

# Without Bold Action, Electricity Insecurity Will Imperil the Texas Growth Story



Source: Texas Tribune

**Gabriel Collins, J.D.\***

**Baker Botts Fellow for Energy & Environmental Regulatory Affairs  
Baker Institute for Public Policy, Rice University**

*\*Note: The opinions and views expressed in this presentation are mine exclusively and do not represent the assessments or positions of the Baker Institute or Rice University.\**

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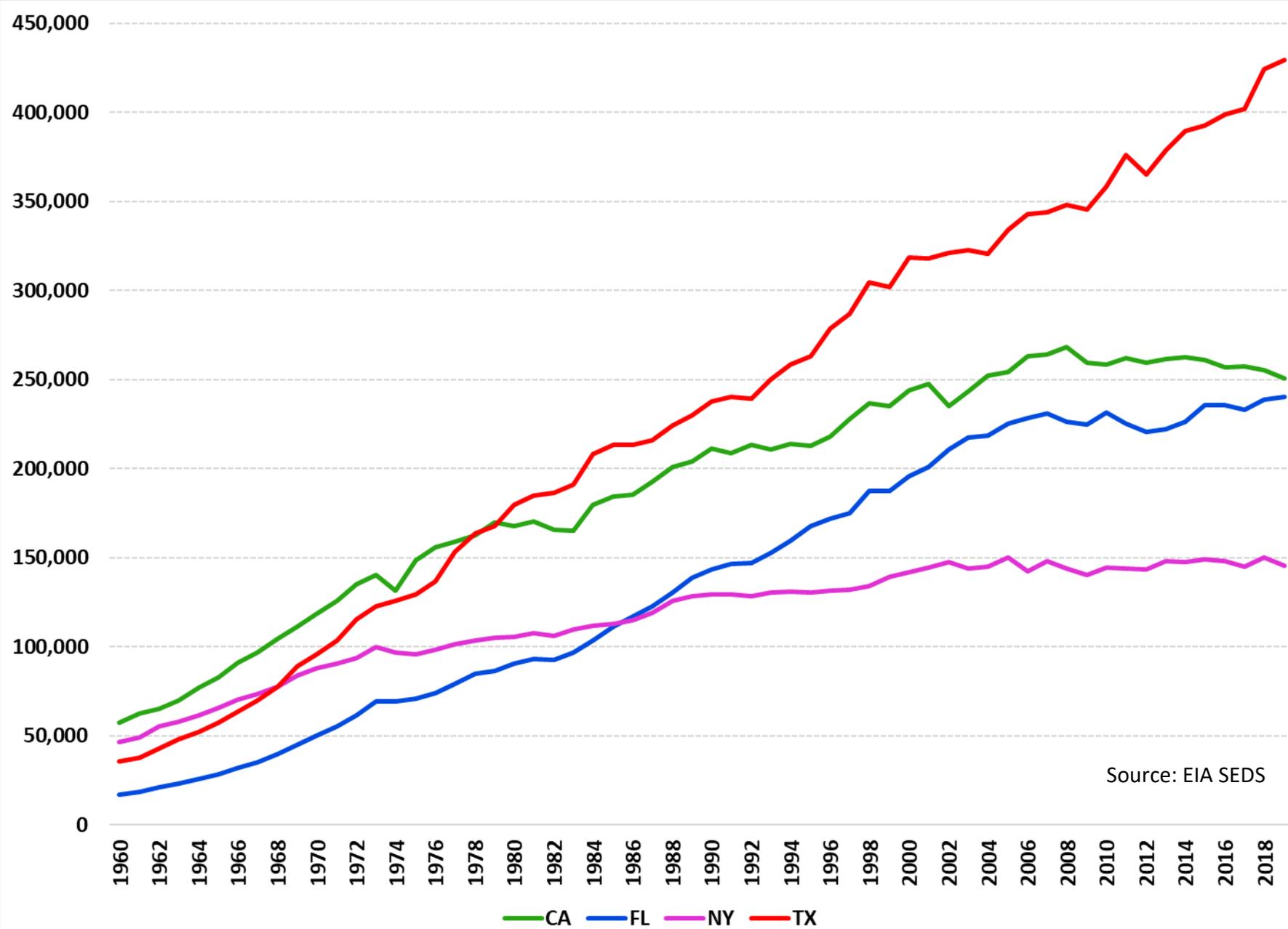
# Key Themes

- Texas is by far and away the largest and fastest-growing U.S. electricity producer and user, generating about 1.5 times as much electricity as the UK did in 2020.
- Texas capacity growth increasingly favors intermittent sources
- The rest of growth is from gas—which power plants must source from offsite and which also fuels homes AND the home standby generators that consumers are buying to compensate for grid unreliability
- **GRID RELIABILITY IS ESSENTIAL FOR INDUSTRIAL COMPETITIVENESS AND GROWTH TO 2050 AND BEYOND**
- Gas + Power becoming an energy security Gordian knot in TX
- Big challenges loom, esp. if transport electrification takes off
- But we have massive opportunities ahead too
  - Power export opportunities from greater interconnection with neighboring grids (after capacity buildout over time in response to comparative advantage)

# Big Texas Growth

# The 4 State “Horsemen” of U.S. Electricity Demand

Texas Power Sales Keep Growing, Unlike Other Big States (MWh)

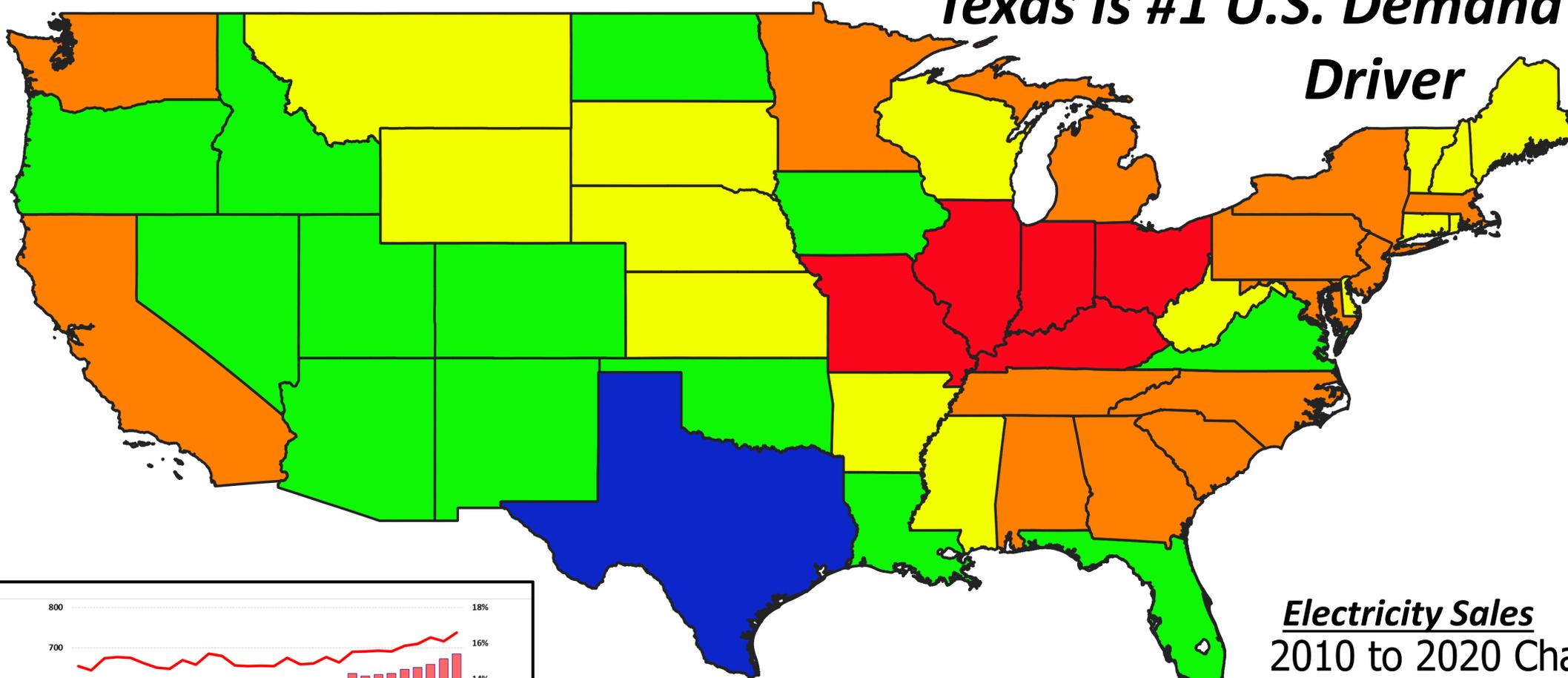


Source: EIA SEDS

*How does this curve  
evolve if we move  
toward 50 million  
Texans by 2060-2070?*

# Texas Is #1 U.S. Demand Electricity

**Driver**

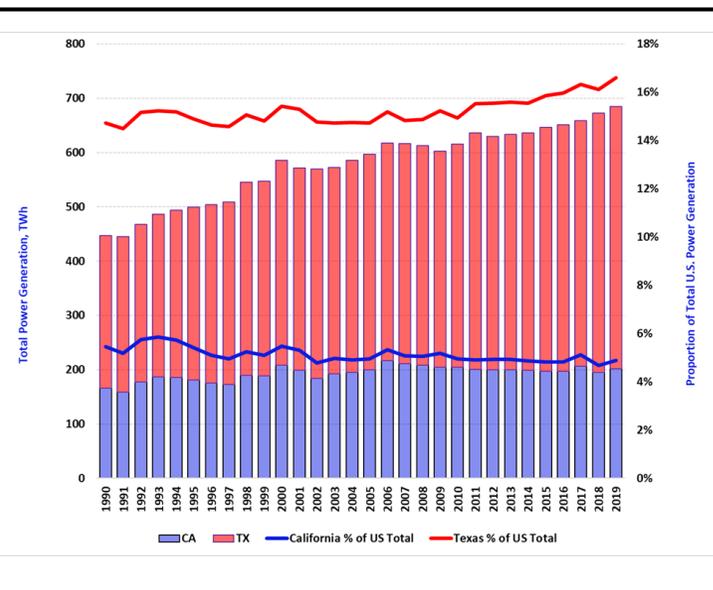


## Electricity Sales

2010 to 2020 Change, MWh

- 23,250,534 to -11,648,888
- 11,648,888 to -5,146,493
- 5,146,493 to 1,141,372
- 1,141,372 to 8,688,090
- 8,688,090 to 50,909,194

**Golden + Lone Star States = ~17% of US National Electricity Production**



# Blackouts

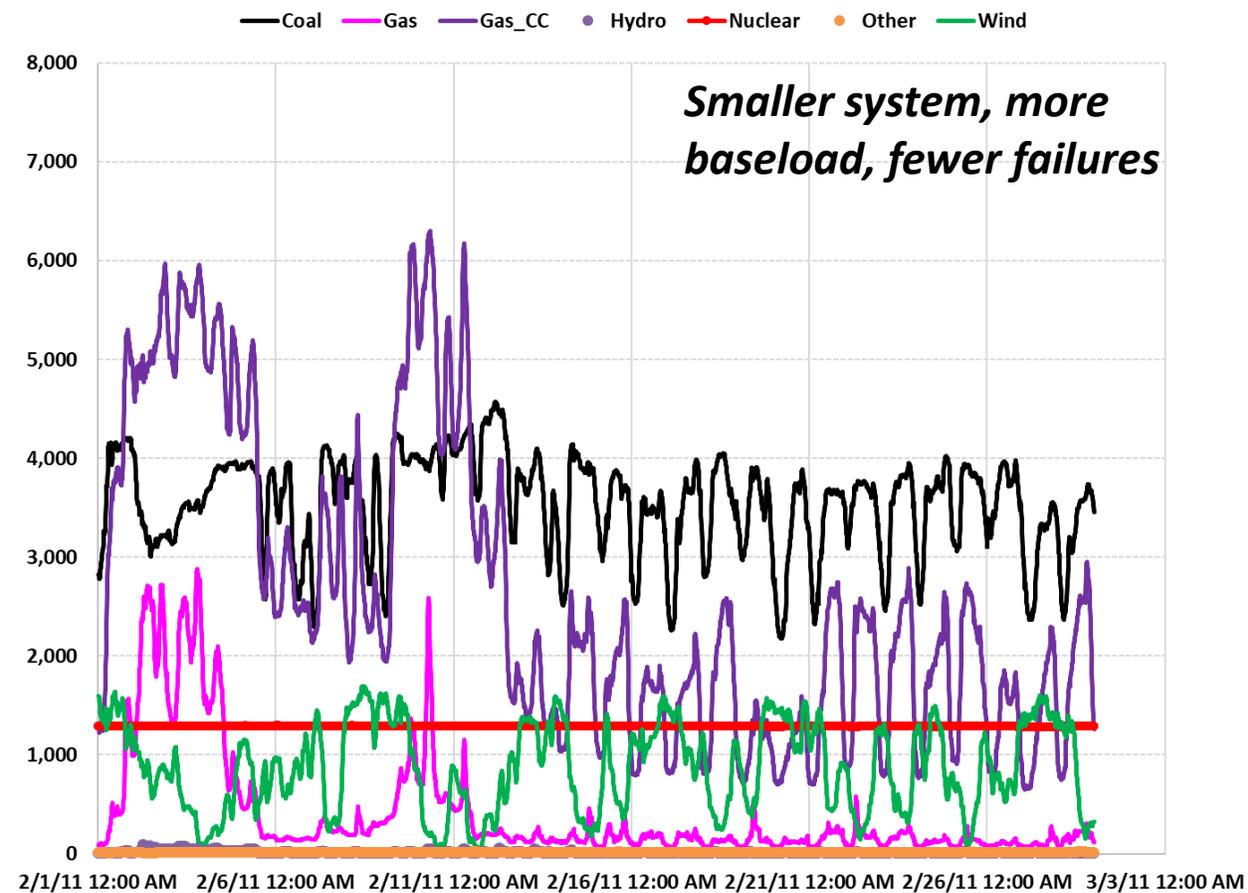
**The  
Outcome  
We  
Should  
Strive to  
Avoid**



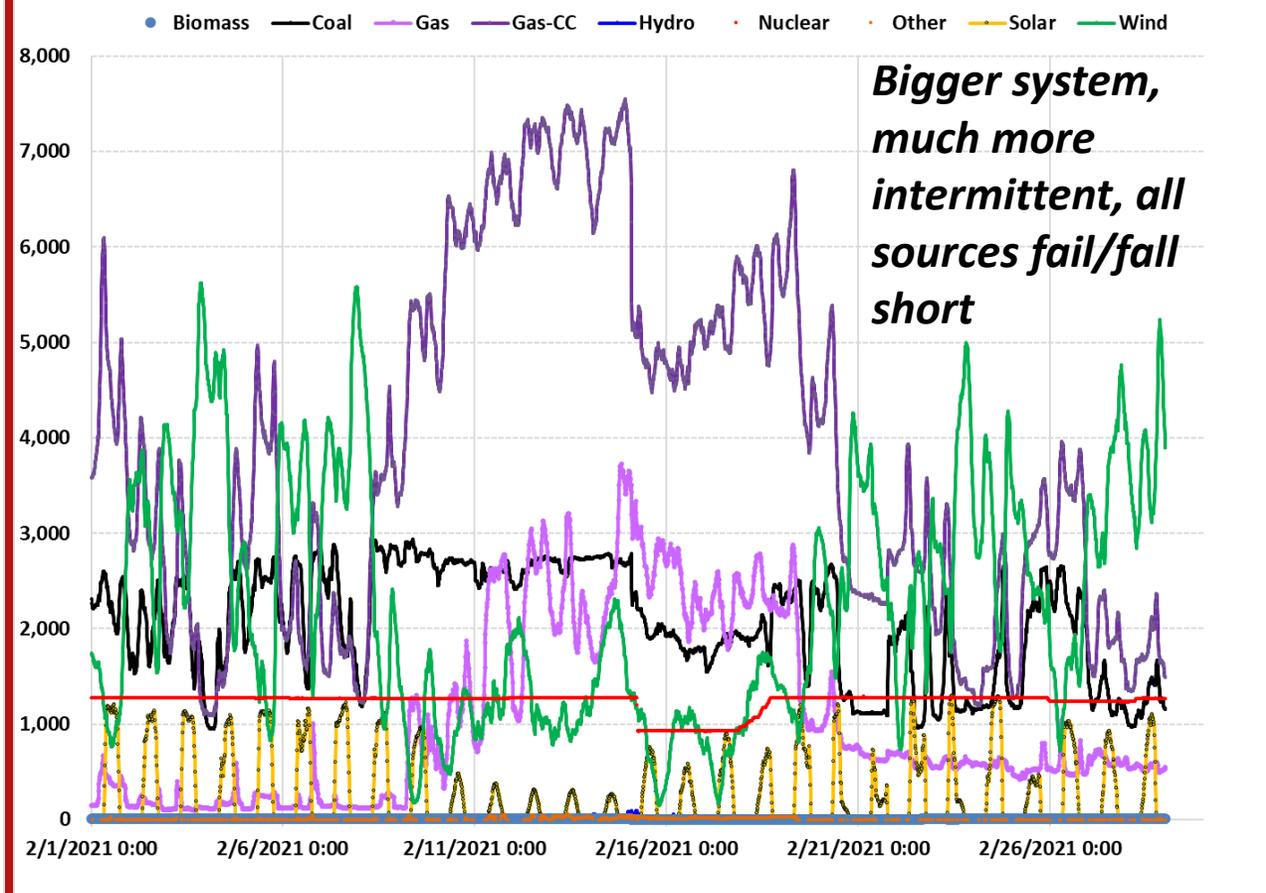
Author's driveway during Great Texas Blackout, February 2021, Houston, TX

# February Troubles

## February 2011, ERCOT Generation, 15-min Intervals, MWh



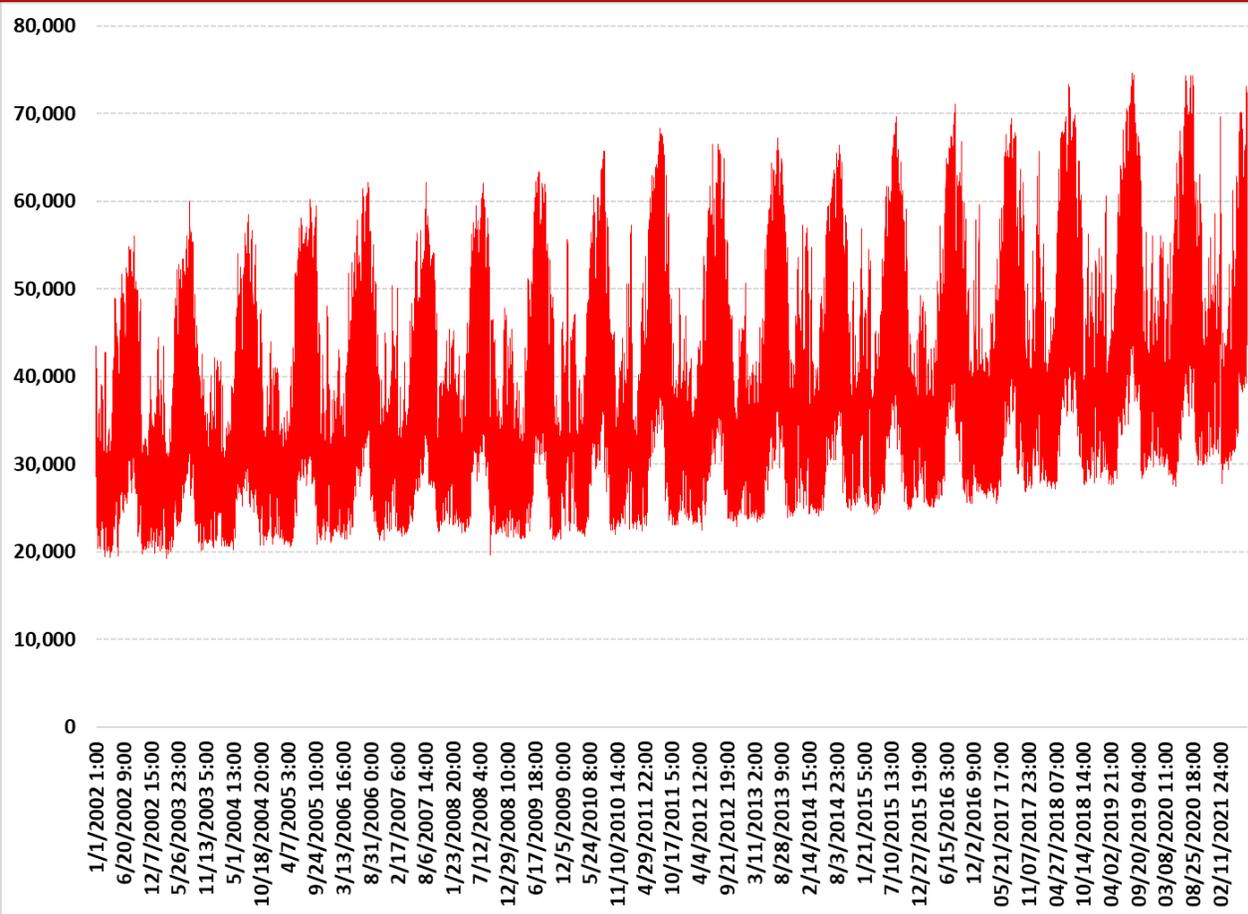
## February 2021, Same



Source: ERCOT, Author's Analysis

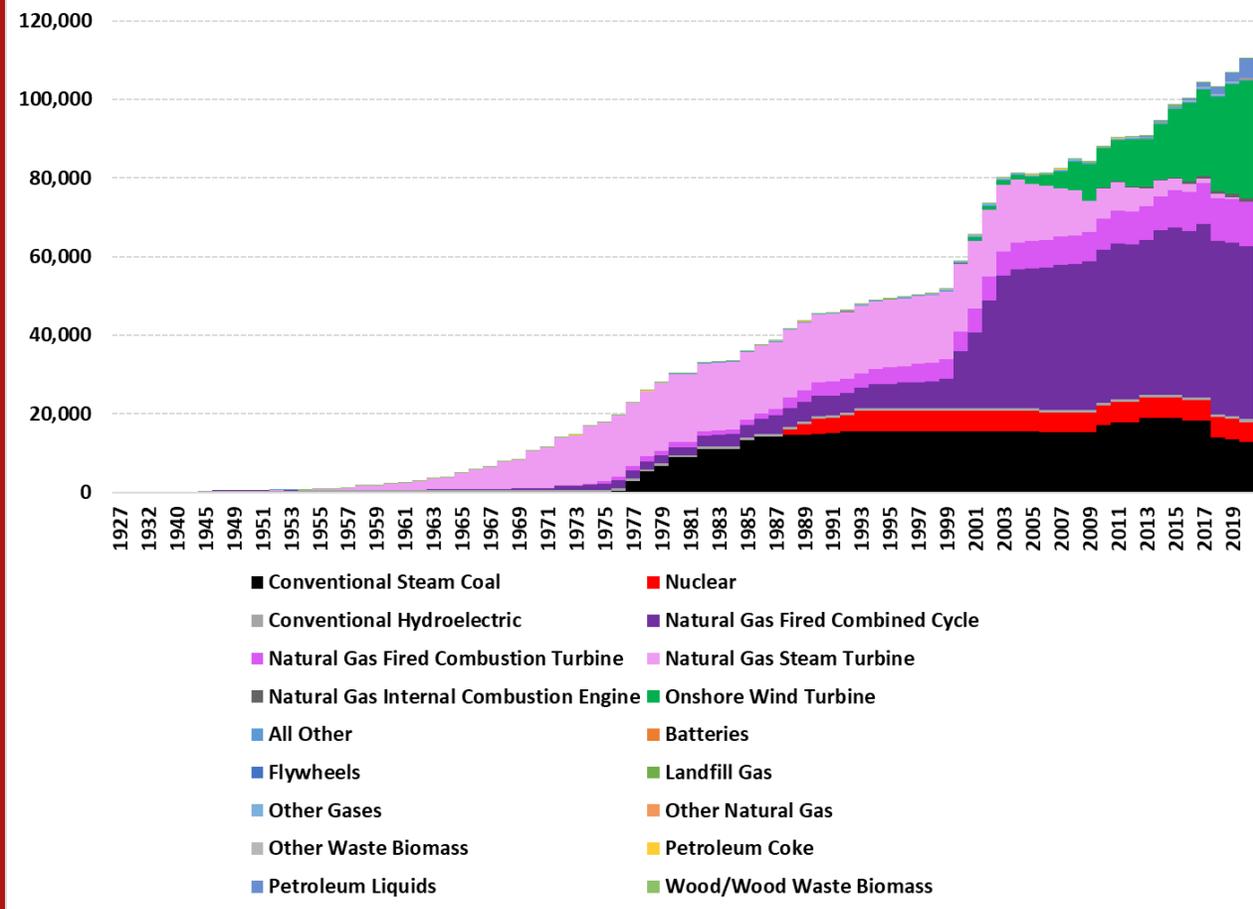
# Major Load Growth Without Commensurate Baseload Gen Expansion

## ERCOT Hourly Load, MW (2002-July 2021)



Source: ERCOT

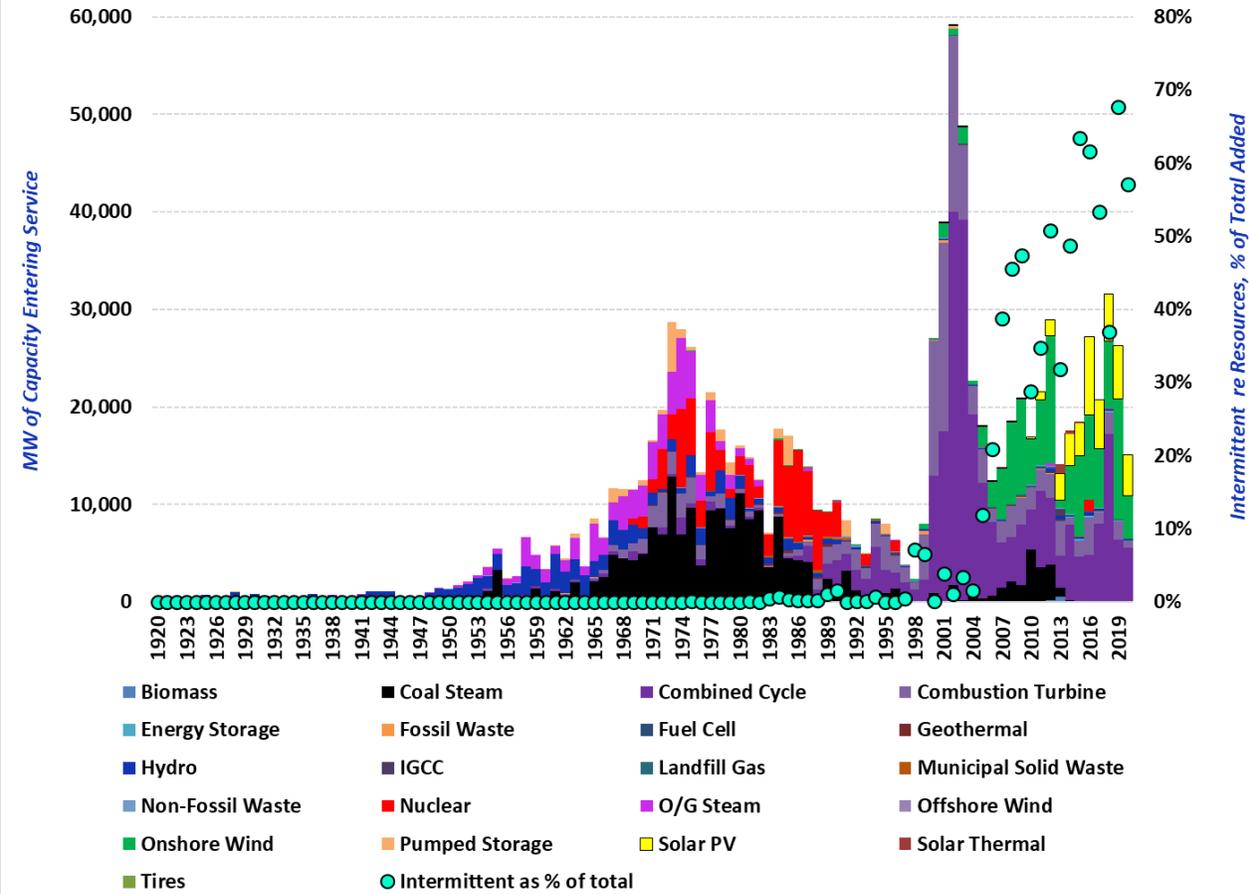
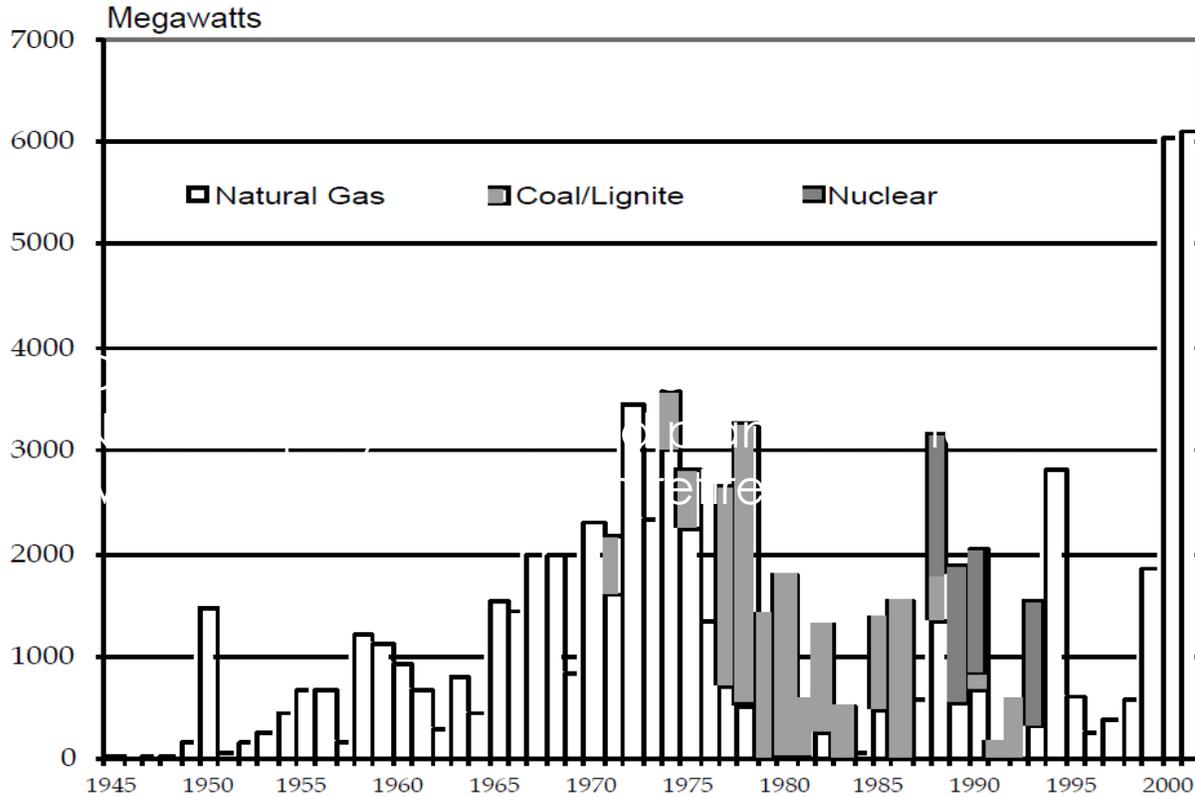
## Texas Generation Capacity, MW (Operating – Retirements)



Source: EPA, Author's Analysis

# TX Power Generation: Massive Scale, Increasingly Intermittent

**Power Plants Opened in Texas  
by Size of Plant, Year Opened and Fuel**



[https://www.beg.utexas.edu/files/cee/legacy/guide\\_electric\\_power\\_texas\\_2003.pdf](https://www.beg.utexas.edu/files/cee/legacy/guide_electric_power_texas_2003.pdf)

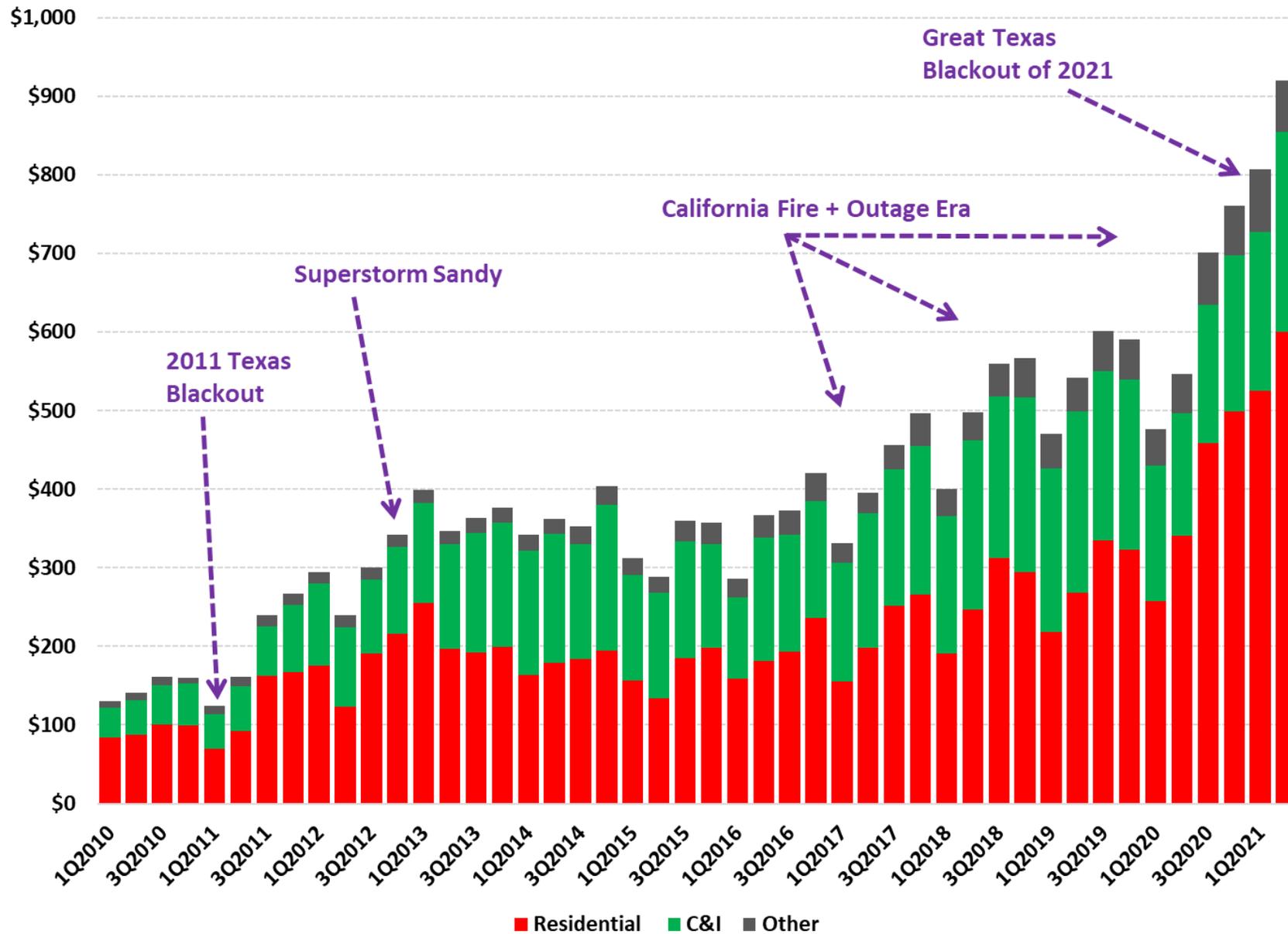
EPA NEEDS Database, August 2021

**How does this change if Texas begins more explicitly pricing in reliability?**

**Texas Gordian Knot of Gas + A  
Couple Ideas to Firm Up  
Power Supplies & Create  
Investment Opportunities**

# Generator Sales Reflect Consumers' Growing Belief In Grid Unreliability

## Generac Quarterly Net Sales by Product Line, Million USD

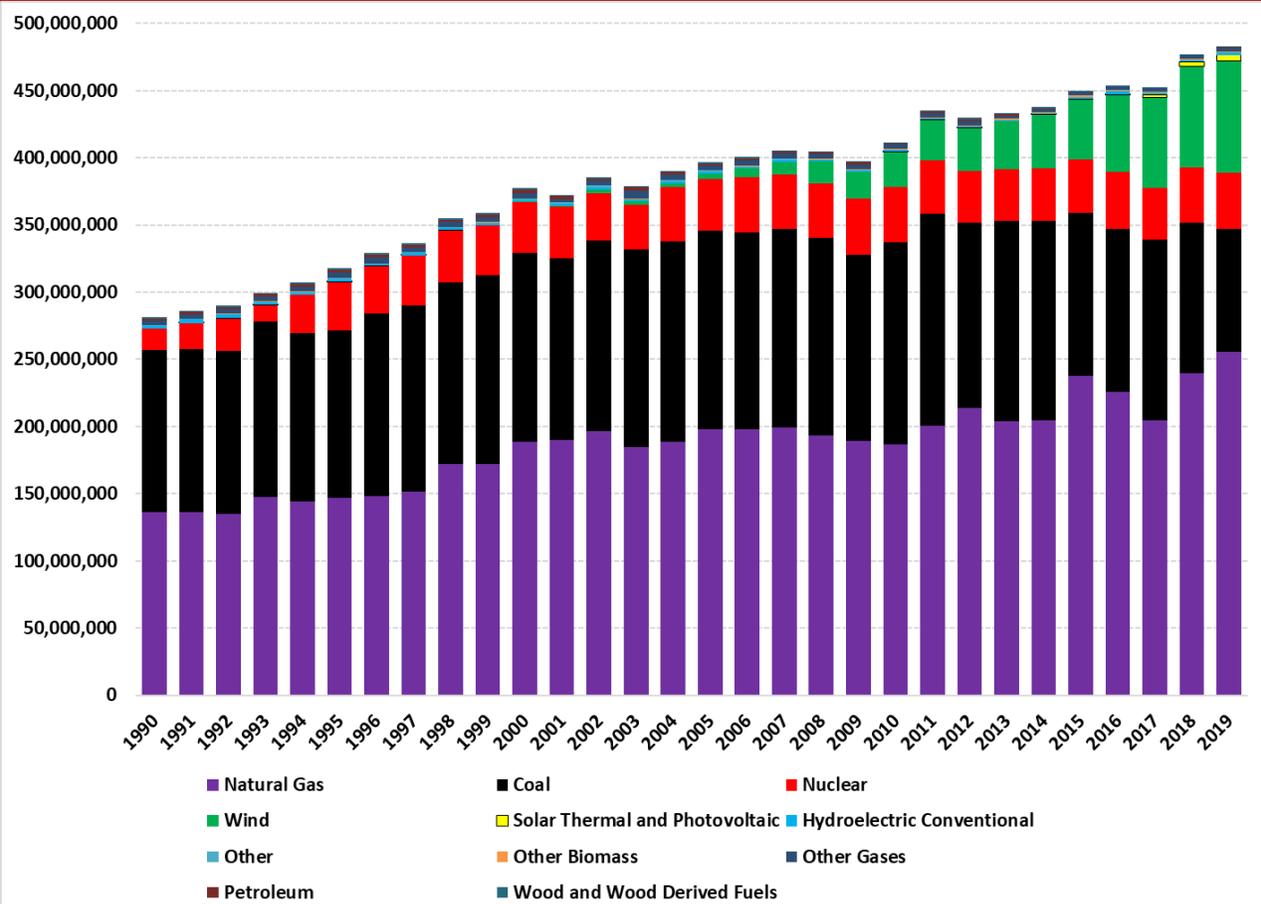


- *“What we're finding is that the person who buys a home standby generator is worried about long duration outages.” —Aaron Jagdfeld, CEO, Generac, 2Q2021 Earnings Call*
- **Generac believes only about 3% of homes in Texas currently have a standby generator, so lots of sales upside.**
- **But what about those who cannot afford \$10,000 or higher outlays for a home standby generator?**

**Inter-Grid Stress Transfer: Self-sourcing driven by power grid unreliability places more pressure on gas grid. 50,000 X 24 kW home standby generators (i.e. 1GW delivered) can use 0.36 BCF/day of gas. A kWh of power from an HSB likely consumes 1.3 to 2 times the gas used by a utility-scale grid-connected plant per kWh.**

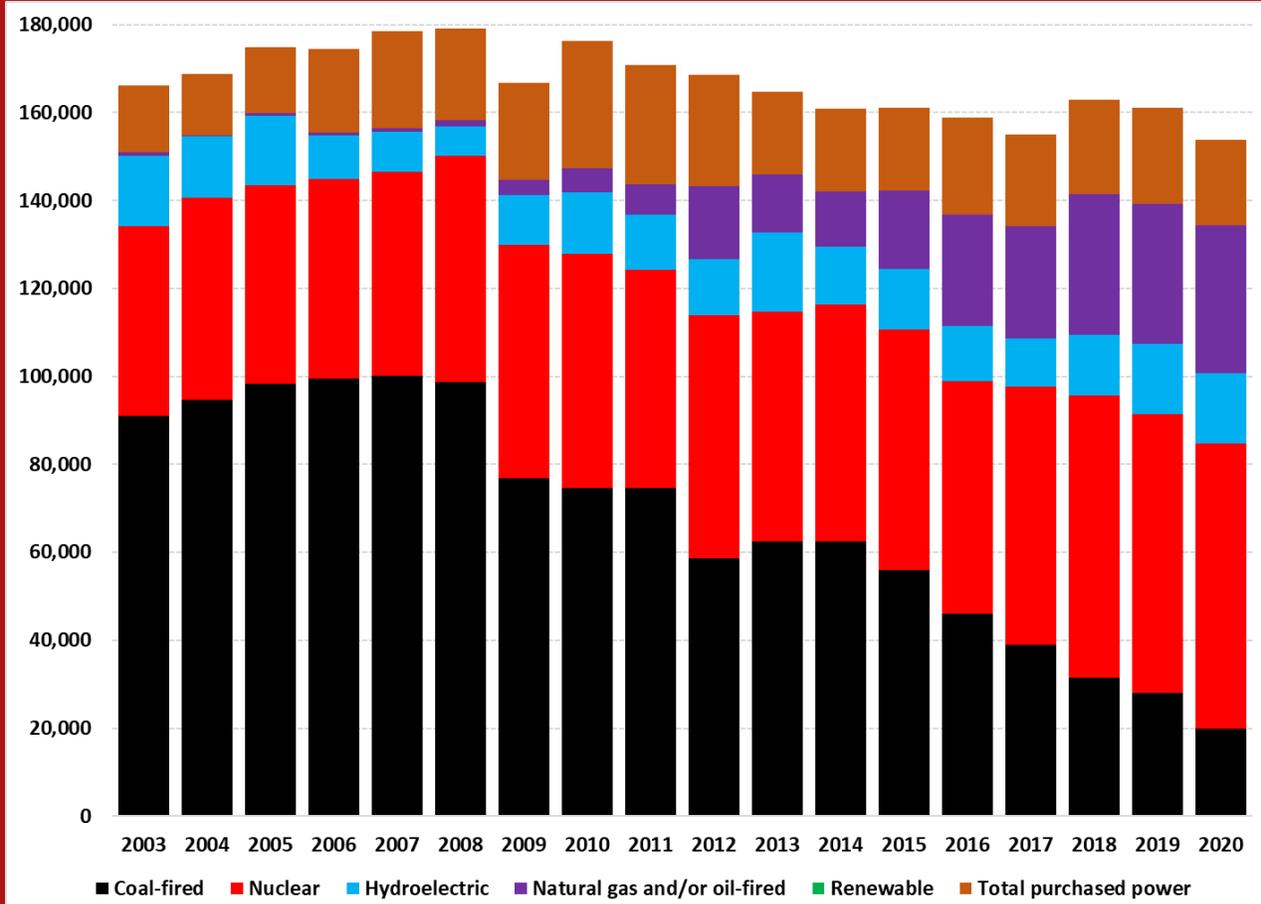
# Texas & TVA: “Crisis/Price-Driven Grid” vs. “Reliability Grid”

Texas Power Generation by Fuel, 1990-2019 (MWh)



Source: EIA

TVA Power Generation by Fuel, 2003-2020 (MWh)

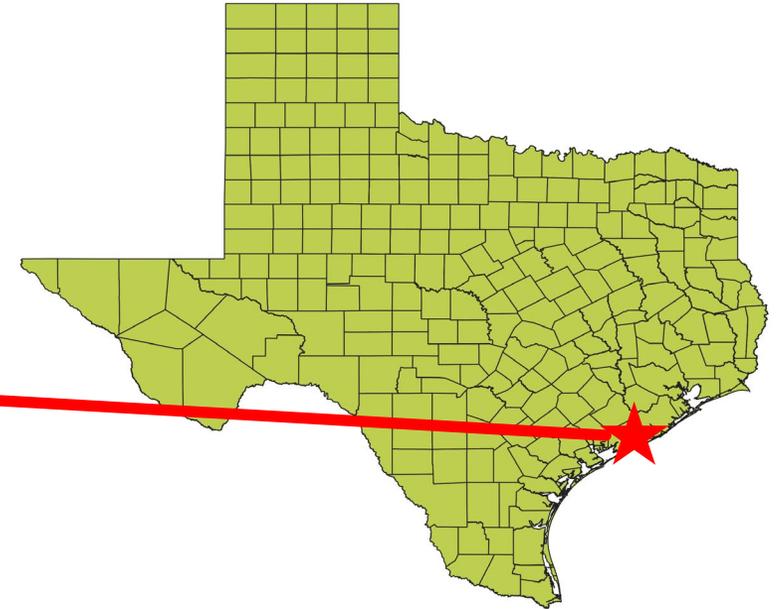
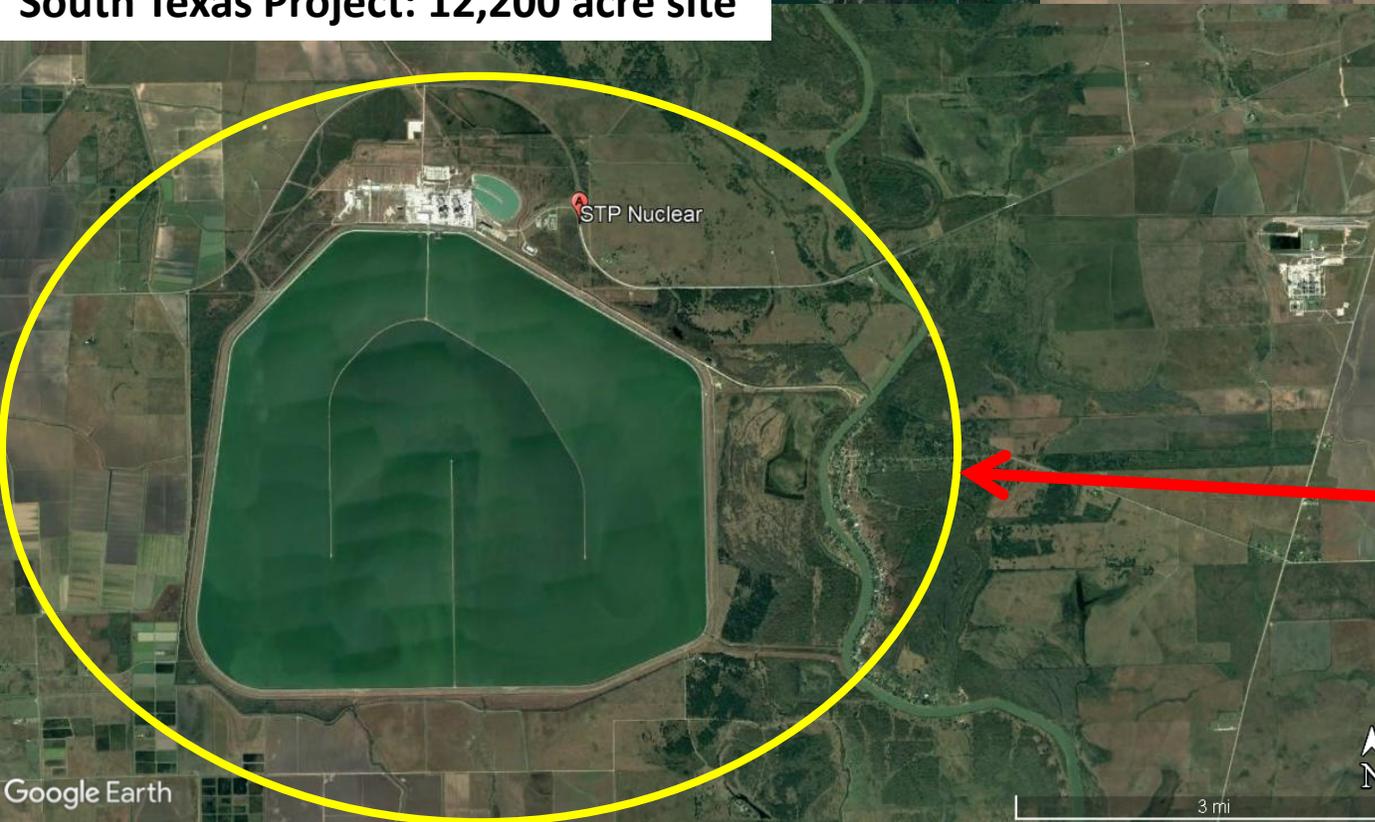


Source: TVA

# Texas Clean and Secure Electricity Supercenters

Could a nuclear renaissance help cut the Gordian knot increasingly tying power and gas security together?

South Texas Project: 12,200 acre site



# Export Opportunities Through More Interconnections?

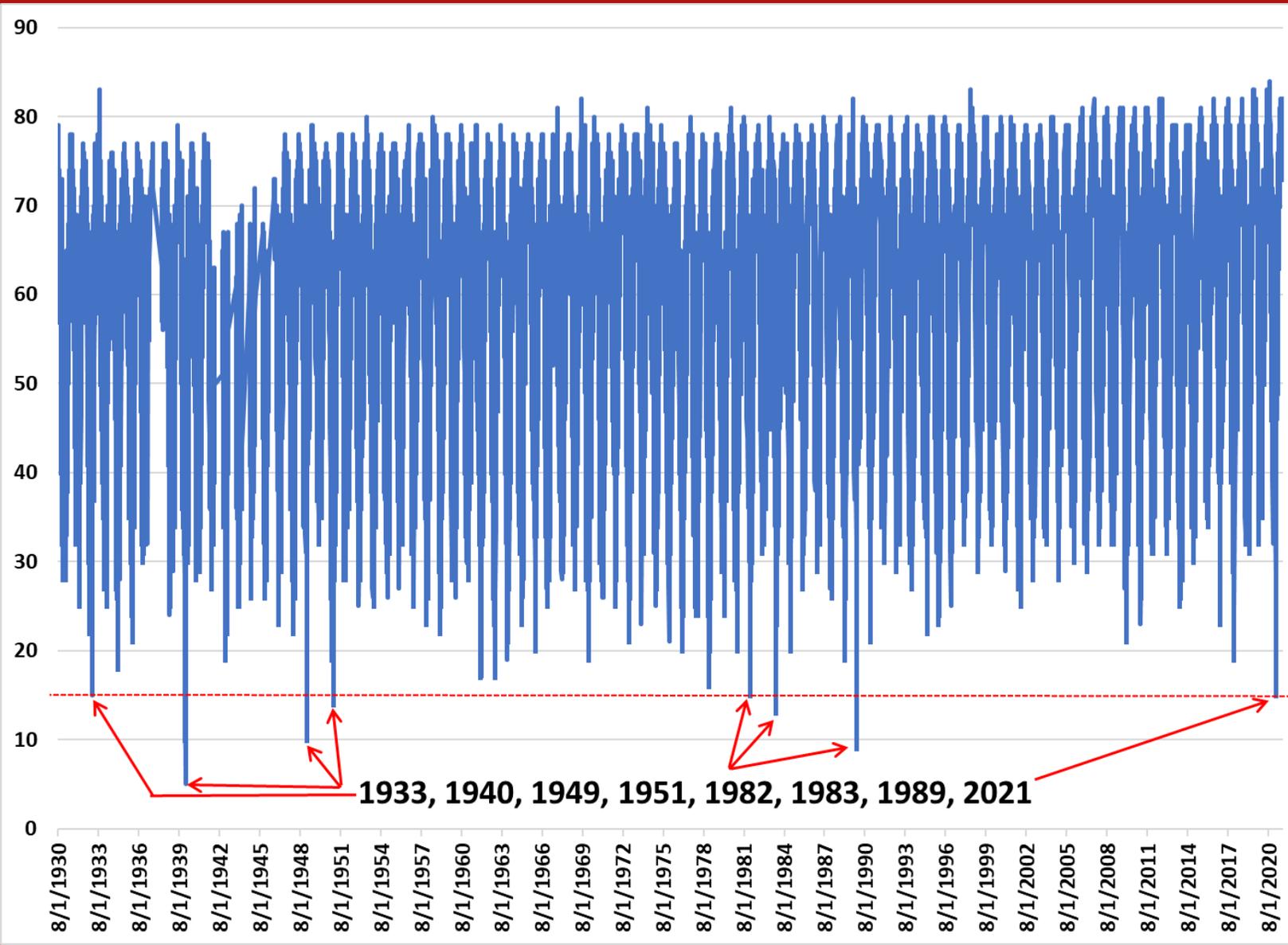
## Blue Bell Creameries

We eat all we can,  
and we sell the rest.

**Mother Nature Will Test the  
TX Grid Many More  
Times...And Potentially in  
Harsher Fashion**

# It Can Get Much Colder Than It Did in Feb. 2021

Houston Hobby Airport Daily Low Temperatures, 1930-2021 (NWS, °F)



The Worst Texas Power Crises Aren't From Hurricanes, But Instead Driven By Extreme Temps

ERCOT has initiated controlled outages four times:

- 22 December 1989 (500 MW)
- 17 April 2006 (1,000 MW)
- 2 February 2011 (4,000 MW), and
- 15-18 February 2021 (20,000 MW). Three of these were extreme temperature events.

# Thank You!

Questions? Drop a line to [gbc3@rice.edu](mailto:gbc3@rice.edu)