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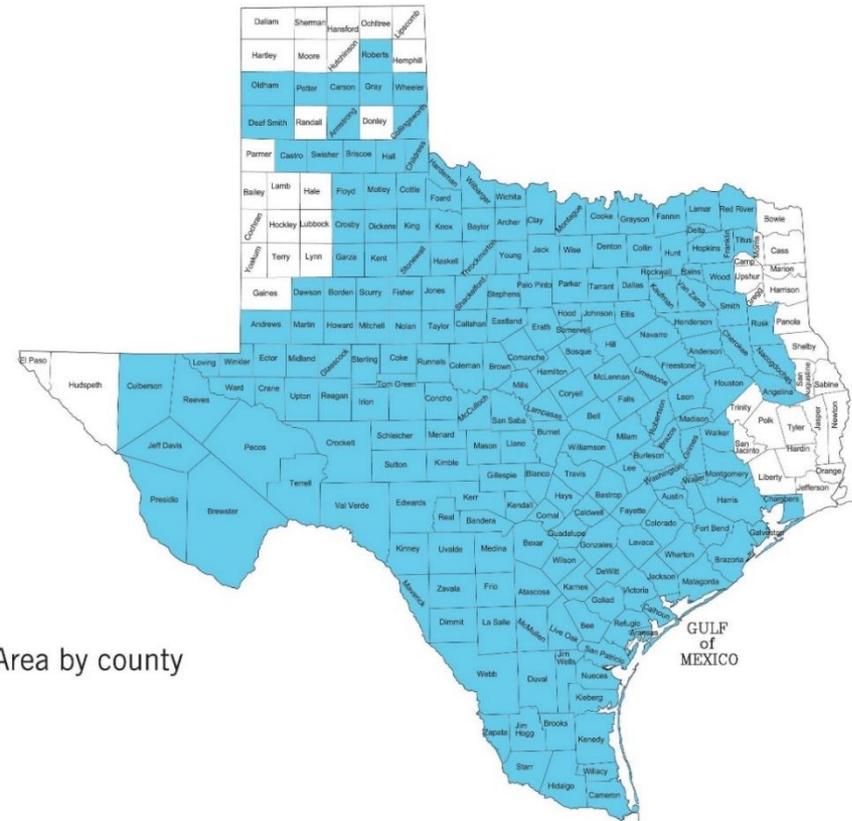
State Affairs
Texas House of Representatives

February 13, 2019

What is ERCOT?

The Texas Legislature restructured the Texas electric market in 1999 and assigned ERCOT four primary responsibilities:

- **System reliability**
- **Competitive wholesale market**
- **Open access to transmission**
- **Competitive retail market**

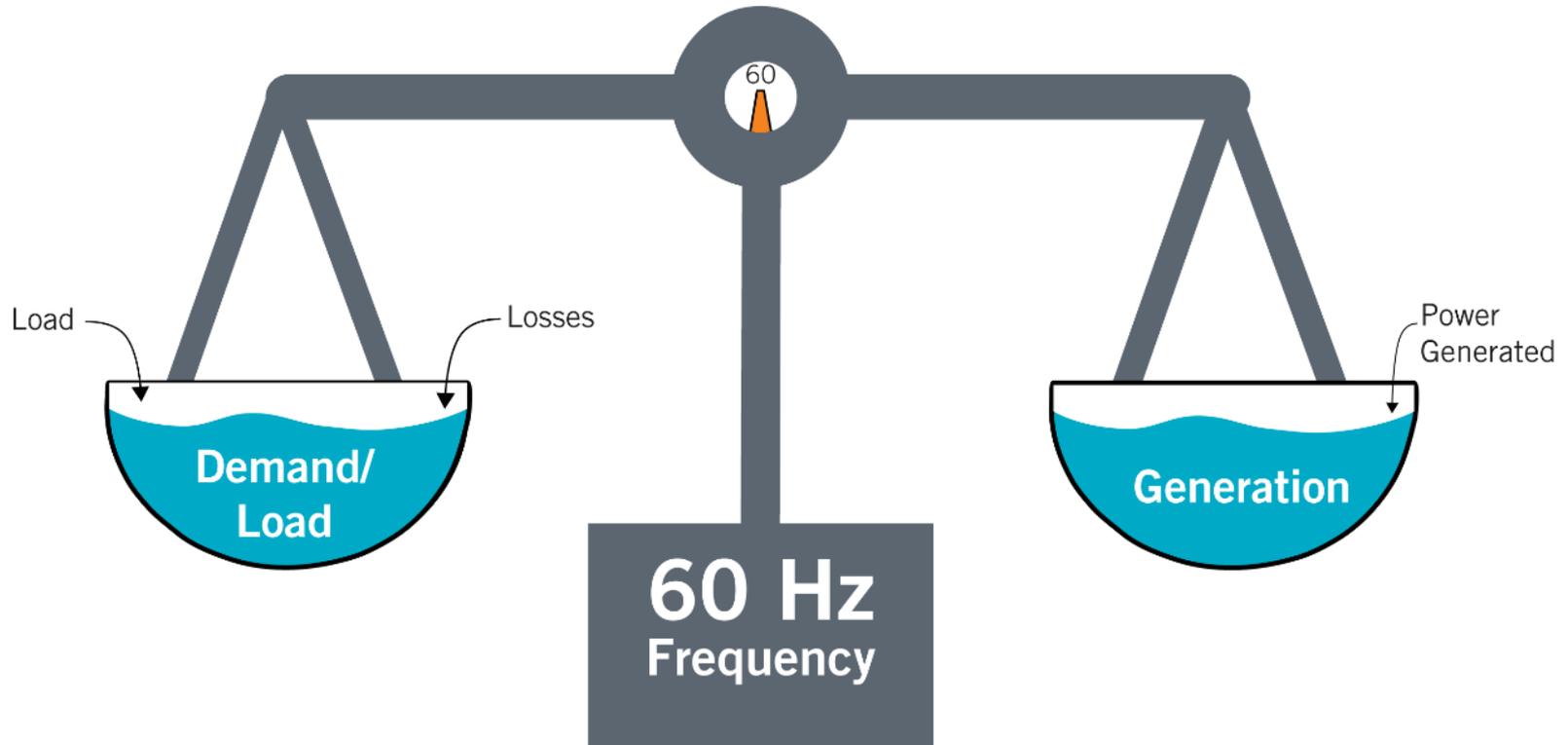


ERCOT is a nonprofit organization that is regulated by the Public Utility Commission of Texas, with oversight by the Texas Legislature.

ERCOT is not a market participant and does not own generation or transmission/distribution wires.

Power Supply (Generation) Must Match Demand (Load)

- The fundamental concept behind ERCOT operations is that generation has to match load at all times.



- In other words, a 1 MW reduction in load has the same effect on the grid as a 1 MW increase in generation.

Demand Side: Current ERCOT Load Records

Peak Demand Record: 73,473 megawatts (MW)

- July 19, 2018, 4-5 p.m.

Weekend Peak Demand Record: 71,445 MW

- Sunday, July 22, 2018, 5-6 p.m.

Winter Peak Demand Record: 65,915 MW

- Jan. 17, 2018, 7-8 a.m.

Recent Monthly Peak Demand Records

2018

- January: 65,915 MW (Jan. 17, 7-8 a.m.)
- May: 67,265 MW (May 29, 4-5 p.m.)
- June: 69,123 MW (June 27, 4-5 p.m.)
- July: 73,473 MW (July 19, 4-5 p.m.)
- November: 56,247 MW (Nov. 14, 7-8 a.m.)

2017

- April: 53,486 MW (April 28, 4-5 p.m.)
- October: 62,333 MW (Oct. 9, 4-5 p.m.)

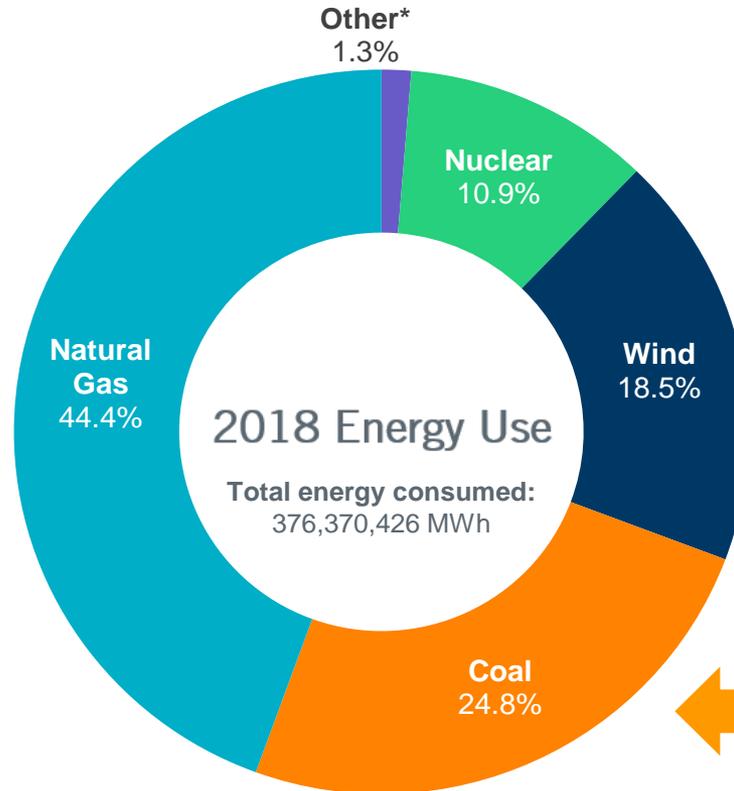
2016

- August: 71,110 MW (Aug. 11, 4-5 p.m.)
- September: 66,949 MW (Sept. 19, 4-5 p.m.)
- December: 57,932 MW (Dec. 19, 7-8 a.m.)

Supply Side: ERCOT Energy Sources in 2018

Natural Gas

- Natural Gas has historically played a large role in Texas power generation.
- Energy prices in ERCOT are very sensitive to gas prices.



Wind

- Geographic diversity growing.
- Wind generation record: 19,672 MW (Jan. 21, 2019, 7:19 p.m.)
- Wind penetration (load served): 56.16% (January 19, 2019, 3:10 a.m.)



Coal

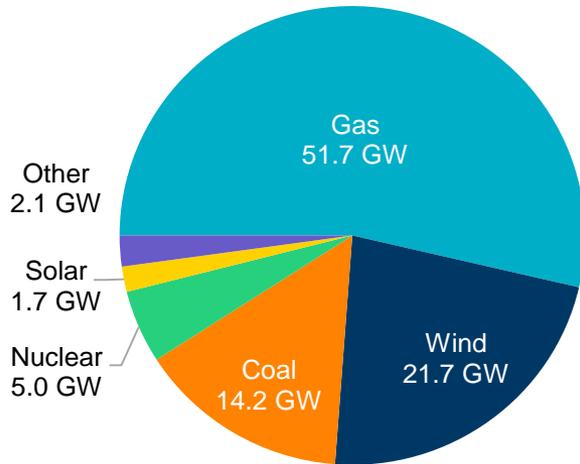
- Coal fleet includes some newer units.
- Retired or permanent mothball status 2018/2019: 5,583 MW



*includes solar, hydro, petroleum coke, biomass, landfill gas, distillate fuel oil, net DC Tie and Block Load Transfer imports/exports, and an adjustment for Wholesale Storage Load

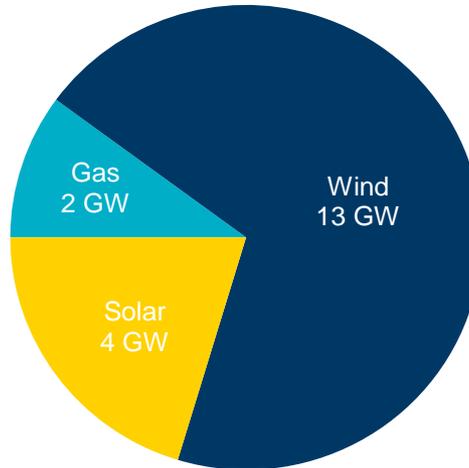
Looking Ahead: ERCOT Resource Mix Trends

Existing resources



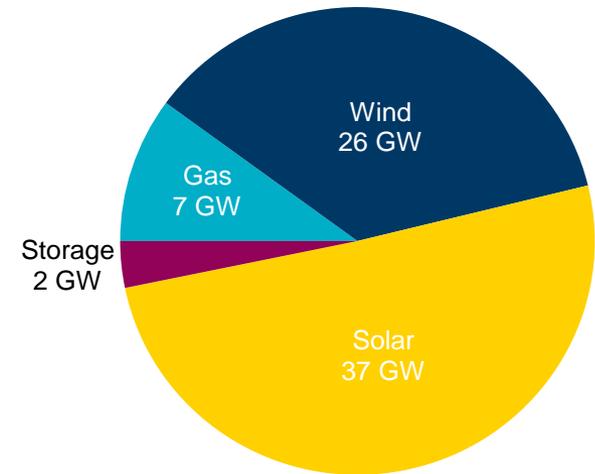
Reflects the installed capacity of resources that were operational as of December 31, 2018, and expected to be available for summer 2019. Gibbons Creek is excluded for Summer 2019 due to ERCOT's January approval of the owner's plan to permanently mothball the unit.

CDR-eligible planned resources



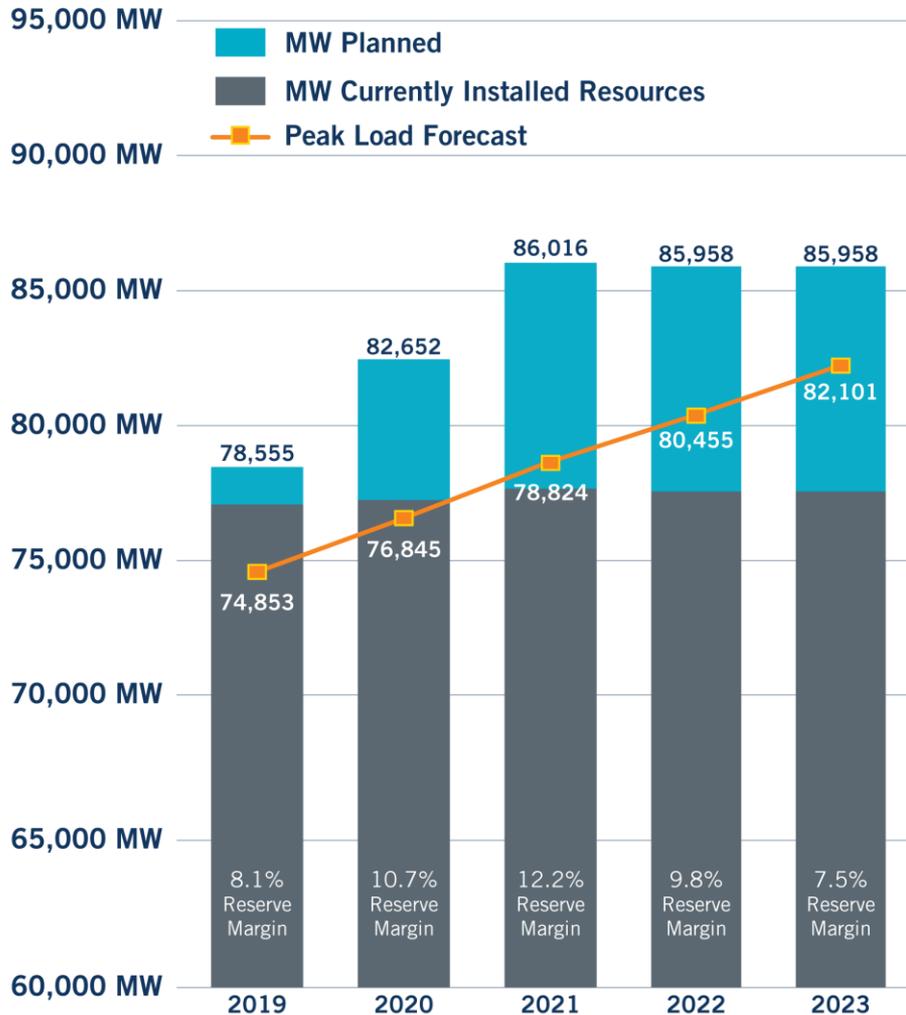
"CDR eligible" represents planned projects that meet the criteria to be included in the ERCOT Capacity, Demand and Reserves reports. These include having signed interconnection agreements, and for gas-fired and other thermal projects, issuance of air/greenhouse gas permits and proof of adequate water supplies for generation.

Other planned resources



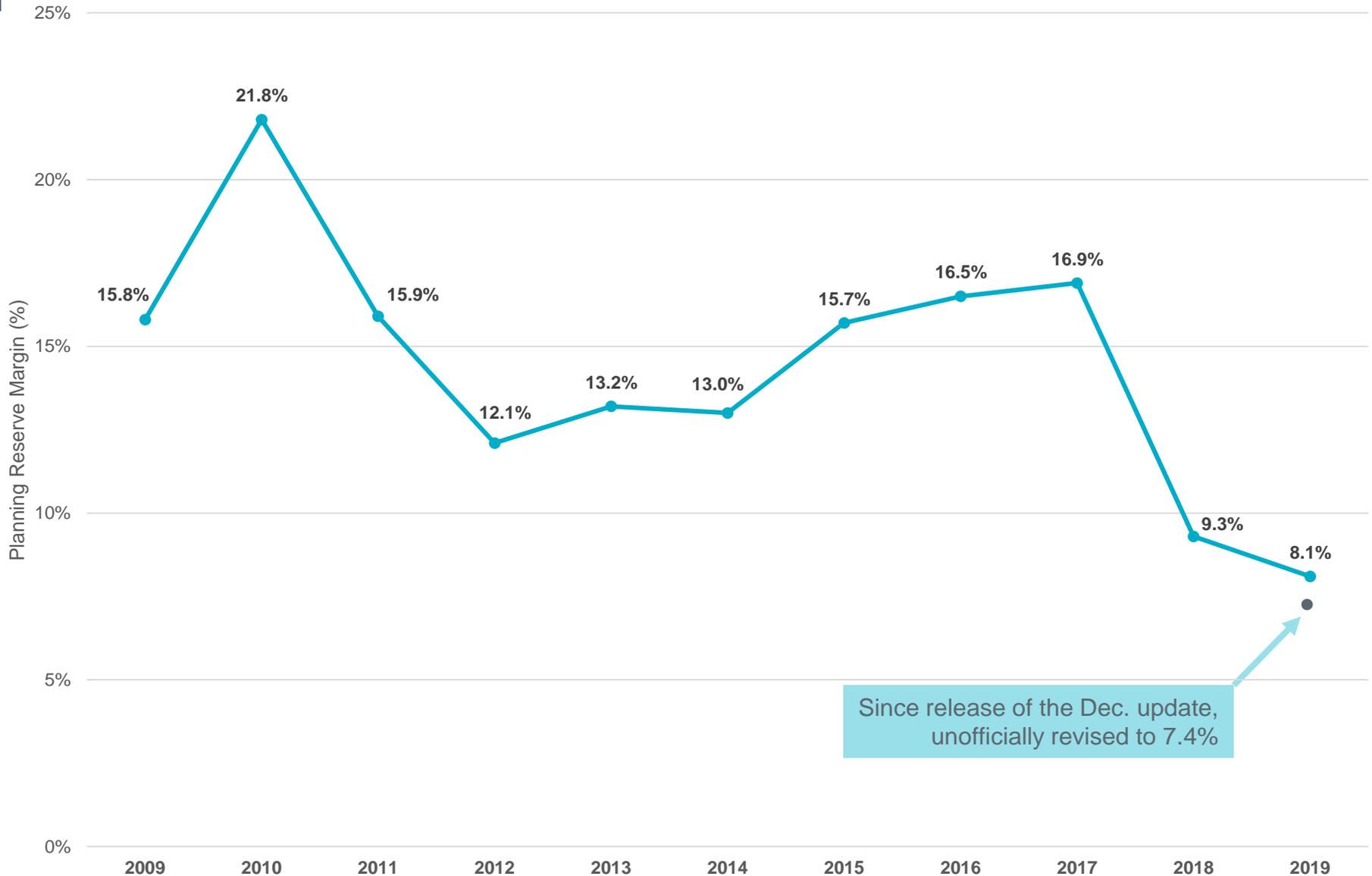
"Other planned" represents planned projects for which interconnection requests have been made, but do not meet the criteria to be reported as planned projects in the CDR reports.

Supply & Demand Forecast



- The December 2018 Capacity, Demand, and Reserves (CDR) report: 8.1% reserve margin for summer 2019. Market decisions to permanently mothball a 470 MW unit lowered the reserve margin expectation to 7.4% for summer 2019.
- At this reserve margin level, it is likely we will have to use the additional resources that are available under our emergency operating procedures on a number of occasions next summer.
- While there is no specific indication at this time that we will have to implement rotating outages, power reserves at this level increase the likelihood that extreme weather, forced outages, low wind output or spikes in demand could lead to emergency conditions.
- Planning reserve margins can shift quickly as the ERCOT market experiences cycles of new investments, retirements of aging resources and growing demand for power.

Historic Summer Reserve Margins (Dec CDR Reports)



Since release of the Dec. update, unofficially revised to 7.4%



ERCOT Reliability Tools: Designed to Manage Normal and Extreme Grid Conditions



Every day, ERCOT manages the grid 24/7, ensuring changing conditions are understood and addressed to keep power flowing. ERCOT and the market participants are focused on performance in summer 2019.

- ERCOT manages an Ancillary Services market that pays resources to be available to respond to unexpected events.
- Demand Response programs managed by ERCOT deliver load reduction when needed to support reliable grid operations.
- The ERCOT wholesale market design provides strong financial incentives for generators to be available when demand rises, and for retail electric providers to prepare for price fluctuations.

ERCOT Cyber & Physical Security Program

- ERCOT has strong executive management support for security.
- ERCOT has a dedicated and integrated cyber/physical security organization and established strategy.
- ERCOT uses layered cyber and physical security architectures known as a defense-in-depth strategy, along with careful monitoring.
- ERCOT is committed to external collaboration with government agencies, law enforcement, industry and national labs to enhance its and the industry's security posture.

NIST Cybersecurity Framework

Identify

Establish a risk management strategy and governance and identify at-risk assets

Protect

Implement protections for systems and data identified as at risk

Recover

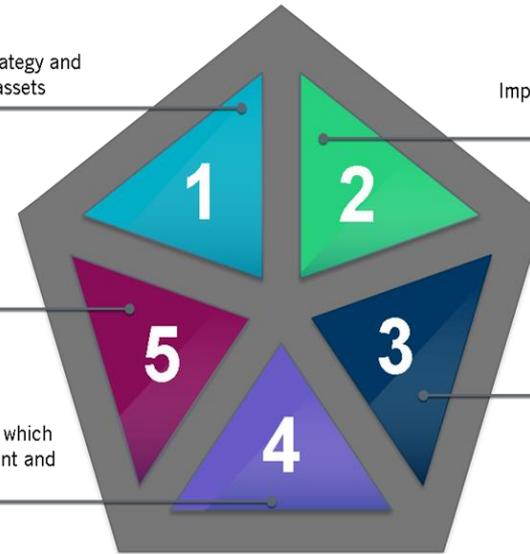
Review and discuss the recovery plan to identify improvements to policies and processes

Detect

Determine how cyber threats are monitored and managed

Respond

Execute incident response plan, which includes investigating the incident and containing the threat



National Institute of Standards and Technology