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# *Public Utility Commission of Texas*

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## **Memorandum**

**TO:** Chairman Thomas J. Gleeson  
Commissioner Lori Cobos  
Commissioner Jimmy Glotfelty  
Commissioner Kathleen Jackson  
Commissioner Courtney K. Hjaltman

**FROM:** Luisa Venegoni, Chief of Staff to the Executive Director

**DATE:** November 19, 2024

**RE:** **November 21, 2024 Open Meeting – Item No. 25**  
**Project No. 56822, Investigation of Emergency Preparedness and Response by Utilities in Houston and Surrounding Communities**

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Please find attached Staff's report for Project No. 56822, *Investigation of Emergency Preparedness and Response by Utilities in Houston and Surrounding Communities*. Staff requests the Commission consider approving the report at the November 21, 2024 open meeting.

A summary of the recommendations within the report can be found below. Recommendations are numbered for ease of reference and not in order of importance.

### *Emergency Preparedness and Response Planning*

#### **1. Utilities should include neighboring utilities, local governments, and emergency services in annual hurricane and major storm drills.**

- Utilities that restricted participation in hurricane drills to internal participants could not effectively test key aspects of their emergency operations plans specifically relating to communication with external stakeholders. Instead, utilities tested communication strategies by discussing them internally. Similarly, water, sewer, and telecommunications utilities should participate in periodic group drills because each utility has a downstream effect on the others. This is particularly true for electric utilities that serve as transmission service providers (TSPs) for smaller electric utilities.

#### **2. The Commission should require pre-storm communication procedures in Emergency Operations Plans.**

- Many electric utilities lack proactive strategies for communicating with other utilities and stakeholders before major weather events. Proactive outreach could allow utilities to

identify and address potential issues before they arise. The Commission's current rules require that EOPs include a communication plan. However, this generally only addresses communication during emergencies.

**3. Utilities should incorporate outage tracker disruptions and high user demand as scenarios in annual hurricane and major storm drills.**

- Functioning outage trackers provide the public with critical information concerning restoration status during electricity outages. The issues with CenterPoint's outage tracker during Hurricane Beryl highlight the importance of ensuring, before an emergency, that outage trackers are properly functioning and able to handle high user demand. Hurricane and major storm drills provide electric utilities with an opportunity to test the capability of outage trackers and practice scenarios involving disruptions to outage trackers.

*Communication and Coordination*

**4. The Legislature should codify a customer's right to information about restoration times and the right to contact an electric service provider by phone.**

- All customers experiencing an outage should have reasonable access to information about their outage status and estimated restoration time. The Commission has launched an administrative rulemaking requiring IOUs to maintain functional and accurate public-facing outage trackers. However, the Commission lacks the authority to require the same of MOUs and co-ops.

Additionally, customers should have the ability to contact their electric service provider to report outages and other electrical emergencies 24 hours a day. Approximately half of the MOUs contacted by Commission during this investigation did not have call center resources.

The Legislature should consider adding these protections to the Public Utility Regulatory Act (PURA) Chapter 17, which outlines customer protections.

- Further, critical loads, such as assisted living facilities and water utilities, must be able to contact their electric service provider directly during an emergency. The Legislature should consider codifying a critical customer's right to timely contact with utility representatives during significant power outages. Some of these customers reported waiting on hold for hours to speak to a customer service representative following Hurricane Beryl.

*Customer Restoration Workflow***5. The Legislature should consider establishing a framework and penalty structure to assess Investor-Owned Utility service quality during major outage events.**

- The Commission oversees and enforces IOU compliance with service quality standards. However, since 1998, the Commission has excluded major events—extreme weather that disrupts power to at least 10% of customers—from these service quality calculations. The exclusion reflects concerns that including such events would misrepresent a utility’s typical reliability. While it’s reasonable to exclude hurricane damage from average service quality metrics, utilities should not avoid accountability for insufficient storm preparation or response.
- Commission staff recommends establishing a new standard to assess IOU system reliability and response during major events. The standard would be applied to a utility’s service quality performance during major events over the course of a year, similar to how the Commission’s current service quality rules are designed. For violations of this standard, the Commission should have the authority to pursue enhanced administrative penalties.

*Physical Infrastructure***6. Utilities should assess poles constructed under prior NESC standards for replacement with poles that meet current extreme wind and ice design standards.**

- Utilities should target circuits chosen for upgrade according to those that serve critical facilities such as hospitals, water treatment plants, or police stations, and that support mobile generation or serve underserved communities.

**7. Utilities should consider automated grid performance devices, like sectionalizers or automatic circuit reclosers, to reduce unnecessary outage times and help restoration crews locate and resolve faults more quickly.****8. In more densely vegetated areas, utilities should assess whether to replace distribution lines with covered conductor.**

- The conductor is the wire that carries the electricity. Covered conductors have an insulating outer layer. This replacement may yield better protection against vegetative debris blown-in from outside the right-of-way and decrease overall outage rates.

*Vegetation Management***9. The Commission should require utilities to establish a designated method for customers to report vegetation hazards.**

- Most vegetation-related outages during Hurricane Beryl were caused by trees growing outside of utility easements and rights-of-way. Utilities can access these areas with landowner permission, but processes for customers to report hazard trees for mitigation or removal must be improved. While most utilities have a program in place, these programs are not immediately accessible on most utility websites.

**10. Utilities should use analytics-based vegetation management strategies to augment, not replace cyclical vegetation management plans.**

- Vegetation management practices within Texas are not standardized, with some utilities moving away from a cyclical plan to a more analytics-based vegetation management plan. Analytics-based plans can help prioritize sections of a service territory due to heightened vegetation hazard. However, utilities should take precaution to not minimize factors like “time between trims.” To ensure all segments in the service territory are addressed, utilities should augment cyclical vegetation management plans with analytics instead of replacing them with a solely analytics-based approach. Alternatively, utilities should ensure that maximum duration between trims serves as a default or failsafe factor within their analytics-based plan. This may require vegetation management budgets to increase slightly to accommodate additional priority segment work.

**11. The Legislature should consider increasing the penalty cap for electric service quality violations.**

- Vegetation-related outages generally represent 15 to 20% of system-wide forced-outages reported by IOUs in each reporting year (excluding major events like hurricanes). System-wide violations of electric service quality metrics are considered one violation for the entire reporting year and are capped at \$25,000. To incentivize proactive measures to improve electric service quality, the Legislature could either increase the penalty cap or expand what may constitute a violation by placing a maximum threshold for forced-outages caused by vegetation-related issues. Enhanced penalties could apply if the utility crosses the threshold due to failure to trim circuits based on its trim cycle plan.

*Staffing and Mutual Assistance*

**12. Utilities should scale up training in emergency response and Incident Command System (ICS)**

- Utilities should ensure sufficient local personnel are trained in both ICS and the utility's emergency operations plans so that the utility can effectively scale up its control of emergency response and restoration to meet the size of the event. In CenterPoint's case, for example, this means envisioning an event requiring 25 or 30 staging areas and planning for all the necessary ICS structure to seamlessly integrate throughout each site and with one another through the utility's operations center.

**13. Utilities should ensure a resilient emergency communications platform is available to both local and mutual assistance crews.**

- Relying on public telecommunications infrastructure may be sufficient for more localized events, but utilities need to plan for failure of these systems and still be able to effortlessly communicate with their own and mutual assistance crews.

*Mobile Generation Facilities*

**14. Utilities should pre-identify critical customer locations suitable for deployment of Temporary Emergency Electric Energy Facilities.**



# **PUBLIC UTILITY COMMISSION OF TEXAS**

INVESTIGATION OF EMERGENCY  
PREPAREDNESS AND RESPONSE BY UTILITIES IN  
HOUSTON AND SURROUNDING COMMUNITIES

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**PROJECT NO: 56822**

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November 2024

Public Utility Commission of Texas

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Kathleen Jackson, P.E., Commissioner  
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# Executive Summary

## Background and Objectives

In May and July 2024, two major weather events tested utilities in the Greater Houston area. A fast-moving thunderstorm called a derecho hit Southeast Texas in May with winds over 100 MPH, damaging electric infrastructure and causing over 1 million power outages. In July, Hurricane Beryl made landfall in Matagorda Bay, disrupting electric service for 2.7 million customers, including 2.2 million CenterPoint customers.

To restore power, utilities had to clear vegetation and debris and fix damaged infrastructure. Even a week after Hurricane Beryl hit, hundreds of thousands of Texans were still without power, making daily life difficult.

On July 14, 2024, Governor Greg Abbott directed the Public Utility Commission of Texas (PUCT) to thoroughly review how well utilities in the Greater Houston area were prepared for and responded to these severe weather events.

The investigation had these goals:

1. Determine how well utilities in the Greater Houston area were prepared for and responded to severe weather events, especially the power outages after the May 2024 derecho and Hurricane Beryl.
2. Develop recommendations for utilities and the Legislature to reduce the length and impact of power outages after following future storms and recommend possible changes to Commission rules.

## Methodology

To gather information, PUCT Staff sent 94 formal requests for information (RFIs) to electric, water, and telecommunications providers in the Greater Houston area.

The investigation's findings and recommendations are based on:

- Staff's analysis of responses to these requests
- Reports filed by utilities, including emergency operations plans (EOPs) and vegetation management reports
- Public input collected online and at a first-of-its kind PUCT workshop held in Houston
- Input from affected people, entities and organizations in the Greater Houston area
- Information provided by emergency-response and weather experts at the Houston workshop.

PUCT staff, including engineers, attorneys, and investigators, analyzed this information to create the investigation's findings and recommendations. This report summarizes and discusses common practices in utilities' severe weather preparedness and response, and specific examples of successes and shortcomings.

## Findings and Recommendations

Recommendations are numbered for ease of reference and not in order of importance.

### Impacts of the Outages

- *Texans' Lived Experience:* Feedback from a public questionnaire shows that Texans felt severe discomfort and stress, mainly due to health-related and financial concerns. They also had trouble getting reliable, accurate information during the power restoration process.
- *Water and Telecommunications:* Water and telecommunications utilities need electricity to operate their facilities. During power outages, they have to use backup generators. Water utilities without enough mobile generators had longer service disruptions. Telecommunications outages made it hard for electric service providers to coordinate with field crews to restore power.
- *Retail Electric Providers (REPs):* REPs had trouble getting timely, specific outage information from utilities. Many REPs had to rely on publicly available information.

### Utility Emergency Preparedness and Response

*Planning:* Utilities generally had emergency preparedness plans in place and conducted major storm drills, but they did not involve other important stakeholders. Larger utilities had more sophisticated storm tracking, outage tracking, and emergency operations management. However, many did not test outage trackers before storms.

1. Utilities should include neighboring utilities, local governments, and emergency services in annual hurricane and major storm drills.
2. The Commission should require pre-storm communication procedures in emergency operations plans.
3. Utilities should incorporate outage tracker disruptions and high user demand as scenarios in annual hurricane and major storm drills.

*Communication and Coordination:* Lack of reliable and accurate communication was the top challenge customers faced during power restoration. CenterPoint's outage tracker failed before Hurricane Beryl, so customers could not get critical information. Critical loads had difficulty contacting their service providers. Less sophisticated utilities relied too much on social media and many do not have a 24-hour phone line or an outage map.

4. The Legislature should codify a customer's right to information about restoration times and the right to contact an electric service provider by phone.

*Customer Restoration Workflow:* Utilities focus on restoring power to critical loads and repairing damage that impacts the greatest number of customers. This means customers in less populated areas or served by a single line might have longer outages.

5. The Legislature should consider establishing a framework and penalty structure to assess IOU service quality during major outage events.

*Physical Infrastructure:* Utility pole infrastructure construction standards appear to be consistent and aligned with the National Electric Safety Code's (NESC) standards for the gulf coast region. Few poles failed; however, meeting standards should not be the only goal.

6. Utilities should assess poles constructed under prior NESC standards for replacement with poles that meet current extreme wind and ice loading design standards.
7. Utilities should consider automated grid performance devices, like sectionalizers or automatic circuit reclosers, to reduce unnecessary outage times and help restoration crews locate and resolve faults more quickly.
8. In more densely vegetated areas, utilities should assess whether to replace distribution lines with covered conductor.

*Vegetation Management:* Utilities relying on analytics-based vegetation management strategies might wait longer between trims in some areas. Most vegetation-related outages during Hurricane Beryl were caused by trees outside of utility easements and rights-of-way. Utilities can only access these areas with landowner permission. Fixing these issues requires better customer engagement. Vegetation management is mostly outsourced. Staffing decisions are influenced by vegetation clearing schedules.

9. The Commission should require utilities to establish a designated method for customers to report vegetation hazards.
10. Utilities should use analytics-based vegetation management strategies to augment, not replace, cyclical vegetation management plans.
11. The Legislature should consider increasing the penalty cap for electric service quality violations.

*Staffing and Mutual Assistance:* Utilities use storm forecasts and damage predictions to plan for restoration. During Hurricane Beryl, many outside workers came to help, causing coordination problems. The challenges were made worse by telecommunications outages.

12. Utilities should scale up training in emergency response and Incident Command Response.
13. Utilities should ensure a resilient emergency communications platform is available to both local and mutual assistance crews.

*Mobile Generation Facilities:* CenterPoint's process for deploying mobile generation to customers was inefficient. In addition, the fleet was not right-sized for a Hurricane Beryl-type restoration event. As a result, the company acquired an additional 21 units through mutual assistance or short-term leases *after* landfall.

14. Utilities should pre-identify critical customer locations suitable for deployment of Temporary Emergency Electric Energy Facilities.



GOVERNOR GREG ABBOTT

July 14, 2024

Mr. Thomas J. Gleeson  
Chairman  
Public Utility Commission of Texas  
1701 North Congress Avenue  
Austin, Texas 78711-3326

Dear Chairman Gleeson:

It is unacceptable that millions of Texans in the Greater Houston area have been (or were) left without electricity for multiple days. It is imperative we investigate how and why some Texas utilities were unable to restore power for days following a Category 1 Hurricane.

Texas utilities bear the responsibility of ensuring system resiliency in their respective service territories. While weather-related disasters are outside of human control, their impact to our daily lives can be mitigated or alleviated if proper system planning and pre-storm preparations are made.

Hurricane Beryl made it clear—improvements must be made. I am directing the Public Utility Commission of Texas (PUC) to undertake a rigorous study to determine the causes of the repeated and ongoing power failures in the Greater Houston area after severe weather events. Some questions that must be answered include: Is the cause of the magnitude and duration of customer outages a result of a physical infrastructure or personnel issue? What were the utilities pre-event planning processes? Why exactly were so many Texans left without power for so many days? When and for what purposes did utilities use their mobile generation resources?

These questions and more must be asked and answered by Texas utility companies. We must identify why Hurricane Beryl impacted millions of Texans when there have been many similar events in Texas' recent past that did not, and we must work to prevent any such future impacts.

I am instructing the PUC to deliver a report on its finding by December 1, 2024, to inform the Texas Legislature prior to the 89th Legislative Session. I thank the PUC for its commitment to Texas and look forward reviewing its report.

Sincerely,

A handwritten signature in black ink that reads "Greg Abbott".

Greg Abbott  
Governor

# 1.0 Introduction

## 1.1 Investigation Approach and Methods

On July 14, 2024, Governor Abbott directed the Commission to take a comprehensive look at the state of preparation of and immediate response by electric utilities in the Greater Houston area to severe weather events. Commission Staff opened Project No. 56822, *Investigation of Emergency Preparedness and Response by Utilities in Houston and Surrounding Communities*, the following day.

To meet objectives of the investigation, Commission Staff identified seven primary areas of focus:

- Emergency preparedness and response planning
- Communication and coordination
- Customer restoration workflow
- Physical infrastructure
- Vegetation management
- Staffing and mutual assistance
- Mobile generation resources

### *Data and Information Gathering*

In August 2024, Commission Staff issued 94 formal, comprehensive Requests for Information (RFIs) to collect information relevant to the seven primary focus areas. Electric, water, and telecommunications providers in the Greater Houston area were required to respond in writing to detailed questions. The topics included preparation efforts, outage response, and restoration efforts related to Hurricane Beryl and the May 2024 derecho. Each RFI included from 19 (water and sewer service providers) to 120 mandatory questions (electric service providers). The responses generated over 12,000 pages of information.

Three classes of electric service providers received RFIs: 28 municipally owned utilities (MOUs), 32 electric cooperatives (co-ops); and five investor-owned utilities (IOUs). Service providers were selected based on their location in the path of the storm systems that created the conditions for the May 2024 derecho or of Hurricane Beryl. A list of all entities issued RFIs can be found in the Appendix.

Commission Staff prioritized transparency with the public throughout the investigation. To this end, documents used to inform the findings are filed in Project No. 56822.<sup>1</sup> RFIs and responses were filed publicly, except where information was otherwise protected in law from disclosure— for example, personally identifiable information. Where information was filed confidentially, Commission Staff conducted outreach to confirm the reason for confidential filing.

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<sup>1</sup> These filings are accessible through the Commission’s Interchange at the following link: <https://interchange.puc.texas.gov/search/filings/?UtilityType=A&ControlNumber=56822&ItemMatch=Equal&DocumentType=ALL&SortOrder=Ascending>. The Interchange is a web-based tool that allows the public to locate information that is filed with the Commission. The public can access the Interchange’s general filing search at the following link: <https://interchange.puc.texas.gov>.

PUCT attorneys, investigators, engineers, and subject matter experts analyzed the responsive information. In conjunction with the RFI response analysis, Staff reviewed utilities' existing Emergency Operations Plans, vegetation management plans, and storm hardening plans.

#### *Public Comments and Input from Other Impacted Entities*

Members of the public and small businesses were encouraged to share their experiences with electric service outages and restoration through an online questionnaire on the PUCT's website. The questionnaire was live from August 1 to October 6, 2024, and the Commission received 16,560 responses. Section 2.1 details the substance of this public comment.

Commission Staff also sought input from local governments, medical and eldercare facilities, trade associations, and community organizations. Retail electric providers (REPs) and power generation companies (PGCs) were also asked to provide feedback on their experiences during the restoration periods. In filings on August 2, 2024, Commission Staff invited these groups to respond to separate sets of voluntary questions and received 16 responses.

#### *Houston Workshop*

On Saturday, October 5, the Commission held a workshop in Houston on utility preparedness and response to severe storms. The Commissioners and Staff heard from 30 members of the public who described their experiences with power outages following Hurricane Beryl and the May 2024 derecho. The Commission also heard from invited experts on emergency preparedness, vegetation management, infrastructure storm hardening, and mutual assistance. These experts represented:

- Texas Division of Emergency Management
- National Weather Service
- Texas A&M Forest Service
- MG Spoor Consulting
- GridSky Strategies Inc.
- Edison Electric Institute
- Southeastern Electric Exchange

### 1.2 May 2024 Derecho Overview and Impacts

On May 16, an expansive and fast-moving thunderstorm, called a derecho, pushed through southeast Texas. Wind speeds were estimated to reach 100 MPH, with sustained winds above 75 MPH.

Unlike a hurricane, a derecho typically begins as a thunderstorm and develops quickly and with little or no warning. Forecasts in the days prior to the May derecho had only noted a slight risk of thunderstorms. This risk increased to moderate on the morning of the storm.

The storm spawned several tornados, and a track of straight-line wind damage was seen across Houston and down through Baytown. The high winds associated with the storm caused significant damage to power lines and transmission towers.

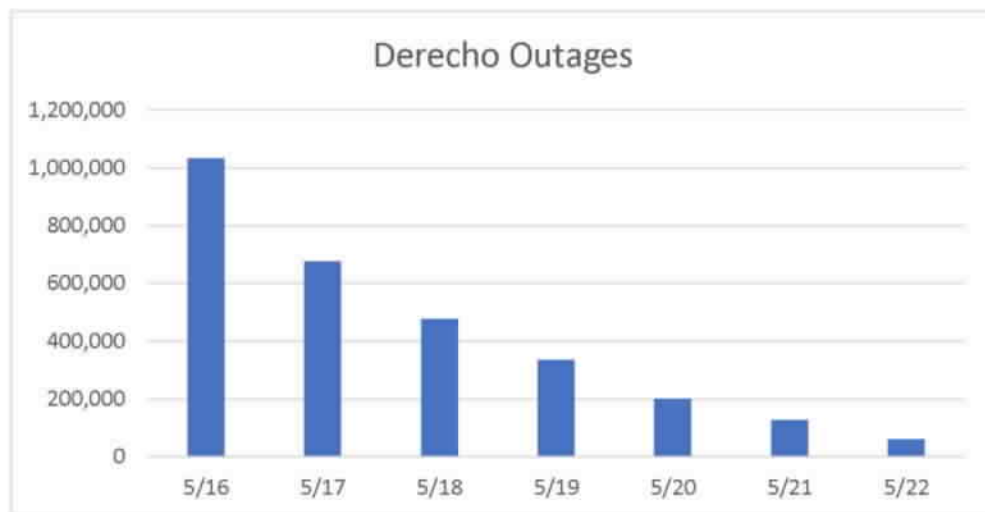
- **Thursday May 16** – Statewide outages peaked at 8 p.m. on May 16 with 1.05 million customers without power and at least 14 transmission lines sustaining damage. The bulk of the impacts were within the CenterPoint service territory. Sam Houston Electric Cooperative, Entergy, San Bernard Electric Cooperative, Bluebonnet Electric Cooperative and Jasper Newton Electric Cooperative also sustained damages. The most heavily impacted location was the Highway 290 corridor going west into Houston and tracking southeast along I-10 into Baytown.



Source: National Weather Service

During early assessments, utilities projected this would be a multi-day restoration effort, especially for the CenterPoint service territory. CenterPoint estimated restoration to be complete around May 22, while other utilities projected outage restoration by May 19.

- **Friday, May 17**– At 3 p.m. on May 17, less than 24 hours after peaking with just over 1 million outages, outage counts were down to about 675,000.
- **Saturday, May 18** – At 3 p.m., outages had been reduced to about 477,000.
- **Sunday, May 19** – At 3 p.m., outages were down to approximately 335,000, with 10,000 of those outside CenterPoint.
- **Monday, May 20**– At 3 p.m. on May 20, outages were down to 200,000.
- **Tuesday, May 21** – At 3 p.m., outages from the Derecho were down to 125,000, all in the CenterPoint service territory.
- **Wednesday, May 22**– Outage numbers continued to decline, and by May 22 there were 59,000 outages and three transmission lines needing repairs.
- **By Thursday, May 23**, additional storm activity in other parts of the state drove overall outages up, but restoration from the derecho was essentially complete.

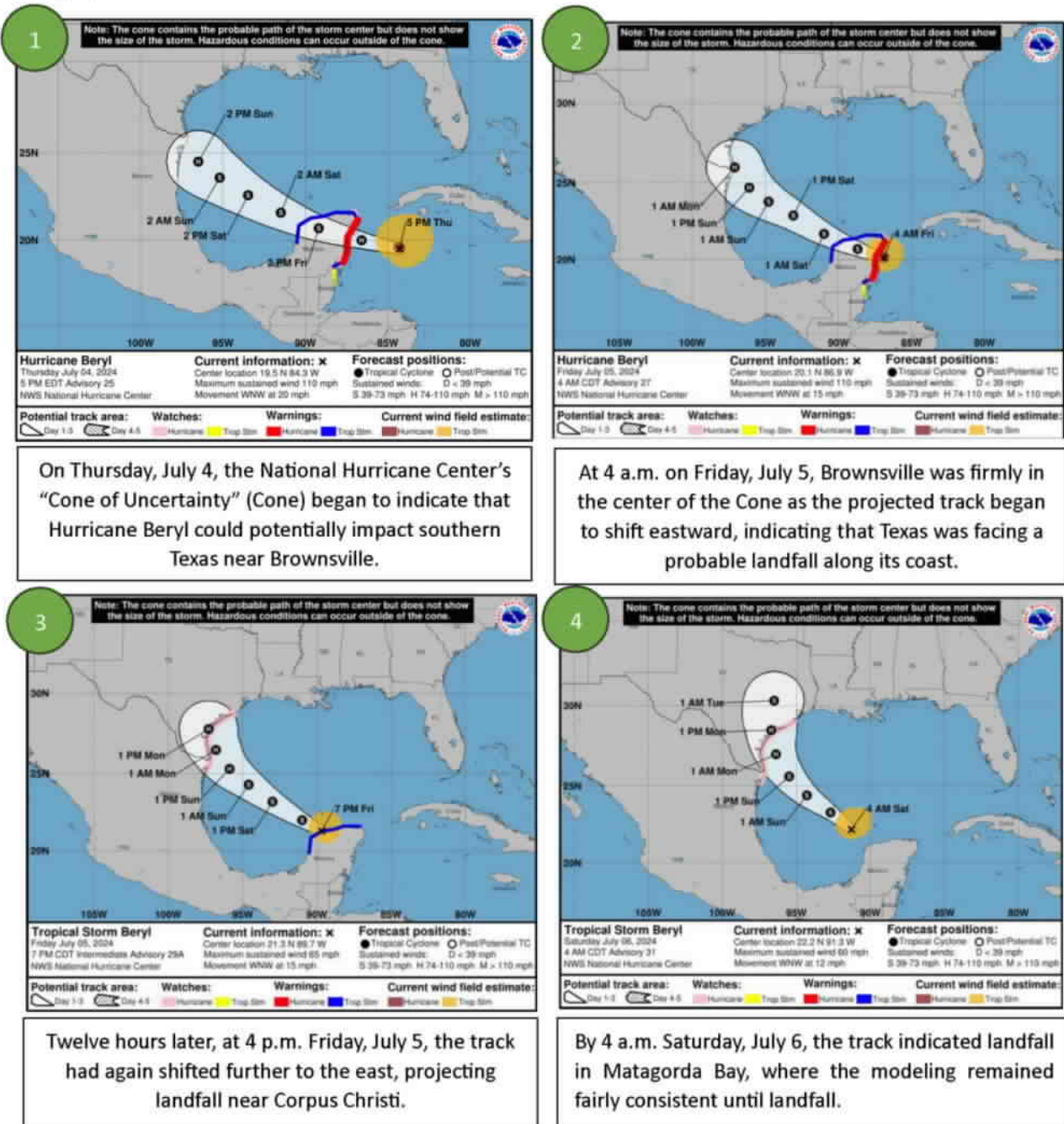




The weather incidents during the months preceding Hurricane Beryl were so numerous and impactful that they were grouped together into a single federal disaster declaration. "Texas Severe Storms, Straight-line Winds, Tornadoes, and Flooding," (DR-4781-TX) covered the period from April 26, 2024, through June 5, 2024.

### 1.3 Hurricane Beryl Overview and Impacts

Hurricane Beryl developed as a Category 1 hurricane in the lesser Antilles on June 29. It rapidly intensified as it moved westward, becoming the earliest in the hurricane season that a storm intensified into a Category 5.



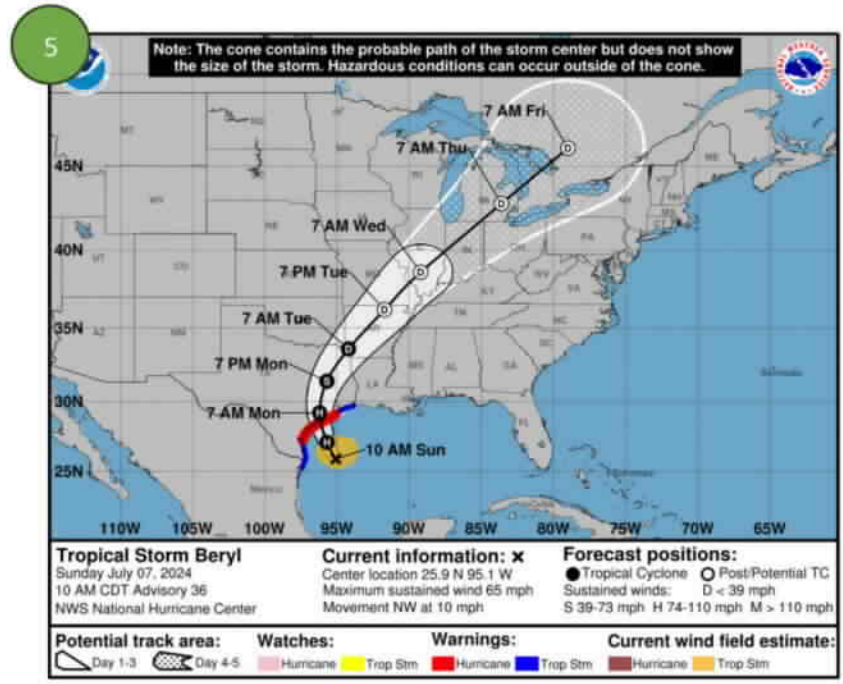
On Thursday, July 4, the National Hurricane Center's "Cone of Uncertainty" (Cone) began to indicate that Hurricane Beryl could potentially impact southern Texas near Brownsville.

At 4 a.m. on Friday, July 5, Brownsville was firmly in the center of the Cone as the projected track began to shift eastward, indicating that Texas was facing a probable landfall along its coast.

Twelve hours later, at 4 p.m. Friday, July 5, the track had again shifted further to the east, projecting landfall near Corpus Christi.

By 4 a.m. Saturday, July 6, the track indicated landfall in Matagorda Bay, where the modeling remained fairly consistent until landfall.

On Monday, July 8, at approximately 4 a.m., Hurricane Beryl made landfall as a Category 1 storm in Matagorda Bay, Texas. Maximum sustained winds at landfall were reported at 80 MPH. The path curved around the western part of the Houston Metro and continued through upper east Texas. By 10 p.m., Beryl was in far east Texas and exited the state soon after.



Hurricane Beryl resulted in significant electric outages across southeast Texas. At the peak, there were 2.7 million hurricane-related outages.

There are a few reasons Hurricane Beryl had such a devastating impact on southeast Texas and the Greater Houston area. High winds, heavy rainfall, vegetation issues, location of impact, and compounding impacts from previous events all contributed. According to the National Weather Service (NWS), Hurricane Beryl strengthened as it made landfall. The strongest winds associated with the thunderstorms in the eyewall were more likely to make it to the ground and travel farther inland than they would have with a steady-state or weakening storm. Per the NWS: “Beryl as a CAT 1 actually produced stronger winds in the Houston area than Hurricane Ike did as a CAT 2 landfalling hurricane and the eyewall with Ike went right over Houston.”

In addition, Beryl approached Houston from the southwest, placing the city on the storm's “dirty” side, which has the highest winds, storm surge, and tornado threat. Heavy rains experienced in Southeast Texas during the preceding winter and spring kept soils moist and made trees and vegetation more susceptible to being uprooted. Trees and vegetation had also been weakened by recent cycles of freezing temperatures in the winter and significant drought in the summers. The combination of these factors resulted in considerable damage from Hurricane Beryl to electric infrastructure. The storm snapped power poles and sent vegetative debris into power lines.



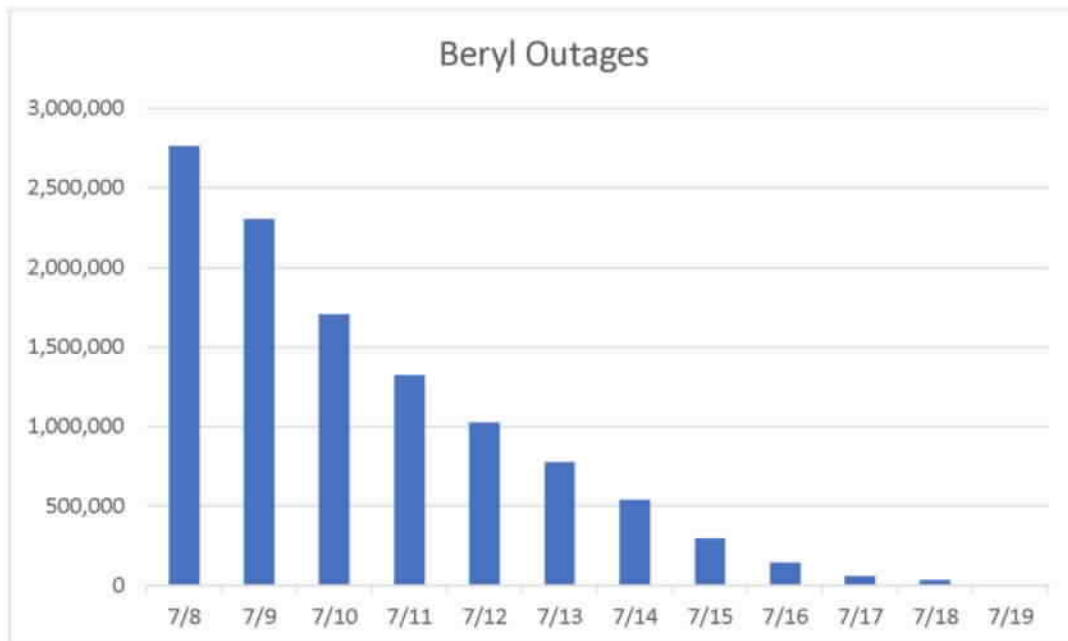
Source: [Houston Public Media, Colleen DeGuzman](#)



Source: [Canary Media](#)

### *Hurricane Beryl-Related Outages and Restoration Timelines*

- **Monday, July 8** – At 9 a.m. there were 1.5 million hurricane-related outages across the state. By 3 p.m. that number had increased to 2.7 million, and ERCOT reported damage to a little over 100 transmission circuits. All utilities affected anticipated this would be an extended multi-day restoration event.
- **Tuesday, July 9** – At 9 a.m. on July 9 there were 2.3 million hurricane-related outages, and ERCOT reported 61 transmission circuits were still damaged.
- **Wednesday, July 10** – On the morning of July 10 there were 1.7 million outages, bringing the restoration total close to 1 million.
- **Thursday July 11** – On July 11, 1.3 million outages remained, and utilities began giving estimated restoration times.
- **Friday, July 12** – Four days after Hurricane Beryl made landfall, approximately 1 million outages remained across the state.

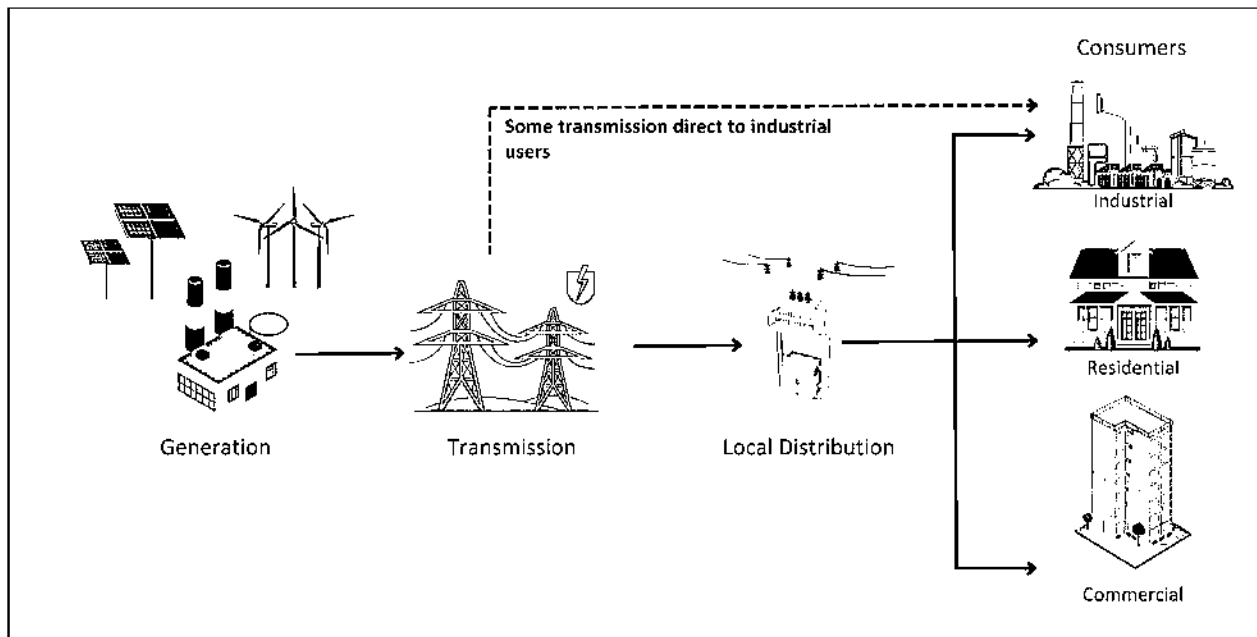


Restoration efforts continued over the next week. Outages steadily declined until July 19, when they fell below 10,000. Restoration timelines varied widely among the utilities, depending on the number and location of the outages. AEP Texas, Oncor, Sam Houston Electric Cooperative, and various other co-ops had fully restored power to affected customers within a week of landfall. In the second week, Entergy, TNMP, and CenterPoint fully restored power to their service territories.

## 1.4 Greater Houston Area Electric Service Providers

### *Investor-Owned Utilities (IOUs)*

Investor-Owned Utilities (IOUs) are private companies that transport electricity from the generating power plant to the consumer. IOUs with service areas in the greater Houston area include CenterPoint Energy (CenterPoint), Entergy Texas (Entergy), Texas-New Mexico Power (TNMP), and American Electric Power (AEP). These companies operate and maintain poles, wires, and substations.



## Investor-Owned Utilities (IOUs) in the Greater Houston Area



### CenterPoint Energy

CenterPoint Energy (“CenterPoint”) is an IOU that serves the central Houston area. CenterPoint has operated in Texas since January 1, 1906. The company has approximately 2,753,976 points of electric delivery and roughly 2,781 employees in Texas.

As an IOU, CenterPoint is regulated under the Public Utility Regulatory Act (PURA).<sup>2</sup> All rates charged by CenterPoint for electric delivery service must be approved by the Commission through a ratemaking proceeding. CenterPoint’s last full ratemaking proceeding was in 2020,<sup>3</sup> with recent interim adjustments in 2024 to reflect changes in wholesale transmission costs<sup>4</sup> and the legislature’s energy efficiency initiatives.<sup>5</sup>

CenterPoint currently has a pending rate case with the Commission.

In addition to rate regulation, PURA also tasks the Commission with oversight of CenterPoint’s system operations, including system reliability, safety, improvement and maintenance. The Commission has the authority to impose administrative penalties of up to \$25,000 against CenterPoint for each failure to meet its service quality and system reliability standards, as well as any other failure to comply with requirements under PURA, Commission rules, or the ERCOT Nodal Protocols.<sup>6</sup> Over the past 10 years, the Commission has fined CenterPoint \$459,000 for violations of Commission rules, including \$149,000 for failures to meet standards for service quality.<sup>7</sup>

<sup>2</sup> Public Utility Regulatory Act, Tex. Util. Code §§ 11.001-66.016.

<sup>3</sup> *Application of CenterPoint Energy Houston Electric, LLC for Authority to Change Rates*, Docket No. 49421, Final Order (Mar. 9, 2020).

<sup>4</sup> *Petition of CenterPoint Energy Houston Electric, LLC to Update its Transmission Cost Recovery Factor*, Docket No. 56680, Notice of Approval (Jul. 25, 2024).

<sup>5</sup> *Petition of CenterPoint Energy Houston Electric, LLC to Update its Energy Efficiency Cost Recovery Factor*, Docket No. 55088, Order (Nov. 3, 2023). See also PURA § 39.905.

<sup>6</sup> PURA § 15.023(b).

<sup>7</sup> Since 2014, the Commission has fined CenterPoint \$149,000 for violations of the service quality metrics established under PURA § 38.005(a) and 16 TAC § 25.52(g). However, it is important to note that the Commission’s ability to pursue administrative penalties for violations of 16 TAC § 25.52(g) is limited by the administrative penalty cap of \$25,000 per violation. See section 3.5 of the report.



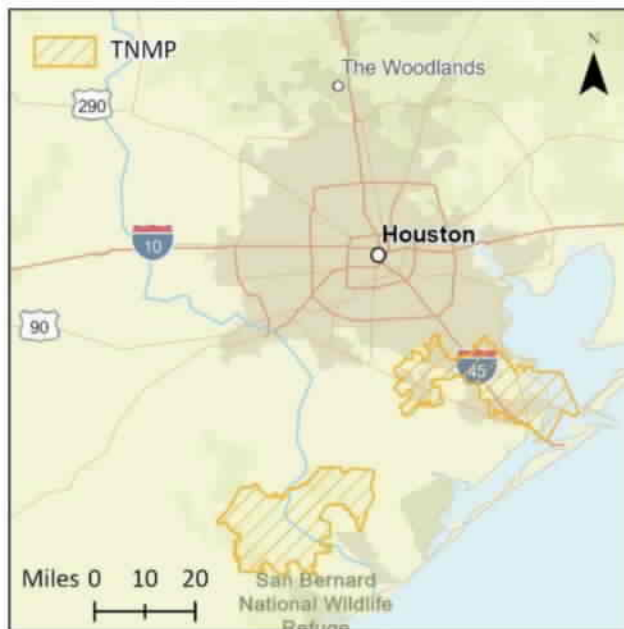
Entergy Texas

Entergy Texas (“Entergy”) is an IOU that serves the northeastern part of the greater Houston area.

The company was originally organized in Texas on August 25, 1925. Entergy has approximately 511,718 utility customers in the state.

Entergy’s current rates were approved by the Commission on August 24, 2023.

Over the past 10 years, the Commission has imposed administrative penalties totaling \$278,600 against Entergy, including \$203,600 for failures to meet system reliability standards.



Texas-New Mexico Power (TNMP)

Texas-New Mexico Power (TNMP) is an IOU that serves several areas of Texas, including two portions of the southern greater Houston area.

TNMP has been operating in Texas since January 1, 1925 and has operated solely in Texas since 2006. The company has approximately 274,149 points of electric delivery and roughly 390 employees in Texas.

TNMP’s current rates were approved by the Commission on December 20, 2023.

Over the past 10 years, the Commission has imposed administrative penalties totaling \$293,000 against TNMP for failures to meet system reliability standards.



*American Electric Power Company (AEP)*

American Electric Power Company (AEP) Texas is an IOU that serves both North Texas and South Texas, including the southwestern greater Houston area.

AEP Texas was established through AEP’s acquisition of Central & South West Corporation in 1997. Central & South West formed in 1925. AEP Texas has approximately 1,111,341 points of electric delivery and 1,594 employees in Texas.

The company currently has a pending rate case with the Commission.

Over the past 10 years, the Commission has imposed administrative penalties totaling at least \$821,000 against AEP Texas, including \$540,000 for failures to meet service quality standards.

*Electric Cooperatives and Municipally Owned Utilities*

Electric transmission and delivery services across Texas can also be provided by electric cooperatives and municipally owned utilities (MOUs). An electric cooperative is an entity created by an agreement of consumers in a designated area to distribute electricity. There are 32 member-owned electric cooperatives in the greater Houston area governed by elected boards – for example: San Bernard Electric Cooperative, Inc., Mid-South Electric Cooperative Association, and Sam Houston Electric Cooperative, Inc. There are 30 municipalities that own and operate utilities in the greater Houston area, including Bellville Light & Power System, City of Hempstead, and City of Liberty. The PUCT does not have retail rate-setting authority over electric cooperatives or MOUs. However, the PUCT does have limited appellate authority for the retail rates of MOUs.

## 2.0 Impacts of Power Outages Following Hurricane Beryl and Derecho Event

### 2.1 Texans' Lived Experience

To get public feedback about outages and restoration, the PUCT used an online questionnaire, reviewed complaints submitted to its Consumer Protection Division (CPD) and held a workshop in Houston. The strong response provides the PUCT valuable insight from each of these efforts, as detailed below.

#### ***Questionnaire:***

The online questionnaire asked individual customers and small businesses about duration of outages, impact of the outages on daily life, and communications from electric service providers. The questionnaire was available on the PUCT's website from August 1 until October 10, 2024, and the PUCT received 16,560 responses. Respondents to the questionnaire were overwhelmingly dissatisfied with the preparedness and response of electric service providers. Customers report outages ranging in duration from less than a day to over 16 days. The largest category of respondents reported three to seven days without power. Hardships included spoiled food and medication, temporary relocations, unplanned purchases, health risks, financial strain, and discomfort. Respondents also expressed appreciation for the efforts of line workers and the support from neighbors and community members.

#### Impact of Outages on Daily Life

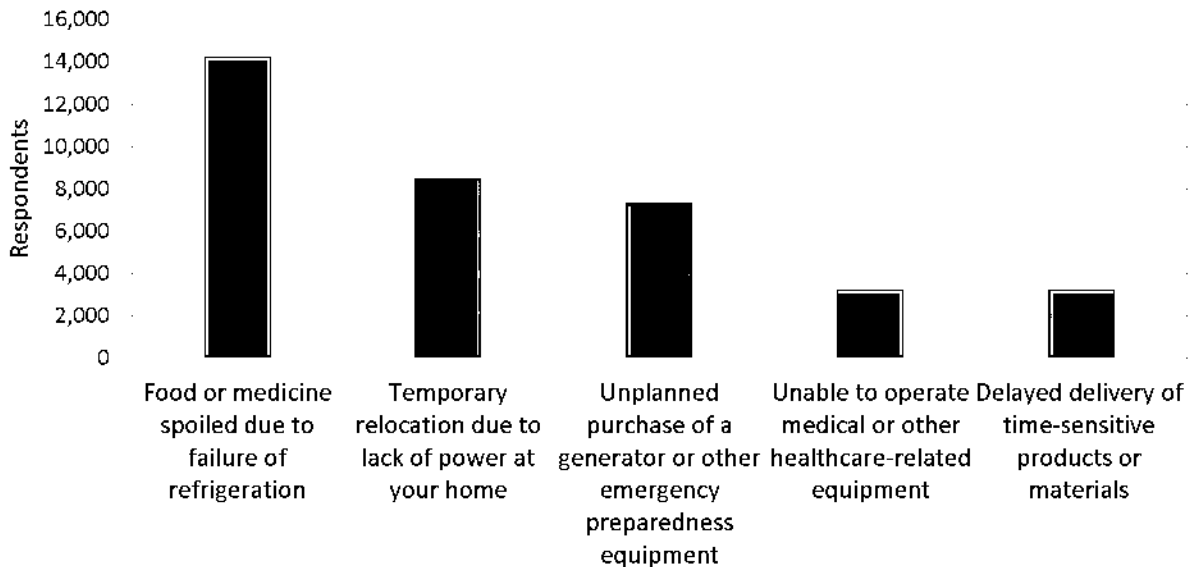
Many people described losing all the food in their refrigerators and freezers, as well as refrigerated medications, such as insulin. Health risks due to loss of refrigerated medications and inability to operate electrically powered medical devices were key concerns. Some used personal generators or relocated to locations with power to safeguard their health. Lack of reliable communication and updates from electric service providers exacerbated the situation, making it difficult to plan and to manage medication needs.

People also discussed significant financial impacts stemming from the power outages. There were many reports of financial strain associated with:

- Cost to replace lost refrigerated food and medication;
- Unplanned purchases of generators and other emergency preparedness equipment;
- Lost income due to inability to work or operate businesses;
- Costs of temporary relocation



## Did you experience any of the following due to a loss of power?



Impacts from the outages were particularly hard on vulnerable individuals, including the elderly, individuals with fixed or low incomes, and those with specific medical needs or mobility impairments. Some quotes from questionnaire respondents highlighting the impacts of the outages are included below:

*I am 74 with respiratory issues and I had several episodes where I had to get in my vehicle to use my CPAP machine. The intense heat affected my heart condition as well.*

*We lost food and refrigerated medication due to the power outage. My husband has diabetes and heart problems, and we didn't have lights for ten miserable days.*

*[M]aintaining the generator was a significant burden physically, mentally, and financially.*

*I devastatingly lost thousands of dollars' worth of refrigerated fertility medication that I paid for out of pocket. As a cancer patient trying to start a family, losing my medicine has caused more undue burden and financial stress for my family.*

*In addition to not being able to work for an entire week, the only viable option was for me to use all of my leave balance to receive compensation for the missed days.*

### Areas for Improvement

Respondents overwhelmingly noted communications from electric service providers as the biggest area for improvement. Lack of reliable and accurate communication was the main issue faced during the Hurricane Beryl and derecho power outages. More than a third of respondents indicated they never heard from their electric service provider. Those who did reported receiving less than one communication per

day. When they did receive communications, the information was often vague or inaccurate and did not provide specific timelines for power restoration. Respondents noted:

*CenterPoint emailed us to say our power was out on... the 9<sup>th</sup>...and then told us it was restored on the 10<sup>th</sup> when it wasn't. It was stressful thinking that they might think our power was on when it wasn't.*

*Two texts were received after power loss which indicated that the power to my home had been restored – that was on day one – but power was out and continued to be out for five days.*

*Generic non-answers. No specifics. No explanation. No believable estimates for service restoration.*

*Communication is key in a crisis. The failure to communicate clearly what was happening created a great deal of stress.*

The questionnaire responses also indicated that one of the most significant issues with communication was CenterPoint's often non-functioning and inaccurate outage map. The issues with CenterPoint's outage map are described in more detail in *Section 3.2 – Customer Communication and Coordination*.

### **Workshop:**

The PUCT conducted a workshop on October 5, 2024 in Houston that included four hours of public comment from 30 attendees. The individuals told personal stories about their experiences during Hurricane Beryl, the derecho, and with power outages over the years. Nearly everyone noted the persistent stress of power outages, as well as a loss of trust in CenterPoint's ability to adequately handle severe storms. Even those with backup generators expressed concern about their growing reliance on generators and affordability. Many recommended a thorough review of CenterPoint's rates and the performance of CenterPoint's Temporary Emergency Electric Energy Facilities during Hurricane Beryl. Many commenters had to rely on themselves or neighbors to provide necessary relief or information given the widespread communication issues during the outages. Commenters also called for increased coordination with local communities. Many suggested that electric service providers use fewer contractors when responding to severe weather events. Commenters said that in-house workers are likely to know the local communities better.

### **Customer Complaints:**

The PUCT's Consumer Protection Division (CPD) received over 2,000 complaints related to Hurricane Beryl and the derecho. Complaints against electric utilities described outages, hazardous conditions, inability to report or receive information, and consumption charges while the customer was without service. Complaints against REPs described inability to reach customer representatives and inaccurate billing for service when consumers had no power. Complaints concerning water service described outages and inability to report or receive information. Complaints concerning telecommunications described service

outages, but the number of complaints was minimal. The PUCT continues to receive and address consumer complaints stemming from the power outages.

## 2.2 Impacts to Water Utilities

Water and sewer utilities are largely dependent on electricity to provide service to their customers. Power is needed to operate pumps and other equipment used to make water safe for consumption. For this reason, these facilities are considered critical loads under the Commission's rules.

A water utility is the company that owns and operates a water or sewer system. A single utility may operate multiple water or wastewater systems in different areas or may operate only one system. To determine how water and sewer utilities prepared for and responded to Hurricane Beryl and the May 2024 derecho, Staff issued requests for information (RFIs) to the 20 largest utilities operating public water or sewer systems in impacted counties<sup>8</sup>. PUCT Staff received responses from 14 of the selected utilities. Because utilities emphasized their experience with Hurricane Beryl in their responses, the discussion below focuses on this storm rather than the derecho.

### *Emergency Preparation*

Most water and sewer utility managers perform pre-storm site walkthroughs to ensure their facilities are ready for forecasted severe weather. During a physical site inspection, water operators or other utility staff secure or remove items that could be damaged due to high winds or flooding. Overflow tanks are emptied to ensure maximum retention during severe weather. Ground tanks are filled with potable water to ensure continuous and adequate service during and immediately after a disaster. Finally, utility staff ensure that any backup generators are tested and topped off with fuel and water treatment tanks are topped off with sufficient chemicals.

The majority of the water and sewer utilities contacted by PUCT Staff have their own backup generation at critical facilities. Following Winter Storm Uri, the Texas Legislature passed legislation (SB 3 (2021, 87th Leg., R.S.) that set standards for how a water or sewer utility can ensure continuous and adequate service. Texas Water Code (TWC) § 13.1394(c) requires affected utilities to adopt an emergency preparedness plan using at least one of thirteen specified methods to ensure continuous and adequate service during an extended power outage. Water and sewer utilities can either install permanent backup generators or provide reasonable alternatives to such measures to ensure continuous and adequate service during an extended power outage.<sup>9</sup>

### *Effects of Hurricane Beryl*

Many of the contacted water and sewer utilities had access to either mobile generation facilities or had permanently installed backup generators at critical facilities. As a result, disruptions were generally limited to facilities that experienced mechanical or operational failures with existing backup generators or were

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<sup>8</sup> See the appendix for the list of impacted counties.

<sup>9</sup> TWC § 13.1395(d)(2)

delayed while mobile generation facilities were connected. Aqua Texas and Undine, LLC experienced the greatest numbers and longest durations of disruption of service, due in large part to an insufficient number of mobile generators.<sup>10</sup>

Aqua Texas operates 107 water systems in the selected counties.<sup>11</sup> Permanent backup generation is installed at 34 of those systems. The remaining 73 water systems were left to share 18 mobile generators in Aqua Texas's fleet (plus any mobile generators that could be acquired after the hurricane) to power critical facilities. Service was interrupted for 72 hours for some Aqua Texas customers as generators were relocated from systems that already had electric service restored.<sup>12</sup>

Undine, LLC operates 87 water systems in the selected counties. Undine, LLC obtained an additional five mobile generation facilities (at a reported cost of \$300,000) to assist with its restoration efforts in the immediate aftermath of Hurricane Beryl. In several instances, Undine's customers were only able to be returned to service once mobile generators were released from a different Undine water system.

CSWR-Texas has installed permanent backup generators at all critical facilities supporting the water systems it operates.<sup>13</sup> One backup generator ran for 360 hours (15 days) while waiting for electric service to be restored.

Both mobile generation and permanent onsite backups are permissible approaches for emergency preparedness plans under Texas Water Code §13.1394(c). The decision to use mobile generation instead of installing permanent backup generators at each critical facility is likely economically efficient. However, water and sewer utilities should carefully consider the proper ratio of generators owned or obtainable through contractual agreement and the total number of facilities that could require backup power. A ratio of one mobile generator for every four water systems – not facilities – likely requires reassessing.<sup>14</sup>

### *Challenges to Service Restoration*

Water and sewer utilities also reported frustration with the level of communication with their electric utilities. Lack of access to a priority contact method with the electric utility resulted in water and sewer utilities reporting outages in the same manner as an individual customer. For example, Quadvest commented that their electric utility's automated system would not permit information to be entered for more than three addresses per call.<sup>15</sup> Due to this limitation, Quadvest had to place 18 calls to the electric utility to report all 54 of their systems affected by Hurricane Beryl.<sup>16</sup>

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<sup>10</sup> A water and sewer utility may operate multiple public water systems or sewer systems in different areas.

<sup>11</sup> The selected counties for the water and sewer RFIs were Austin, Brazoria, Chambers, Colorado, Fort. Bend, Galveston, Harris, Liberty, Matagorda, Montgomery, Waller, and Wharton Counties.

<sup>12</sup> *Id.*

<sup>13</sup> RFI 1-4(f).

<sup>14</sup> RFI 1-8(b)

<sup>15</sup> RFI 1-16.

<sup>16</sup> See generally, RFI 1-3

### *Resilience and Lessons Learned*

A water and sewer utility's ability to provide continuous and adequate service to its customers is tied to its access to reliable electricity. Water and sewer utilities contacted as part of this investigation leveraged permanent backup generation, mobile generation, or a mix of the two. The water and sewer utilities that experienced the shortest interruptions tended to have either permanently installed backup generators or enough mobile generators to cover all critical facilities.

- **Review of Emergency Preparedness Plans to Determine Needs Are Adequately Addressed:**  
Water utilities should ensure their emergency preparedness plans account for the number of mobile generators necessary to provide coverage for all critical facilities. Several water systems experienced prolonged disruptions while waiting for mobile generators to become available and relocated. Utilities should also consider re-evaluating contractual agreements to obtain additional mobile generators during emergencies to account for a possible shortage of available units during times of high demand.

### 2.3 Impacts to Telecommunication Utilities

The telecommunications market in Texas is made up of voice, broadband, and cable and video services. The Commission only regulates the intrastate rates and services of certain providers of landline service. Other telecommunications services, including broadband and wireless service, are regulated by the Federal Communications Commission. For purposes of this report, the Commission issued requests for information to all telecommunications service providers operating in Texas that may have been affected by Hurricane Beryl.

The telecommunication sector is critical for ensuring continuity of electric service during and after severe weather events due to its interdependence with electric utility operations. Electric utilities rely on telecommunications for real-time coordination with field teams during a restoration event. Conversely, the telecommunications networks depend on power from utility services to function. Without effective communications systems, electric utilities face delays in restorations, while telecommunications utilities need stable electric service to maintain their networks.

### *Effects of Hurricane Beryl*

Telecommunications providers in the Greater Houston Area experienced widespread service disruptions from Hurricane Beryl, mainly due to infrastructure damage and electricity outages. Disruptions began on July 8 and lasted through July 16 for most providers. Nextlink restored services within days, while Spectrum/Charter (Charter) fully restored service by July 9. AT&T faced significant restoration challenges and achieved full recovery of wireless services by July 14 and wireline by July 18.

AT&T saw impacts to both wireless and wireline services affecting about 915,000 customers, with 11 counties operating at less than 80% capacity. AT&T also reported 351,000 customers with Voice/VoIP numbers were affected. A substantial portion of AT&T's service outages were attributable to infrastructure damage – 164 poles, 270,000 feet of fiber cable, and 120,000 feet of copper cable were affected. However, 75% of the impacted infrastructure could be rehung without replacement.

In contrast, smaller telecommunications companies such as Astound Broadband, Nextlink, and Charter experienced disruptions that were attributable to electricity outages, affecting approximately 620,000 customers. Astound and Nextlink reported minimal damage to infrastructure.

### *Challenges to Service Restoration*

**A major challenge for many telecommunications providers was the need to coordinate with electric utilities to restore power to telecommunications infrastructure.** AT&T had representatives embedded within emergency operations centers and maintained direct communication with IOUs such as CenterPoint and Entergy. However, coordinating these efforts was often slow due to the unclear prioritization of telecommunications by electric utilities. Additionally, smaller telecommunications utilities were not proactively contacted by electric providers and made multiple unsuccessful attempts to communicate restoration needs.

**Telecommunications utilities also faced issues repairing infrastructure damage and refueling backup power sources due to sustained inclement weather and right-of-way obstructions.** Telecommunications companies faced access issues due to road closures, fallen trees or road debris, and unsafe working conditions. These challenges prevented timely infrastructure repair and complicated refueling of backup power sources. AT&T field crews, for example, were often unable to safely deploy immediately after the storm due to high winds and other dangerous conditions. These delays impeded access to critical infrastructure and hampered the speed of recovery efforts.

**Logistical challenges related to refueling generators and deploying additional temporary backup units posed significant hurdles.** The ability to deploy and maintain backup power was crucial to maintaining operations during the electricity outages. AT&T kept thousands of cell tower sites online using on-site backup and temporary generators. AT&T had dedicated teams periodically refueling these generators. In contrast, Astound used 150+ backup power supplies that had to be constantly monitored and refueled on an ad hoc basis. The ongoing need for fuel and the risk of generator failures created additional pressure during the restoration process.

### *Resilience and Lessons Learned*

Telecommunication utilities rely on a combination of backup power systems, redundant infrastructure, and proactive disaster planning to minimize service disruptions during severe weather events. These resilience measures are critical to ensuring that customers—especially those in vulnerable and essential services—remain connected. Hurricane Beryl revealed numerous opportunities for telecommunications utilities to improve preparedness and response procedures for future events.

- **Importance of Maintaining Backup Power Systems:**  
Hurricane Beryl emphasized the need for adequate and sustained backup power. AT&T and Astound were able to keep much of their network operational with extensive use of backup generators, but prolonged outages showed the limitations of current systems. In some cases, battery systems provided only a limited window of service continuity, which prove insufficient

during extended outages. Proactive maintenance of backup power like testing and maintaining adequate reserves of fuel can minimize storm-related network issues. Providers should consider increasing the capacity and duration of backup power systems to handle longer power outages and incorporate more rigorous proactive maintenance.

- **Improved Coordination with Electric Utilities:**  
Effective coordination with electric utilities was essential for timely power restoration and, by extension, network recovery. AT&T's pre-storm engagement with CenterPoint and Entergy was a key factor in reducing service disruption. Improved pre-storm coordination can expedite recovery and reduce telecommunications service disruption.
- **Rapid Deployment of Field Teams:**  
Quick mobilization of trained field teams played a significant role in the restoration of telecommunications services. AT&T reported that pre-positioning of disaster recovery teams near high-risk areas enabled faster repairs and generator refueling once conditions permitted. Providers should continue to invest in mobile disaster recovery assets and ensure that personnel are trained and equipped to work under challenging conditions.

## 2.4 Impacts to Retail Electric Providers

In the ERCOT region, consumers that are not served by an MOU or electric cooperative have a choice of retail electric provider (REP). REPs buy power from power generators and sell power to consumers. REPs also manage the retail relationship with the consumer, including billing and customer service. Investor-owned transmission and distribution utilities (TDUs), like CenterPoint, are responsible for maintaining the infrastructure that physically delivers power to the end-use customer. This means that a REP must rely on the TDU for information regarding physical conditions on the transmission and distribution system that could impact the REP's individual customers.

In August 2024, Commission Staff submitted voluntary requests for information (RFIs) to REPs to assess REP experiences during the May 2024 derecho and Hurricane Beryl. Though the RFIs focused on these two storms, the REPs' responses highlighted general patterns and issues that could occur in any similar emergency. Consistent outreach efforts during both emergency events, the REPs had difficulty contacting the TDUs. In addition, the little information the TDUs provided to the REPs was unsatisfactory. REPs largely relied on TDU websites and local news reports for general restoration information. REPs could not obtain premise-specific information on outage status or times of restoration for customers.

The REPs communicated any information they did receive from the TDUs or through other outlets to their customers. REPs equipped customer relations employees with general information to field customer questions on topics such as power outages, recovery updates, available payment assistance, and invoices with estimated reads. Additionally, REPs used social media posts, press releases, emails, web page updates, and account updates to relay information to customers.

REP communications to customers before the storms largely focused on storm preparation. During and after the storms, communications with customers shifted to providing outage information and recovery resources. Questions to REPs about outages and restoration efforts were most common from customers in CenterPoint's service territory because CenterPoint was not easily accessible and struggled to maintain

a functioning outage tracker. As recovery continued, communications pivoted to providing customers with information regarding availability of payment assistance and usage data for billing purposes. For example, REPs reported many instances of customer inquiries regarding charges for usage when electric service was out. For such instances, the REPs focused on confirming the TDU was aware of the outage, informing customers that the TDU was correcting any inaccuracies, and assuring customers that the REP would not assess charges for usage when electric service was out.

Responding REPs overwhelmingly indicated that the main issue faced by REPs before, during, and after the storms was the lack of timely, accurate outage information from the TDUs. REPs highlighted the absence of an operational online outage tracker map, the inability of customers to successfully report outages to the TDUs, and the absence of information regarding location of outages and estimated restoration times. Timely, accurate outage information from TDUs is valuable because such information enables REPs to provide meaningful responses to customer questions about outages. Many customers who contacted REPs wanted restoration timing estimates and confirmation that the customer's TDU knew about the customer's premise-specific outage. Because such information is not conveyed to REPs, communications between REPs and their customers were challenging.

The Commission is pursuing some communication-related solutions through rulemakings.<sup>17</sup>

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<sup>17</sup> *Electric Utility Outage Trackers and Hazardous Condition Reporting*, Project No. 56897 (pending); *Provision of Emergency Contact Information to Transmission and Distribution Utilities by Retail Electric Providers*, Project No. 56898 (pending).



## 3.0 Assessment of Utility Emergency Preparedness and Response

### 3.1 Emergency Preparedness and Response Planning

Commission rules require electric service providers to maintain minimum levels of preparedness for emergencies. Utilities, TDUs, power generation companies, MOUs, electric cooperatives, REPs, and ERCOT must file emergency operation plans (EOPs).<sup>18</sup> EOPs are a key component of an emergency management program. They establish the overall authority, roles, and functions performed during an emergency event or incident. Under Commission rules, an entity must continuously maintain its EOP.<sup>19</sup> An entity also must include certain information in its EOP, including common operational functions that are relevant across emergency types and annexes (e.g., hurricane annex) that outline the entity's response to specific types of emergencies.<sup>20</sup> An entity is required to conduct or participate in at least one drill each calendar year to test its EOP unless the entity has activated its EOP in response to an emergency that calendar year.<sup>21</sup> Following an annual drill, the entity must assess the effectiveness of its emergency response and revise its EOP as needed.<sup>22</sup>

#### *Hurricane and Major Storm Drills*

The format of annual hurricane drills varied considerably both within and across the utility classifications.

The majority of IOUs conducted a tabletop hurricane drill in 2024.<sup>23</sup> The most commonly drilled conditions were Category 3 storms (111-129 mph winds) making landfall in or near the provider's service area. Drills were generally conducted as tabletop exercises, involving a series of discussions focused on how to implement aspects of the EOP to address the conditions contemplated for the drill. Condition sets were often based on previous major regional storms. For example, CenterPoint based its 2024 drill on storm surge and wind speed conditions of Hurricane Gilbert (1998) and outage figures from Hurricane Ike (2008).<sup>24</sup> Fewer than 20% of the contacted electric service providers conducted an operations-based or functional exercise as part of their annual hurricane or major storm drill.

IOUs generally excluded external participation in their hurricane drills. However, IOUs were more likely than MOUs and co-ops to invite third parties to observe at least a portion of their drill.

Just over 25% of the contacted MOUs and 54% of co-ops conducted hurricane drills. Five co-ops reported that responses to either the May 2024 derecho or Hurricane Beryl served in place of conducting a separate hurricane or major storm drill. MOUs and smaller co-ops were more likely to have static drill conditions (i.e., the overall format of the drill either does not change or has minimal adjustments year-to-year) than the IOUs.

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<sup>18</sup> See 16 Tex. Admin. Code (TAC) 25.53.

<sup>19</sup> *Id.*

<sup>20</sup> *Id.*

<sup>21</sup> *Id.*

<sup>22</sup> *Id.*

<sup>23</sup> Oncor does not conduct hurricane drills but does conduct major ice storm drills. See RFI 1-1

<sup>24</sup> CenterPoint's response to Staff RFI 1-1

CenterPoint adjusts its hurricane drills year-to-year.<sup>25</sup> CenterPoint conducted its 2024 hurricane drill as a tabletop exercise. The conditions experienced in Hurricane Beryl were not markedly different from the condition set used in the company’s 2024 hurricane drill.

<b>CenterPoint’s 2024 Hurricane Drill Test Conditions</b>	<b>Hurricane Beryl’s actual effect on CenterPoint</b>
Category 3 storm 125 mph wind speed 150 mph gusts 2.1 million affected customers	Category 1 storm 80 mph wind speed 97 mph gusts 2.2 million affected customers

Performance during CenterPoint’s 2024 drill was measured by participants’ identifications and use of plans, processes, or procedures that addressed drill injects, issues, and areas for improvement. Drill participants stated that CenterPoint’s drill conditions were plausible and realistic. After participating in the drill, all participants reported feeling better prepared to deal with the capabilities and hazards addressed in the drill. Additionally, 91% of participants reported increased understanding about and familiarity with CenterPoint’s response procedures, resources, and capabilities. Participants also reported that the drill was well-structured, organized, and allowed for good collaboration and open communication. Overall, CenterPoint considered the 2024 drill a success.

*External participation in hurricane and major storm drills*

Many of the contacted electric service providers restricted participation in hurricane and major storm drills to the provider itself and its subsidiaries. Only three electric service providers invited unaffiliated parties to participate in their 2024 hurricane and major storm drills. For example, Hemphill City Government invited county emergency management officials, area hospitals, and eldercare facilities to participate in its hurricane drill. South Texas Electric Cooperative, which serves as the transmission service provider (TSP) for nine member cooperatives, extended invitations to all of its member utilities. Entergy invited Edison Electric Institute to observe its 2024 hurricane drill, but it did not invite its MOU customers to participate in the hurricane drill.

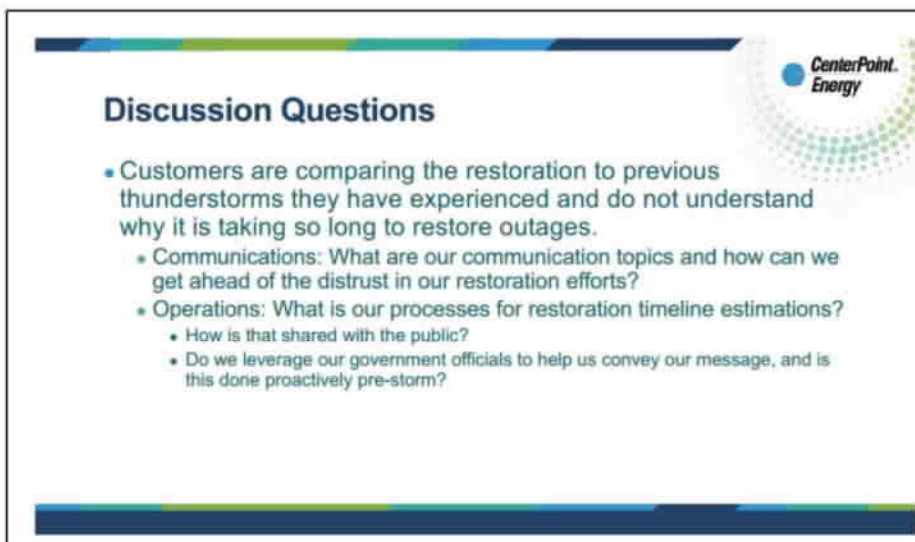
Several electric service providers cited confidentiality concerns centered around the provider’s EOP as the reason for limiting participation. As an alternative to external participation in drills, some electric service providers attempted to incorporate feedback received from customers after major weather events into future drills.

CenterPoint, like most electric service providers contacted in this investigation, restricted participation in its hurricane drill to internal personnel.<sup>26</sup> The City of Houston reported, for example, its last participation

<sup>25</sup> CenterPoint conducted an operation-based drill in 2023.

<sup>26</sup> CenterPoint reported that it had invited local governments, trade associations, and eldercare facilities to participate in previous drills.

in a hurricane preparedness exercise with CenterPoint was a panel discussion in May 2020.<sup>27</sup> Restricted participation limits assessment of communication strategies. Without external participation, an electric service provider can only assess whether a message was delivered or speculate about customer expectations. Importantly, the provider cannot assess whether the drill communication achieved the desired result. For example, CenterPoint included a scenario in its 2024 hurricane drill in which customers compared the restoration efforts taken to address the fictional storm to restorations to previous thunderstorms:



Despite testing for how to address customer expectation concerning restoration efforts, CenterPoint was unprepared for how to address similar sentiment during its response to Hurricane Beryl.

### *Operation Condition Systems and Emergency Operations Plans*

Nearly 70% of the contacted utilities use a multi-tiered operation condition system (OCS) in addition to an EOP. An OCS sets out clear steps for a utility to follow based on specific operating conditions, like percentage of customers without power or the duration of outages. Most contacted utilities had several OCS tiers that are designed to be activated before the EOP. This design allows utilities to handle minor disruptions without requiring a major interruption to normal operating procedures.

A key difference between OCSs and EOPs is that an OCS does not necessarily specify roles for individuals. When an EOP is activated, an individual may be assigned a specific task that differs from that person's usual duties. For example, Wharton County Electric Co-Op reported that during Hurricane Beryl, its Operations Chief managed the workflow of mutual assistance and in-house crews. Duties included handling lodging (and cooking for the crews) and serving as a contact for the media and government officials. By contrast, an OCS might address a relatively minor issue by shifting crews instead of shifting divisions, allowing the utility to continue normal operations during resolution.

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<sup>27</sup> City of Houston response to Commission staff's first request for information to local governments, Project Number 56822.

Commission Staff reviewed several OCSs that required activation of the EOP toward the final stage of the OCS. This means assessing a utility's preparedness solely based on when it activated its EOP may overlook important pre-EOP steps. For example, confirming availability of preferred contractors, contacting mutual assistance organizations, and recalling critical personnel may occur in the second tier of OCS, before the EOP is activated. CenterPoint, which uses two distinct OCSs, activates its EOP only when conditions reach the third of four possible tiers of its transmission system-specific OCS. CenterPoint activated its EOP on July 6, 2024 – two days before Hurricane Beryl made landfall. However, response preparation within CenterPoint's Emergency Preparedness and Response Team (EP&R) began as early as June 25, 2024 (13 days before landfall, 11 days before EOP activation) and calls to line workers were made on July 2, 2024 (6 days before landfall, 4 days before EOP activation).

### *Storm Tracking*

Better technological storm tracking tools generally meant storms could be tracked earlier and more accurately. At minimum, most utilities used a mix of local news and national weather services as part of their storm tracking programs. The overwhelming majority of the IOUs and approximately half of the electric cooperatives use advanced storm tracking resources, like StormGeo or Ventusky. Advanced storm tracking resources aggregate weather-related data from multiple national and international weather services. These resources allow the progression of weather systems to be modeled beyond a medium range (6 days out) forecast. Utilities that relied solely on local and national weather services generally began tracking Hurricane Beryl two to five days later than utilities leveraging more advanced tracking services. CenterPoint used a combination of storm tracking resources, including StormGeo, national weather services, and the Harris County Office of Homeland Security Emergency Management Tropical Awareness Update.

Most of the OCSs and EOPs reviewed by Commission Staff used either location of a storm or estimated time to landfall as trigger mechanisms for escalating conditions to a higher degree of system readiness. Utilities that implemented strategies to track storms by location (e.g., as they entered the Gulf of Mexico) tended to react and prepare for Hurricane Beryl faster than utilities that tracked storms based on estimated time to landfall. IOUs tended to track storms based on location instead of time to landfall, while MOUs and smaller co-ops were more likely to track storms based on estimated time to landfall. Notably, most IOUs acted on storms significantly earlier than MOUs and smaller co-ops.



### Outage Tracker Testing

Thirty-three of the contacted electric service providers have an outage tracker that allows a customer to determine whether a home or business is experiencing an outage. For this purpose Cloud-based systems are often preferred over server-based systems because they can be scaled more easily to address surges in demand.<sup>28</sup> Commission Staff found that outage trackers are not meaningfully tested as part of pre-storm preparation and tracker disruptions were not incorporated into hurricane drill condition sets.

Utilities that had external-facing outage trackers generally review these systems on a daily or weekly basis. However, daily checks are not meaningful replacements for pre-storm checks. Daily checks confirm system availability and accuracy but don't necessarily test accessibility and capacity. For example, a daily check of a system might involve attempting to trip a set of test circuits to see if the information flags on the tracker. Stress tests help determine how many users can access the tracker simultaneously before it begins to fail.

Many utilities – especially coops and MOUs – do not incorporate outage tracker testing into system readiness operations before a hurricane or major storm. Only three MOUs and 18 coops tested their outage trackers (external and internal) as part of their pre-hurricane season or pre-storm preparations. TNMP did not test its outage tracker in advance of hurricane season or as part of pre-storm preparations, relying instead on daily monitoring. Oncor conducts internal tests on its cloud-based outage tracker<sup>29</sup>, but

<sup>28</sup> Cloud-based systems in other industries have been contacted by distributed denial-of-service (DDoS) attacks, which serve to disrupt the functionality of the system by overloading its capacity.

<sup>29</sup> Oncor's response to RFI Staff 1-8

does not stress test its tracker. However, Oncor does alert its vendor about the potential for heightened traffic on the outage tracker in advance of major weather events.<sup>30</sup> CenterPoint used an on-premises, server-based outage tracker until August 1, 2024. This tracker underwent monthly testing consisting of taking primary servers down and routing the program through the backup server. However, CenterPoint had never load tested its server-based outage tracker. As detailed in *Section 3.2 – Communication and Coordination*, CenterPoint’s outage tracker failed during the May 2024 derecho and Hurricane Beryl because its servers could not handle the increased traffic.

None of the utilities reported incorporating outage tracker disruptions as part of the condition in their hurricane or major storm drills.

### *Pre-Storm Communications*

Post-landfall communication with local and state officials are generally addressed in significant detail (with regard to frequency, duration, and content) in a utility’s EOP. However, few EOPs addressed a utility’s communication strategy or process with critical loads and government officials as part of pre-storm preparation. As discussed in *Section 2.2 - Impacts to Water Utilities*, none of the contacted water utilities reported being contacted by their electric utilities (generally utilities in the larger classification in this section) before Hurricane Beryl.

Many contacted MOUs and Co-Ops indicated either making no special effort to communicate with these stakeholders before a major storm or only reach out as needed. All IOUs reported plans to coordinate with government organizations before a major storm, but they are less proactive about working with other groups. For example, CenterPoint specifically stated that it “did not have a specific process in place to push out communication directly to all Critical Load customers in advance of the storm.”<sup>31</sup> Critical load includes medical facilities, elder care facilities, police stations, firehouses, and other critical infrastructure. CenterPoint relied on a series of generalized stakeholder group meetings held between May and June to communicate with these facilities.

CenterPoint’s communication strategy is representative of the plans exhibited by many other IOUs, MOUs, and cooperatives. These stakeholders are expected to reach out to the utility if special consideration is needed. By failing to proactively coordinate with these groups in advance, utilities may miss opportunities to address potential issues before they occur.

### *May 2024 Derecho Emergency Operations Plans Activations*

The speed and suddenness of the May 2024 derecho led to varied EOP activation timelines across utilities. derechos, while rare, are typically predictable as severe weather systems. However, these storms are often initially treated as severe thunderstorms until the threat from high winds becomes clear. Only a few utilities reported tracking the systems that became the May 2024 derecho. Four (Oncor, Entergy, City of Bellville, and Sam Houston Electric Co-Op) activated their EOP in the days before the storm hit.

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<sup>30</sup> *Id.*

<sup>31</sup> CenterPoint Energy Houston Electric, LLC’s Response to the Public Utility Commission of Texas First Requests for Information at 1074-75 (Aug. 30, 2024).

<b>EOP Activation Date</b>	<b>Utility</b>
May 13	Entergy
May 14	Oncor; City of Bellville
May 15	Sam Houston Electric Co-Op

Around a third of the contacted utilities (21) reported outages due to the derecho, which affected approximately 1.1 million customers. The most common cause of outage was damage due to straight-line wind, at times exceeding 90 mph. These winds caused significant damage to 14 transmission lines within CenterPoint’s service territory. Most utilities – even those significantly affected by the storm – did not activate their EOPs for the May 2024 derecho.

CenterPoint activated its EOP after 3:00 p.m. on May 16, 2024. Approximately 84% of the total effected customers were within the CenterPoint service territory, accounting for about 920,000 customer outages at the peak. Entergy had the second highest customers on outage, with a peak of 69,448 (6.3% of the total affected customers).

The suddenness of the derecho limited utilities’ ability to pre-position additional line workers and vegetation management crews in advance of the storm. Similarly, pre-storm communication was largely impossible. CenterPoint did not report any issues with staging or acquiring mutual aid during the May 2024 derecho.

## **Recommendations**

Recommendations are numbered throughout the report for ease of reference and not in order of importance.

- 1. Utilities should include neighboring utilities, local governments, and emergency services in annual hurricane and major storm drills.**
  - Utilities that restricted participation in hurricane drills to internal participants could not effectively test key aspects of their EOP, specifically relating to communication with external stakeholders. Instead, utilities tested communication strategies by discussing them internally. Similarly, water, sewer, and telecommunications utilities should participate in periodic group drills because each utility has a downstream effect on the others. This is particularly true for electric utilities that serve as transmission service providers (TSPs) for smaller electric utilities.
- 2. The Commission should require pre-storm communications procedures in emergency operations plans.**
  - Many electric utilities lack proactive strategies for communicating with other utilities and stakeholders before major weather events. Proactive outreach could allow utilities to identify and address potential issues before they arise. The Commission’s current rules require that EOPs

include a communication plan.<sup>3233</sup> However, this generally only addresses communication *during* emergencies.

### **3. Utilities should incorporate outage tracker disruptions and high user demand as scenarios in annual hurricane and major storm drills.**

- Functioning outage trackers provide the public with critical information concerning restoration status during electricity outages. The issues with CenterPoint’s outage tracker during Hurricane Beryl highlight the importance of ensuring, before an emergency, that outage trackers are properly functioning and able to handle high user demand. Hurricane and major storm drills provide electric utilities with an opportunity to test the capability of outage trackers and practice scenarios involving disruptions to outage trackers.

## 3.2 Communication and Coordination

Commission Staff issued Requests for Information (RFIs) to electric service providers to determine how utilities communicate and coordinate with customers and stakeholders during major weather events. RFI response data indicates Investor-Owned Utilities (IOUs) employ more sophisticated communications strategies than Municipally Owned Utilities (MOUs) and electric cooperatives. Among all utilities, there is room to improve proactive coordination with community stakeholders and other utility services.

In addition to the RFIs, the Commission collected input from Houstonians about their experiences communicating with electric service providers during severe weather through an online questionnaire. Respondents identified the lack of reliable and accurate communication as a top issue faced during the power restoration process. For additional detail on questionnaire responses, see *Section 2.1 Texans’ Lived Experience*.

### *Customer Communication Strategies*

Customer communication strategies rely heavily on social media. Nearly all contacted utilities used at least two forms of media—typically their website and social media—to communicate with customers before, during, and after major weather events. Most IOUs and cooperatives indicated they also provide information using some form of text messaging service, email service, or smartphone application. Other electric utilities also used radio, news releases, and other forms of traditional media to deliver information to a broad customer base.

Before and during the May derecho and Hurricane Beryl, utilities overwhelmingly focused on social media to share storm preparation and safety messaging. In the aftermath of both storms, all impacted utilities used social media—particularly Facebook—to share information about physical damage, outages,

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<sup>32</sup> 16 Tex. Admin. Code 25.53(d)(2).

<sup>33</sup> Specifically, an entity with transmission or distribution service operations must describe in its EOP the procedures *during* an emergency for handling complaints and for communicating with the public; the media; customers; the commission; the Office of Public Utility Counsel (OPUC); local and state governmental entities, officials, emergency operations centers, the reliability coordinator for its power region; and critical load customers directly served by the entity



restorations, and customer safety. With the exception of CenterPoint, Commission Staff’s review of customer feedback showed no specific concerns about the sufficiency of public-facing, post-storm communications.

### *Critical Loads*

Post-storm communications between utilities and critical loads were problematic, particularly for long-term care facilities. Hundreds of nursing and assisted living facilities were impacted by Hurricane Beryl. The Texas Assisted Living Association reported that its members had difficulty obtaining information following the storm. Assisted living facility staff waited on customer service hold lines for hours, and utility representatives “could not consistently note whether the assisted living facility’s account showed a current priority restoration status.” See section 3.1 *Emergency Preparedness and Response Planning* for additional discussion about proactive communication with critical loads.

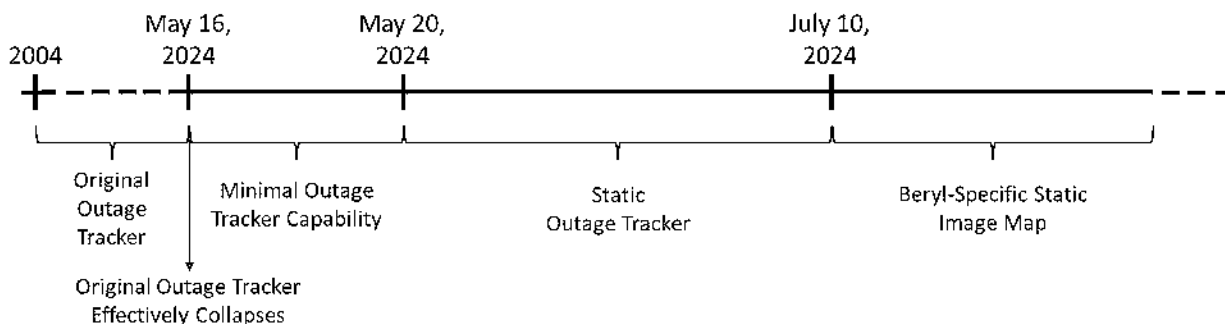
### *CenterPoint’s Outage Tracker*

Customer feedback revealed widespread frustration with CenterPoint’s outage tracking systems. The company’s storm recovery communications focused largely on sharing general information through interviews, media inquiries, press releases, and social media posts. However, CenterPoint failed to provide its customers with critical information: a reliable estimate of when power would be restored in a given location.

CenterPoint’s original outage tracker could not withstand the site traffic associated with the derecho. The utility failed to prioritize the development of a functional replacement tracker in the months that followed. Without a working outage tracker CenterPoint’s customers were left without access to critical information about their restoration status in the aftermath of Hurricane Beryl.

### *Outage Tracker Failures*

Between May 1 and July 31, 2024, CenterPoint utilized three different web-based outage tracking systems:



- The original outage tracker launched in 2004 and was last updated in July 2022. This outage tracker effectively collapsed on May 16, 2024, when it was overwhelmed by site traffic during and after the derecho. Less than two percent of impacted customers were able to successfully access the webpage.

- Four days later, on May 20, 2024, CenterPoint replaced the original outage tracker with a “static outage tracker” as an interim solution. The static outage tracker displayed only the total number customer outages and restorations. There was no information about specific outage status or estimated restoration times. A color-coded, derecho-specific map was later added to show restoration progress. However, customers reported it was still unreliable and inaccurate, sometimes reflecting restored power where outages were still ongoing. Despite these issues, CenterPoint retained the static tracker until July 10, 2024—two days after Hurricane Beryl knocked out power for approximately 90% of CenterPoint’s customers.<sup>52</sup>
- For the first two days of Hurricane Beryl recovery, over 2.2 million CenterPoint customers lacked independent access to information about their outage statuses. On July 10, CenterPoint launched a third outage tracker: a Beryl-specific static image map updated daily with color-coded areas showing active service, assigned repairs, and areas still to be assessed. Like the previous map, it sometimes incorrectly reflected power had been restored to areas with ongoing outages, leaving customers to wonder if the company was aware of their outages.

CenterPoint’s reliance on an inadequate tracker raises questions about why it did not prioritize launching a more functional interim outage tracker sooner. As an electric utility situated in a region prone to tropical weather patterns, the company was aware of the looming hurricane season. Further, following the derecho recovery efforts, it was aware its static outage tracker was insufficient.<sup>53</sup>

#### *Current Outage Tracker*

On August 1, 2024, CenterPoint launched a new, cloud-based interactive outage tracker. This new tracker is hosted by a vendor that employs “autoscaling” technology that automatically increases the number of servers hosting the application as user demand grows. The map is guaranteed to remain functional with 100,000 concurrent users. Prior to the launch, CenterPoint successfully load tested it with 30,000 concurrent users.

#### *Municipally Owned Utility Customer Communication*

RFI response data indicates that municipally owned utility (MOU) communication strategies fall short of their peers’, leaving customers without reliable ways to contact their utility during an outage. For example, while 100% of contacted IOUs and over 90% of contacted cooperatives maintain a public-facing outage tracker, only 10% of responding MOUs do.<sup>54</sup>

Further, more than half of responsive MOUs have no call center or help desk resources and instead rely on other city employees to field calls during emergencies. MOUs that *do* maintain call centers overwhelmingly rely on the availability of other city employees to augment call center staff during emergency events—if they supplement call center staffing at all.<sup>55</sup> It is unclear how MOU customers can report outages or other emergencies in circumstances where other city employees are unavailable to answer calls, such as after regular business hours or during emergency weather events.

MOUs are often small utilities with fewer resources, and the costs of solutions like interactive outage trackers may outweigh the potential benefits they would provide. However, the majority of contacted MOUs appear underprepared to handle customer communication during a major outage event. Ensuring

customers can contact their electric service provider by phone during emergencies is a key part of a modern customer communications strategy.

## **Recommendations**

Recommendations are numbered throughout the report for ease of reference and not in order of importance.

### **4. The Legislature should codify a customer's right to information about restoration times and the right to contact an electric service provider by phone.**

- All customers experiencing an outage should have reasonable access to information about their outage status and estimated restoration time. The Commission has launched an administrative rulemaking requiring IOUs to maintain functional and accurate public-facing outage trackers. However, the Commission lacks the authority to require the same of MOUs and co-ops.

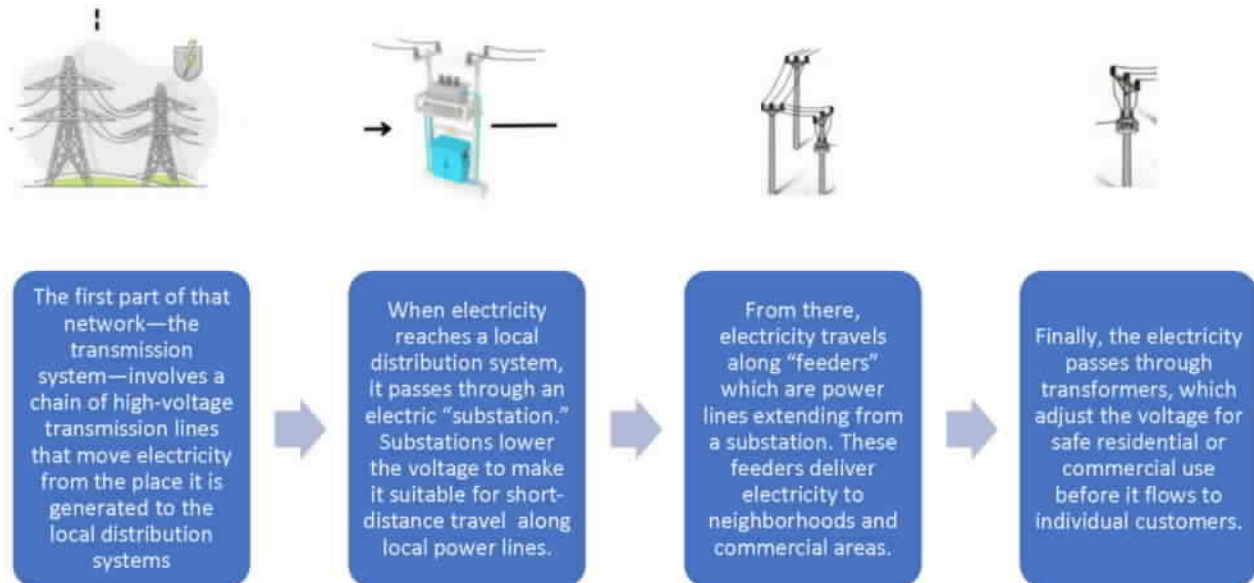
Additionally, customers should have the ability to contact their electric service provider to report outages and other electrical emergencies 24 hours a day. Approximately half of the MOUs contacted by Commission during this investigation did not have call center resources.

The Legislature should consider adding these protections to the Public Utility Regulatory Act (PURA) Chapter 17, which outlines customer protections.

- Further, critical loads, such as assisted living facilities and water utilities, must be able to contact their electric service provider directly during an emergency. The Legislature should consider codifying a critical customer's right to timely contact with utility representatives during significant power outages. Some of these customers reported waiting on hold for hours to speak to a customer service representative following Hurricane Beryl.

### 3.3 Customer Restoration Workflow

Restoring power for electric customers depends on the continuous operation of a complex network of physical infrastructure.



Damage to any part of a utility’s transmission or distribution system may disrupt service for customers located “downstream.” For example, damage to a transformer may cause an outage on one side of a street, while damage to a substation may impact whole neighborhoods. After a major storm, it is not uncommon for customers to be impacted by damage to more than one of the electric facilities used to provide service to that customer. To restore power, the utility must repair all damage affecting the flow of electricity to a customer’s premises.

A review of workflow restoration procedures indicates that the most effective way to optimize the restoration process is to proactively enhance the reliability of system infrastructure. Ensuring utility infrastructure is prepared to withstand the expected hazards of a utility’s service territory will reduce the total number of outages following a major storm and reduce the extent of damage responsible for outages that do occur.

#### *Outage Reporting and Management*

Utilities follow similar procedures for incorporating outage reports into restoration workflow. Most IOUs and electric cooperatives use technology to ensure the outage reporting process is simple and accessible for most customers. Typically, customers can report outages to customer service agents, interactive voice response (IVR) systems, or online through utility websites or mobile applications. Outages reported to

IOUs and electric cooperatives are then entered into outage management systems, which allow utilities to track outages, assign restoration crews, and monitor restoration progress.<sup>34</sup>

The speed with which a utility responds to a specific outage is influenced by a number of factors. The presence of critical facilities, the size of the outage, safety concerns, and the equipment necessary to repair the damage each play a role. When there is widespread damage, utilities may delay the deployment of work crews until damage is assessed and utilities can determine how to allocate restoration resources. Effective pre-storm management—especially pre-staging crews and materials, when possible—helps reduce logistical delays in the restoration process.

For MOUs, the outage restoration process is less clear-cut. In August 2024, the Commission sent RFIs to MOUs to determine how customer calls were incorporated into restoration workflow following Hurricane Beryl. Most contacted MOUs did not provide a substantive response to the question, either because they were not impacted by Hurricane Beryl or because they do not have a customer call center.<sup>35</sup> MOUs that *did* provide a substantive response described strategies that mirrored those described by IOUs and electric cooperatives. It is not clear how MOUs that lack call center resources receive outage reports, or how long it takes those outages to be incorporated into utility workflow.

### *Restoration Prioritization*

Customers in low-density areas may experience longer power outages. All contacted utilities indicated that, during an outage event, they attempt to prioritize restoration to critical loads and repairing damage that impacts the greatest number of customers.<sup>36</sup>

Restoring power to the greatest number of customers typically means prioritizing repairs to damage at transmission lines and substations before feeders and other downstream equipment. This approach ensures power is restored to more customers more quickly, but it may prolong outage durations for some customers based on their physical location. The design of electric distribution systems also plays a role. Utility service territories are divided into individual electric “circuits” (also called feeders) extending from substations.<sup>37</sup> Prioritizing repairs that will restore power to the greatest number of customers means restoration to more isolated circuits may be delayed. Circuits often have a looped design so customers located along damaged lines can be “back fed” power. However, some circuits have a “radial” design. If a radial circuit is damaged, customers cannot be “back fed” electricity from elsewhere in the system. Radial circuits are often located in less densely-populated areas, meaning rural and suburban customers – and others along radial circuits – may often experience more prolonged delays.

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<sup>34</sup> While most contacted IOUs and cooperatives followed this general procedure, the specific procedures followed for restoring reported outages vary between utilities.

<sup>35</sup> See Section 3.2, above (explaining that approximately half of all contacted MOUs reported that they do not maintain call center resources but rely on other city employees to answer calls when available).

<sup>36</sup> Critical loads include, but is not limited to, hospitals, police stations, fire stations, other utilities, and customers with special in-house life-sustaining equipment. See also 16 TAC § 25.52(f) and (h)(2), 25.53(e), and 25.62(4)(C)(i)(IV).

<sup>37</sup> Isolating circuits allows utilities to limit the number of customers affected by a single outage—much like the circuits in a residential home, where a fault may cause the circuit breaker to “trip” for one room while allowing the remaining rooms to maintain power.

## **Recommendations**

Recommendations are numbered throughout the report for ease of reference and not in order of importance.

### **5. The Legislature should consider establishing a framework and penalty structure to assess IOU service quality during major outage events.**

- The Commission oversees and enforces IOU compliance with service quality standards. However, since 1998, the Commission has excluded major events—extreme weather that disrupts power to at least 10% of customers—from these service quality calculations.<sup>3839</sup> The exclusion reflects concerns that including such events would misrepresent a utility’s typical reliability. While it’s reasonable to exclude hurricane damage from average service quality metrics, utilities should not avoid accountability for insufficient storm preparation or response.

Commission staff recommends establishing a new standard to assess IOU system reliability and response during major events. The standard would be applied to a utility’s service quality performance during major events over the course of a year, similar to how the Commission’s current service quality rules are designed. For violations of this standard, the Commission should have the authority to pursue enhanced administrative penalties.

## 3.4 Physical Infrastructure

Staff analyzed RFI responses pertaining to the resiliency of electric service providers’ physical infrastructure in the Greater Houston area. Staff reviewed information related to infrastructure inspection cycles, minimum widths of rights-of-way, and the strength and wind loading design and construction standards. Additionally, staff reviewed infrastructure failures, the causes of those failures, and potential for those same failures to cause problems in the future. Utility standards and practices are generally consistent across the region. Most electric service providers in the Greater Houston area follow similar design and construction standards.

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<sup>38</sup> See 23 TexReg 11923 (1998) (to be codified at 16 TAC § 25.52) (proposed Jun. 12, 1998) (acknowledging that SAIFI and SAIDI standards may be adversely impacted by single outstanding weather events, contemplating excluding major events from SAIFI and SAIDI calculations once individual utility standards are established, and stating that “the commission does not intend to adopt requirements having the unintended consequence of requiring inefficient reliability expenditures due to adopting standards affected by abnormal operating experiences.”). See also the Commission’s annual service quality report form, which specifically limits SAIFI and SAIDI calculations to “forced outages,” available at <https://www.puc.texas.gov/industry/electric/forms/#electric-form-6a>.

<sup>39</sup> These metrics include the system-average interruption frequency index (SAIFI) and system-average interruption duration index (SAIDI). A utility’s SAIFI value represents the average number of times a customer’s electric service is interrupted, and its SAIDI value represents the average amount of time service is interrupted.

## National Electrical Safety Code Loading Factors

The National Electrical Safety Code (NESC) is a set of industry-defined standards designed to promote safe installation, operation, and maintenance of the electric utility systems. NESC Rule 250B, which specifies combined ice and wind loading criteria, defines four district loading areas due to typical weather conditions: Heavy, Medium, Light, and Warm Island loadings.<sup>40</sup> As shown below, Texas' gulf coast is located in the light loading district.

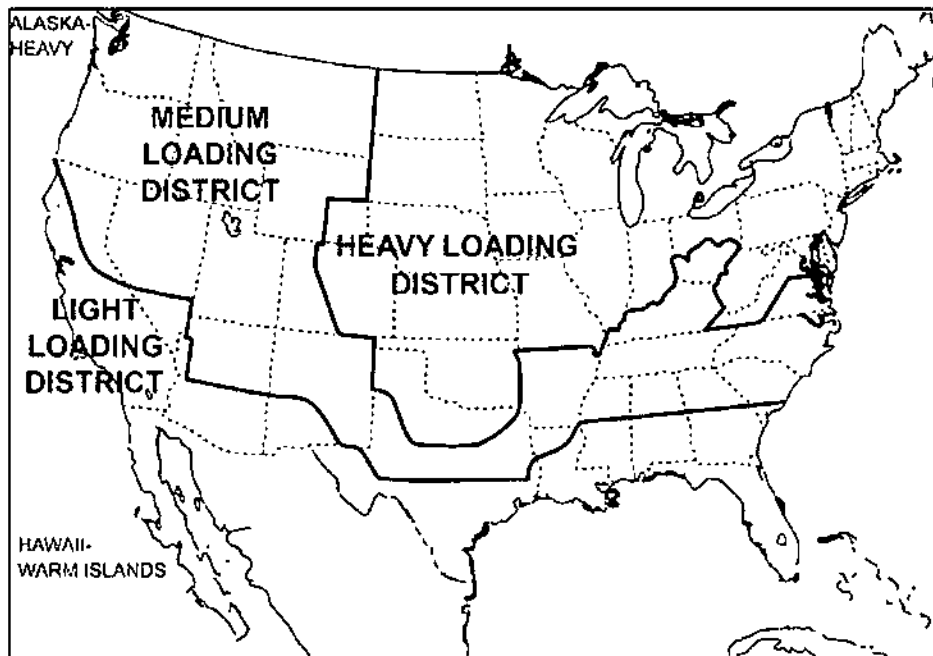


Figure 1: General loading map of the United States with respect to loading of overhead lines<sup>41</sup>

Within each of these loading areas, Rule 250B defines a specific horizontal wind pressure, radial ice thickness, and temperature that should be considered in the design of structures. NESC Rule 250C, extreme wind loading, applies to structures or their supported facilities that exceed 60 feet above ground or water level and require the design to withstand the extreme wind speeds. The figures below show extreme wind speed design standards of between 90 and 130 mph for areas located on or near the gulf coast, depending on structure's construction standard used.

<sup>40</sup> IEEE NESC C2-2023 at 178.

<sup>41</sup> *Id.* at 181.

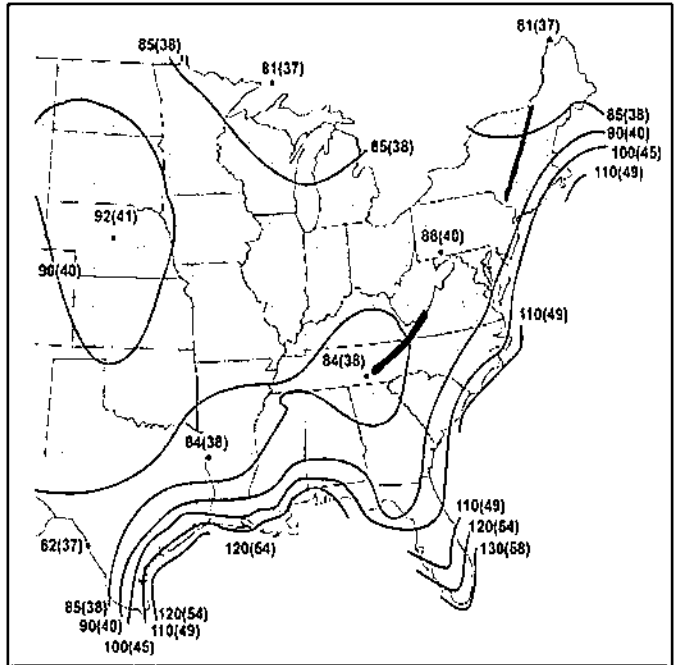


Figure 2: Grade C, 50-year Mean Recurrence Interval (MRI) 3 second gust wind speed map<sup>42</sup>

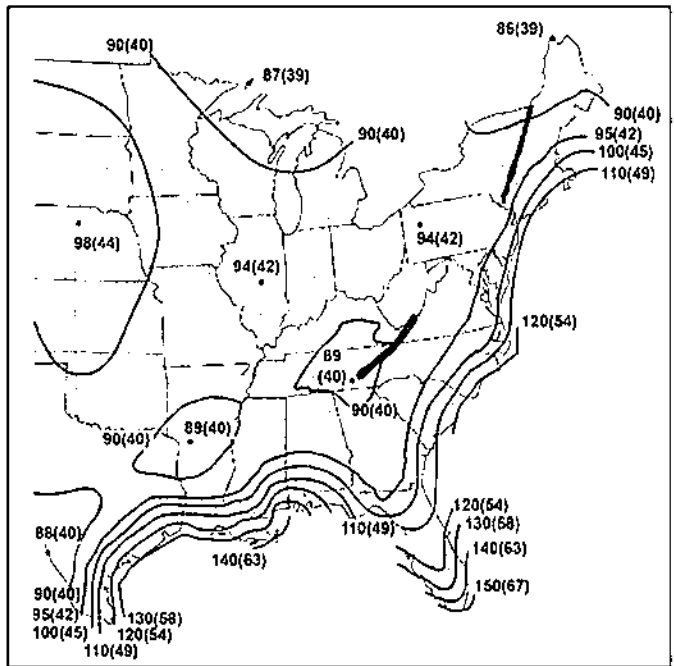


Figure 3: Grade B, 100-year MRI 3 second gust wind speed map<sup>43</sup>

Finally, NESC Rule 250D, extreme ice with concurrent wind loading, applies to structures or their supported facilities that exceed 60 feet above ground or water level. This rule requires a structure and its

<sup>42</sup> *Id.* at 185.

<sup>43</sup> *Id.* at 183.



supported facilities to be designed to withstand loads associated with the uniform ice thickness and concurrent wind speeds specified in the 2023 NESC.

The table below demonstrates the design standards used by various electric service providers in the greater Houston area as compared with the NESC light loading design standard.

	Horizontal Wind Pressure (psf)	Radial Ice Thickness (in.)	Extreme Wind Speed (mph)
<b>NESC Light Loading</b>	<b>9</b>	<b>0.0</b>	--
CenterPoint <sup>44</sup>	3	0.5	110-132
AEP Texas	20	1.0	103-150
Entergy	9	0.0	~95-135
TNMP	9	0.0	90-130

Notably, all utilities reported meeting or exceeding NESC Rule 250B standards. In 2022, CenterPoint began applying both NESC 250C and 250D to all new and replacement distribution facilities, regardless of structure height.<sup>45</sup> Additionally, CenterPoint stated that, while only 1.8% of the poles on its system have been installed to meet this standard, a sample of a small population of circuits revealed that approximately 50% of its existing poles already met these standards.<sup>46</sup>

Oncor will begin assessing and upgrading its existing overhead distribution facilities to meet NESC 250C and 250D, regardless of structure height.<sup>47</sup> Oncor will apply these rules to all new and replacement distribution facilities as well, similar to what CenterPoint began doing in 2022.

Most MOUs and co-ops report using the NESC strength and loading factors in effect at the time of construction and use the NESC 250B wind load district associated with the utility’s location. There were seven co-ops that report building to Rural Utilities Services (RUS) standards that meet or exceed NESC specifications.<sup>48</sup>

*Right-of-way (ROW) Design*

Most electric service providers require similar rights-of-way when designing their distribution systems. Generally, utilities plan for between 10 and 15 feet of right-of-way, with the line running down the center of the easement.

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<sup>44</sup> CenterPoint’s current distribution system strength and loading design standards exceed NESC Rule 250B for Light Loading Districts by considering the weight of ice on its conductors. The utility’s standards come close to meeting design standards for Heavy Loading Districts, which require construction considering 0.5 in. of ice plus 4 pounds per square foot (psf) of horizontal wind pressure.

<sup>45</sup> CenterPoint’s Response to Staff RFI 1-81.

<sup>46</sup> CenterPoint’s Response to Staff RFI 1-85.

<sup>47</sup> Application of Oncor Electric Delivery Company LLC for Approval of a System Resiliency Plan (May 6, 2024)

<sup>48</sup> Rural Utilities Services is a program of the US Department of Agriculture’s Rural Development initiative.

Utility	Single Phase (ft.)	Three-Phase (ft.)
CenterPoint	10	10
Oncor	10	15
AEP Texas	10	10
Entergy	15	15
TNMP	10	16
Coops	10-15	10-15
MOUs	10	10

CenterPoint indicated that it requires a minimum 14 feet ground easement for single and three-phase lines when shared with other dry utilities, like gas or telecommunications. A 16 feet ground easement is used for single and three-phase lines when shared with other dry utilities and a wet utility, like water. Additionally, CenterPoint also has easements that were previously defined in platted dedications and negotiated agreements that pre-date the utility’s minimum ROW standards. In some cases, the ROW is as narrow as 5 feet.

*Pole Embedment*

Several factors determine how far into the ground a distribution pole should be embedded, including pole height, pole class, pole material, structural loads, and soil conditions. Most utilities follow Rural Utilities Service (RUS) specifications for pole embedment: 10% of the total pole length plus two feet.<sup>49</sup>

CenterPoint uses a design software to determine pole embedment, with the following minimums:<sup>50</sup>

- Class 2 and smaller wood poles: 10% of total pole length plus 2 feet.
- Class 1 and larger wood poles: 10% of total pole length plus 3 feet.
- Fiberglass and ductile iron poles: 10% of total pole length plus 3 feet.

AEP Texas provided a chart showing the pole depths for 5 different soil types based on the length of pole used.<sup>51</sup> For normal soil conditions, with class 4, 5, and 6 poles, pole embedment averages the 10 percent of total pole length, plus 2 feet standard.

Entergy Texas began using the following pole embedment in 2022:<sup>52</sup>

- Wood poles: 10% of pole length plus 3 feet.
- Non-wood poles: 10% of pole length plus 4 feet.

TNMP, 26 MOUs, and 29 coops use the RUS standard of 10% of pole length plus 2 feet.

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<sup>49</sup> US Department of Agriculture Rural Development Utilities Program: RUS Bulletin 1724E-205.

<sup>50</sup> CenterPoint Response to Staff RFI 1-79.

<sup>51</sup> AEP Texas Response to Staff RFI 1-58.

<sup>52</sup> Entergy Response to Staff RFI 1-58.

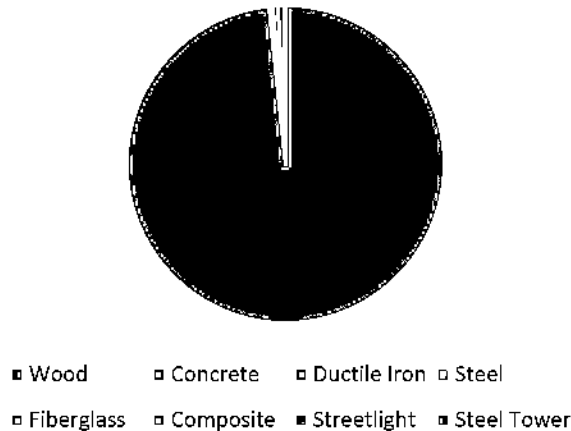
### Pole Inspections

CenterPoint, AEP Texas, and Entergy inspect their distribution poles on a 10-year cycle, meaning approximately 10% are inspected annually. Oncor inspects high-impact poles on a 10-to-15-year cycle. TNMP conducts inspections as part of day-to-day operations or as warranted by operating conditions and/or reliability indicators. Of the contacted MOUs, 10 conduct pole inspections as an on-going manner part of daily operations. Others conducted pole inspections on cycles ranging from twice a year to every 10 years. Most co-ops inspect 10% of distribution poles each year.<sup>53</sup>

### Pole Counts

Prior to the May 2024 derecho event, the electric service providers contacted in the investigation had more than 3.7 million distribution poles in the ground providing service. The contacted IOUs own about 56% and the contacted MOUs and co-ops own about 44% of these. With one exception, more than 95% of each electric service provider’s distribution pole fleet was made of wood.<sup>54</sup>

**Distribution Pole Types**  
(AEP Texas, Entergy, Oncor, CenterPoint, TNMP)

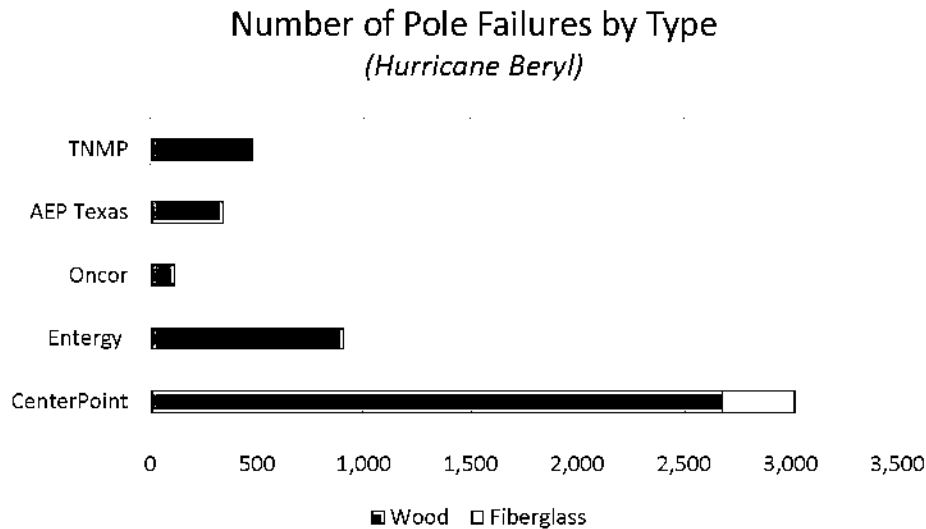


<sup>53</sup> Response to Staff RFI 1-54(a) (Other Utilities) and Staff RFI 1-75(a) (CenterPoint).

<sup>54</sup> Response to Staff RFI 1-56(a) (Other Utilities).

*Pole Failures*

Utilities reported that most poles that failed during Hurricane Beryl were wood.



These failures represent less a small fraction (less than one percent) of each IOU’s total wood poles.

Pole Type	CenterPoint	Entergy Texas	Oncor	AEP Texas	TNMP
Wood	0.24%	0.19%	0.06%	0.26%	0.48%
Fiberglass	2.69%				

CenterPoint reported that about 3,000 of its 1.6 million distribution poles failed.<sup>55</sup> The company did not formally track the failure mode for each pole but stated that evidence suggests most pole failures were due to structural loading from vegetation and other debris.

Using more composite materials in pole and crossarm construction can reduce customer outages and restoration times by enabling the distribution system to withstand the latest extreme wind loading and ice design criteria found in NESC rules 250C and 250D. This includes using non-wood engineered structures and a combination of trussing, cross arm replacement, or pole replacement. However, given that less than 1% of wood poles actually failed during Hurricane Beryl, strategic placement of poles built from composite materials will minimize overall costs to consumers while enhancing the resiliency of critical portions of the utility’s distribution grid.

<sup>55</sup> CenterPoint stated the company does not have records regarding each pole that was replaced or the reasons each pole was replaced. However, the company provided the total number of replacement poles that were sent to crews in the field and stated that these numbers correlate closely, if not exactly, to the total number of distribution poles that failed.

### *Impacts of Vegetation*

Staff's investigation was hindered by CenterPoint's inability to track the failure modes for its distribution system.<sup>56</sup> However, PA Consulting assessed CenterPoint's storm preparedness and restoration efforts associated with Hurricane Beryl and discovered that over 75% of overhead distribution circuits experienced lockouts, which left more than 2.1 million CenterPoint Energy customers without power.<sup>57</sup> A lockout is when a circuit breaker attached to a pole locks in the open position until a line worker clears the fault and manually closes the circuit breaker. These lockouts appear primarily related to vegetation affecting grid performance.

The majority of vegetation-related outages resulting from Hurricane Beryl were caused by vegetation originating from outside the ROW. For additional discussion, see *Section 3.5 – Vegetation Management*.

When wind uproots vegetation and blows it into a pole or line, cross arms might fail even if the pole itself remains intact. If the cross arm fails, the line itself might fall to the ground, short-circuiting the entire line. This in turn causes a lockout until the line can be rehung and the circuit breaker is closed. This type of structural problem may account for a large percentage of the nearly 800,000 affected distribution poles.

PA Consulting made the following recommendations with regard to CenterPoint's grid performance, design, and automation:<sup>58</sup>

- Develop a program to segment less than 500 customers per remotely controllable circuit
- Develop protection and sectionalizing strategy for neighborhoods served by only one line
- Increase use of composite pole and crossarms
- Replace Open Wire with Covered Conductors

Staff agrees with these recommendations.

### *Sectionalizers*

Sectionalizers—devices that isolate faulted line sections from the functioning parts of a system—can prevent premature lockouts on main feeders, keeping the rest of the feeder energized. Sectionalizers combined with circuit breakers can identify the approximate location of the problem area which aids in restoration times. When properly applied, sectionalizers can prevent cable and other equipment from burning out and, when tied with communications packages, sectionalizers can be turned on or off from a remote location.

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<sup>56</sup> CenterPoint Response to Staff RFI 1-77.

<sup>57</sup> CenterPoint Energy response to RFI Staff RFI01-019S Supplemental

<sup>58</sup> *Id.*

## **Recommendations**

Recommendations are numbered throughout the report for ease of reference and not in order of importance.

**6. Utilities should assess poles constructed under prior NESC standards for replacement with poles that meet current extreme wind and ice loading design standards.**

- Utilities should target circuits chosen for upgrade according to those that serve critical facilities such as hospitals, water treatment plants, or police stations, and that support mobile generation or serve underserved communities.

**7. Utilities should consider automated grid performance devices, like sectionalizers or automatic circuit reclosers, to reduce unnecessary outage times and help restoration crews locate and resolve faults more quickly.**

**8. In more densely vegetated areas, utilities should assess whether to replace distribution lines with covered conductor.**

- The conductor is the wire that carries the electricity. Covered conductors have an insulating outer layer. This replacement may yield better protection against vegetative debris blown-in from outside the ROW and decrease overall outage rates.

### 3.5 Vegetation Management

Effective vegetation management minimizes storm-related outages by reducing the risk of vegetative debris contacting power lines. Hurricane Beryl caused more extensive damage from fallen trees compared to previous severe weather events. The compounding effects of rains, freezing temperatures, and droughts in recent years made trees and vegetation more susceptible to uprooting. The high winds sent branches and entire trees into power lines from inside and outside utility rights of way. Approximately half of CenterPoint's Hurricane Beryl-related circuit outages were the result of vegetation.<sup>59</sup>

Commission Staff reviewed how utilities plan for and implement vegetation management strategies, including how they approach vegetation hazards located outside of easements and rights-of-way (ROWs).

#### *Cyclical and Analytical Vegetation Management Plans*

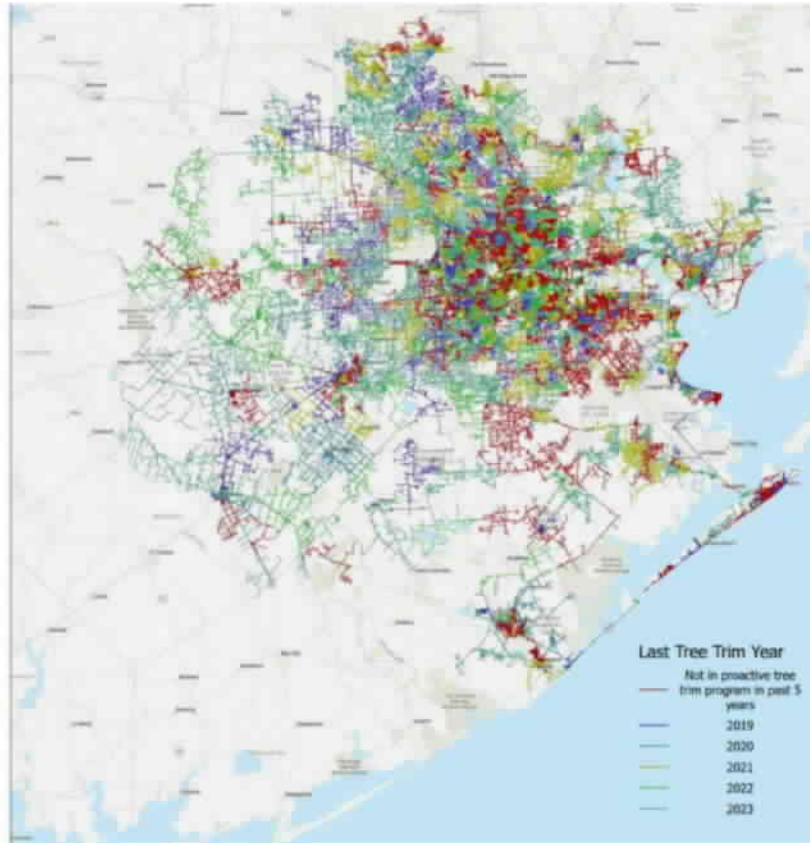
Vegetation management practices can be divided into cyclical and analytical plans. Under a *cyclical vegetation management plan*, a utility identifies the desired number of years required to trim its entire system once and then divides up the work. Time and budget are the predominant factors in cyclical planning. The most common cyclical vegetation management plans used a five- to eight-year clearing schedule. These plans allow for easier budgeting because the utility knows exactly how many circuit miles

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<sup>59</sup> CenterPoint Energy response to RFI Staff RFI01-019S Supplemental

must be cleared each year. Smaller utilities included in the investigation tended to favor a cyclical vegetation management plan.

*Analytical vegetation management plans* determine the trimming schedule based on datapoints. CenterPoint switched to a more analytical plan in 2020. It ranks and prioritizes circuits based on potential impact to critical loads, overall customer count, and previous vegetation-related outages. The time between trimmings is considered but it is not a controlling factor. Circuits with more vegetation issues are addressed more frequently under this type of plan.



The image above overlays circuits within CenterPoint’s service territory that experienced an outage due to Hurricane Beryl. The image is color-coded to indicate the last year CenterPoint performed work on these circuits. Circuits in blue were trimmed most recently under CenterPoint’s final cyclical vegetation management plan in 2019. Circuits in red had not been trimmed in the last five years.<sup>60</sup> Large parts of south and central Houston had not undergone trimming since at least 2018, and parts of central Houston, west Houston, and north Houston had not been trimmed under CenterPoint’s current plan.<sup>61</sup>

Not every outage in CenterPoint’s system can be associated with a failing in its vegetation management policy, but the map suggests CenterPoint’s criteria should be adjusted to trim more frequently.

<sup>60</sup> CenterPoint did not provide information as to which circuits had been trimmed in 2024 in advance of either the May 2024 derecho or Hurricane Beryl.

<sup>61</sup> As of September 2024, when the image was generated.

The majority of co-ops and MOUs contacted in the investigation budget for trimming their entire system once every three to five years. However, vegetation management is not simply based on the number of crews, but the type of work being performed. The City of Hallettsville, which reported only having one problematic tree near its main substation, does not have the same vegetation concerns as Oncor, which sends vegetation patrols into the heavily wooded areas within its service territory.

### *Vegetation Management Staffing*

At the August 29, 2024 Texas Senate Special Committee on Hurricane Beryl hearing, CenterPoint CEO Jason Wells testified that the company outsourced its vegetation management to approximately 500 contractors before July 8, 2024, but was looking to bring more crews in-house.<sup>62</sup> He committed to expanding the company's vegetation management plan to add an additional 2,000 distribution line miles to its annual clearance schedule. To accomplish this task, CenterPoint stated it would increase its vegetation management workforce from 628 (12 fulltime, 616 contractors) to more than 2,700 resources, which would make it the largest team of any utility contacted for the investigation.

IOUs contacted in the investigation reporting vegetation management staffs of between 147 and 1,650 people. Co-ops typically reported vegetation management departments between 30-50 people. MOUs typically employed between 10-20.

The variation in staffing across utilities is driven by the differences in each utility's service territory. Utilities consider how many crews are required to clear the entire system within the utility's trimming cycle, what type of vegetation exists in the service area, and the risks to service quality that vegetation presents to the utility's customers.

### *Contracted vegetation management work*

The decision to outsource vegetation management work appears to be the industry standard.

None of the IOUs contacted for the investigation employed any fulltime vegetation management staff other than in managerial or expert roles, like foresters. Vegetation management work, like line work, is inherently dangerous but generally requires less training than line work. From an economic perspective, outsourcing an equally dangerous, but less technical, function allows a utility to allocate resources to expand the scope of the outsourced work or to reinvest into other critical business areas. For example, City of Caldwell noted that its decision to outsource nearly its entire vegetation management staff came down to the need to fit critical work into a tight budget. Caldwell opted to hire five contractors for the same cost as one fulltime employee. Karnes Electric Co-op, which uses a mix of fulltime and contract staff, stated that its contracted vegetation management crews cost approximately one-third of a similarly experienced in-house employee.

Some utilities contacted in this investigation took slightly different approaches to staffing their vegetation management departments:

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<sup>62</sup> See *Senate Special Committee on Hurricane and Tropical Storm Preparedness, Recovery, and Electricity*, 88<sup>TH</sup> TEX. LEG. INTERIM SESS., 5:20:47-5:21:20 <https://senate.texas.gov/cmte.php?c=549> (July 29, 2024).



- Karnes Electric Co-Op and Bluebonnet Electric Co-Op appeared to have a 40-60 split between inhouse crews and outsourced crews.
- Houston County Electric Co-Op uses in-house crews for work like removing hazardous trees and uses contractors for more routine vegetation work.
- Mid-South Electric Co-Op and several MOUs (City of Hemphill, Newton Municipal Utilities) indicated that they cross train in-house line workers to handle both vegetation management and line work. While this strategy maximizes resources, a reliance on line workers to perform vegetation management work necessarily reduces the amount of either task these crews could accomplish.

### *Vegetation-Related Reporting*

#### *Causes of Forced Outages*

Each IOU must report each year on its electrical service quality.<sup>63</sup> These reports include the system-average interruption frequency index (SAIFI) and system-average interruption duration index (SAIDI). A utility's SAIFI value represents the average number of times an average customer's electric service may be interrupted over the course of a year, and its SAIDI value represents the average number of minutes service may be interrupted over the course of a year.<sup>64</sup><sup>65</sup> These values are reported for both the utility's entire distribution and for certain qualifying feeders. Lower SAIFI and SAIDI values reflect better service quality. Utilities can face administrative penalties for failing to meet the standards set by the Commission.<sup>66</sup>

Service interruptions are reported by the type of outage, and vegetation-related outages are generally reported in forced-interruption figures. Importantly, outages caused by major events – such as hurricanes – are not included in forced-interruption calculations.<sup>67</sup>

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<sup>63</sup> 16 TAC 25.81. See also 16 TAC 25.52

<sup>64</sup> SAIFI is calculated by summing the number of customer interruptions for each event dividing by the total number of customers on the system being indexed. See generally, 16 TAC 25.52(c)(8)(A).

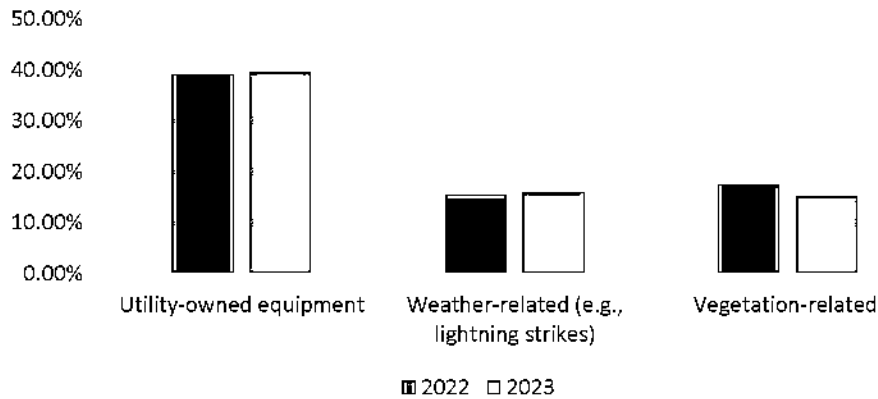
<sup>65</sup> SAIDI is calculated by summing the restoration time for each interruption event times the number of customers interrupted for each event and dividing by the total number of customers. See generally 16 TAC 25.52(c)(8)(B).

<sup>66</sup> A utility's annual electric service quality is measured against its average SAIFI and SAIDI values for the later of reporting years 1998 through 2000, the first three reporting years the utility was in operation, or the last time the Commission updated the utility's service quality standards. Utilities reporting SAIFI and SAIDI values for forced outages that exceed five percent of the system wide standard or who have qualifying feeders exceeding 300% of the actual reporting year value for two or more consecutive years are subject to administrative penalties. These thresholds are codified in PURA § 38.005(b).

<sup>67</sup> A forced-interruption is an interruption, exclusive of major events, that results from conditions directly associated with a component requiring that it be taken out of service or an interruption caused by improper operation of equipment or human error. See generally 16 TAC 25.52(c)(4)(A).

## Causes of Forced Outages (excludes major weather events)

*Average of all Texas IOUs as reported in electric service quality filings*



Administrative fines for electric service quality are classified as Class A violations and are capped at \$25,000 per violation per day.<sup>68</sup> However, because these violations are based on an annual average, penalties are often less than \$100,000 annually.<sup>69</sup> It is often cheaper for IOUs to pay annual service quality penalties than to correct issues that lead to longer and more frequent outages.

Increasing the penalty amounts and reducing the per-feeder threshold should increase an IOU's effort to address vegetation issues across its system. Vegetation-related outages are largely within the utility's control and can often be mitigated by effective vegetation management.

IOUs contacted in the investigation reported in their electric service quality reporting that between 12.37% and 22.8% of forced outages were caused by vegetation-related issues in 2022.<sup>70</sup>

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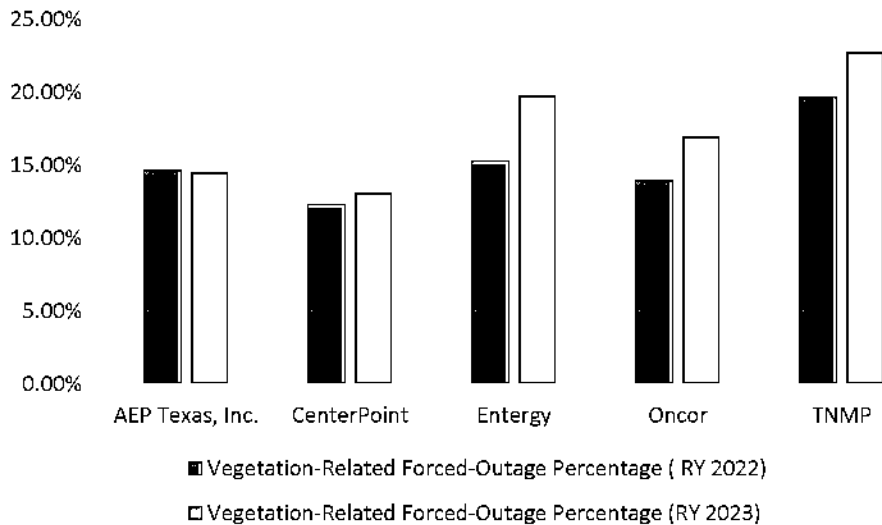
<sup>68</sup> See PURA § 15.023(b)

<sup>69</sup> The Commission's ability to penalize those violations is limited to a one-time \$25,000 penalty for each system-wide or per-feeder violation in the applicable reporting year.

<sup>70</sup> See generally Project No. 54467, CY 2022 Utility Service Quality Report Under 16 TAC 25.81.

## Annual Percentage of Forced Outages Caused by Vegetation-Related Issues

*Excludes major events like hurricanes.*



In 2023, most utilities contacted in the investigation, except AEP Texas, reported more vegetation-related outages compared to 2022.<sup>71</sup> Entergy saw the largest percentage increase (22% increase).

### *Annual Vegetation Management Reporting*

Electric utilities are required to file an annual report concerning their vegetation management plan with the Commission.<sup>72</sup> Each plan must estimate how many circuit miles the utility estimates it will clear that year and provide information about whether it met its previous year's goal.<sup>73</sup>

The IOUs contacted in this investigation met or exceeded their 2023 vegetation management goals<sup>74</sup>:

Utilities	2023 Distribution Miles	2023 VM Plan Clearing Goal (miles) <sup>75</sup>	2023 Clearing Goal Met or Exceeded?
Oncor	90,740	3,100 <sup>76</sup>	Yes
CenterPoint	29,270	3,500	Yes
Entergy	14,400	1,212	Yes
AEP Texas	45,070	1,000	Yes

<sup>71</sup> See generally Project No. 56005, CY 2023 Utility Service Quality Report Under 16 TAC 25.81

<sup>72</sup> See 16 TAC § 25.96.

<sup>73</sup> See 16 TAC § 25.96(f)(1)(H).

<sup>74</sup> TNMP's figure is not included because Commission Staff suspects a possible filing error. Separate filings indicate 2023 clearing goals of both 908 miles and 614 miles. Reports of work completed reflect 453 miles.

<sup>75</sup> Utilities' vegetation management plans

<sup>76</sup> Oncor response to RFI Staff 1-81

CenterPoint reported exceeding its 2023 vegetation management clearing goal by 30%. However, it had an increase (5.72%) in vegetation-related force-outages between 2022 and 2023. This suggests that the actual number of distribution line miles cleared helped mitigate some, but not all, of the threats posed to CenterPoint's electric service quality by hazardous vegetation.

### *Addressing Vegetation Hazards Through Customer Engagement*

Clearing circuit miles is central to every vegetation management plan, but electric utilities must also be equipped to address unscheduled vegetation issues as they are reported. MOUs and coops -are more likely than larger utilities to incorporate vegetation issue spotting into the functions of all utility employees. For example, at Mid-South Electric Cooperative, all employees are tasked with "spot[ting] hazard trees" while moving around the community they serve. Some larger utilities, like Oncor, focus vegetation issue spotting programs on specific geographic regions with unique challenges. Oncor's East Texas Hazard Tree Program sends foresters and vegetation management crews to patrol circuits in heavily wooded areas to address hazardous vegetation.

Historically, CenterPoint has not implemented vegetation management strategies and policies that could address unscheduled problems. CenterPoint customers have expressed concerns over an inability to effectively report potential hazards. During the October 5, 2024 workshop, several CenterPoint customers stated that CenterPoint had failed to trim trees around distribution poles.<sup>77</sup> One commentator stated that, despite many requests, CenterPoint had not trimmed trees on his property that were steadily growing nearer to a distribution pole in almost 30 years. Customer engagement is a necessary and vital component of effective vegetation management planning.

Oncor provides an online portal for customers to learn about and report potential vegetation management issues on their property.<sup>78</sup> The online portal allows customers to provide the information immediately. However, methods for reporting vegetation issues are normally not immediately obvious on a utility's website. Oncor's main page has portals to report power outages, downed power lines, and streetlight outages, but customers need to click through three pages before reporting a hazard tree. Entergy's customers must click through four pages before being told to call the utility's main contact number. A customer may be willing to navigate through their utility's website to locate a contact number for a tree issue at their residence but may not have the same patience when reporting a hazard identified on their commute. While above examples may not be ideal, CenterPoint's customer engagement on this issue may restrict the flow of customer-reported information. CenterPoint requires customers to call in to report a hazard tree and then arrange to speak with a forester at a later date.<sup>79</sup> Utilities should make all efforts to reduce roadblocks for customers attempting to report potentially hazardous vegetation issues.

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<sup>77</sup> PUCT Workshop, October 5<sup>th</sup> <https://www.adminmonitor.com/tx/puct/workshop/20241005/>

<sup>78</sup> <https://www.oncor.com/content/oncorwww/us/en/home/about-us/vegetation-management/location.html>

<sup>79</sup> <https://www.centerpointenergy.com/en-us/Safety/Pages/Tree-Trimming-Removal.aspx?sa=ho&au=res>

### *Vegetation Outside the Right of Way*

Utilities that tracked outages caused by vegetation during the May 2024 derecho and Hurricane Beryl reported that most outages were caused by trees growing outside of utility easements or the right-of-way (ROW).

- CenterPoint’s largest vegetation management provider estimated 60% of the vegetation damaging the company’s distribution infrastructure during Hurricane Beryl was caused by tree fall-ins from outside the easement or ROW.<sup>80</sup>
- Entergy attributed about 49% of its Beryl outages to vegetation outside the ROW.<sup>81</sup>
- AEP Texas reported that 100% of its outages in Matagorda and Wharton Counties were caused by vegetation fall-ins originating outside the ROW.<sup>82</sup>
- Co-ops estimated that generally between 50 -100% of their outages were caused by vegetation outside the ROW.

On average, utilities operating transmission facilities had easements or ROWs of at least 50 feet (25 feet on either side of the line), with up to 100 feet. Distribution lines generally had smaller easements and ROWs, usually between 20 to 30 feet (10-15 feet on either side of the line). Even a utility that clear cuts its easement can be impacted by tree growth outside the easement. Lamar County Electric Cooperative Association - which has clear cut its easements and ROWs since 2012 – reported one vegetation-related outage during Hurricane Beryl.<sup>83</sup> In that instance, a 75-foot tree from outside the 100-foot easement (50 feet on either side of the line) fell due to high winds and brought down a powerline.<sup>84</sup>

To address trees outside the ROW, most utilities attempt to work with the property owner and ask permission to address the hazardous condition at no cost. However, this is not always successful. City of Liberty noted that, “[p]roperty owners love their trees and refuse to work with [us] to clear any potentially hazardous trees.”<sup>85</sup>

Other approaches include tree replacement programs and education strategies. Brownsville Public Utility offers to replace trees growing near an easement with others planted further back on the property.<sup>86</sup>

Some utilities take more extreme approaches to address the problem. One utility stated that they may disconnect a customer from power if a hazardous tree out of the easement posed a significant risk. Another utility adopted an “ask forgiveness, not permission” approach to the problem by proactively removing hazard trees regardless of their location.

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<sup>80</sup> PUCT open meeting, July 25, 2024; [https://www.adminmonitor.com/tx/puct/open\\_meeting/20240725/](https://www.adminmonitor.com/tx/puct/open_meeting/20240725/)

<sup>81</sup> Entergy Texas response to RFI Staff 1-83.

<sup>82</sup> AEP Texas response to RFI Staff 1-83

<sup>83</sup> Lamar County Electric Co-op Association response to RFI Staff 1-83.

<sup>84</sup> *Id.*

<sup>85</sup> City of Liberty response to RFI Staff 1-84

<sup>86</sup> Brownsville Utility Trade a tree

## **Recommendations**

Recommendations are numbered throughout the report for ease of reference and not in order of importance.

### **9. The Commission should require utilities to establish a designated method for customers to report vegetation hazards.**

- Most vegetation-related outages during Hurricane Beryl were caused by trees growing outside of utility easements and rights-of-way. Utilities can access these areas with landowner permission, but processes for customers to report hazard trees for mitigation or removal must be improved. While most utilities have a program in place, these programs are not immediately accessible on most utility websites.

### **10. Utilities should use analytics-based vegetation management strategies to augment, not replace, cyclical vegetation management plans.**

- Vegetation management practices within Texas are not standardized, with some utilities moving away from a cyclical plan to a more analytics-based vegetation management plan. Analytics-based plans can help prioritize sections of a service territory due to heightened vegetation hazard. However, utilities should take precaution to not minimize factors like “time between trims.” To ensure all segments in the service territory are addressed, utilities should augment cyclical vegetation management plans with analytics instead of replacing them with a solely analytics-based approach. Alternatively, utilities should ensure that maximum duration between trims serves as a default or failsafe factor within their analytics-based plan. This may require vegetation management budgets to increase slightly to accommodate additional priority segment work.

### **11. The Legislature should consider increasing the penalty cap for electric service quality violations.**

- Vegetation-related outages generally represent 15 to 20% of system-wide forced-outages reported by IOUs in each reporting year (excluding major events like hurricanes). System-wide violations of electric service quality metrics are considered one violation for the entire reporting year and are capped at \$25,000. To incentivize proactive measures to improve electric service quality, the Legislature could either increase the penalty cap or expand what may constitute a violation by placing a maximum threshold for forced-outages caused by vegetation-related issues. Enhanced penalties could apply if the utility crosses the threshold due to failure to trim circuits based on its trim cycle plan.

## 3.6 Staffing and Mutual Assistance

Mutual assistance groups are membership organizations that enable electric utilities to share personnel, materials, and equipment to help each other recover from a major event like a hurricane. Group members develop agreements that contain the terms and conditions for sharing these resources. Therefore, instead of negotiating a new agreement every time a disaster occurs, utilities can work from the pre-established agreements. This simplifies the logistics of sending and receiving help quickly.

There are seven regional mutual assistance groups in the country, and Texas is included in four of these:

- Midwest Mutual Assistance Group (MMAG)

- Western Region Mutual Assistance Group
- Texas Mutual Assistance Group (TXMAG)
- Southeastern Electric Exchange (SEE)



AEP Texas, TNMP, Entergy Texas, Oncor, and CenterPoint each belong to one or more mutual assistance groups. Most electric cooperatives and MOUs indicated that they participate in mutual assistance groups as well.

To request resources from a mutual assistance group, a member utility that faces a severe event first activates its own emergency operations plan (EOP). If the utility projects it will exhaust its own resources before service can be restored, it will submit a formal request through its mutual assistance group. Typically, a utility is expected to fully mobilize its internal workforce and utilize local contractors before requesting assistance under a mutual assistance program. For example, AEP Texas mobilized its employee and contracted workforce, then drew on resources from its AEP sister companies located closest to south Texas, and finally requested help from its mutual assistance partners.

Data from the responses to these RFIs about staffing and mutual assistance indicated that coordinating thousands of mutual assistance workers presented logistical challenges. Overcoming these challenges could help speed recovery from events like Hurricane Beryl.

### *Pre-Staging Strategies*

Storm path forecasting and damage predictions are important to pre-staging decisions and mutual assistance requests. Because hurricanes often shift paths as they approach land, a utility must constantly reassess staging strategies to place resources near the expected impact zone, but not in the storm's direct path. Staging resources is crucial to managing restoration efforts. For example, AEP Texas held multiple internal meetings daily to review the storm development, including potential impact zone. The company

reassessed its plan multiple times as Hurricane Beryl's track shifted north from Brownsville towards Matagorda Bay.

CenterPoint continued running its "damage prediction model"<sup>87</sup> to anticipate the storm's expected impacts and justify the requested assistance needed prior to landfall, and to make prestaging decisions.<sup>88</sup> This model estimates the number of resources required and types and number of poles estimated to be impacted. However, the damage prediction model was largely ineffective and offered little value in decision-making:

*"At multiple times beginning on July 6, the Saturday before Beryl, the damage prediction model yielded estimates of 538 total FTEs for a 14-day restoration to 2,559 total FTEs for a 5-day restoration. The actual result was 14,000 FTEs who delivered an 11-day restoration (excludes damage assessors)."*<sup>89</sup>

Importantly, when a utility is asked to provide mutual assistance, it must first assess its own needs and forecasted weather threats before releasing crews to assist others. Because storm paths can shift before landfall, requests for assistance are coordinated carefully within mutual assistance groups to ensure appropriate resource allocation.

Utilities are also expected to fully mobilize their internal workforce and local contractors before requesting aid through a mutual assistance program. AEP Texas began requesting mutual assistance resources on July 5.<sup>90</sup> CenterPoint and Sam Houston Electric Co-Op followed with requests on July 6, while TNMP requested assistance the morning of July 8.<sup>91</sup> Entergy secured all necessary resources through its own workforce and contractor network and did not request mutual assistance.<sup>92</sup> As damage assessments were completed after the storm, utilities further evaluated their needs and issued additional requests based on the full extent of the damage.

### *Staging and Mobilization*

Hurricane Beryl affected a large geographic area, which required the mobilization of thousands of external personnel and equipment in a very short period of time. The large geographic impact meant many electric service providers were seeking assistance during the same time period. Unsurprisingly, the high demand for resources meant crews were dispatched to the Houston area from states like Missouri, Oklahoma, Tennessee, Alabama, among others.

CenterPoint's first four staging sites (of 22 total) were "check-in and dispatch" ready the day of Hurricane Beryl's landfall (July 8). This designation means the site had sufficient materials and resources to receive, check in, and dispatch crews.<sup>93</sup> To manage the large number of incoming workers and to avoid areas likely to be affected by the storm, CenterPoint set up staging sites located farther outside of the greater Houston area. These more remote locations resulted in longer transit times to work sites. Because vegetative debris

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<sup>87</sup> The model was limited to Hurricane Ike data (2008).

<sup>88</sup> CenterPoint Energy response to RFI Staff 1-109

<sup>89</sup> CenterPoint Energy supplemental response to RFI Staff 1-19

<sup>90</sup> CenterPoint Energy response to RFI Staff 1-111

<sup>91</sup> Texas-New Mexico Power response to RFI 1-91

<sup>92</sup> Entergy Texas, Inc. response to RFI Staff 1-95

<sup>93</sup> CenterPoint Energy response to RFI Staff 1-115



often blocked major road access, crews either were delayed in getting to work sites or had to remain idle until ingress routes were cleared. These delays understandably caused frustration for some Houstonians who saw field crews as idle and felt their needs were being overlooked as their neighborhoods went days without power. In a few regrettable incidents, some crews were threatened by individuals with weapons. CenterPoint deactivated and relocated one staging site due to safety concerns.

### *Coordination and Logistics Challenges*

Some utilities experienced delays issuing work orders to field crews due to the sheer number of field personnel. Utilities noted that differences in communication protocols, lack of familiarity with local infrastructure, and damage to telecommunications systems complicated the integration of external crews.

CenterPoint reported challenges with coordinating communications between multiple mutual assistance partners and internal teams. With such a large number of external workers deployed across its service area, maintaining consistent and clear communication, and effectively deploying work crews was difficult. CenterPoint (and all the utilities) employed FEMA's National Incident Management System - Incident Command System (ICS) to establish a clear chain of command and communication structure. CenterPoint's leadership also held frequent conference calls with mutual assistance partners to keep all parties updated on progress and resource needs.

TNMP encountered significant communication difficulties due to Hurricane Beryl's impact on local telecommunications infrastructure. Cell towers and communication lines were damaged, limiting the utility's ability to maintain contact with external crews in the field. TNMP mitigated this challenge by relying on multiple communication methods—phone calls, text messages, emails, and in-person briefings—to ensure all crews received critical updates. Despite these efforts, communication breakdowns occasionally delayed restoration work, particularly in more remote areas. For additional detail on the telecommunications outages, see Section 2.3, *Impacts to Telecommunications Service Providers*.

## **Recommendations**

Recommendations are numbered throughout the report for ease of reference and not in order of importance.

### **12. Utilities should scale up training in emergency response and Incident Command System (ICS).**

- Utilities should ensure sufficient local personnel are trained in both ICS and the utility's emergency operations plans so that the utility can effectively scale up its control of emergency response and restoration to meet the size of the event. In CenterPoint's case, for example, this means envisioning an event requiring 25 or 30 staging areas and planning for all the necessary ICS structure to seamlessly integrate throughout each site and with one another through the utility's operations center.

### **13. Utilities should ensure a resilient emergency communications platform is available to both local and mutual assistance crews.**

- Relying on public telecommunications infrastructure may be sufficient for more localized events, but utilities need to plan for failure of these systems and still be able to effortlessly communicate with their own and mutual assistance crews.

### 3.7 Mobile Generation Facilities

Temporary Emergency Electric Energy Facilities (TEEEF) are mobile generation units that can be used to provide temporary power to critical facilities. A TEEEF unit can be deployed to supply power to an end-use customer, such as a medical facility or cooling center, or to energize portions of a utility's distribution system. The units must be sized appropriately to meet the requirements of the deployment location. Commission Staff reviewed how electric service providers deployed and energized TEEEF. CenterPoint and Oncor were the only TDUs to deploy TEEEF following Hurricane Beryl. Oncor deployed just a single unit to the City of Lufkin Water Treatment Facility.<sup>94</sup>

Prior to Hurricane Beryl's landfall, CenterPoint's fleet consisted of 15 32-megawatt (MW) units (totaling 480 MW) and nine units of five MW or less (totaling 28 MW). CenterPoint did not deploy any of its 32 MW units following Hurricane Beryl because, the company asserts, these units were specifically procured to assist with "load shed support" during a grid level shortage of generation.<sup>95</sup>

#### *Overview of TEEEF Deployment following Hurricane Beryl*

CenterPoint attempted to deploy 30 mobile generation units.<sup>96</sup> Nine units were part of its existing fleet, nine units were acquired through short-term leases, and 12 units were borrowed through mutual assistance from Oncor and AEP. TEEEF deployment following Hurricane Beryl was used to restore power to critical facilities by both connecting directly to facilities and by energizing entire segments of a distribution circuit ("mid-span connection")<sup>97</sup>. CenterPoint energized 382 customers<sup>98</sup> with the TEEEF units it had under lease (15 customers directly and 367 via mid-span connection). In combination with the TEEEF it was loaned through Mutual Assistance, CenterPoint brought 460 customers online (13 customers directly and 65 via mid-span connection).<sup>99</sup>

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<sup>94</sup> Oncor response to RFI Staff 1-112

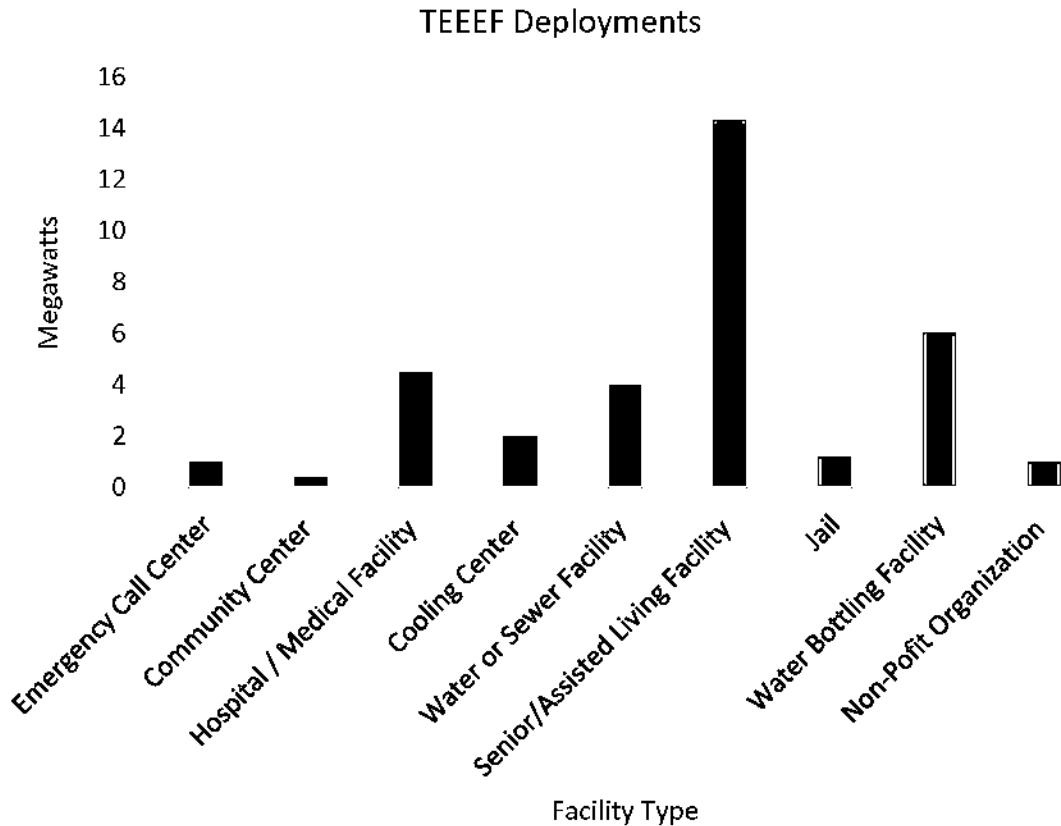
<sup>95</sup> CenterPoint response to RFI Staff 1-126

<sup>96</sup> CenterPoint did not deploy two of its 5 MW units and one of the .56 MW units it obtained through mutual assistance.

<sup>97</sup> CenterPoint response to RFI Staff 1-134

<sup>98</sup> "Customers" is referring to a single meter, which could represent hundreds of people if it was connected to a site such as a cooling center or senior living facility.

<sup>99</sup> CenterPoint response to RFI Staff 1-134



#### *Matching TEEEF Units to Customers*

When considering where to deploy a TEEEF unit, a TDU must consider both technical (voltage and phasing requirements) and logistical (road access and physical space requirements) factors. Once these requirements are met, CenterPoint requires that the customer have an electrician on site during both the connection and disconnection of the TEEEF unit<sup>100</sup>. CenterPoint maintains a prioritized list of *facility types* eligible for TEEEF. However, no *specific customers* or locations were pre-identified. This led to delay in deploying TEEEF units to restore power to critical customers and facilities. Ultimately, CenterPoint was unable to deploy two of its 5 MW units and one of the .560 MW units it received through mutual assistance. The company stated it could not find a location to feasibly deploy these units because it could not match voltage requirements, phasing compatibility, or size for certain deployment sites.<sup>101</sup>

<sup>100</sup> CenterPoint response to RFI Staff 1-133

<sup>101</sup> CenterPoint response to RFI Staff 1-140

Priority	Category	Example Categories
1	Hospitals	100 Bed In-Patient Hospitals, Cancer Treatment, Level 1 Trauma Center
2	Emergency Services/ Airport	City and County Emergency Management, First Responder Facilities (Police, Fire Ambulatory), Airport Facilities
3	Cooling Centers	
4	Senior/Assisted Living	
5	Small Emergency Rooms/ Dialysis	Out-Patient Care Facilities, Dialysis Clinics, Small ER Centers
6	Clinics/Pharmacy	Urgent Care, Clinics, Commercial Pharmacies
7	Grocery Stores	Major Grocery Store Chains
8	Commercial facilities	Commercial facilities that support logistics/supply chain, community, individual relief, and restoration efforts

CenterPoint has acknowledged the need for necessary process improvements to its TEEEF deployments. Having more crews to enable additional TEEEF deployments each day, and to utilizing a tracking system to support deployment and fueling are among the identified improvements. CenterPoint also noted additional measures to implement, such as: maintaining a list of previously reviewed locations (to speed up technical review process) and the utilization of a pre-identified list of “of critical customer locations developed through coordination between various cities, counties, and customer engagements for faster review of outage impact and TEEEF deployment.”<sup>102</sup>

#### *CenterPoint’s TEEEF Fleet and Additional Procurements*

The day before landfall and in the days following the storm, CenterPoint procured an additional 21 units totaling approximately 7.43 MWs through either mutual assistance or short-term lease. In total, CenterPoint attempted to deploy 30 units, most of which were not part of its pre-Beryl fleet.

Procurement Date	TEEEF Units $\leq$ 5 MW
On hand before Hurricane Beryl	5 x 5 MW 2 x 1 MW 2 x .500 MW
July 7	4 x .400 MW
July 10	4 x 1.2 MW (from Mutual Assistance)
July 12	3 x .230 MW 2 x .200 MW
	4 x .560 MW 1 x .625 MW (from Mutual Assistance)
July 13	3 x .625 MW (From Mutual Assistance)

<sup>102</sup> CenterPoint response to RFI Staff 1-141

### *Commission Rulemaking*

The Public Utility Regulatory Act (PURA) § 39.918 authorizes transmission and distribution utilities (TDUs) to lease TEEEF and operate the facilities during a significant power outage.<sup>103</sup> The Commission has an ongoing rulemaking to implement PURA § 39.918 in Project No. 53404, titled “Temporary Emergency Energy Facilities and Long Lead-Time Facilities”. Comments on the draft rule were initially due on July 18, 2024. However, the due date was extended to August 2, 2024, to allow interested parties to incorporate Hurricane Beryl response activities in their comments. The Commission will finalize the rule by the end of the year.

### **Recommendations**

Recommendations are numbered throughout the report for ease of reference and not in order of importance.

#### **14. Utilities should pre-identify critical customer locations suitable for deployment of Temporary Emergency Electric Energy Facilities.**

### 4.0 CenterPoint’s Greater Houston Resiliency Initiative

In response to the issues raised regarding CenterPoint’s service following Hurricane Beryl, CenterPoint launched the Greater Houston Resiliency Initiative (GHRI). According to the CenterPoint, the GHRI is “a comprehensive suite of actions aimed at further strengthening the electric grid, improving communications, and enhancing partnerships across the Greater Houston area.”

Commission Staff took the initiatives laid out by CenterPoint and created a chart that tracks each initiative in its designated category. As CenterPoint completes each initiative, Commission staff requests documentation from CenterPoint agents or designees with knowledge specific to the initiative in question. As of November 2024, this chart is available as item No. 29 in Project No. 56793.

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<sup>103</sup> PURA § 39.918 does not authorize TDUs to own TEEEF.

## Appendix

Entities receiving and responding to mandatory Requests for Information (RFIs)

Name	Response provided?
<b>Investor-Owned Electric Utilities (IOUS)</b>	
AEP Texas Inc.	Yes
CenterPoint Energy Houston Electric, LLC	Yes
Entergy Texas, Inc.	Yes
Oncor Electric Delivery Company LLC	Yes
Texas-New Mexico Power Company	Yes
<b>Electric Cooperatives</b>	
Bartlett Electric Cooperative, Inc.	Yes
Bluebonnet Electric Cooperative, Inc.	Yes
Bowie-Cass Electric Cooperative, Inc.	Yes
Cherokee County Electric Cooperative Association	Yes
Deep East Texas Electric Cooperative, Inc.	Yes
Fayette Electric Cooperative, Inc.	Yes
Guadalupe Valley Electric Cooperative, Inc.	Yes
Heart of Texas Electric Cooperative, Inc.	Yes
Houston County Electric Cooperative, Inc.	Yes
Jackson Electric Cooperative, Inc.	Yes
Jasper-Newton Electric Cooperative, Inc.	Yes
Karnes Electric Cooperative, Inc.	Yes
Lamar County Electric Cooperative Association	Yes
Lyntegar Electric Cooperative, Inc.	No
Magic Valley Electric Cooperative, Inc.	Yes
Medina Electric Cooperative, Inc.	Yes
Mid-South Electric Cooperative Association	Yes
Navarro County Electric Cooperative, Inc.	Yes
Navasota Valley Electric Cooperative, Inc.	Yes
Nueces Electric Cooperative, Inc.	Yes
Panola-Harrison Electric Cooperative, Inc.	Yes
Rio Grande Electric Cooperative, Inc.	Yes
Rusk County Electric Cooperative, Inc.	Yes
Sam Houston Electric Cooperative, Inc.	Yes
San Bernard Electric Cooperative, Inc.	Yes
San Patricio Electric Cooperative, Inc.	Yes
Southwest Arkansas Electric Cooperative Corp.	Yes
Trinity Valley Electric Cooperative, Inc.	Yes
Upshur-Rural Electric Cooperative Corp.	Yes
Victoria Electric Cooperative, Inc.	Yes
Wharton County Electric Cooperative, Inc.	Yes
Wood County Electric Cooperative, Inc.	Yes
<b>Municipally Owned Utilities (MOUs)</b>	

Bellville Light & Power System	Yes
Brenham Municipal Light & Power System	Yes
Brownsville Public Utilities Board	Yes
BTU Rural Electric Division	Yes
Caldwell City Government	Yes
College Station Utilities	Yes
Cuero Electric Utility	Yes
Flatonia Electric Department	Yes
Giddings Light & Power System	Yes
Hallettsville Municipal Utilities	Yes
Hearne Municipal Electric System	No
Hemphill City Government	Yes
Hempstead Electric Department	Yes
Jasper Light & Power System	Yes
Kirbyville Light & Power Company	Yes
La Grange Utilities	Yes
Lexington Municipal Electric Department	Yes
Liberty Municipal Electric System	Yes
Livingston Municipal Electric System	Yes
Moulton Electric Department	Yes
Newton Municipal Utilities	Yes
Robstown Utility System	Yes
San Augustine Light & Water Department	Yes
Schulenburg Utilities Department	Yes
Shiner City of	Yes
Timpson Light & Water Department	Yes
Weimar Electric Utilities	Yes
Yoakum Municipal Utilities	Yes
<b>Water Utilities</b>	
Aqua Texas	Yes
Texas Water Utilities LP	Yes
Quadvest LP	Yes
Undine Texas LLC	Yes
CSWR- Texas Utility Operating Company LLC	Yes
MSEC Enterprises	Yes
Corix Utilities Texas Inc.	Yes
T & W Water Service Company	Yes
Utilities Investment Companies Inc.	Yes
Crystal Springs Water	No
Nextera Water Texas LLC	Yes
Woodland Hills Water	Yes
C & R Water Supply Inc.	No
Midway Water Utilities Inc.	No
Orbit Systems	No
SRC Water Supply Inc.	No
Undine Texas Environmental LLC	No

<b>Telecommunications Utilities</b>	
Spectrum	Yes
AirCanopy Internet Services, Inc	No
Ameriphone Network, LLC	No
Astound Broadband	Yes
AT&T Texas	Yes
Cumby Telephone Cooperative	No
Gigamonster Network LLC	No
Nextlink Internet	Yes
South Texas Internet LLC	No



## Acronyms

AEP	American Electric Power
CPD	Consumer Protection Division
CSWR	Central States Water Resources
EOP	Emergency Operations Plan
FTE	Full-Time Equivalent
ICS	Incident Command System
IOU	Investor-Owned Utility
MOU	Municipally Owned Utility
NESC	National Electric Safety Code
OCS	Operating Condition System
PGC	Power Generation Company
PURA	Public Utility Regulatory Act
PWS	Public Water System
REP	Retail Electric Provider
RFI	Request for Information
ROW	Right-of-Way
RUS	Rural Utilities Services
SAIDI	System Average Interruption Duration Index
SAIFI	System Average Interruption Frequency Index
TDU	Transmission and Distribution Utility
TEEEF	Temporary Emergency Electric Facilities
TNMP	Texas-New Mexico Power
TSP	Transmission Service Provider
TWC	Texas Water Code

## Impacted Counties

Anderson
Angelina
Aransas
Austin
Bowie
Brazoria
Brazos
Burleson
Calhoun
Cameron
Camp
Cass
Chambers
Cherokee
Colorado
DeWitt
Fayette
Fort Bend
Freestone
Galveston
Goliad
Gregg
Grimes
Hardin
Harris
Harrison
Hidalgo
Houston
Jackson
Jasper
Jefferson
Kenedy
Kleberg
Lavaca

Lee
Leon
Liberty
Madison
Marion
Matagorda
Milam
Montgomery
Morris
Nacogdoches
Newton
Nueces
Orange
Panola
Polk
Refugio
Robertson
Rusk
Sabine
San Augustine
San Jacinto
San Patricio
Shelby
Trinity
Tyler
Upshur
Victoria
Walker
Waller
Washington
Webb
Wharton
Willacy