

Texas ERCOT - Power Grid Analysis

Why Texans should leave the power grid

Team Members

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Consumption

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Comparison

Intro:

Texas current power grid is ERCOT (Electric Reliability Council of Texas) this power grid has failed their residents numerous times. Our goal is to convince Texans to be in support of leaving this faulty grid and join a shared power grid such as the Eastern and Western interconnection grids. To achieve this goal we will employ data regarding power outages, electricity consumption, historical temperatures and average cost.

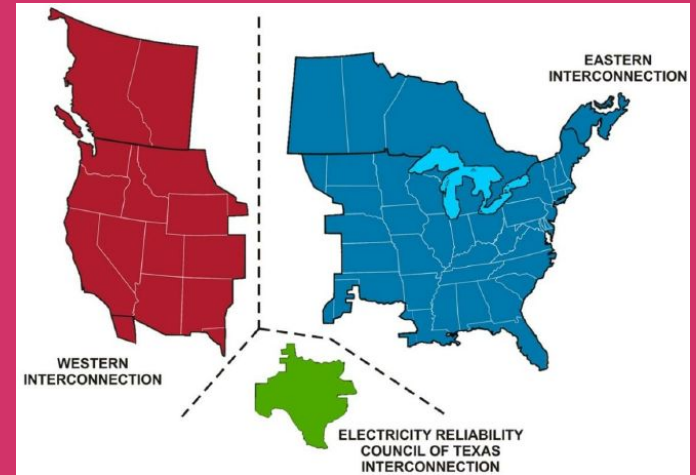
ERCOT

Is an independent system operator that manages the flow of electric power in the state of Texas it covers about 90 percent of the states electric load. This scheduled electric power grid connects more than 52,700 miles of transmission lines and 1,030+ generation units.

Shared Grids

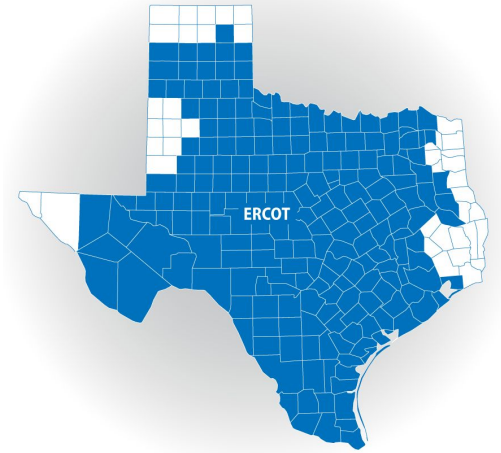
Western Interconnection: Stretches from Western Canada South to Baja California in Mexico, reaching eastward over the Rockies to the Great Plains. All of the electric utilities in the Western Interconnection are electrically tied together during normal system conditions and operate at a synchronized frequency.

Eastern Interconnection: Reaches from Central Canada Eastward to the Atlantic coast (excluding Québec), South to Florida and West to the foot of the Rockies (excluding most of Texas). All of the electric utilities in the Eastern Interconnection are electrically tied together during normal system conditions and operate at a synchronized frequency.



Current state of Texas Power Grid

- Why is Texas Power Grid separate? (historically)
- The U.S is divided into three interconnections: Eastern, Western, and ERCOT
- President Franklin D. Roosevelt New Deal included passing a new law signed in 1935, Public Utility Holding Company Act
- ERCOT Grid currently operates 90% of Texas



Summer Weather Grid Strain

Summer Weather Grid Strain

- In hot places such as Texas, electrical usage is usually highest on summer afternoons.
- Adding electrical capacity to deal with peak demand can be expensive
- Power companies try to reduce demand in various ways, including by increasing temperatures on home thermostats
- Graph shows power supplied and consumed in megawatts as a function of time (in hours) measured on Aug. 9, 2022

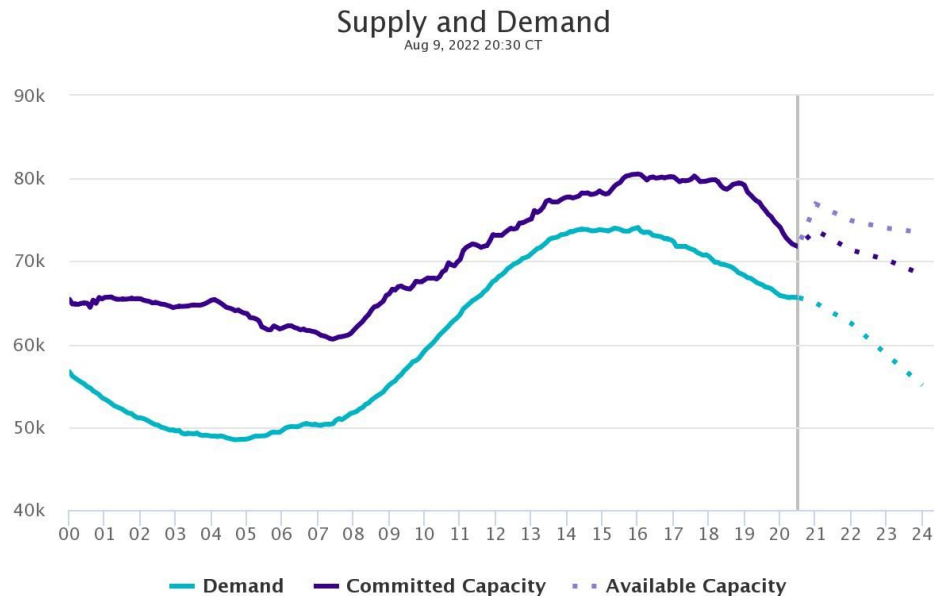


Image courtesy of:

<https://www.ercot.com/gridmktinfo/dashboards/supplyanddemand>



Winter Freeze Response Comparison

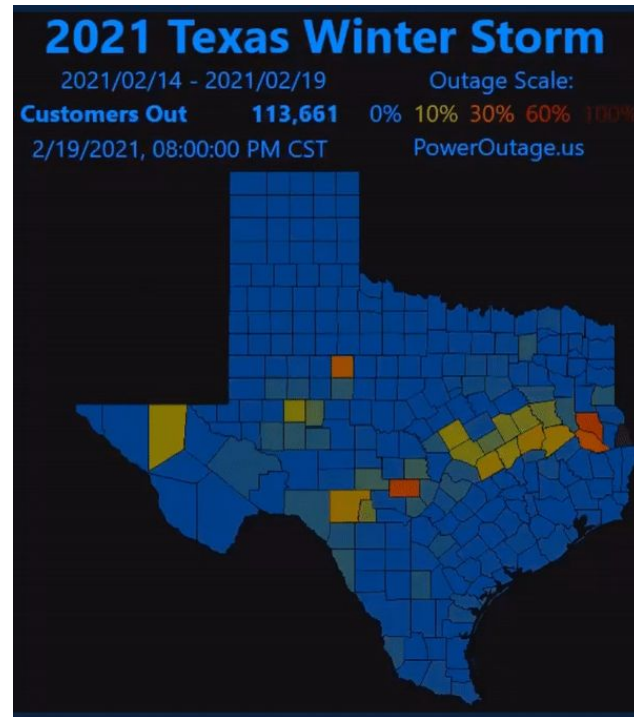
What happened in February 2021?

In February of 2021 specifically during the week of the 13th, Texas was hit with an unprecedented winter storm that devastated the entire state. In the wake up winter storm Uri around 70% of Texans we left without power.

- About 70% of Texans felt some sort of effect. Many were left without
 - Power (ex: heaters and cooking capabilities)
 - Food
 - Water

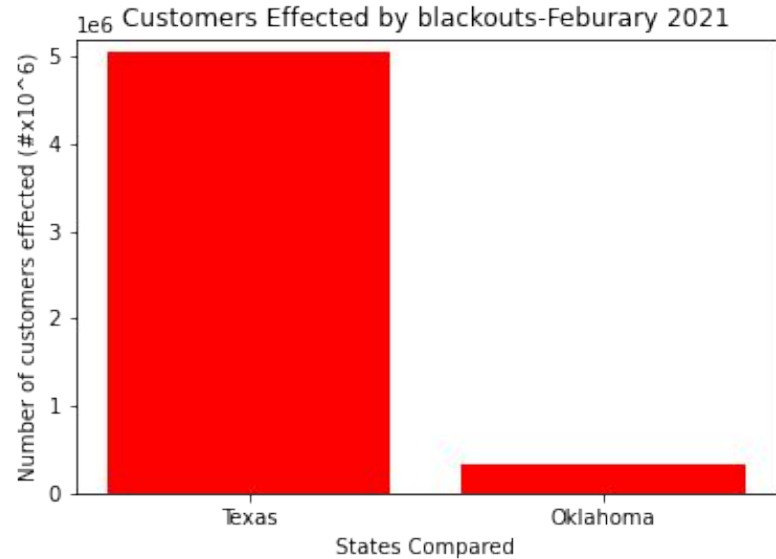
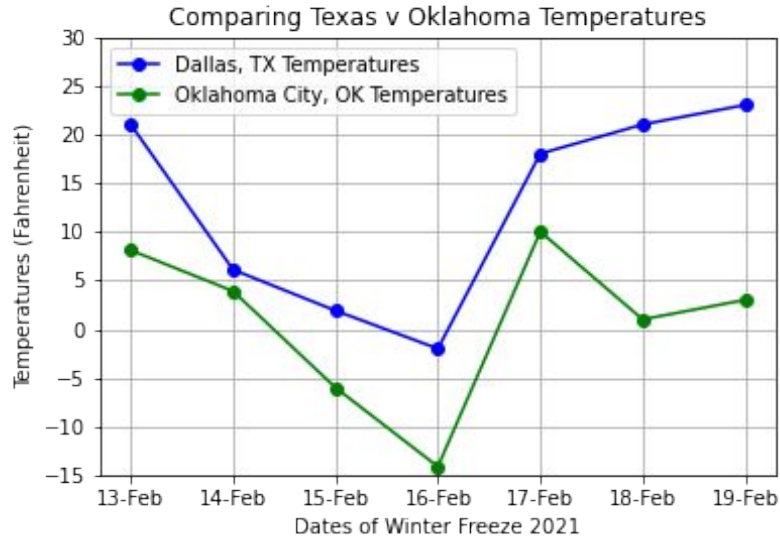
Ercot was warned on February 11th about the freezing conditions, but it wasn't until the 14th that the grid started failing. On the 14th, was when implemented rolling blackouts

- Rolling blackouts: when the company purposely turns off power in a specific area in order to preserve the electrical grid



<https://twitter.com/i/status/1364366650393452544>

Winter Freeze Response Comparison -Texas V Oklahoma



- Regarding the bar charts it is important to note that this data is referring to the number of *account*. Not individual people it is estimated that the actual number of *people* affected was actually somewhere between 12-17 million

How did this happen?

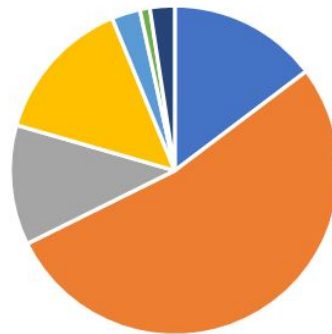
Texas is one of nation's top producers of energy. They have:

- Wind
- Natural Gas
- Coal
- Solar
- Nuclear

Main reason the power grid failed was because ERCOT did not *weatherize* their energy sources. This error alone caused more than 50% of the grid failure.

In 2011 ERCOT was warned that their grid would fail when faced with extreme weather conditions, however since they are an unregulated organization the warning went unheard.

Outage Causes (Feb 2021)



Existing Outages	15%
Weather Related	53%
Fuel Limitations	12%
Equipment Issues	14%
Transmission Loss	3%
Miscellaneous	1%
Frequency Related	2%



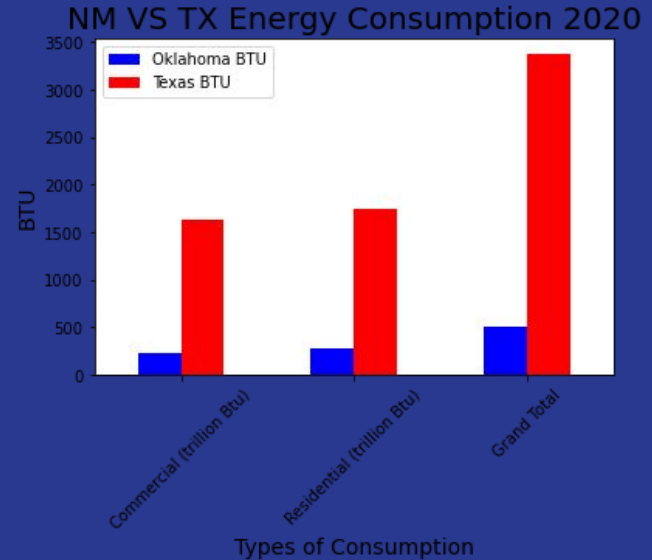
Energy Consumption Evaluation

The amount of energy used in 2020 for Texas , Oklahoma, & New Mexico.

The Energy Consumption used in 2020 for Texas and New Mexico.

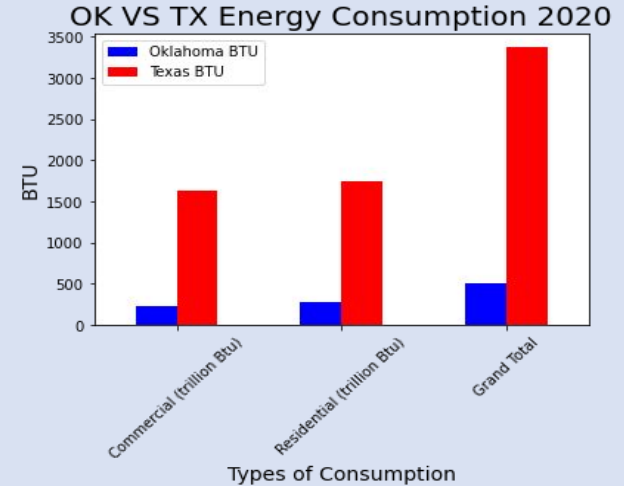
Energy Consumption 2020	NM	TX
Commercial (trillion Btu)	116	1631
Residential (trillion Btu)	126	1744
Grand Total	242	3375

New Mexico currently uses the Western interconnection grid a shared powered grid that covers the western region their energy consumption based off of commercial and residential use, showed a significant difference in the amount of BTU(British Thermal Unit) saved compared to Texas.



The Energy Consumption used in 2020 for Texas and Oklahoma.

Energy Consumption 2020	Oklahoma BTU	Texas BTU
Commercial (trillion Btu)	223	1631
Residential (trillion Btu)	282	1744
Grand Total	505	3375



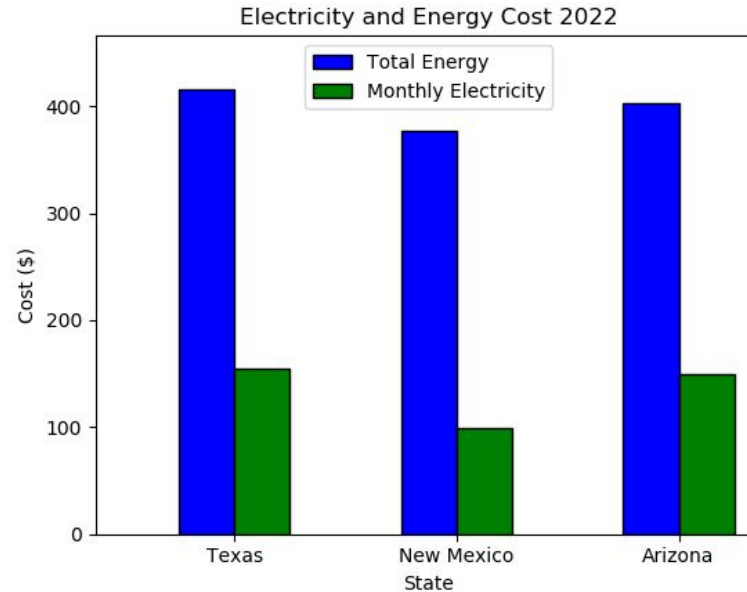
Oklahoma currently uses the Eastern interconnection grid a shared powered grid that covers the Eastern region their energy consumption based off of commercial and residential use, showed a slight increase in the amount of BTU(British Thermal Unit) used compared to New Mexico however there is still substantial difference in the total energy consumed compared to Texas.

Cost Comparison

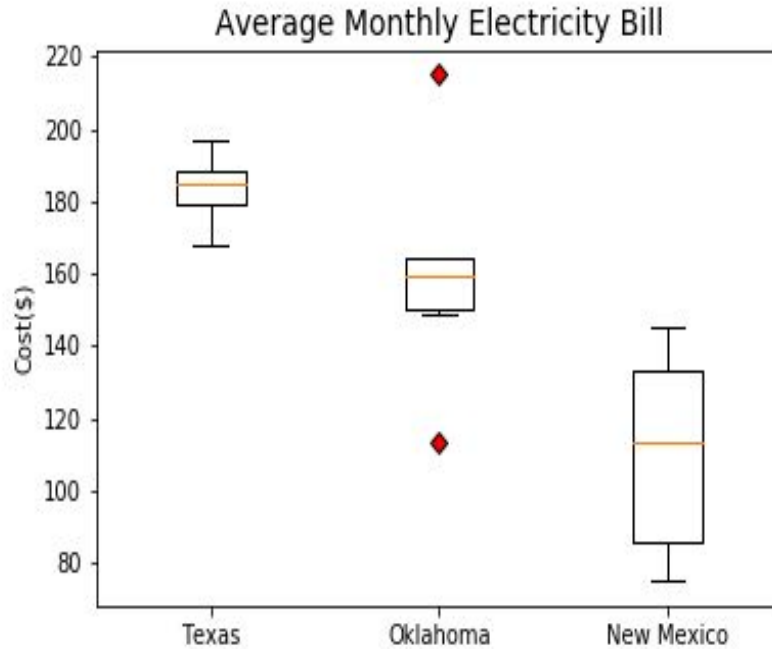
The average cost of energy and electricity for 2022

Energy and Electricity Cost for 2022 for Texas, New Mexico and Arizona

State	Total Energy Cost	Monthly Electricity Cost
Texas	\$ 416	\$ 154
New Mexico	\$ 377	\$ 99
Arizona	\$ 403	\$ 150



Average Electricity Bill for 2022 for Texas, Oklahoma and New Mexico



Conclusion:


So, in the beginning we started wanting to disprove the idea that ERCOT is reliable and performs to acceptable levels based on:

- price averages
- energy usage
- black out rates.

What does ERCOT do instead?

- regulates homeowners' thermostats
- denies people electricity when they need it the most
- takes advantage of customers by charging higher electricity bills than the states surrounding us.

All of these things highlight the true extent of how ERCOT has been abusing their freedom that they gained by being independent from the rest of the country. It is time that Texas joins the US national power grid and allow Texans the opportunity to get fair and reliable energy.



Citations

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