

# Tacoma Power

## ERCOT Blackouts : Briefing for Public Utility Board

Chris Robinson

Tacoma Power Superintendent



# Overview of Event

**Part 1**

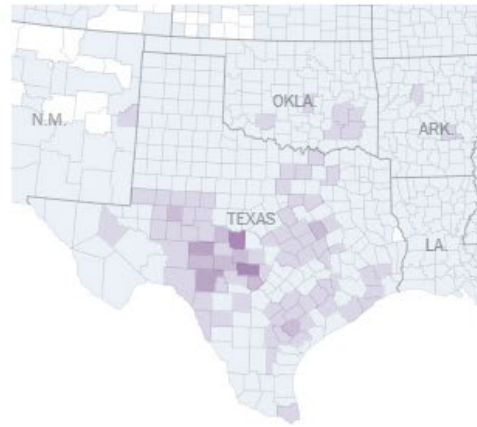
## Overview of Event

# What Happened?

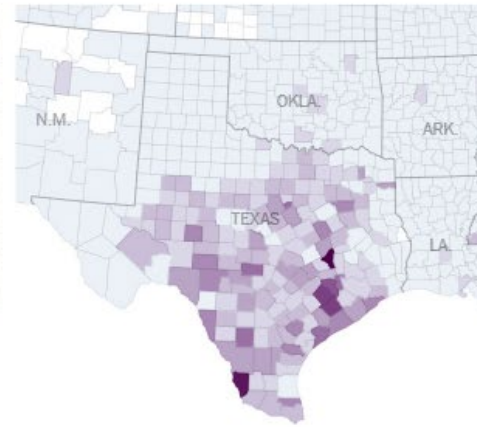
### Rolling Blackouts

- Starting on 2.14.2021, the Electric Reliability Council of Texas (ERCOT) triggered rolling blackouts after a simultaneous spike in demand and drop in supply shocked its system
- Millions of customers were left without power for multiple days

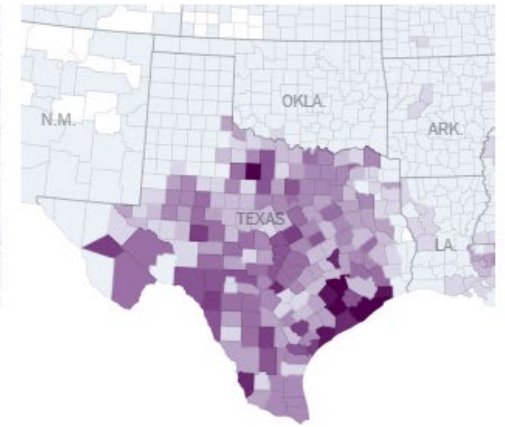
Sunday, 7 p.m.  
110,000 customers (0.9%)



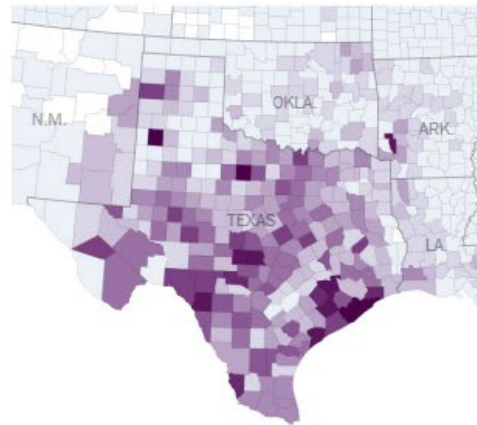
Monday, 3 a.m.  
1.1 million customers (8.8%)



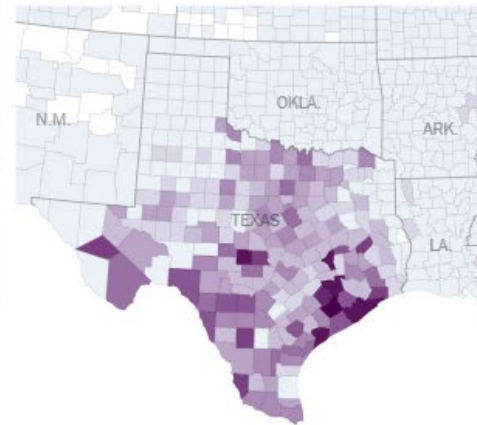
Monday, 10 p.m.  
4.5 million customers (31.6%)



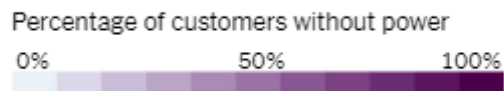
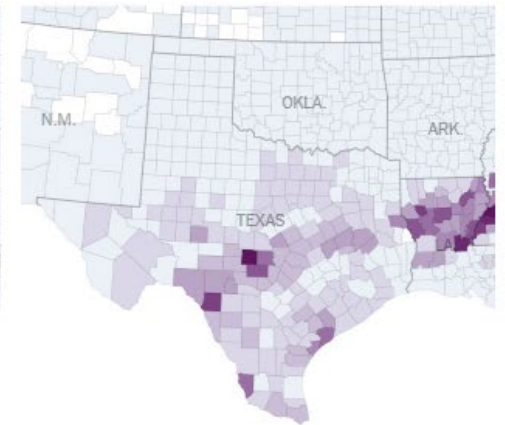
Tuesday, 12:15 p.m.  
4.4 million customers (35.1%)



Wednesday, 11:30 a.m.  
3.4 million customers (27%)



Thursday, 10:30 a.m.  
490,000 customers (3.9%)



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# What factors caused these events?

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**High Demand**

**Failure to Winterize Generation Resources**

**Inability to Import from Neighboring Interconnections**

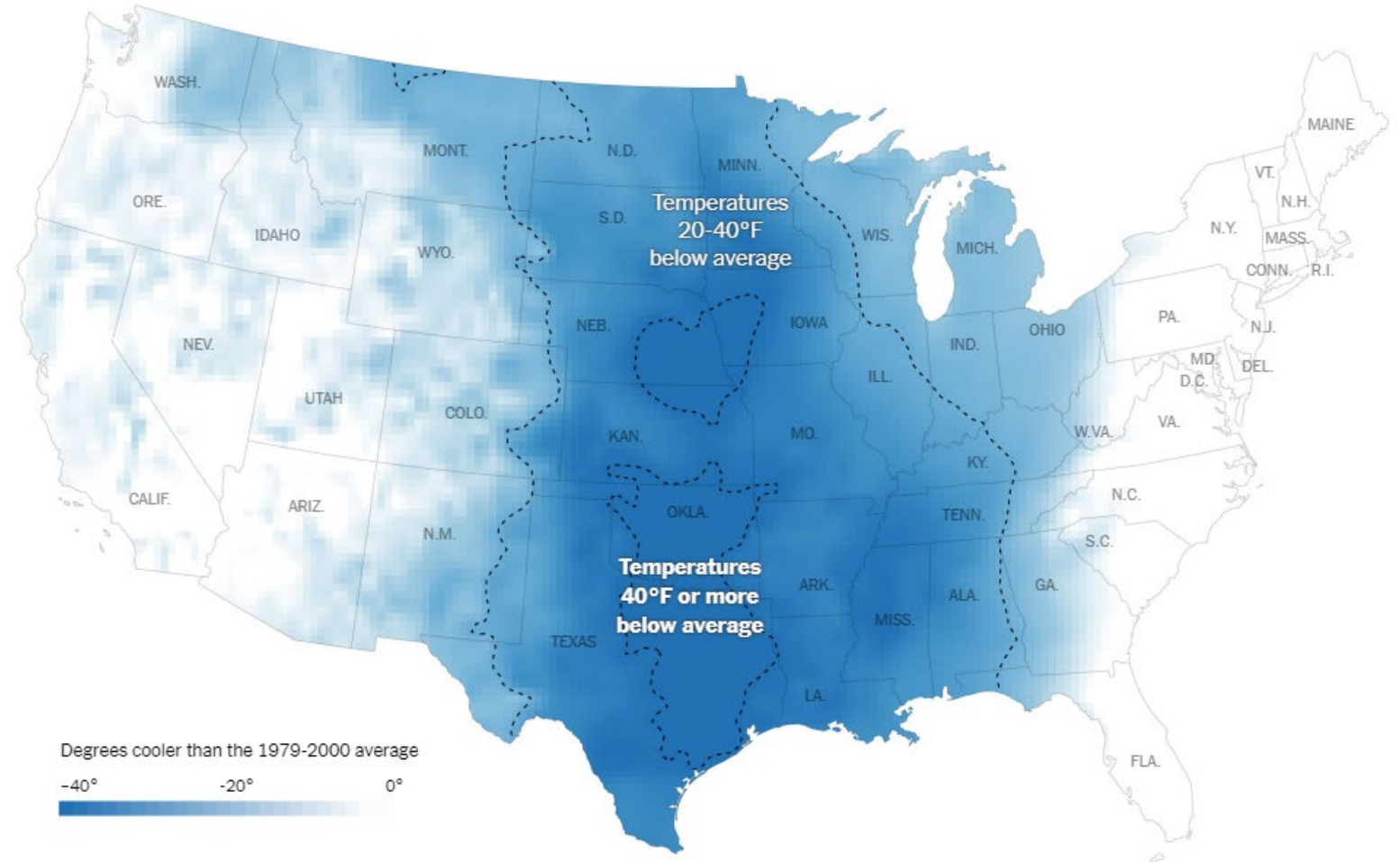
**Lack of Resource Adequacy Program**

## Contributing Factors

# Cold Temperatures

### Extreme Cold

- Storm brings Arctic temperatures to Texas and other parts of the Midwest.
- Temperatures are much lower than normal

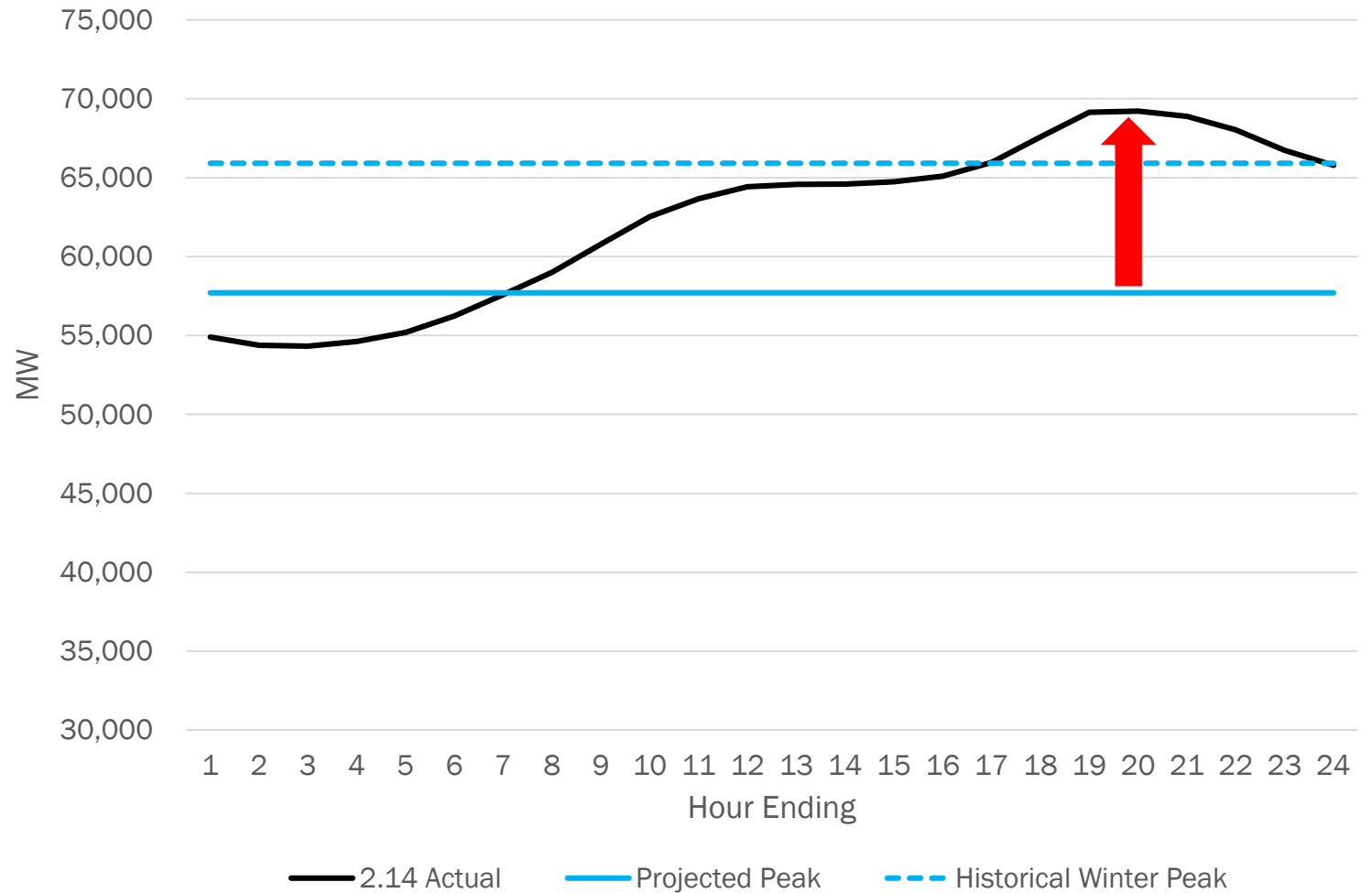


## Contributing Factors

# Electric Demand

### Record Demand

- Cold temperatures cause ERCOT to set a record winter system peak of 69,150 MW on 2.14
- Previous winter peak record was 65,519 MW set in 2018
- Actual demand was much higher than the day-ahead forecast of 57,699 MW

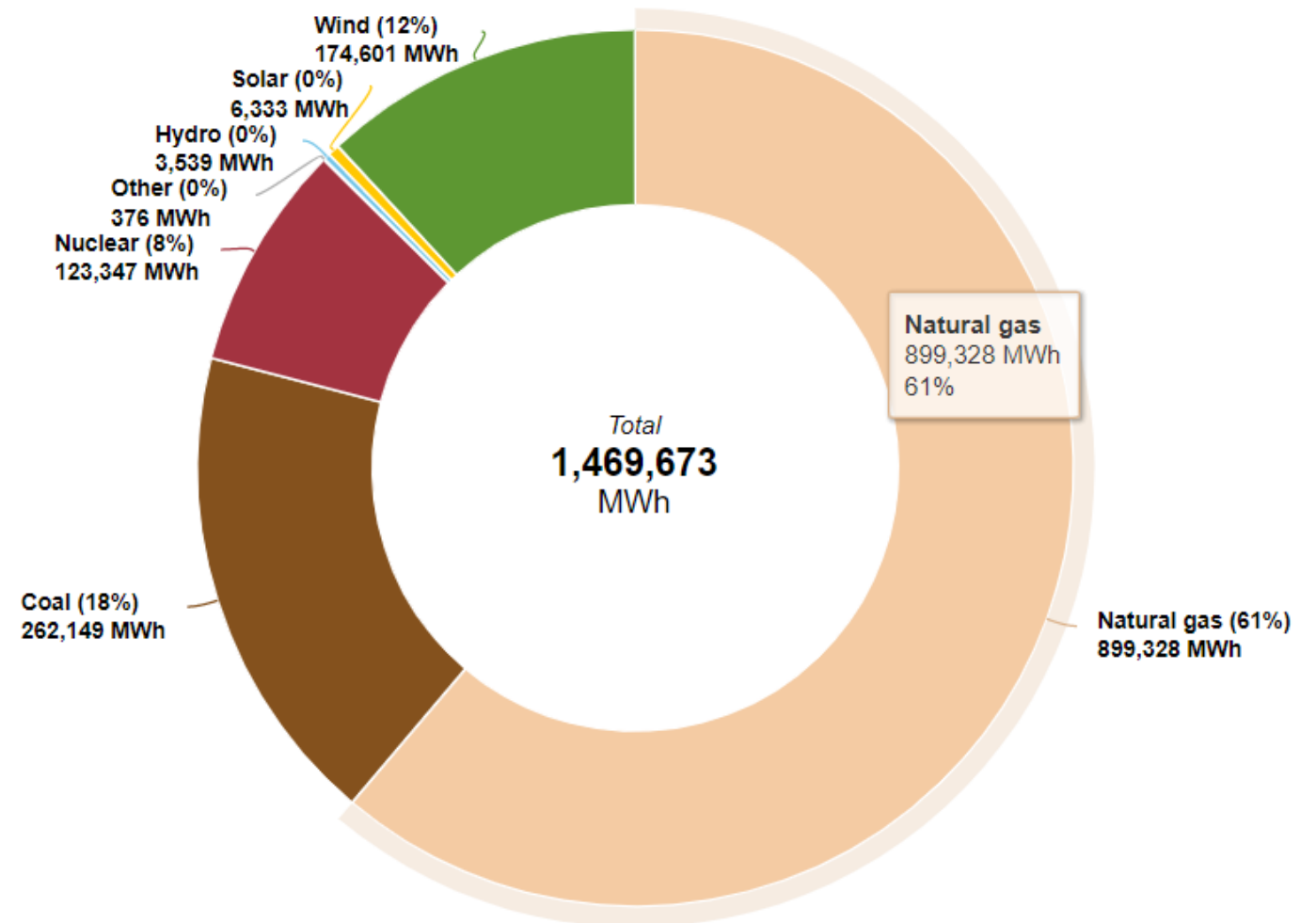


## Contributing Factors

# ERCOT Fuel Mix

### Texas Heavily Reliant on Natural Gas

- Texas largely relies on natural gas to generate electricity during times of high demand.
- Natural gas infrastructure was unprepared for the temperatures brought by the winter storm.



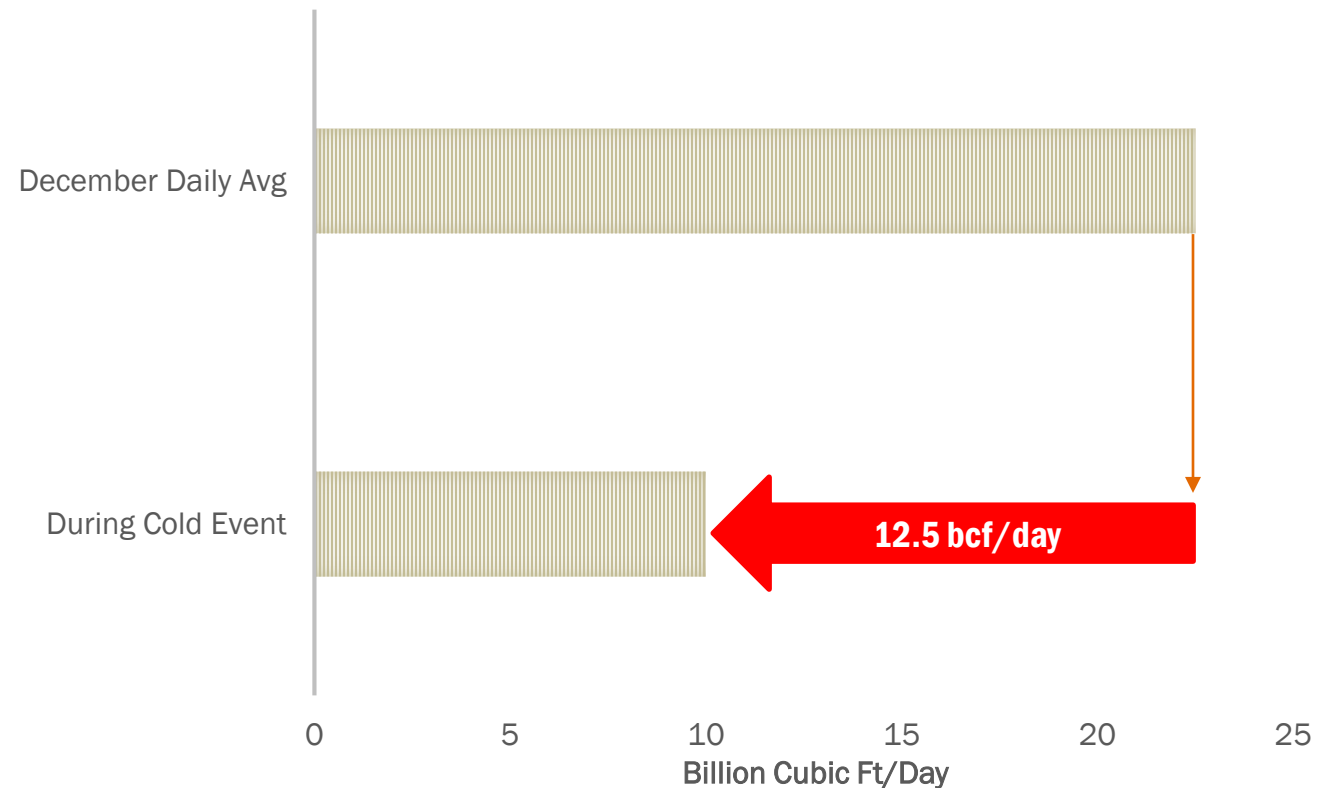
## Contributing Factors

# Natural Gas Supply Chain

## Wellhead “Freeze-offs”

- Natural gas production curtailed at the source
- Freeze-offs occurred when the small amount of water produced alongside the natural gas crystallized or froze, completely blocking off the gas flow and shutting down the well
- This combined with high demand from residential natural gas customers **limited the amount of gas available for power production**

## PERMIAN BASIN PRODUCTION



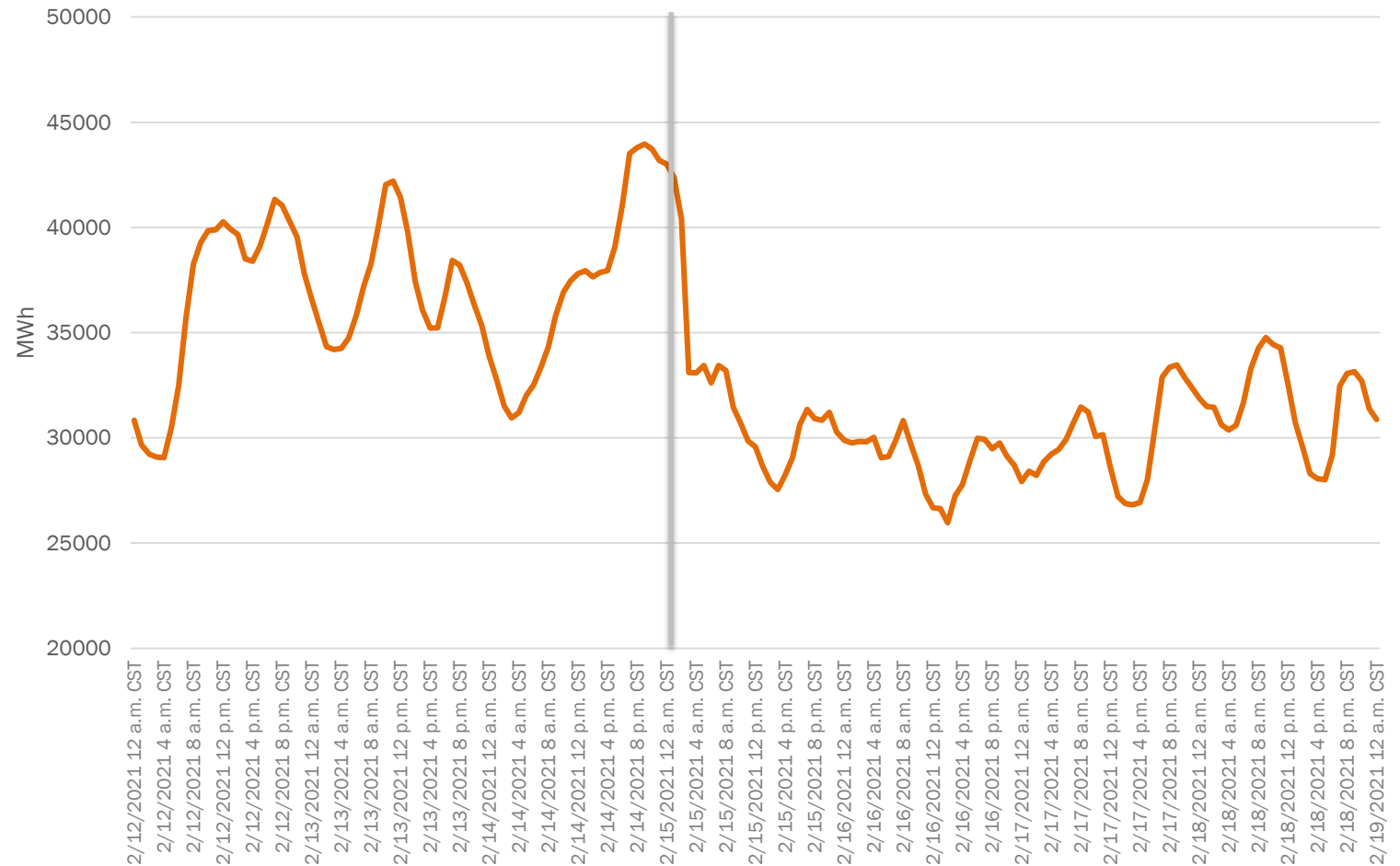


## Contributing Factors

# Natural Gas Generation Outages

### Severe Loss of Capacity

- About a third of natural gas capacity was unable to generate – about 17,000 MW
- Many plants failed due to lack of **winterization** procedures
- Many plants failed due to lack of natural gas **availability**



## Contributing Factors

# Coal Generation Outages

### Coal

- 4,417 MW of coal generation went offline due to lack of winterization procedures

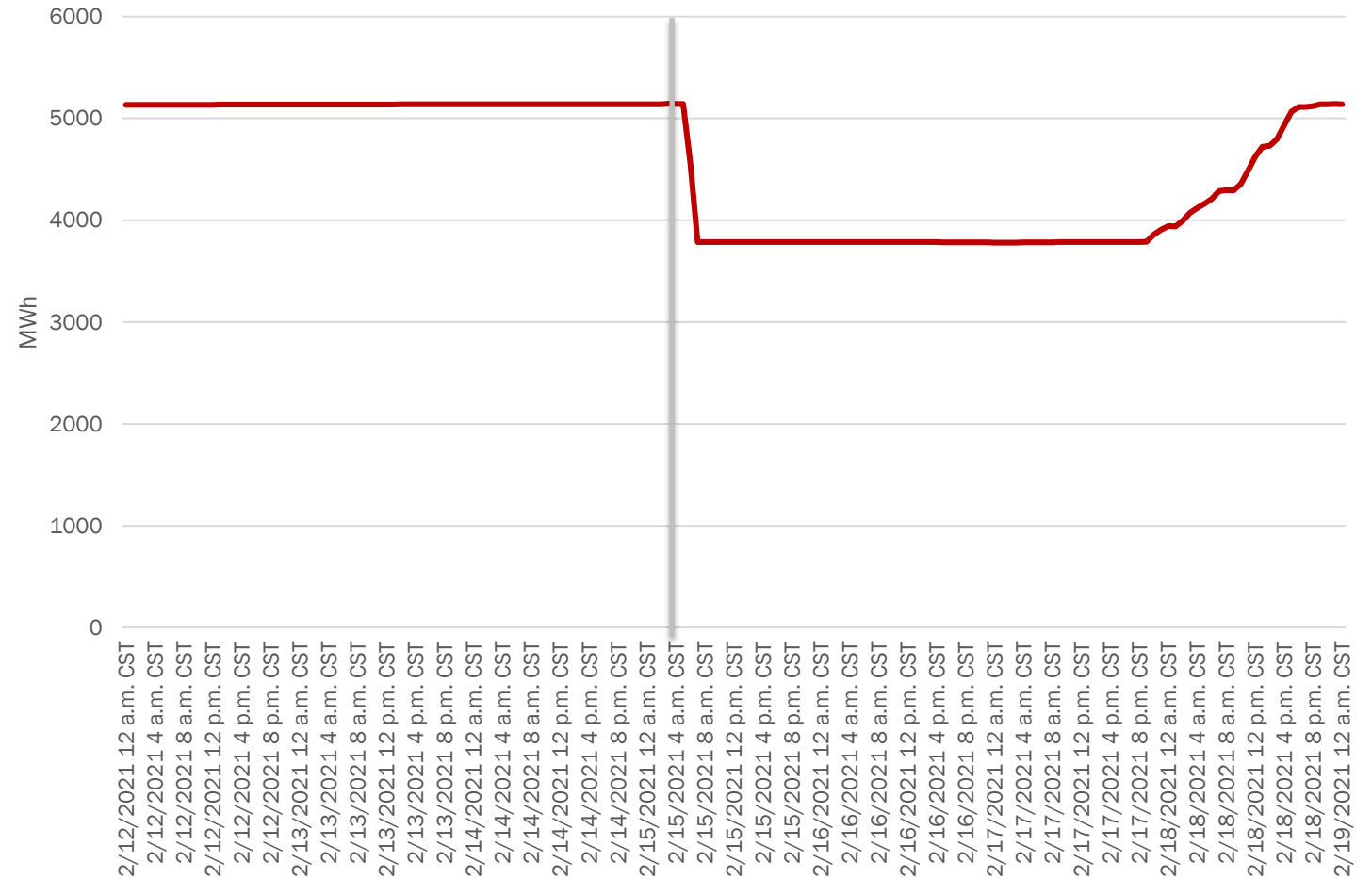


## Contributing Factors

# Nuclear Generation Outages

### Nuclear

- 1,360 MW of nuclear generation went offline due to lack of winterization procedures

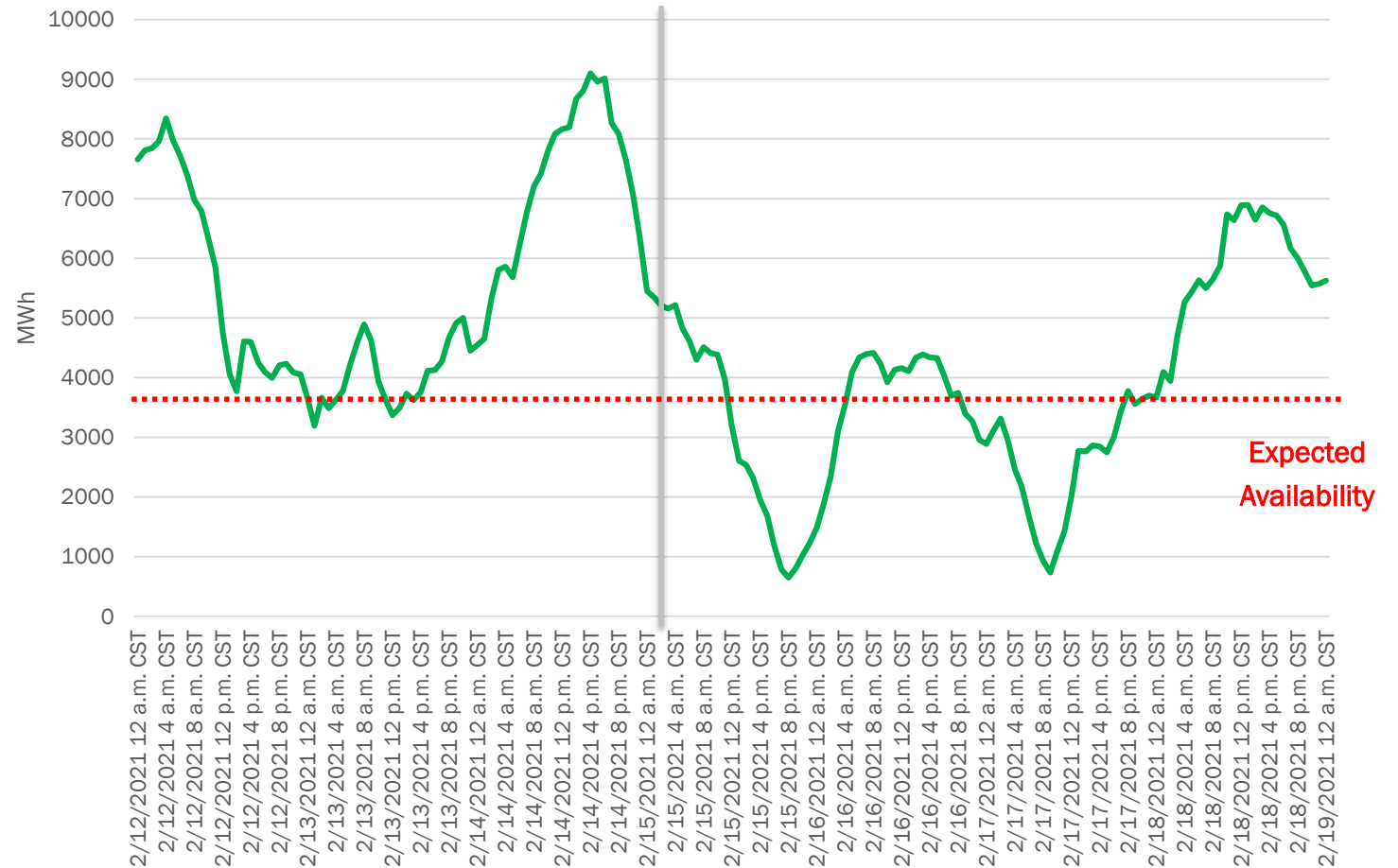


## Contributing Factors

# Wind Generation Outages

### Wind Generation

- Wind generation experienced outages due to lack of winterization procedures
- Generated **more and less** than expected over cold event
- Impact of outages small relative to natural gas

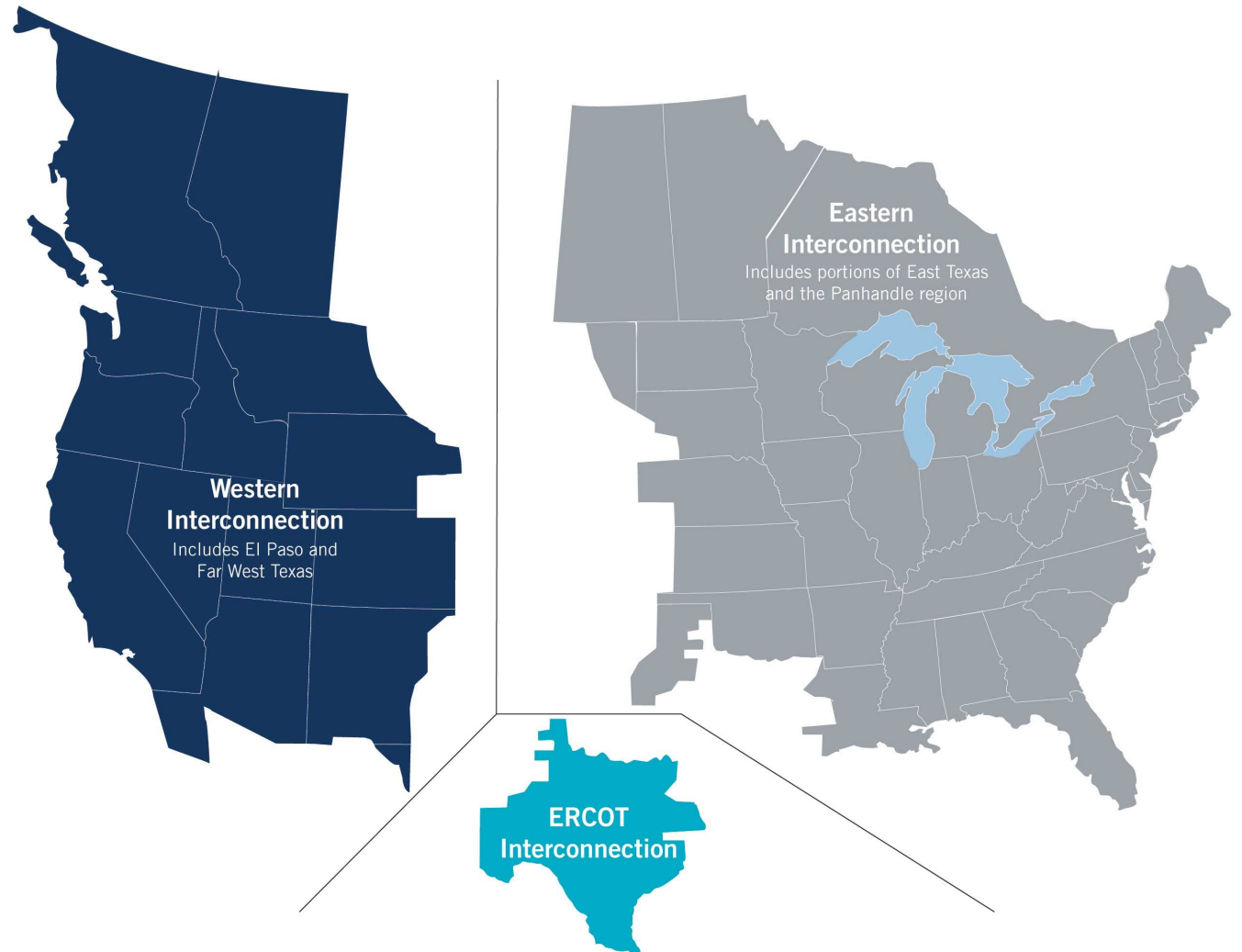


## Contributing Factors

# Going it Alone

### ERCOT Island

- ERCOT not connected to Western or Eastern Interconnections
- Prevents Texas from importing energy from its neighbors
- Large interconnections enable “diversity benefits” which result in higher reliability



## Contributing Factors

# Lack of Resource Adequacy Program

## Scarcity Pricing Model

- Texas does not have a direct regulatory framework to ensure there is sufficient capacity online to meet peak demand
- It relies on a scarcity pricing model that allows for high wholesale market prices to incentivize power plant construction
- This resulted in a lower level of reserves in ERCOT vs. other regions
- The Southwest Power Pool (SPP) has a resource adequacy program and experienced very few outages during the cold event

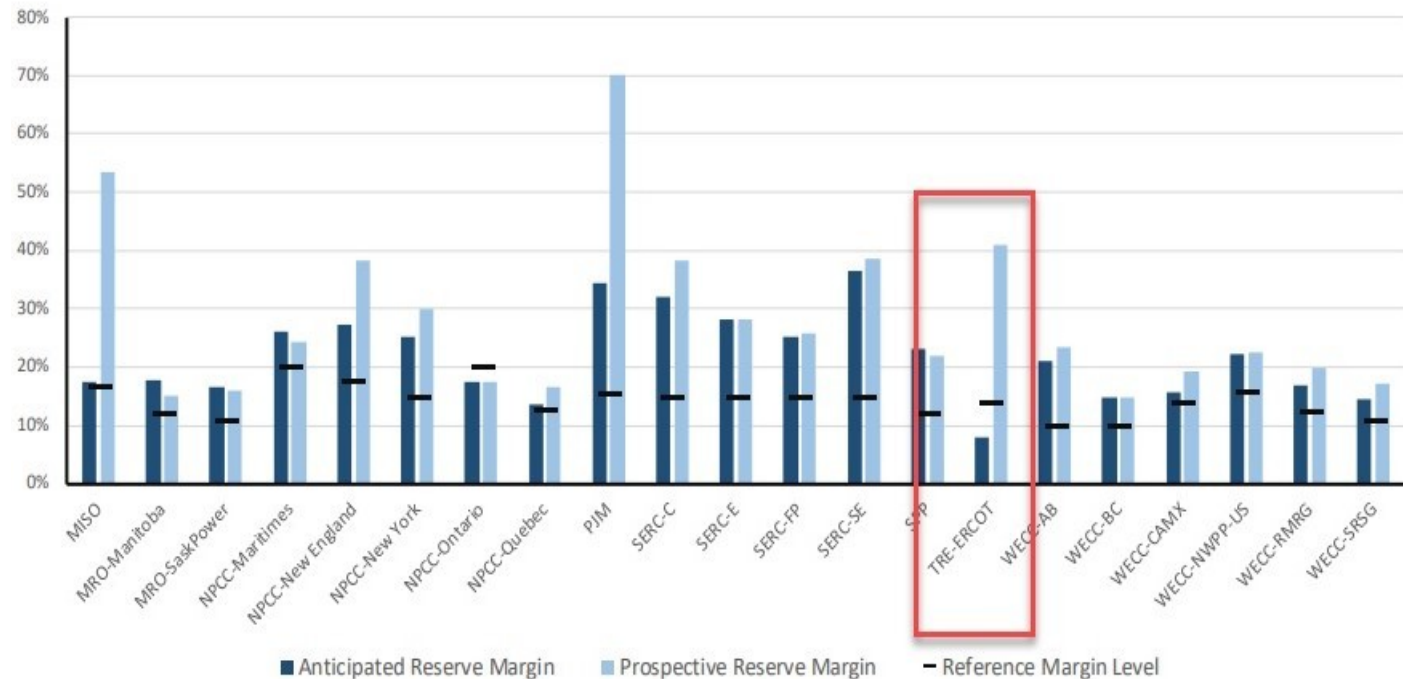


Figure 1: Anticipated and Prospective Reserve Margins for 2024 Peak Season by Assessment Area

# Takeaways

**Part 2**

## Takeaways

# How would we hold up in an extreme cold snap?

### Hydroelectric Generation Performance in Cold Events

- The primary source of energy, water from reservoirs, would remain unaffected. Water for our turbines is typically drawn from deep below the surface through very large pipes.
- Many of our powerhouses are heated from the excess heat of the generator or from auxiliary energy produced by the generator. This makes them self-sufficient when they are running.

### Potential Issues

- Issues would arise if transmission lines were lost due to a severe storm and then there was a prolonged deep freeze. We would be unable to run the hydro generators since they could not connect to the grid, some diesel backup generator fuel sources could gel rendering them useless, cooling water and measurement lines needed when the generator starts could freeze preventing a start when the transmission line was restored. This is an unlikely scenario but is possible.
- Extreme conditions can also result in slower response times to outages because employees must travel miles in snow, ice and down trees to access facilities and restore units that have tripped. Units that trip cannot be restored remotely for safety reasons.



## Takeaways

# What are the risks for our owned power supply?

### Flooding

- Facilities can flood in extreme weather events.
- These include floods such as in the late 1990s when the LaGrande Powerhouse was flooded and rendered inoperable for months or the mudslide at Cushman in 1999 when the powerhouse was flooded and rendered inoperable for a month.

### Drought

- Energy supply could be limited due to a drought.
- We saw this most recently in the winter of 2019 before our last major snowstorm.

### Earthquakes

- One of our most significant risks in the Northwest are earthquakes.
- Public safety is our top priority.
- We have a strong dam safety program that periodically evaluates all possible failure modes and risks and then addresses them. This includes seismic risks where we continually look at the latest seismic science
- Based on the latest fault information and evaluate our structures based on that science.
- All our dams are sound and expected to withstand large seismic events.

## Takeaways

# What risks are facing the region?

### Issues in the Western Interconnect Could Impact Tacoma Power

- The Northwest is different than Texas, but Tacoma faces reliability risks if the larger grid experiences generation shortages
- In March 2019, the region had a close call with unusually cold weather combined with a gas pipeline outage and a transmission line outage brought us close to emergency conditions
- In August of 2020, generation shortages in California caused rolling blackouts there and triggered emergency conditions for several other balancing areas in the WECC
- Additional coal-fired generation is being retired and replacement capacity is lagging, so the entire Western grid is on higher alert for generation shortages during extreme winter and summer conditions.

## Takeaways

# How Can Tacoma Power Avoid Similar Blackouts?

### Support Development of a Regional Resource Adequacy Program

- Tacoma Power is currently working with the Northwest Power Pool, SPP, and peer utilities in the region to stand up a resource adequacy program
- Program participation will enable Tacoma Power to access pooled capacity from other utilities in the event of an emergency

### Continue Practice of Investing in our Assets

- Tacoma Power has a tradition of investing in our generation and transmission assets
- Our generation resources have an excellent track record of reliability during critical system events

### Continue Practice of Planning for Extreme Events

- Tacoma Power plans for cold winter events as part of its Integrated Resource Plan
- We test our portfolio of resources against historic droughts and historic cold snaps
- Tacoma Power also plans for cold winter events as it considers forward sales as part of our risk management process