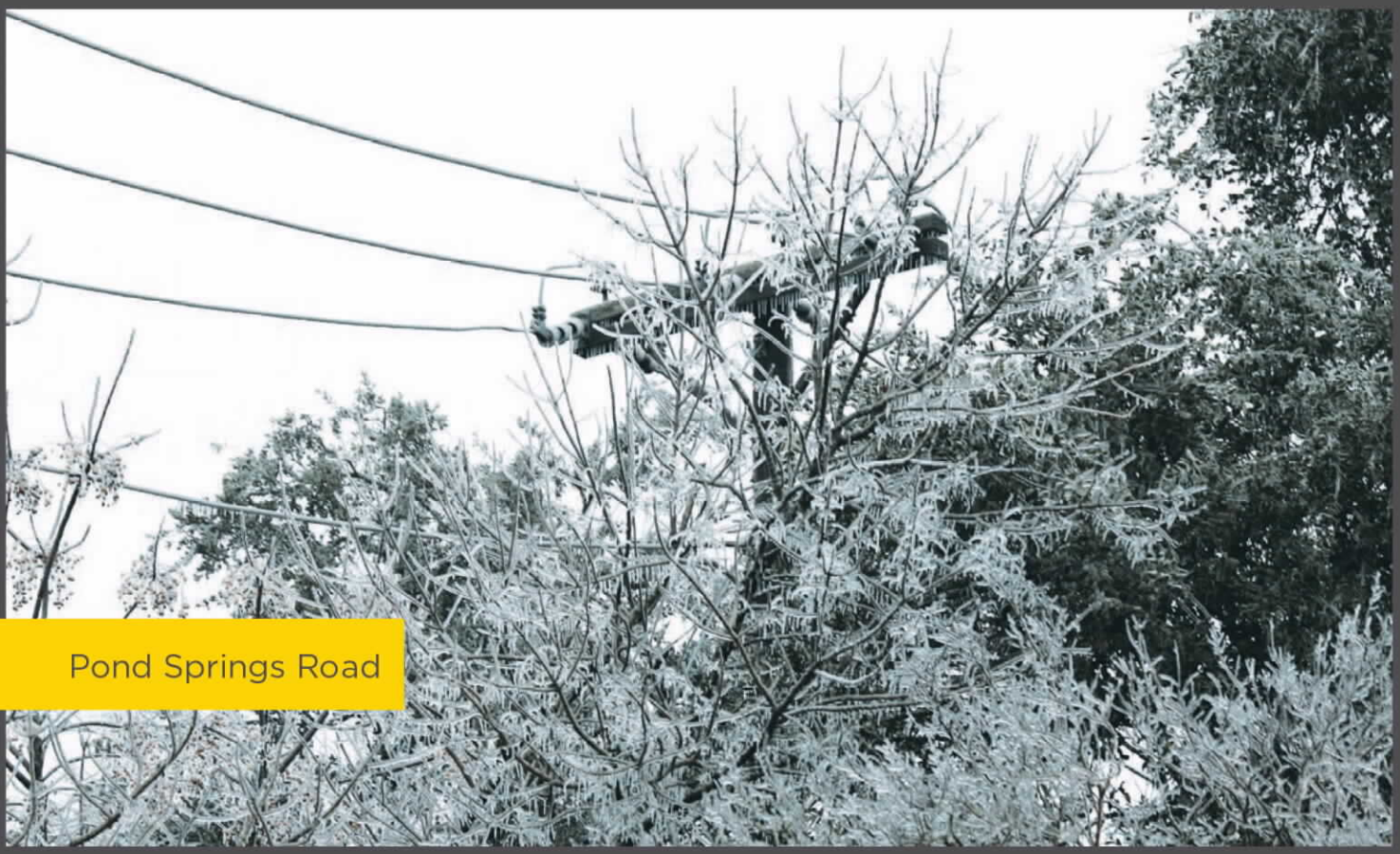
## Communications Companies

### Background

There are approximately 30 communications companies in the Austin area that rent space on Austin Energy structures (poles and buildings) for the placement of their equipment and wires. Some of this communication infrastructure draws power from Austin Energy's electric connections. The dedicated service team at Austin Energy was in direct contact with most of these customers during the Winter Storms to identify and resolve issues.

### Follow-Up Actions

OA 2.9 – Continue direct contact between the dedicated service team and these customers on a regular basis to resolve issues. (Ongoing)



Pond Springs Road

## Observation 3 — Medically Vulnerable Registry

**Austin Energy reached out to 365 customers associated with the Medically Vulnerable Registry (MVR) during the Winter Storms, performing wellness checks and providing resource information as needed.**

### Background

The COA Customer Assistance Program (CAP) engages with vulnerable populations across Austin Energy's territory to reduce and avoid interruption of critical utility services. MVR is a program within CAP through which Austin Energy provides account support, one-on-one case management, home visits, referrals to other social service providers and a sensitive, customer-centric collections process for MVR customers.

During the Winter Storms, CAP team members were activated and conducted outreach to enrolled MVR customers and those customers pending approval. They checked on well-being, power status, and reminded customers of the emergency backup plans they created in collaboration with CAP staff. MVR customers were provided with resources for food, water and warming centers. MVR customers who could not be reached directly or through a third party were referred to Austin Energy field staff. The field staff conducted 21 wellness checks and referred nine customers to EMS.

### Follow-Up Actions

OA 3.1 – Incorporate processes to check meter status, alert staff to outages among medically vulnerable populations and confirm a triage plan for wellness checks with internal teams and other COA departments. (Qtr. 4, 2021)

OA 3.2 – Work with other COA departments to establish a coordinated communication process to assist the medically vulnerable. (Qtr. 1, 2022)

OA 3.3 – Refine the existing MVR process to update contact information regularly through outbound call efforts. (Qtr. 1, 2022)

## Observation 4 — Incident Command Team

**The Austin Energy Incident Command Team successfully activated during the Winter Storms and it provided leadership and coordinated restoration activities according to established procedures. The Incident Command Team included the full breadth of Austin Energy leadership to ensure all groups were briefed on unfolding Winter Storms events and that they were responsive. The extent and severity of the Winter Storms revealed improvement opportunities in policy and procedures, staffing and training.**

### Background

Austin Energy uses the NIMS in its Incident Command System (ICS) to command, control and coordinate emergency events. At the time of the Winter Storms, Austin Energy's ICS had been continuously activated since March 2020 in response to the COVID-19 pandemic. The ICS transitioned, without interruption, to respond to the Winter Storms event. The ICS includes an Executive Crisis Management Team and an Operational Incident Command Team. These teams held frequent structured meetings during the Winter Storms. Critical communications and severe weather updates were available to key decision makers, resulting in informed decisions based on broad parameters and a high level of situational awareness. Some key improvement opportunities noted during the Winter Storms include evaluating and improving employee preparedness and training processes.

### Follow-Up Actions

OA 4.1 – Review Incident Command Policy and Procedures and identify areas for improvement, focusing on employee preparedness and emergency training, including emergency role-playing exercises. (Qtr. 4, 2021)

OA 4.2 – Develop an ICS training plan for new team members, conduct training activities and exercises and review annually. (Completed Qtr. 3, 2021)

OA 4.3 – Promptly assign personnel to fill vacancies in the Incident Command Team. (Ongoing)


Incident Command

## v. Observation 5 — Management of ERCOT-Mandated Load Shed

**The four days of ERCOT-mandated Load Sheds were unprecedented in both duration and extent of power reductions. As a result, Austin Energy's Load Shed portfolio was exhausted during the Winter Storms that constrained the utility's ability to rotate outages.**

### Load Shed

#### Background

Load Shed is the deliberate shutdown of electric power in part or parts of a power-distribution system, generally to prevent the failure of the entire system when customer electric demand (i.e., "load") exceeds the available generation capacity of the ERCOT system. ERCOT mandates two types of Load Shed — Manual Load Shed and Under Frequency Load Shed (UFLS), also known as Automatic Load Shed. The strain on the capacity of a system is generally caused by either a lack of available power generation or limited power flows available across transmission lines because of the potential impacts of overloading transmission lines. Load shed is different than forced outages caused by storm damage to wires, such as that caused by fallen trees and branches (Forced Outages).

Manual Load Shed is an intentional power outage. ERCOT requires utilities to have Manual Load Shed processes in place to help keep electric demand in balance with supply (generation and transmission) and to maintain grid stability. When ERCOT

issues Load Shed instructions via EEAs, Austin Energy is required to shed no less load than the quantity required by ERCOT. To be compliant, Austin Energy must respond to each Load Shed Instruction within 30 minutes. Shedding exactly the obligated quantity of power is ideal but not realistic, as, like most utilities, Austin Energy's ability to shed load is at the circuit level. Accordingly, Austin Energy cannot fine-tune the amount shed to exactly meet ERCOT's obligation and it must shed circuits until it meets or exceeds ERCOT's Load Shed requirement.

When ERCOT mandates Manual Load Shed, Austin Energy uses a computer-based system to reduce load and lessen the strain on the electric system on a circuit-by-circuit basis. Austin Energy's portfolio for Manual Load Shed is limited, as many circuits are typically protected from Manual Load Shed due to the existence of Critical Load Customers or the UFLS status of the circuit. Customers who did not have their power shut off were likely on a circuit with one of these two characteristics. Ideally, Austin Energy can complete Manual Load Shed with "rotating outages" in which the power outages are rotated across Austin Energy's Load Shed portfolio (i.e., the circuits available for Manual Load Shed) so that customers are not on overly long outages without power. However, during the Winter Storms, Load Shed requirements were so large that Austin Energy's Load Shed portfolio and its ability to rotate outages was adversely impacted.

ERCOT also requires each electric distribution operator, including Austin Energy, to designate circuits for UFLS. Austin Energy must designate 25 percent of its load in three blocks of circuits (5 percent, 10 percent and 10 percent) that will automatically drop offline if the ERCOT system frequency drops to certain thresholds. Insufficient power supply, high demand or a combination of both can cause drops in system frequency. If frequency deviates too far from the tight system requirements, the physical reality of electricity can cause system instability and grid collapse. UFLS is designed to prevent these frequency changes from causing an uncontrolled cascading blackout of the ERCOT grid. Due to the quick actions that are needed, UFLS is automated without operator involvement. The UFLS settings are programmed into under-frequency relays (a method by which electrical devices known as relays sense frequency drops in the power system and cause the circuit breakers to trip). In accordance with ERCOT requirements, UFLS-designated circuits are generally not available for Manual Load Shed, as UFLS acts as circuits of last resort for Load Shed to avoid this system collapse. During the Winter Storms, the ERCOT electric frequency dropped precipitously close but did not dip to the point where Austin Energy's UFLS circuits were required by ERCOT to operate and shed load.

Conversely, when ERCOT issues instructions to restore load, Austin Energy is required to restore no more load than the quantity allowed by ERCOT. As such, Austin Energy restores circuits until it reaches the point at which restoring one more circuit would exceed ERCOT's allowance. This pattern of "meet or exceed" Load Shed and "not to exceed" load restoration leads to an increased overall impact and time of restoration. ERCOT takes this imbalance into account when assessing real-time supply and demand, and as a result, the grid remains stable throughout the duration of the Load Shed event. At the conclusion of the Winter Storms, utilities like Austin Energy were left with more load to restore, which can result in restoration issues (Cold Loads or Forced Outages)[6] that require additional time or field support to restore.

Since the February 2011 winter storm, Austin Energy has doubled the number of circuits through sectionalization, which has increased the amount of load available for Manual Load Shed by more than 350 percent. As circuits have been sectionalized, more non-critical load customers are on circuits that are available for Manual Load Shed, and the circuits that serve Critical Load Customers include fewer non-critical load customers. While Austin Energy has sectionalized circuits and significantly increased the quantity of load available for Load Shed, the quantity of the ERCOT imposed Manual Load Sheds during the Winter Storms was up to five times greater than the 2011 winter storm event. The power reductions during the Winter Storms occurred over four days, whereas the duration of power reductions during the 2011 winter storm was less than eight hours. In some cases, Austin Energy circuits remained de-energized for many days due to the combination of deep

[6] "Cold Load Pickup" is an overcurrent condition that can occur when a distribution circuit is reenergized following an extended outage because the power supply has been unavailable for a sufficiently long period of time such that the load has reached a "cold" state before being re-energized. A "Forced Outage" on an electric distribution system is an outage caused by a breakdown such as an outage caused by tree limbs falling on an electric line or by the breakage of electrical equipment.

and prolonged ERCOT Load Sheds and storm-related damage on the circuits. Since the Winter Storms, Austin Energy has continued to increase the number of circuits or loads available for this type of Load Shed. Two sectionalization circuits have been added and another three are in the planning stages.

During the event, Austin Energy also worked with customers who still had power to encourage those customers to reduce power usage. Austin Energy met all the compliance targets set by ERCOT for power shedding and restoration during the Winter Storms.[7]

### Follow-Up Actions

OA 5.1 – Review Austin Energy's existing Load Shed Program and identify opportunities for improvement. (Completed Qtr. 3, 2021)

OA 5.2 – Refine customer communications in anticipation of Load Shed events to adequately communicate the possibility of prolonged outages and the importance of having robust emergency plans in place. (Qtr. 4, 2021)

OA 5.3 – Increase communications with Commercial and Industrial (C&I) customers on the need for emergency plans and backup generators to ensure that chemicals are stored safely in the event of a prolonged power outage. (Qtr. 4, 2021)

OA 5.4 – Continue active engagement in the regulatory process, including ongoing and proposed changes at ERCOT and PUCT. (Ongoing)

OA 5.5 – Continue to evaluate Austin Energy's electric system to identify circuits appropriate for sectionalization, and initiate projects to sectionalize additional circuits. (Ongoing)

## Critical Load

### Background

Austin Energy has identified customers that significantly impact public health and safety in its service area. These customers are classified as "Critical Load Customers" accordingly to levels of criticality. To the extent practical, circuits that supply Critical Load Customers are considered "Critical Load" circuits and are generally not subjected to Manual Load Shed even during energy emergencies.

Critical Load circuits reduce the number of circuits available for both shutting off power and rotating outages. As the state capital, with many essential government, health and emergency facilities, Austin has a disproportionately high number of these circuits. After the February 2011 winter storm, Austin Energy refined and improved its processes for identifying and updating its Critical Load Customer List. In addition, it has implemented an automated load-shed tool in the Supervisory Control and Data Acquisition (SCADA) system.

Critical customers with the highest criticality rating provide services that directly and immediately impact sustaining and protecting life or public safety, such as hospitals, utility control centers, international airports and water and wastewater treatment plants. Other Critical Load customers are facilities that significantly affect public health and safety but do not provide direct life support functions. Examples of these are nursing homes, ambulatory health care facilities and primary

[7]For more detailed information on this topic, see Current Nodal Operating Guides (http://www.ercot.com/mktrules/guides/noperating/current) Section 2: System Operations and Control Requirements, 2.6 Requirements for Under Frequency and Over Frequency Relaying.

public safety facilities such as 911 Call Centers.

Non-Critical Load Customers that share a circuit with Critical Load Customers are typically not subject to Load Shed as Austin Energy is not able to shed load on a more granular level than at these circuits. During a Load Shed event, however, Austin Energy works with these customers to encourage them to reduce power usage.

## Follow-Up Actions

OA 5.6 – Evaluate further sectionalizing of circuits with Critical Load Customers. Actions are on a case-by-case basis and can include:

- OA 5.6.1 – Initiating a project to identify whether critical customers could be moved onto dedicated circuits, and the equipment and resources required to reconfigure circuits. (Qtr. 1, 2022)
- OA 5.6.2 – Initiating a project to identify locations for the installation of equipment that will allow Austin Energy to shut off power to as many customers as possible that are not critical customers but are on a critical circuit. Austin Energy is currently working on seven circuits where critical load customers are located near the head of circuit and switches are in place to switch off downstream customers that are not critical customers. (Qtr. 1, 2022)

OA 5.7 – Evaluate inclusion of select Downtown Network loads in Load Shed programs and determine the feasibility of large customer voluntary load curtailment. (Qtr. 1, 2022)

OA 5.8 – Evaluate refining the current processes for identifying Critical Load Customers and the implementation of an improved online process for Critical Load request intake to optimize Critical Load data handling. (Qtr. 4, 2021)

OA 5.9 – Communicate to Critical Load Customers the importance of installing their own backup generators to free up additional circuits for Manual Load Shed. (Qtr. 4, 2021)

OA 5.10 – Improve education and communication outreach to Critical Load Customers to ensure they understand that there is always a possibility of an extended outage in extreme grid emergencies and encourage these customers to develop robust emergency plans, including backup generation, sufficient fuel or energy storage and plans for emergencies lasting longer than 24 hours. (Qtr. 4, 2021)

OA 5.11 – Review Austin Energy's ERCOT-mandated UFLS participation and work with ERCOT to jointly develop a strategy to enable greater flexibility around using UFLS circuits during ERCOT-mandated Load Shed. (Qtr. 1, 2022)

## Advanced Metering Infrastructure

### Background

Advanced Metering Infrastructure (AMI) is an integrated system of smart meters, communications networks and data management systems that enable two-way communication between utilities and customers. AMI automates functions like measuring electricity use and connecting and disconnecting services. AMI enables utilities to reduce demand and help manage energy consumption automatically and remotely.

The use of AMI for Load Shed is a concept that the electric utility industry, including Austin Energy, has explored but has not yet implemented. More testing and technological advancements are required to expand AMI capabilities. If technically feasible and operationally prudent, the use of AMI for Load Shed events will give Austin Energy an additional tool to shut off power and rotate outages more precisely during mandatory Load Shed.

During the Winter Storms, Austin Energy did not use AMI for Load Shed for the following reasons:

- Standard utility industry practice uses AMI for remote service connections in small quantities. AMI networks are not currently designed or proven for shedding and restoring tens of thousands of customers multiple times per day.
- AMI meters with service connect and disconnect functions, called Service Connect Meters, can only be installed on average-sized residential homes and is not suitable for businesses or larger homes. At the present time, Service Connect Meters are not fully deployed throughout Austin Energy's service territory.
- Austin Energy's standard practice is to test new functions thoroughly before deployment.
- Any kind of significant issue resulting from the use of AMI for widespread disconnect service may trigger the need for physical visits to each customer site, which could potentially overwhelm field personnel and lengthen outage times.
- Service Connect Meters are designed to remotely operate connect and disconnect functionalities on an average home size with up to a 200 Amp service. These meters are not yet designed to handle loads associated with larger homes, businesses or commercial sites. At the time of the Winter Storms, even though Service Connect technology on a 200 Amp service is tested and rated to withstand repeated operation under load, Austin Energy had yet to implement a significant program under extreme conditions.

### Follow-Up Actions

OA 5.12 – Conduct project feasibility discussions between Austin Energy and representatives of its AMI vendor to explore utilizing of AMI technology for Load Shed. (Ongoing)

## Large Commercial and Industrial Customers

### Background

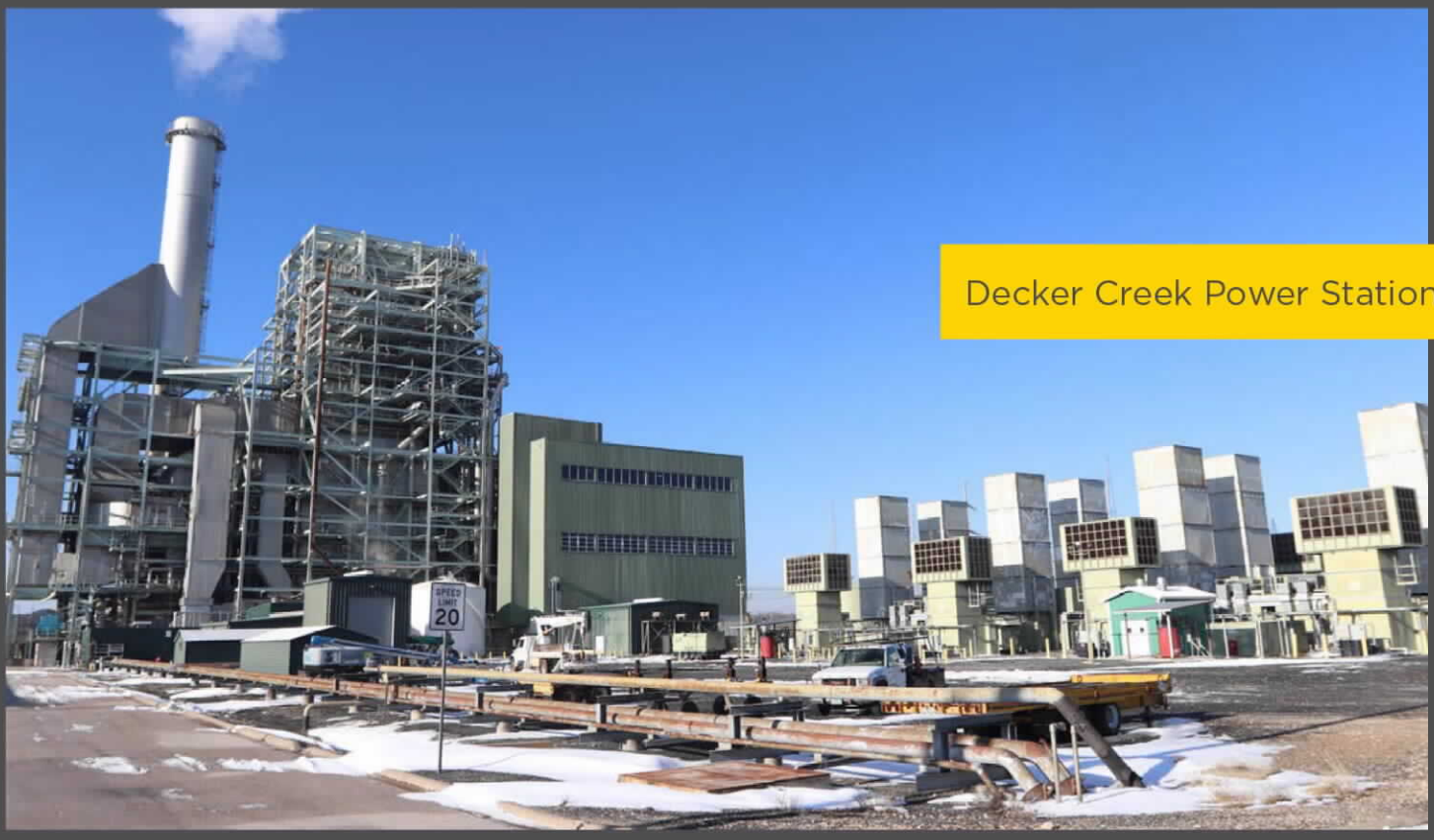
Large C&I customers with a high need for reliability often enter into a Dual Feed Service Agreement with Austin Energy for a second redundant circuit to maintain power if the first circuit has an outage. The dual feed can make it challenging to shed load for these customers, as the load is automatically transferred to an alternate circuit.

Rotating power shutoffs for some large C&I customers is not practical and would be disruptive to the grid. The sheer size of some C&I loads make repeated or sudden shutdowns and restorations impractical due to both the adverse impact on the customer's system as well as the surrounding electric grid. Certain large C&I customers have hazardous materials on-site or processes in place that could create health and safety concerns for their employees or the public if they experience a sudden and complete loss of power. Customers are responsible for managing and mitigating the risks associated with any on-site hazardous materials during power outages and meeting their regulatory obligations. During the Winter Storms, Austin Energy and the COA were called on to identify fuel sources for backup generators or restore power to specific customers to minimize public safety risk. Given these unique circumstances, Austin Energy identified an opportunity to achieve significant electric use reductions through a pre-planned curtailment process. Using this process, large C&I customers will be better able to significantly reduce load in a grid emergency in a safe and controlled manner.

### Follow-Up Actions

OA 5.13 – Establish a collaborative Load Curtailment program for large C&I customers to safely increase the amount of power available for Load Shed during ERCOT-mandated Load Shed events. (Qtr. 4, 2021)

OA 5.14 – Identify large C&I customers that require coordination due to complex service arrangements or potential onsite hazards. (Qtr. 1, 2022)




Decker Creek Power Station

## Downtown Underground Electric Network

### Background

Downtown lights and buildings on the Austin Energy downtown underground network electric grid remained energized during the Winter Storms while other parts of the city were without power for prolonged periods. The Downtown Network is an underground, high voltage, mesh network fundamentally different than the radial distribution grid found throughout the rest of Austin Energy's service territory. The network design, which is common in many large city centers, is designed to allow the flow of electricity through several different paths to ensure very high reliability. Unlike the radial distribution system, it is not possible to remotely disconnect specific segments of the downtown network, as the power will flow from another direction. Either the entire network must be de-energized, or specific buildings must be de-energized at the building's electrical vault.

There are also many critical loads on the downtown network, including hospitals, emergency operations centers and critical communications infrastructure. There are safety concerns related to suddenly de-energizing elevators in high rises. These network circuits are excluded from the Austin Energy Manual Load Shed program. Due to the operational complexity and limited resources available, Austin Energy did not mobilize crews to de-energize individual buildings with relatively small loads. Instead, high-priority restoration tasks were assigned to the crews during the Winter Storms. Austin Energy did communicate with downtown building owners, operators and occupants to reduce load as much as possible. Going forward, opportunities exist for better planning and coordination of power-use reductions in the downtown area during periods of constrained supply.

### Follow-Up Actions

OA 5.15 – Develop a communications protocol to engage Downtown Network customers on voluntary, collaborative and customer-implemented reductions of power use. This includes shutting down all non-essential lighting and equipment. (Qtr. 4, 2021)

OA 5.16 – Develop a method to manually cycle large commercial buildings for future load shed events. (Qtr. 4, 2021)

OA 5.17 – Initiate a project to document and formalize this manual process. (Qtr. 4, 2021)

# Observation 6 — ERCOT Market and Generation Plants

**Austin Energy has weatherization processes in place for Generation Plants and prepares for summer and winter weather each year. These processes are guided by industry best practices and subject to state and federal reliability compliance standards and protocols. The unexpected and extreme nature of the Winter Storms exceeded the established industry weatherization process guidelines. Austin Energy's generation resources, which are required to offer generation into the EROCT market, performed well overall with minimal outages during the Winter Storms.**

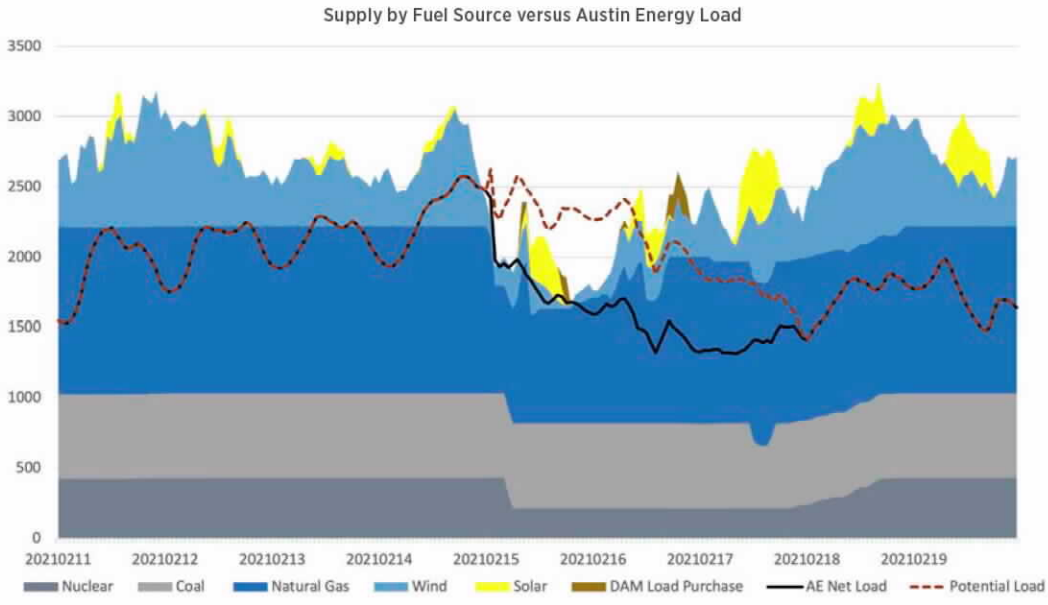
### Background

ERCOT operates a competitive, unbundled wholesale generation market that comprises a mix of utilities and power generation companies. All energy generators must sell into this market. Municipally owned utilities like Austin Energy that own generation, transmission, distribution and have retail customers are also required to offer generation resources into the ERCOT market. All power to serve Austin Energy's load is purchased through the ERCOT market. This market was designed to allow an electric utility to buy the most cost effective source of supply possible to service its customers whether that power is produced from its own generation resources or by other generators in the market. This design also means that the reliability of Austin Energy depends on the availability of power produced and transmitted by the collective power

resources and electric infrastructure of the ERCOT power grid. Austin Energy's generation resources positively contributed to power availability for the reliability of the ERCOT electric grid during the Winter Storms. However, there was not enough power available collectively from all generators to serve ERCOT's load. These conditions meant that, while Austin Energy's customers were protected from the high prices of the event, they were still subject to the ERCOT-mandated outages needed to maintain grid stability.

Austin Energy has a diverse mix of more than 5,000 MW of total power generation capacity, including three natural gas-powered plants in the Austin area.[8] Austin Energy co-owns two power plants outside Austin — one is powered by coal (Fayette Power Project — FPP), the other by nuclear fuel (South Texas Project — STP). Austin Energy also owns a biomass-burning plant near Nacogdoches, Texas (Nacogdoches Generation Facility). Austin Energy has worked with local leaders to develop the Austin Energy Resource, Generation and Climate Protection Plan to 2030 and is in compliance with the goals of this plan.[9] Purchase Power Agreements are in place for the remainder of the Austin Energy generation portfolio, namely for its renewable power supply. Austin Energy's generation resources performed well overall with minimal outages during the Winter Storms.[10] One exception concerned a unit outage at STP, of which Austin Energy is a minority co-owner but not the operator. The time series set forth in the chart below shows Austin Energy generation resource output relative to its customer load during the Winter Storms. In addition, the Nacogdoches Generation Facility was not in operation due to seasonal mothball which meant that the plant only ran in the more economically favorable summer months. The plant could not come out of seasonal mothball to run during the Winter Storms because fuel could not be transported in time due to harsh conditions.

## Austin Energy's Diverse Generation Resource Portfolio




As noted above, the power produced by Austin Energy's generation plants does not directly serve Austin Energy customers because of the interconnected nature of the statewide ERCOT grid and therefore this power could not be used to support power availability to its customers. However, Austin Energy's generation ultimately supported the stability of the entire grid and helped to prevent a grid-wide failure. Performance of the generation plants also shielded COA and Austin Energy

[8] Austin Energy Power Plants (https://austinenergy.com/ae/about/company-profile/electric-system/power-plants)

[9] Resource Generation Planning Update (https://austinenergy.com/ae/about/reports-and-data-library/generation-resource-planning-update)

[10] Austin Energy February Storm Briefing (https://www.austintexas.gov/edims/document.cfm?id=355922)

customers from catastrophic financial losses due to the purchase of expensive replacement power which was experienced by some other utilities in ERCOT.

Weatherization Preparation is the practice of protecting a facility from the elements and Austin Energy carries it out in accordance with ERCOT requirements. Austin Energy made recommended weatherization improvements to its plants following the February 2011 winter storm and it is now contracting with a third-party engineering firm to perform an analysis to identify opportunities in current Weatherization Preparation processes. Key Winter Storms impacts observed by the team included damage to pipes, water leaks and frozen control lines. Some identified Weatherization Preparation gaps have already been closed, such as acquiring and maintaining extreme cold weather equipment on-site, and Austin Energy will review and implement the third-party recommendations as appropriate.[11]

### Follow-Up Actions

OA 6.1 – Monitor and engage with regulatory changes in the Weatherization Preparation area. (Ongoing)

OA 6.2 – Review and update the existing Plant Freeze Protection Checklists. (Completed Qtr. 4, 2021)

OA 6.3 – Assess heat tracing on lines at floors of gas Generation Plants and outside water piping and perform any necessary upgrades. (Qtr. 4, 2021)

OA 6.4 – Review and evaluate the weatherization practices, including checklists and procedures for routine winter preparedness, at power generation facilities. (Qtr. 4, 2021)

OA 6.5 – Evaluate field instrumentation and conduct engineering analysis of winterization measures at all facilities. Implement the identified corrective and freeze protection measures. (Qtr. 4, 2021)

OA 6.6 – At District Energy and Cooling facilities,

OA 6.6.1 – Review existing cooling tower procedures to include draining non-operational cooling towers and maintaining continuous flow in operational ones. (Qtr. 4, 2021)

OA 6.6.1 – Design and implement change controls to optimally run cooling towers when temperatures are below freezing. (Qtr. 4, 2021)

OA 6.6.1 – Fabricate and install protection on a gas turbine inlet filter to prevent ice and snow buildup from entering a gas turbine and causing a generating unit trip. (Qtr. 4, 2021)

OA 6.7 – Recommission Nacogdoches Generation Facility in anticipation of 2021-2022 winter season. (Completed Qtr. 4, 2021)

## Observation 7 — Restoration Process

**Customers benefit from effective utility restoration efforts and from timely, clear and relevant customer communications regarding outages, power restoration timelines and taking specific steps to help restoration efforts.**

### Background

It is Austin Energy's goal to give accurate, timely and consistent messaging to its customers. During and after the Winter Storms, some Austin Energy customers reported being given inadequate or inaccurate information regarding outages and the restoration of power or they reported difficulty in reporting outages. Some customers reported difficulty using

[11]Austin Energy Power Plant Winterization (http://www.austintexas.gov/edims/document.cfm?id=362355)

the outage website. Customers also had questions about the accuracy of outage information on the website, as well as complaints about receiving text messages with incorrect information regarding power restoration. Austin Energy is implementing improvements to its outage website, restoration processes and damage assessment processes to provide better communication on power outages and restoration efforts. The team is developing and implementing a tiered Estimated Time of Restoration (ETR) process to be used during future storm restorations. These improvements better address customers' planning needs.

## Damage Assessment Personnel

### Background

Line crews typically perform damage assessments during smaller storms. In larger storm events, line crews are supplemented with other field staff in secondary roles, and this staff augmentation method has been successfully used by Austin Energy to reduce the workload of line crews.

### Follow-Up Actions

OA 7.1 – Document expansion of the Incident Command Team to include damage assessment functions and responsibilities, to be activated during major storms and events. (Qtr. 1, 2022)

OA 7.2 – Expand damage assessment staffing with selected Engineering and Distribution Electrician staff in secondary roles. (Qtr. 2, 2022)

OA 7.3 – Document damage assessment role into the ADMS Field Client[12] and implement this capability in ADMS. (Qtr. 1, 2022)

## Single Outage Process

### Background

Utility practice is to prioritize the restoration of large-scale outages. A "single outage" is defined as an outage that affects a single customer. Restoring these outages is generally postponed until the end of the storm restoration process by most electric utilities. Austin Energy developed, staffed and executed a process for restoring single outages during and after the Winter Storms.

Austin Energy made the following improvements to the Single Outage Process:

- Identify and address individual or nested outages during future restoration events and investigate outage and restoration data to report power restoration on the outage website accurately.
- "Areas" can now be manually polled (a.k.a. "pinging" a meter or remotely reading a meter on-demand) through the AMI network at the circuit level to acquire outage and restoration information, and the first polled positive responses are logged.
- A second poll is sent only to premises with no return message.
- The Single Outage Process includes efforts by workgroups within Austin Energy. The Austin Energy Contact Center

[12]ADMS Field Client is a web-based application that is specially designed for field personnel to access the distribution management system remotely.

staff and the Escalations staff coordinate staff and streetlight crew efforts to patrol non-responsive meters for service level or distribution level issues.

- While crews are patrolling, the poll attempt process continues until a ping result is achieved. This data is then reconciled with ADMS.
- All processes have been tested and verified as well as mapped and documented. The processes are ready to be added to the Incident Command Process Catalog, a process tracking catalog used and maintained by the Incident Command Team.

### Follow-Up Actions

OA 7.4 – Add the Single Outage Process to the Incident Command Process Catalog. (Qtr. 1, 2022)

OA 7.5 – Enhance the Single Outage System by integrating ADMS and the AMI Head End System (the front-end system that transmits meter data from the field). This integration will minimize or eliminate the need for manual intervention, resulting in increased efficiency and a more rapid response time. (Qtr. 2, 2022)

## Advanced Distribution Management System

### Background

At Austin Energy, ADMS is the software platform that supports the full suite of electric distribution management and optimization processes. ADMS includes functions that automate outage restoration and improve the performance of the Austin Energy distribution system. During the Winter Storms, ADMS experienced some notification and alert errors. Austin Energy analyzed the causes of these errors and addressed the issues as outlined below.

### Follow-Up Actions

OA 7.6 – Brief the Field Crews and Control Room Operators on the importance of promptly updating the work order status in ADMS. (Completed Qtr. 1, 2021)

OA 7.7 – Address ADMS user screen issues as follows:

OA 7.7.1 – A technical issue was identified and resolved by immediately installing a patch by the ADMS vendor during the Winter Storms event. (Completed Qtr. 2, 2021)

OA 7.7.2 – A production update that addressed screen issues was posted in Production. (Completed Qtr. 2, 2021)

OA 7.7.3 – ADMS outage-file-related issues that impacted the Outage Map and Outage Alert Texting were caused by file format and internal processing issues. These issues caused a group of affected customers to be unrepresented on the outage map and excluded from outage text alerts. A set of fixes was deployed. (Completed Qtr. 3, 2021)

OA 7.8 – Evaluate and improve existing restoration processes to include:

OA 7.8.1 – Identification of factors that determine when ADMS should switch back into normal operations mode. (Completed Qtr. 2, 2021)

OA 7.8.2 – Information on truck availability. (Completed Qtr. 2, 2021)

OA 7.8.3 – Automation of work orders. (Completed Qtr. 2, 2021)

OA 7.9 – Identify activities that can be delegated to other roles to allow staff serving as Operators and Shift Supervisors additional bandwidth and conduct a Dispatcher training simulation. (Completed Qtr. 2, 2021)

OA 7.10 – Develop and formalize the Single Outage Process. (Completed Qtr. 3, 2021)

OA 7.11 – Evaluate and improve the Escalation Process, communicate with and train personnel on the new Escalation Process. (Completed Qtr. 3, 2021)

OA 7.12 – Develop and implement a tiered ETR process to be used during future storm restorations. (Qtr. 2, 2022)

OA 7.13 – Develop tier levels (e.g., large groups, medium groups, small groups, singles). (Qtr. 2, 2022)

OA 7.14 – Establish Field Line Crew and Forestry Crew Liaisons in the Energy Control Center (ECC) during incident Command activations, as needed. (ongoing)

## Energy Management System/Supervisory Control and Data Acquisition System (EMS/SCADA)

### Background

During the Winter Storms, the Austin Energy EMS/SCADA system enabled Austin Energy to execute ERCOT-mandated Load Shed requirements. Following the 2011 winter storm, Austin Energy improved its Manual Load Shed process, by enhancing its Load Shed processes and tools. These enhancements included implementing an automated Manual Load Shed application in its EMS/SCADA system and creating new processes to update and maintain its Critical Load and Manual Load Shed lists. The EMS/SCADA system's Load Shed application monitors the real-time indications and measurements of remote field devices and allows for more automated and systematic control of such devices. This capability was important due to the large number of field devices to remotely control, especially during the prolonged periods of extreme weather and difficult travel conditions experienced during the Winter Storms.

In January 2020, Austin Energy went live with a new, industry-leading EMS/SCADA system that had many improved features including a new Load Shed application. This system implementation included extensive testing as well as a week-long certification review by on-site personnel from TexasRE and NERC. Austin Energy also performed several storm and emergency drills to ensure that the system and personnel were prepared for adverse events.

### Follow-Up Actions

OA 7.15 – Continue to test and update the EMS/SCADA System as necessary to maintain its effectiveness. (Ongoing)

## Cold Load Pickup

### Background

Cold Load Pickup is an overcurrent condition that can occur when a distribution circuit is re-energized following an extended outage because the power supply has been unavailable for a sufficiently long period of time such that the load has reached a "cold" state before being re-energized.[13] Frequently, Cold Load Pickup currents are high and cause the circuits to trip. This condition is especially challenging in extreme weather events, because large appliances like heating or air conditioning equipment consume a large amount of electricity that can aggregate into thousands of kilowatts per household or business

Cold Load Pickup was an issue during multiple days of the Winter Storms. The extent and duration of the required power shutoffs to a large number of Austin Energy's circuits exhausted the pool of circuits not considered critical and prevented Austin Energy from being able to rotate outages. Many circuits remained out of service for extended periods, and

[13] "What is meant by Cold Load Pickup," Schneider Engineering (https://www.se.com/eg/en/faqs/FA410344/); and "Cold Load Pickup Issues," IEEE Explore (https://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=4982512)

temperatures in homes and businesses dropped during these extended outages. These extended outages worsened Cold Load Pickup issues when electric circuits were restored and many large appliances were simultaneously energized, causing a simultaneous spike in energy usage. This energy spike frequently caused re-energized circuits to subsequently trip an overcurrent.

In response to Cold Load Pickup issues, Austin Energy crews sectionalized circuits using circuit switches and then restored power in segments. This segment-by-segment or incremental restoration took longer because of difficult road and operating conditions and helped to avoid more widespread power outages from Cold Load Pickup.

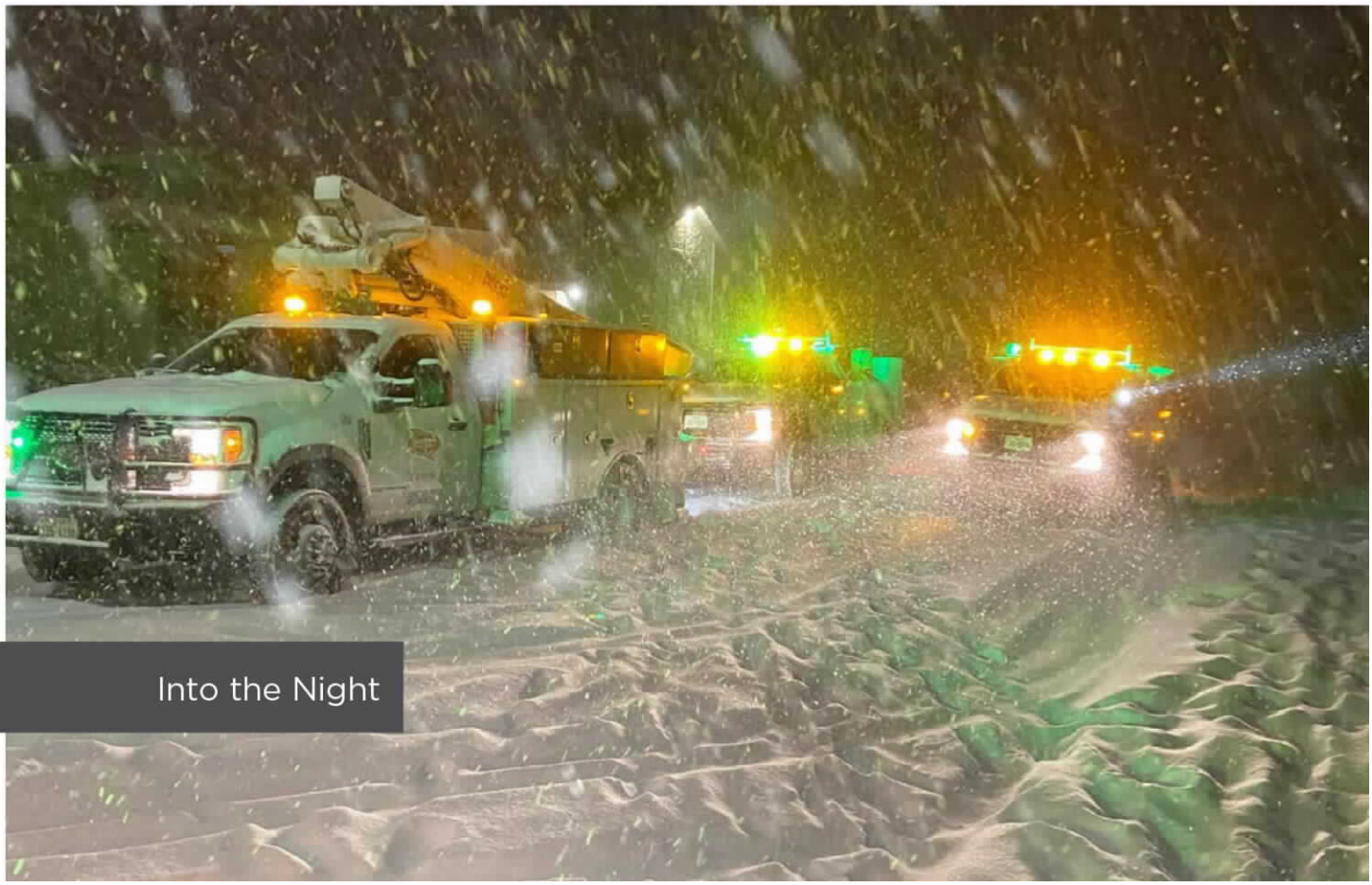
## Follow-Up Actions

OA 7.16 – Continue to field sectionalize and restore circuits in increments where Cold Load Pickup is an issue in the short term, while evaluating long-term alternative processes. (Ongoing)

OA 7.17 – Evaluate the Cold Load Pickup process to determine necessary changes and document the process for bringing back circuits when Cold Load Pickup may affect restoration. (Qtr. 1, 2022)

OA 7.18 – Evaluate geographic areas with large penetrations of electric heating appliances and further analyze alternative relay settings and other mitigation factors, such as automated reclosers. (Qtr. 1, 2022)

OA 7.19 – Continue to communicate to the public, and to building operators and facility managers, the importance of turning off electrical devices and setting back thermostats when electric outages occur, and to slowly adjust thermostat settings after power is restored. (Ongoing)



Into the Night

# Observation 8 — Management of Vegetation near Power Lines

**Austin Energy electric circuits with recently pruned vegetation performed significantly better during the Winter Storms than circuits around vegetation that had not been pruned recently. Austin Energy's customers benefit from the maintenance of adequate and standard tree clearances.**

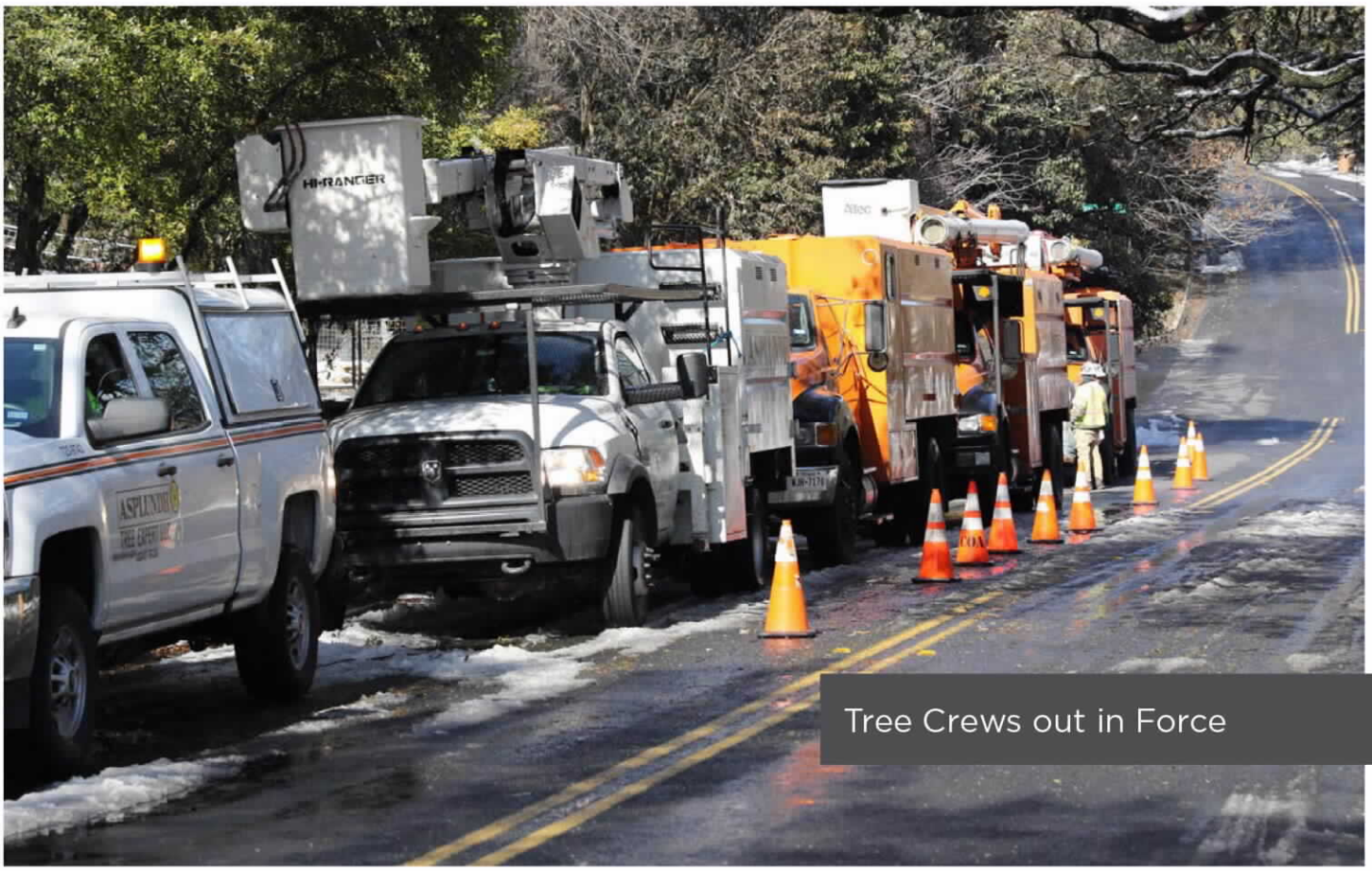
## Background

Austin Energy's contractors performed significant emergency tree pruning near power lines to remove tree branches and trees damaged by the inclement weather in order to restore power. The utility's customers benefit from adequate clearances between branches and vegetation and power lines. In 2019, Austin Energy increased its standard clearances between trees and wires. As Austin Energy vegetation management contractors complete their citywide tree trimming cycle, there will be greater clearances between trees and power lines throughout the city and fewer instances of tree-caused outages during significant storm events.

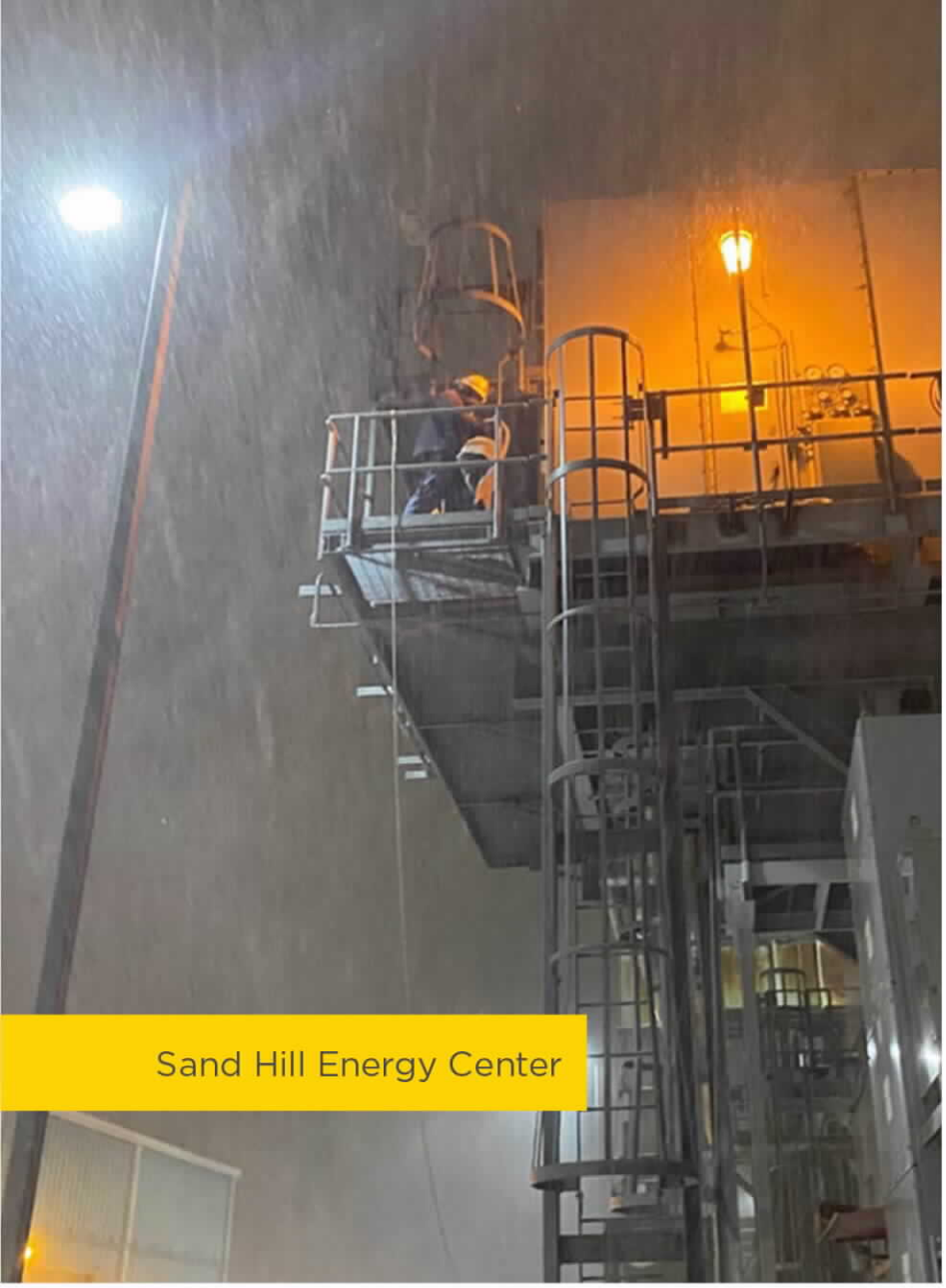
## Follow-Up Actions

OA 8.1 – Continue the Austin Energy vegetation management pruning program cycle and maintain adequate clearances between trees and wires in accordance with the tree pruning clearances established in 2019. (Ongoing)

OA 8.2 – Communicate to neighborhood associations and other community groups the pressing need for Austin Energy to prune regularly in accordance with its standard clearances to ensure that adequate tree and vegetation clearances are established and maintained around power lines. (Ongoing)




Tree Crews out in Force



Sand Hill Energy Center

Working the Line

Balcones Restoration Event

# Observation 9 — Substations

**Austin Energy substations operated without major issues during the Winter Storms. The few issues that did arise presented opportunities to improve Austin Energy substation operations during storm events.**

## Background

With one exception, Austin Energy substations operated without any major incidents during the Winter Storms. The one operational issue involved a slow breaker operation at a substation on the west side of the service territory. The affected breaker was slow to clear a fault after storm-damaged vegetation fell on a power line. This slow breaker operation resulted in a brief substation outage and the loss of one of the two key supply circuits to the AW Ullrich WTP. Although power at the substation was quickly restored, field and plant switching were delayed due to challenging road conditions that impacted the ability of AW staff to perform operations at the water treatment plant.

Austin Energy also experienced a gas-insulated transmission circuit breaker that ran short of gas during the Winter Storms. Gas-insulated transmission circuit breakers are designed to protect high-voltage electrical circuits from damage caused by overload or short circuit. When transmission breakers run low on gas, the breakers require service. Accordingly, Austin Energy staff were dispatched to the substation where low gas was detected. While the low-gas conditions did not cause any major operational issues or customer outages, addressing low gas on transmission breakers required travel to substations in challenging road conditions by Austin Energy staff.

## Follow-Up Actions

OA 9.2 – Identify through a dedicated Austin Energy team, remediation approaches for gas transmission breakers. These remediation approaches include monitoring and control changes and selected breaker replacements. The team uses Electric Power Research Institute (EPRI) contacts and resource materials to develop these approaches. (Qtr. 1, 2022)

OA 9.2 – Develop with a dedicated Austin Energy team, a distribution breaker refurbishment program and identify potential routine breaker maintenance improvements to reduce incidences of slow breaker operations. This team is also using EPRI contacts and resource materials to assist in resolution. As of mid-September 2021, this team has refurbished over 100 breakers using in-house technicians. (Qtr. 4, 2021)

Parmer Lane Substation

# Observation 10 — Transmission Lines

**The Austin Energy transmission system was not heavily impacted during the Winter Storms. As a result of the extended freezing weather, ice accumulation and high winds, there were three incidents that caused transmission lines to be de-energized.**

## Background

Austin Energy has approximately 624 miles of overhead transmission lines. These lines serve the Austin area substations and extend far beyond Austin to interconnect with generation facilities and other transmission systems. The Austin Energy transmission system was not heavily impacted during the Winter Storms. There were three incidents that caused lines to be de-energized as a result of the extended freezing weather, ice accumulation and high winds. These incidents did not have any material operational impact on the electric system.

Austin Energy has a 345kV circuit that shares transmission towers with the Lower Colorado River Authority (LCRA). Both the Austin Energy and LCRA circuits experienced outages resulting from broken static conductors that fell on the phase conductors. These failures were caused by increased tension in the conductor caused by prolonged freezing temperatures and high winds. Austin Energy and LCRA worked together to remove the broken static conductors and restore the circuits.

Another 345kV circuit operated and reclosed several times due to "galloping" conductors. Galloping is caused by ice accumulation on the conductors coupled with high winds creating conditions for the phase conductors to swing into each other.

Severe cold weather causes conductors to contract, and when combined with icing, can cause wires to reach a state of high tension, which increases the risk of breakage. On a 138kV circuit, a single strand of optical ground wire (OPGW) broke, became unraveled, and made contact with a phase conductor, causing a momentary outage. Austin Energy staff concluded that the OPGW was likely struck by lightning and damaged prior to the winter storm. Transmission construction crews completed the OPGW repair, and the circuit was placed back in service.

## Follow-Up Actions

OA 10.1 – Coordinate with LCRA to replace and upgrade the static conductors for 345kV lines on the jointly owned transmission line that experienced breakages. (Qtr. 4, 2021)

OA 10.2 – Meet with LCRA to review emergency event response responsibilities for jointly owned facilities. (Completed Qtr. 3, 2021)

OA 10.3 – Evaluate the need for additional anti-galloping devices on affected circuits. (Completed Qtr. 3, 2021)

# Observation 11 — Black Start Process

**Austin Energy took steps and strategically stationed personnel at critical substations to execute its Black Start Restoration Plan, in preparation for a possible total ERCOT system blackout, which fortunately did not occur.**

## Background

Many customers in Austin experienced prolonged outages due to the four days of ERCOT-mandated Load Shed (discussed in Observation 5 — Load Shed Requirements and Management). These controlled power outages were done to prevent a total system collapse and blackout, which would have resulted in power loss for the entire grid for a much longer period and required a restart of the electric system. This restart of the entire grid after an uncontrolled system collapse is called "Black Start."

Austin Energy has an agreement with ERCOT to provide black start capability from one of its four Decker gas turbines. The Austin Energy Black Start Restoration Plan outlines the guidelines for restoring electric service in the event of a partial or complete collapse of ERCOT or the Austin Energy system. This plan prioritizes restoring the ERCOT system to a normal state as quickly as possible, in a stable and orderly manner. Implementation of this plan requires coordination between Austin Energy, ERCOT, neighboring Transmission Service Providers, Resource Entities and Qualified Scheduling Entities. This restoration plan is written to address various operating situations in conjunction with ERCOT's Black Start Plan. Austin Energy conducts tabletop drills and other readiness activities to perform this role.

While Austin Energy's Black Start Agreement with ERCOT provides for a designated primary and backup unit, any of the four Decker gas turbine generators can perform the service. During the Winter Storms, the primary unit was available throughout the entirety of the winter storm. In the event of a total grid failure, all generation within ERCOT would go dark. At Decker there are two diesel generators that would supply power at the plant to restart the gas turbines. During the Winter Storms, the two diesel generators were started to confirm availability. While the primary diesel generator performed well, there was a minor adjustment needed to start the backup diesel generator. This minor adjustment was accomplished in less than thirty minutes. The backup diesel generator adjustment did not affect the ability of Austin Energy to provide Black Start services to ERCOT.

An ERCOT system blackout did not occur during the Winter Storms. However, ERCOT's difficulty controlling the frequency of the system during the Winter Storms highlighted the need to ensure that all aspects of this potential event are explored.

## Follow-Up Actions

OA 11.1 – Evaluate the existing Black Start Process to ensure consistency and continuity between the Black Start Process and Business Continuity Plans. (Completed Qtr. 2, 2021)

OA 11.2 – Develop scheduling scenarios for multiday emergency events that can be filled out ad-hoc and develop a process to track and identify available call center staff and other staff necessary to handle essential needs during emergency events. (Completed Qtr. 3, 2021)

OA 11.3 – Maintain and communicate an updated list of available work sites and meeting locations for staff and team meetings during Incident Command activations. (Ongoing)

OA 11.4 – Work with HSEM to develop a Grid Failure and Business Continuity seminar for stakeholders to strengthen organizational resilience, better coordinate decisions and identify and address planning gaps. (Ongoing)

## Observation 12 — Fleet Management

**During the Winter Storms, prolonged low temperatures and significant winter precipitation presented challenges for vehicle travel. Opportunities exist for ensuring that Austin Energy's fleet vehicles are storm-ready.**

### Background

Austin Energy has a fleet of approximately 800 vehicles and units in addition to passenger vehicles. This fleet includes a wide range of specialized vehicles and equipment that are critical to electric operations. During the Winter Storms, Austin Energy staff experienced challenges with this fleet. These challenges included ensuring that enough vehicles were readily accessible and storm-ready, as well as training staff on proper winter weather driving and weather-appropriate equipment use. Winter weather vehicle equipment, such as snow tires or chains for snow and ice, is not commonly needed in Central Texas. Austin Energy staff had inadequate supplies of winter weather-appropriate equipment needed for safer driving in winter weather conditions.

### Follow-Up Actions

OA 12.1 – Identify and document the types of vehicles and winter storm equipment needed for significant and prolonged storm events. (Completed Qtr. 3, 2021)

OA 12.2 – Ensure Austin Energy and the COA's Fleet Department have clear lines of responsibility for ensuring that vehicles are winter storm-ready and that winter storm-related accessories and parts are readily available at appropriate Austin Energy facilities. (Completed Qtr. 3, 2021)

OA 12.3 – Ensure that Austin Energy and the COA's Fleet Department have an established communication plan to coordinate support of the fleet being dispatched to the field during winter storm events. (Qtr. 4, 2021)

OA 12.4 – Develop training on winter storm driving, including how to drive with snow chains and support for how and when to install and remove snow chains. (Qtr. 4, 2021)

OA 12.5 – Ensure fleet vehicles are available to COA's Fleet Service Center Operations to ensure all appropriate preventative maintenance is performed seasonally and completed before winter. (Qtr. 4, 2021)

## Observation 13 — Vegetation Debris Resulting from Winter Storms

**The Winter Storms caused widespread and significant damage to trees and other vegetation throughout the city, some near power lines. During the Winter Storms, Austin Energy contractors performed emergency tree pruning near power lines to restore power. Austin Energy will not generally have its contractors remove vegetation debris during major storms, as power restoration is the utility's priority. Confusion arose because property owners were not aware of the debris pickup process in effect during major storms.**

### Background

The Winter Storms caused widespread and significant damage to trees and other vegetation throughout the city. Downed trees and branches also damaged some Austin Energy infrastructure. During the Winter Storms, property owners had questions regarding responsibility for removing the storm-generated tree and vegetation debris, some of which resulted from Austin Energy's storm restoration work.

There were numerous cases of falling trees and heavy limbs toppling sections of power lines during the Winter Storms. This made significant tree pruning necessary to complete the power restoration. As power restoration is Austin Energy's priority during widespread storm events, such as the Winter Storms, debris associated with Austin Energy's work was not uniformly picked up by Austin Energy's vegetation management contractors when the debris was generated.

### Follow-Up Actions

OA 13.1 – Collaborate with COA departments and communicate to the public on social media platforms on major storm debris pickup process. (Qtr. 4, 2021)

OA 13.2 – Update the Austin Energy website to highlight the debris pickup process in effect during major storms. (Qtr. 4, 2021)

## Observation 14 — Emergency Critical Supplies

**During the Winter Storms, food, water and shelter supplies for Austin Energy on-site and field staff dropped below optimal levels.**

### Background

Essential and support employees carry out crucial roles to ensure Austin Energy can effectively provide power to the community during emergency events. During the Winter Storms, some Austin Energy employees were on-site at utility facilities 24/7 and in the field in treacherous weather and icy road conditions. These teams were provided meals and accommodation at Austin Energy plants and facilities or hotels. There were challenges to the timely provision of catering and supplies for these employees as most businesses were closed and icy conditions made the roads impassable to traffic. Ensuring adequate water, food and lodging for on-site employees was a significant challenge.

### Follow-Up Actions

OA 14.1 – Determine a means of obtaining and storing safe drinking water for use during severe weather events. As of September 2021, approximately 70 pallets of shelf-stable drinking water had been obtained. (Completed Qtr. 3, 2021)

OA 14.2 – Determine a means of obtaining shelf-stable food supplies that can be stored for extended periods without damage or degradation. (Qtr. 2, 2022)

OA 14.3 – Review current critical supply inventory list, determine minimum supply storage levels and determine a firm schedule for refreshing inventory. (Qtr. 2, 2022)

OA 14.4 – Review current vendors and caterers list; strengthen and establish vendor and caterer relationships and determine a firm schedule for periodically updating the list of vendors and caterers. (Completed Qtr. 2, 2021)

# Observation 15 — Employee Health and Well-Being

**During the Winter Storms and in the days following, many employees were working long hours in high-stress situations as was required to maintain and restore power.**

## Background

Essential and support employees carry out crucial roles to ensure Austin Energy effectively provides power to the community. The 10 days of storms were a period of very high stress for employees engaged in work necessary to maintain and restore power. During the Winter Storms, many employees were on-site 24/7 and many were in the field in treacherous conditions as necessary to support Austin Energy operations. Other employees worked long hours from their homes following COVID-19 remote-work protocols. Like the rest of the community, many Austin Energy employees had homes and families without water, electricity, heat or internet access. Counselors from the Employee Assistance Program (EAP) were brought on-site to some Austin Energy locations (with particular focus and attention on the Energy Control Room) to be available and provide direct assistance to employees.

## Follow-Up Actions

OA 15.1 – Continue having supervisors and leadership perform regular employee well-being check-ins to determine how employees are coping in the aftermath of the Winter Storms. (Completed Qtr. 3, 2021)

OA 15.2 – Continue to reinforce the EAP as many employees were affected by the stress of the Winter Storms event. (Ongoing)

OA 15.3 – Review existing employee support plans and procedures, update existing ones and identify additional steps to support employees who carry out duties in extreme weather conditions, such as security guards stationed outside and the Customer Care team. (Completed Qtr. 3, 2021)


Meal Prep

## Observation 16 — Remote Workforce

**In March 2020, Austin Energy transitioned its workforce to a hybrid of on-site and remote work at the onset of the COVID-19 pandemic. Extensive work continued to be performed remotely at the inception of the Winter Storms. This arrangement allowed the remote workforce to perform routine and critical Austin Energy work while also limiting the number of staff required to be on weather-impacted roads to reach Austin Energy worksites.**

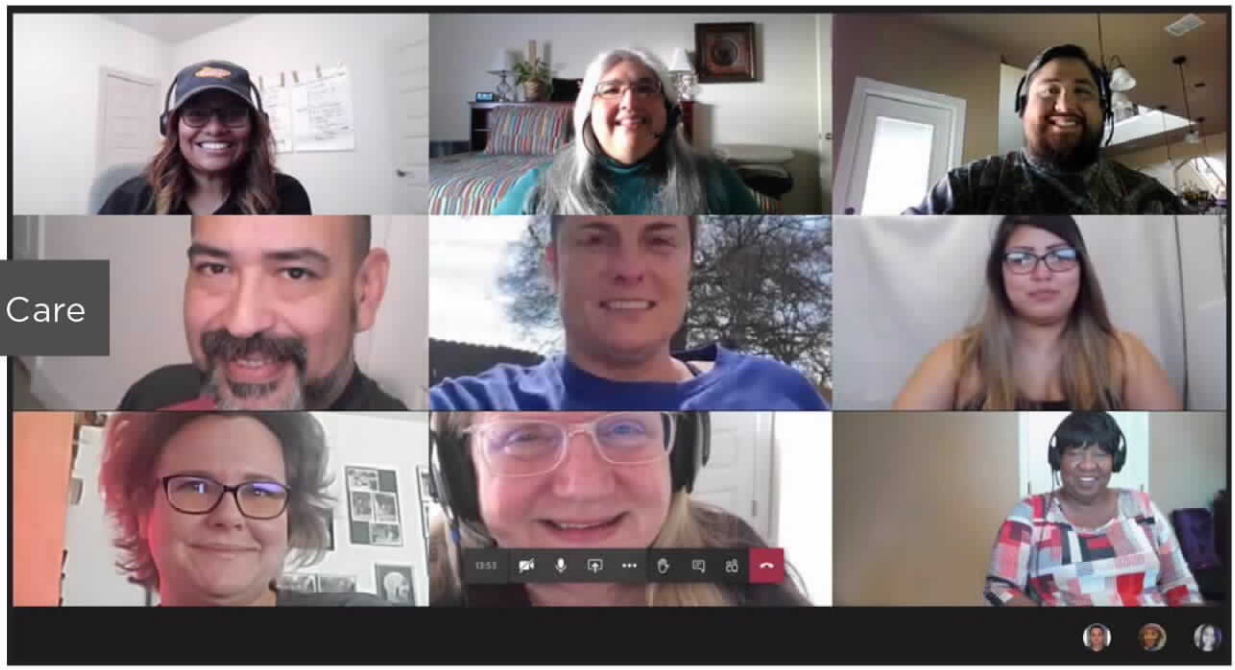
### Background

To continue to meet the operational mission of Austin Energy, approximately 70 percent of Austin Energy staff transitioned to remote work to mitigate the impacts of the COVID-19 pandemic. In early 2020, Information Technology (IT) systems and processes were quickly strengthened to support a largely remote workforce. This initiative included a shift from desktop computers to more versatile notebook computers. Staff became acclimated and skilled at working effectively and collaboratively while remote. This capability was invaluable during the Winter Storms as staff could remotely support the on-site workforce. While the loss of power or internet impacted some remote staff, other staff could take on additional responsibility to ensure that essential work was performed. An additional benefit of remote work during the Winter Storms was that fewer Austin Energy staff were required to be on-site, and Austin Energy resources (water, food and bedding) were more effectively used to support critical on-site personnel.

### Follow-Up Actions

OA 16.1 – Continue supporting a remote workforce, including the final transition to notebook computers and further strengthen the IT infrastructure. (Ongoing)

Customer Care



# Observation 17 — Safety Management

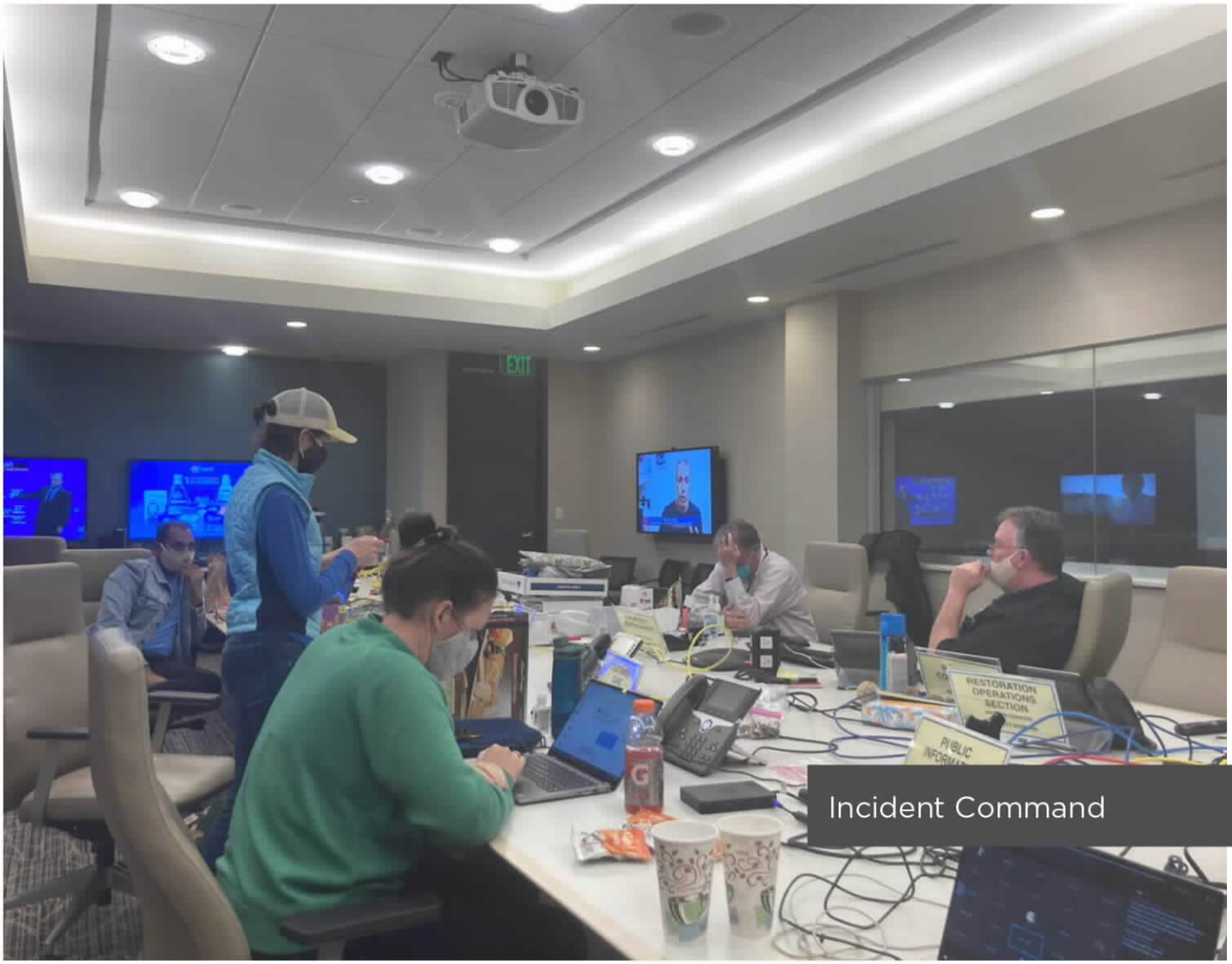
**The Winter Storms caused severe weather and treacherous road conditions over the course of many days. Austin Energy staff did not suffer any worker injuries or fatalities during the Winter Storms.**

## Background

Safety Management is a core principle of Austin Energy. A safe and healthy workplace protects workers from injury and illness, lowers the costs of injury and illness, reduces absenteeism and turnover, increases productivity and quality and raises employee morale. Safety messages and tips were constantly issued and consistently reinforced during the Winter Storms.

## Follow-Up Actions

OA 17.1 – Research and review other electric utility AARs and documented safety event synopses that were prepared following the Winter Storms and determine if any additional safety precautions can be implemented during future severe weather events. (Ongoing)




Incident Command

## Observation 18 — Climate Event Risk Assessment

**Climate and weather risk assessments informing Austin Energy operations will provide greater value in managing future extreme weather conditions if the assessments are updated at a regular frequency, extreme cold events analyzed explicitly and analyses of regional vulnerabilities that may impact Austin Energy's customers included.**

### Background

To date, Austin Energy has conducted climate risk analyses focused on anticipated increases in heat, drought, floods and wildfires over the long-term (50–100 years). Impacts of those events have typically been assessed assuming the events are stand-alone; assessments have focused on local disruptions. The Winter Storms demonstrated the significant risk posed by an extended cold weather event with both local and grid-wide impacts and damage.

### Follow-Up Actions

OA 18.1 – Enhance existing climate event risk analysis and vulnerability assessments to incorporate updated climate forecast data. Develop scenarios for planning purposes reflecting updated expectations for average climate conditions, extreme climate events and grid-scale impacts. (Qtr. 1, 2022)

OA 18.2 – Conduct formal risk assessments with these updated scenarios to understand impacts to Austin Energy from different types of climate events and develop mitigation measures. (Qtr. 1, 2022)

## Observation 19 — Collaboration with COA Departments

**The Winter Storms highlighted the need to further strengthen collaboration and communication between COA departments.**

### Background

The Winter Storms showed the need to further the collaboration and communication between Austin Energy and other COA departments to ensure uniformity and consistency with the communication and services provided.

### Follow-Up Actions

OA 19.1 – Develop a policy in coordination with the HSEM to determine in-person versus remote Emergency Operations Center (EOC) attendance. (Completed Qtr. 3, 2021)

OA 19.2 – Work with the City Controller's office to pre-establish reporting codes prior to a severe weather event to ensure proper tracking of activities and tasks. (Completed Qtr. 3, 2021)

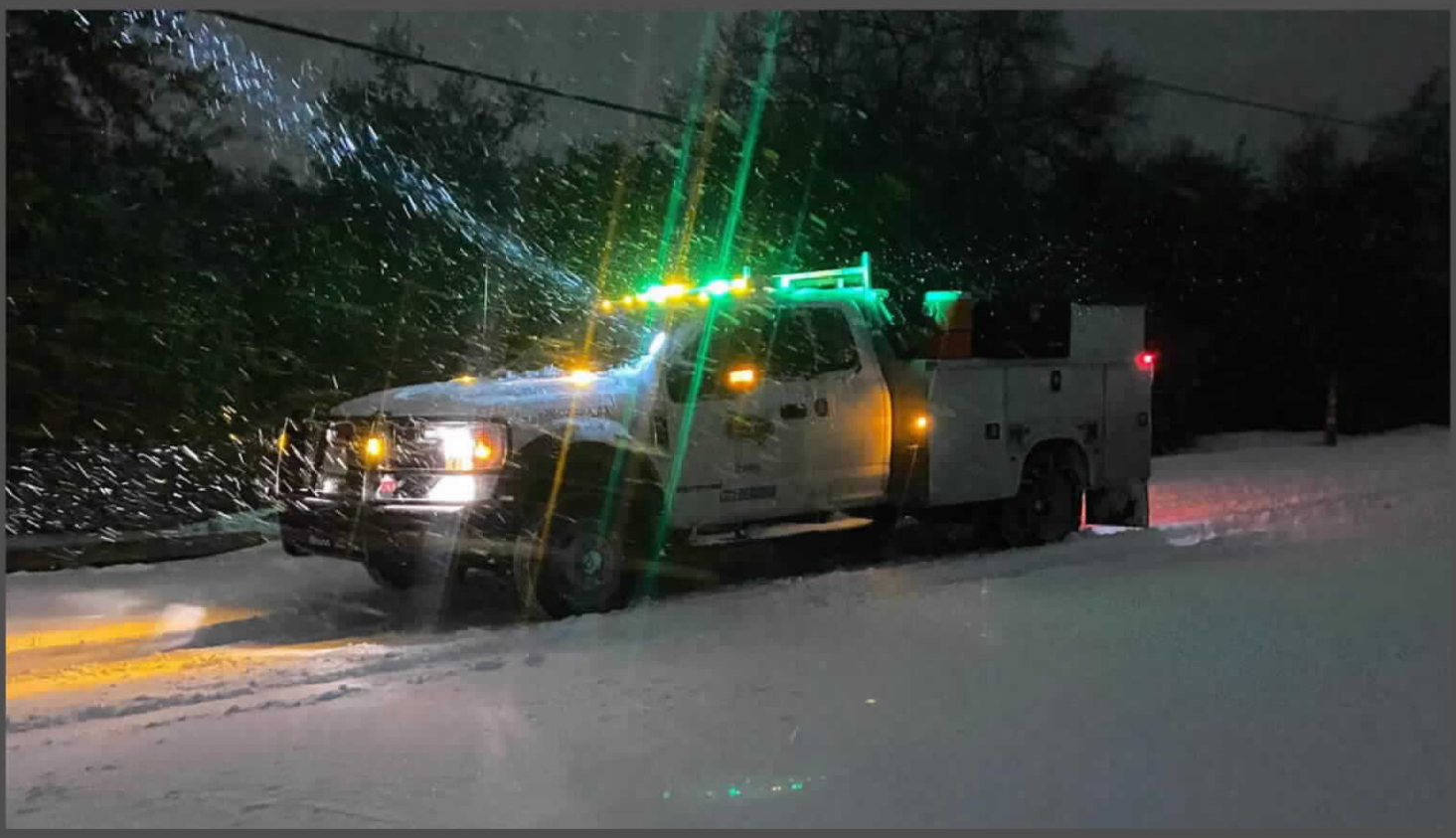
OA 19.3 – Support the development of a City-Wide Resilience Hubs Network in accordance with the direction provided by City Council **Resolution 20210408-028** passed in April 2021. The Resolution calls for COA departments to design and equip pilot resilience hubs that provide the community with resources during disasters. The Resolution also calls for COA departments to create a community-wide plan for more hubs sufficient to serve all Austinites during emergencies. This multi-department effort is being led by the Office of Sustainability with input from Austin Energy and other departments. (Ongoing)

# 5. CONCLUSION

The Winter Storms and the associated ERCOT emergency events were unprecedented. During the freezing temperatures, ice storms and torrential freezing rain, Austin Energy drew on many decades of storm restoration experience to serve the community. The situation significantly worsened when ERCOT, the market operator for a large portion of Texas, was unable to meet electric demand and directed a series of Load Sheds spanning four days, from February 15 – 18. Austin Energy faced these challenges despite hazardous and sometimes impassable roads to keep critical facilities energized while providing local generation that helped prevent a catastrophic grid failure in the ERCOT region of Texas.

Austin Energy operated within the regulatory framework during the Winter Storms to meet requirements imposed by Federal and State agencies and regulations including ERCOT-mandated Load Shed. Despite Austin Energy's storm preparations, the sustained adverse weather conditions associated with the Winter Storms challenged recovery efforts. Austin Energy recognizes opportunities for improvement within the utility, its interactions with other COA departments and the industry. Austin Energy is actively engaged in its internal change process and the change processes led by regulatory bodies such as the Public Utility Commission of Texas, Federal Energy Regulatory Commission and North American Electric Reliability Corporation.

This report identifies, highlights and documents the knowledge gained during the Winter Storms. For each Observation, Follow-Up Actions have been identified with completion timeframes (quarter and year). Austin Energy will continue its efforts to build a utility that is resilient in the face of future extreme storm events.



Customer Driven.
Community Focused.℠

# 6. APPENDIX A: ACRONYMS

| | | |
|---|---|---|
| A | AAR | After Action Report |
| | ADMS | Advanced Distribution Management System |
| | AMI | Advanced Metering Infrastructure |
| | ATD | Austin Transportation Department |
| | AW | Austin Water |
| C | CAP | Customer Assistance Program |
| | C&I | Commercial and Industrial |
| | COA or City | City of Austin |
| | CTM | Communication and Technology Management Office |
| E | EAP | Employee Assistance Program |
| | EEA | Energy Emergency Alerts |
| | EOC | Emergency Operations Center |
| | EPRI | Electric Power Research Institute |
| | ERCOT | Electric Reliability Council of Texas |
| | ETR | Estimated Time of Restoration |
| F | FEMA | Federal Emergency Management Agency |
| | FERC | Federal Energy Regulatory Commission |
| H | HOA | Homeowner's Association |
| | HSEM | Homeland Security and Emergency Management |
| I | ICS | Incident Command System |
| | IEEE Explore | Publication of the Institute of Electrical and Electronics Engineers |
| | IT | Information Technology |
| L | LCRA | Lower Colorado River Authority |
| M | MVR | Medically Vulnerable Registry |
| N | NERC | North American Electric Reliability Corporation |
| | NIMS | National Incident Management System |
| | NOAA | National Oceanic and Atmospheric Administration |

## Acronyms continued.

| | | |
|---|---|---|
| | **NWS** | National Weather Service |
| **O** | **OPGW** | Optical Ground Wire |
| **P** | **PUCT** | Public Utility Commission of Texas |
| **S** | **SARA** | Seasonal Assessment of Resource Adequacy |
| | **SCADA** | Supervisory Control and Data Acquisition |
| | **StormGeo** | A subscription-based weather service used by Austin Energy |
| **T** | **TexasRE** | Texas Reliability Entity |
| | **TGS** | Texas Gas Service |
| **U** | **UFLS** | Under Frequency Load Shed |
| | **UPS** | Uninterruptible Power Supply |
| **W** | **WTP** | Water Treatment Plant |

Sand Hill Energy Center



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