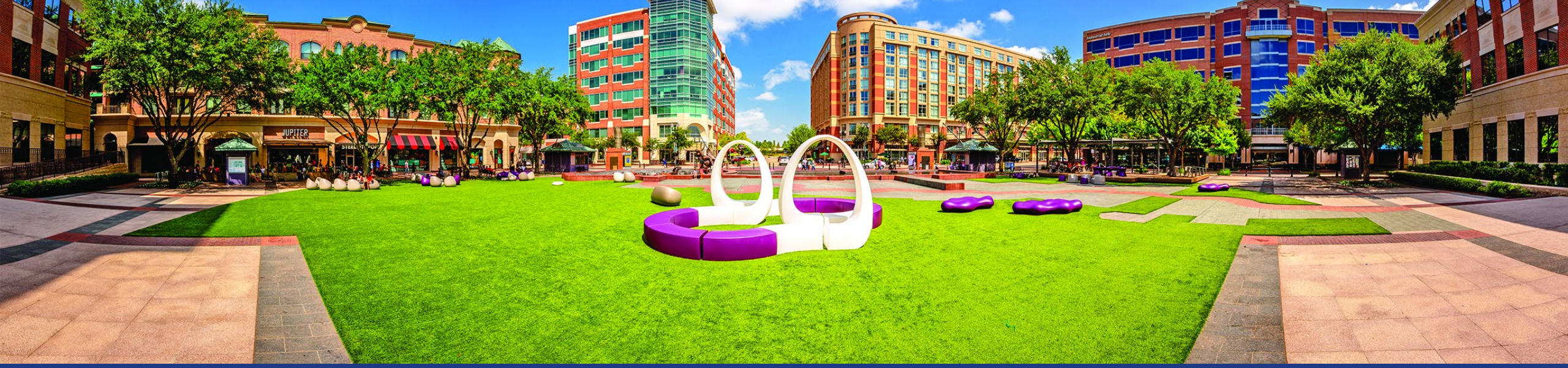


Sugar Land Rapid Start Power Plant

Information Sharing Session

Agenda

01 Introductions

02 Project Overview

03 ERCOT Overview

04 Plant Operation & Safety

05 Environmental

06 Q&A

Introductions

City of Sugar Land

Sugar Land Development Corporation

Imperial Power Plant LLC

Wärtsilä

Why?

PROBLEM

Frequent power interruptions (outages, fluctuations) over the past 5-7 years impacting residents, city operations, and corporate partners.

SOLUTION

Pursue local power generation to enhance sustainability and resilience, especially during extreme events like winter storms or hurricanes, peak energy demand times.

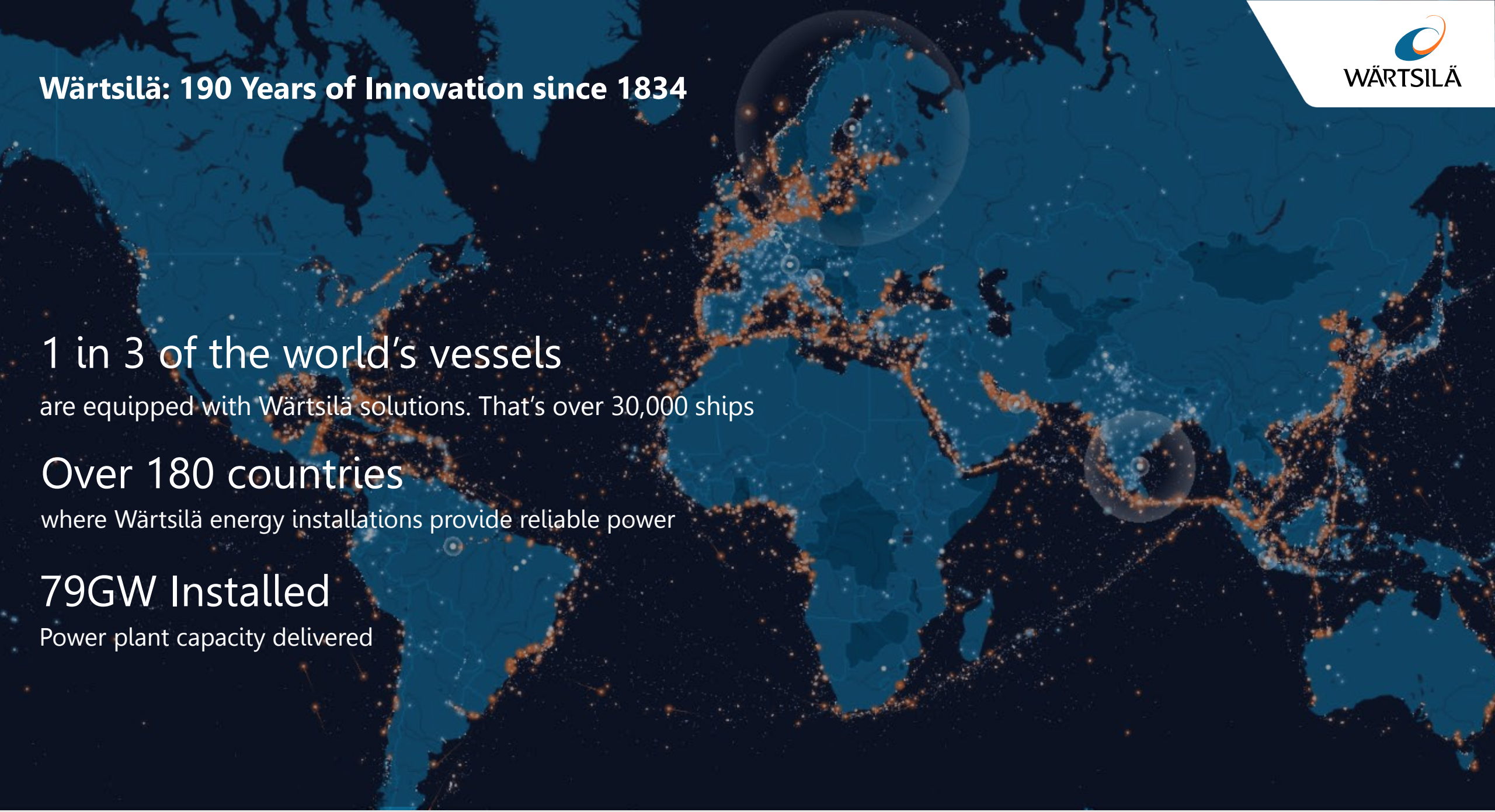
WHY THE CITY'S ROLE

Local generation can reduce outages and stabilize the grid

BUSINESS CONCERNS

Frequent requests from businesses to improve electricity delivery, often directed through the Economic Development Department.

Wärtsilä: 190 Years of Innovation since 1834



1 in 3 of the world's vessels

are equipped with Wärtsilä solutions. That's over 30,000 ships

Over 180 countries

where Wärtsilä energy installations provide reliable power

79GW Installed

Power plant capacity delivered

Wärtsilä Energy in numbers

Globally recognised leader

in engine power plant & energy storage installations

180

Countries delivered to

4 900+

Employees

5GW+

Power plant capacity delivered in the USA

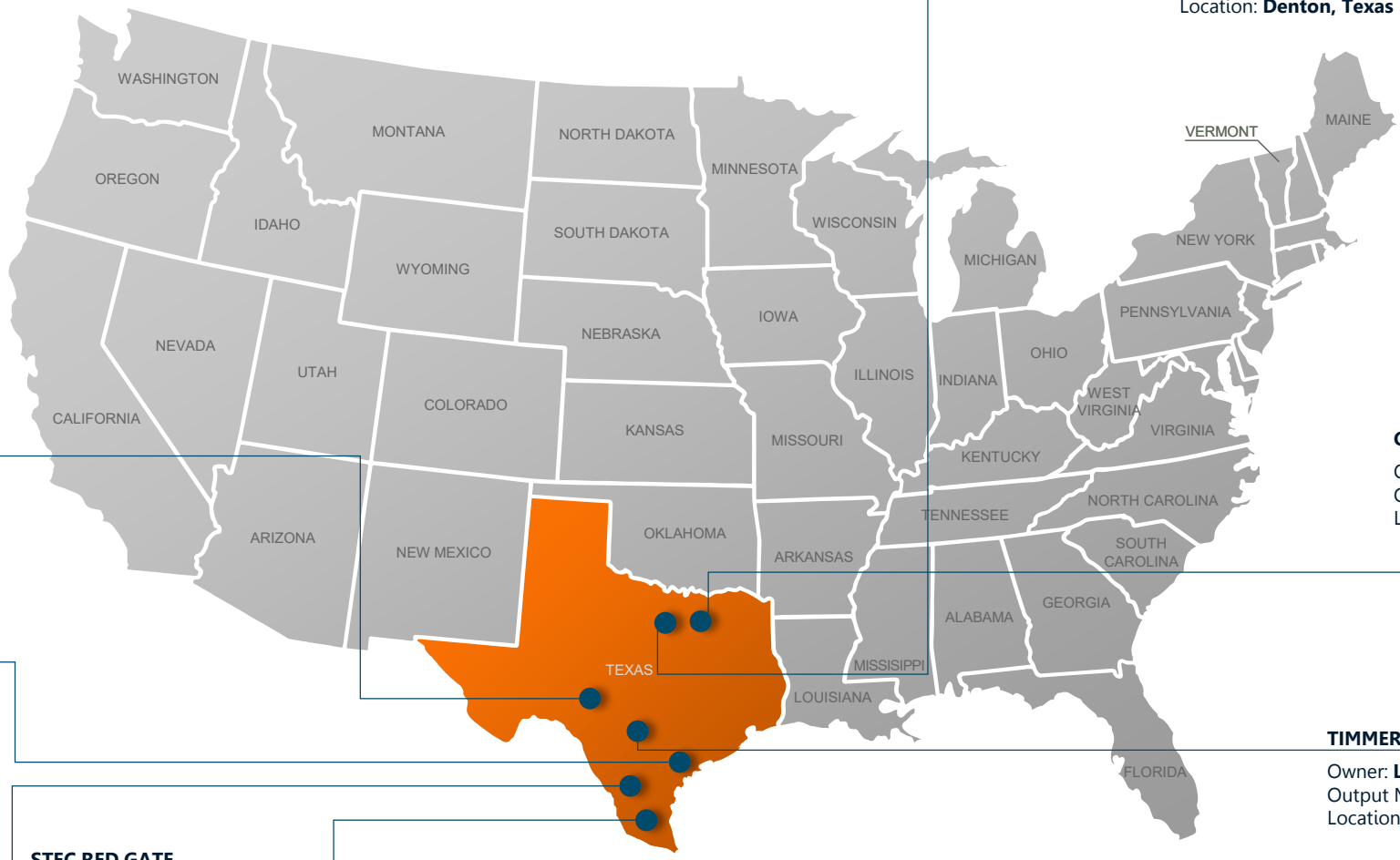
125+

Energy storage installations

18GW

Installations under service agreements

Engine (RICE) Power Plants in Texas



DENTON ENERGY CENTER
Owner: **City of Denton**
Output MW: **231.1**
Location: **Denton, Texas**

ANTELOPE STATION
Owner: **Golden Spread Electric Cooperative**
Output MW: **172.8**
Location: **Abernathy, Texas**

GEUS POWER PLANT
Owner: **Geus**
Output MW: **26.1**
Location: **Greenville, Texas**

MOSS BLUFF HUB - COMPRESSOR STATION
Owner: **Moss Bluff, LLC**
Output MW: **5.5**
Location: **Moss Bluff, Texas**

TIMMERMAN PLANT (TBD 2025/2026)
Owner: **Lower Colorado River Authority**
Output MW: **380 (190 per facility)**
Location: **Maxwell, Texas**

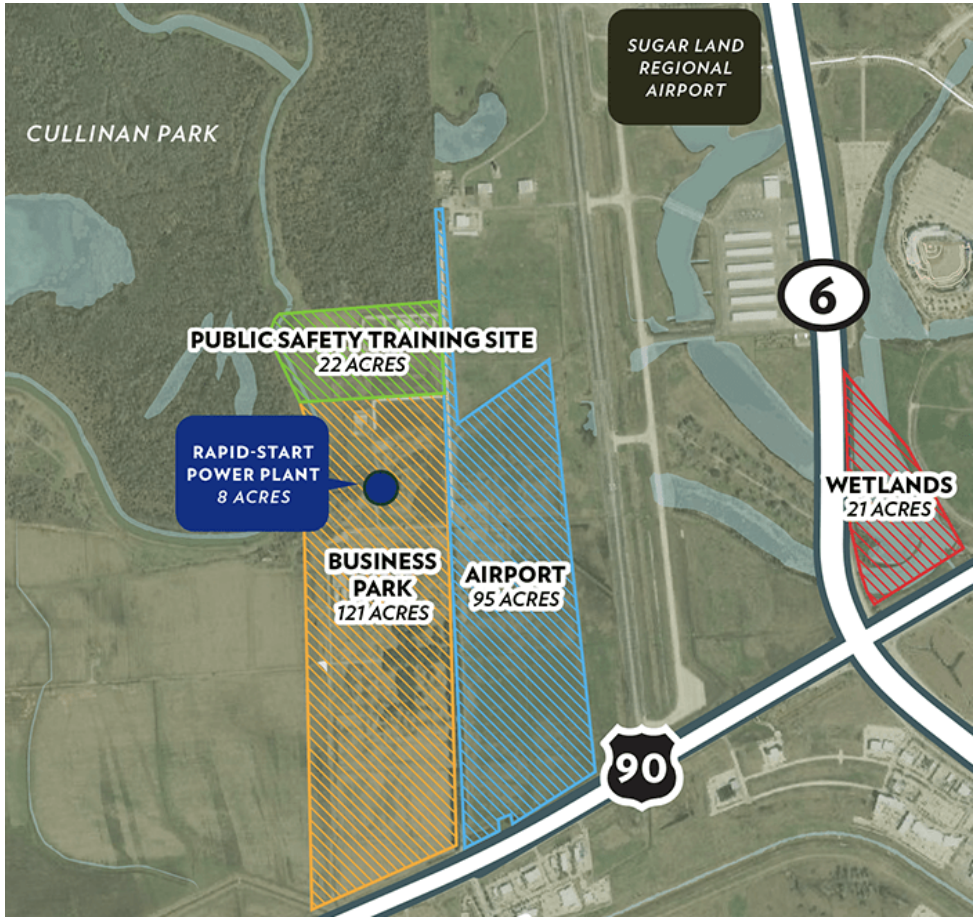
PEARSALL POWER PLANT
Owner: **South Texas Electric Cooperative**
Output MW: **208.8**
Location: **Pearsall, Texas**

STEC RED GATE
Owner: **South Texas Electric Cooperative, Inc.**
Output MW: **231.1**
Location: **Edinburg, Texas**

Americas installed base map

Project Overview

- 148 MW Power Project Utilizing 12 Wärtsilä Reciprocating Engines
- Site Size 8.3 Acres on the North end of the planned business park adjacent to Sugar Land Regional Airport
- Plant will utilize natural gas with the ability to use hydrogen if an economic fuel source becomes available in the Houston Hub



WHAT IS THE TEXAS ENERGY FUND TIMELINE AND WHERE ARE WE IN IT?

** Timeline is subject to change.*

Project Update

Interconnection Studies

- ERCOT interconnection application filed
- Project connecting to 138kv system

Early Development Stage

- Air/Water/Cultural/Geotechnical Studies
- Regulatory Compliance Studies

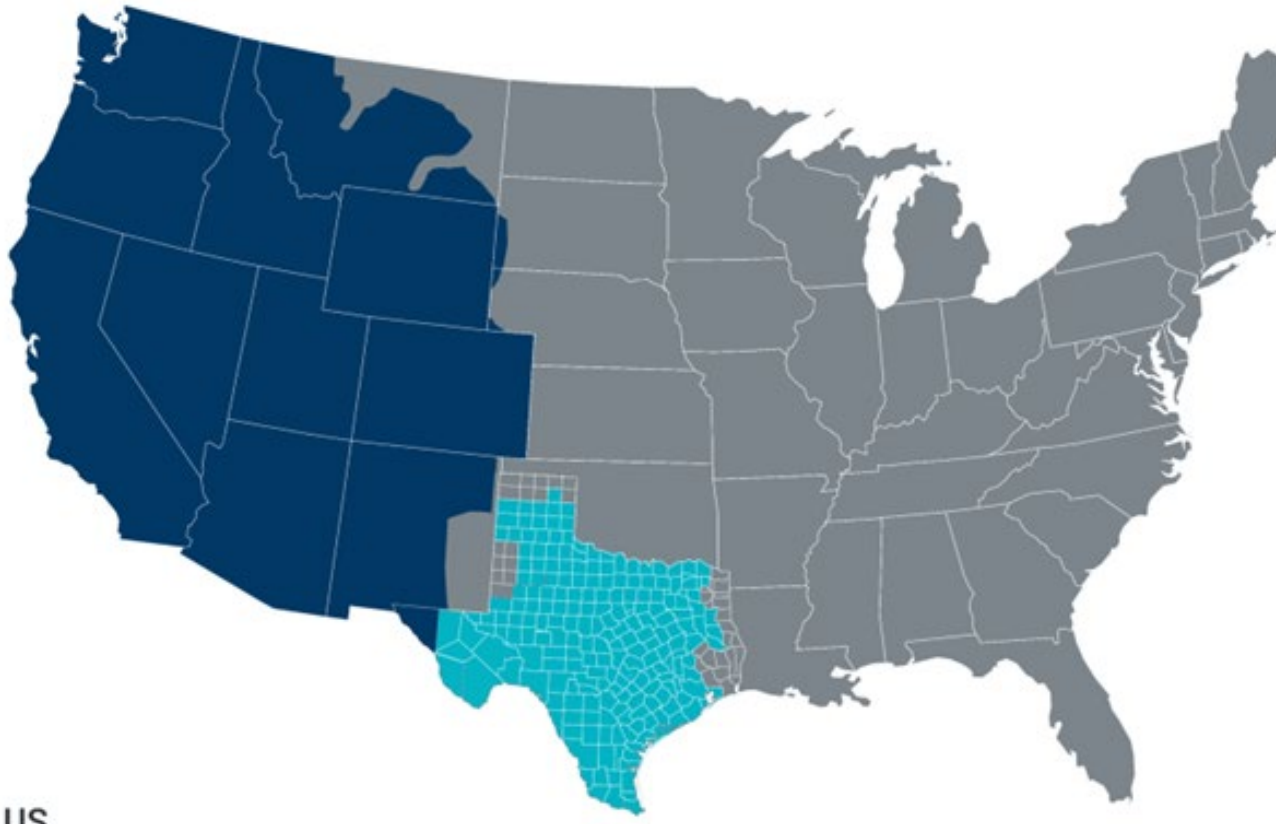
Reciprocating Internal Combustion Engine

- What are they?
- Why use them here?

Texas Energy Fund

- Notice of Intent Filed (Completed)
- Texas Energy Fund Application (Completed)
- Application Review (Ongoing)

Texas Basics: ERCOT



ercot
Your Power. Our Promise.

The Electric Reliability Council of Texas (ERCOT) is a nonprofit organization that ensures reliable electric service for 90 percent of the state of Texas. The grid operator is regulated by the Public Utility Commission of Texas and the Texas Legislature.

90% percent of Texas Load

More than **27 million** customers in the ERCOT region

75% of load is competitive-choice customers — nearly 8 million electric-service IDs (premises)

1 MW of electricity is enough to serve about 250 residential customers during ERCOT peak hours.

85,508 MW
Record peak demand (August 10, 2023)

85,116 MW
Weekend peak demand record (August 20, 2023)

**Unofficial until settlements occur*

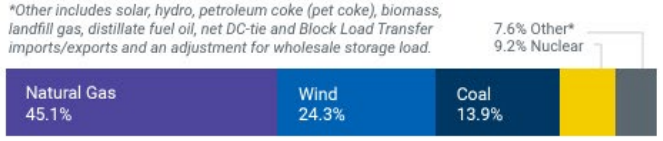
2024 Generating Capacity

Reflects operational installed capacity based on December 2023 CDR report for Summer 2024.

The sum of the percentages may not equal 100% due to rounding.
**Other includes biomass and DC Tie capacity.*

2023 Energy Use

**Other includes solar, hydro, petroleum coke (pet coke), biomass, landfill gas, distillate fuel oil, net DC-tie and Block Load Transfer imports/exports and an adjustment for wholesale storage load.*



Fact Sheet
July 2024

1,873+
active market participants that generate, move, buy, sell or use wholesale electricity

1,250+
generating units, including PUNs

54,100+
miles of high-voltage transmission

103,609+ MW
expected capacity for Summer 2024 peak demand

38,835 MW
of installed wind capacity as of January 2024, the most of any state in the nation

22,258 MW
of utility-scale installed solar capacity as of January 2024

5,242 MW
of installed battery storage as of January 2024

27,881 MW
wind generation record (June 17, 2024)

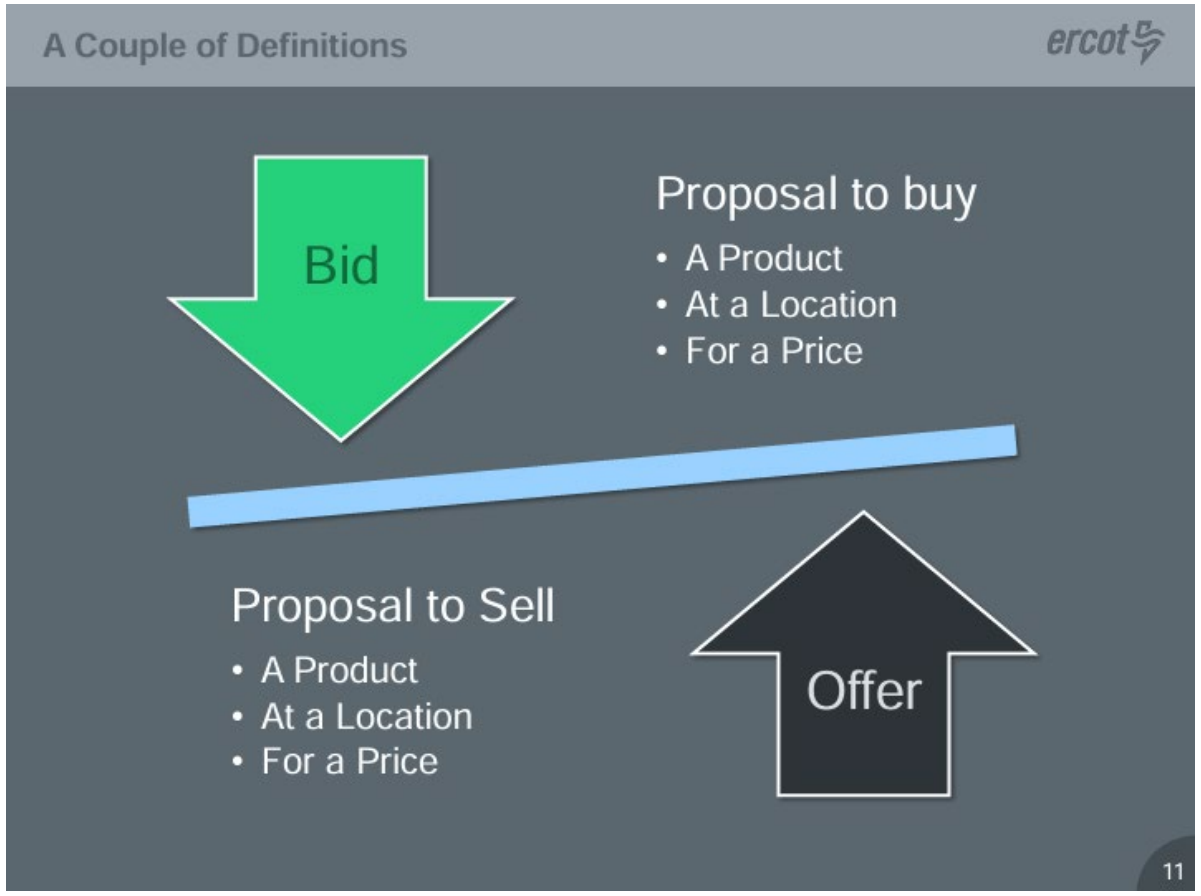
69.15%
wind penetration record (April 10, 2022)

19,489 MW
solar generation record (July 2, 2024)

42.98%
solar penetration record (March 28, 2024)

$3.3 billion
transmission projects endorsed in 2022

ERCOT Market Operations



Fundamental Concept – Generation / Load Balancing

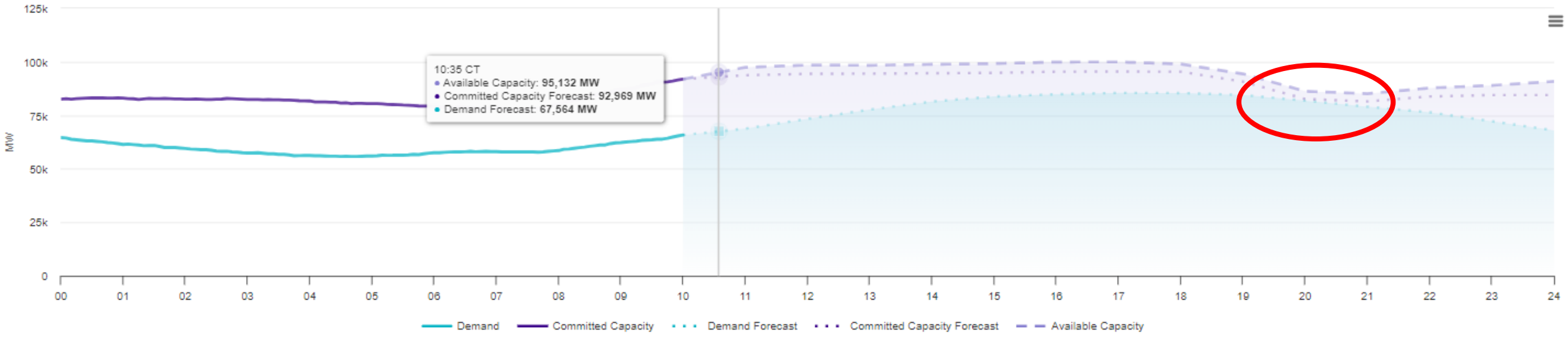
Supply and Demand

Supply and Demand is a graphical representation of the ERCOT system's current power supply (capacity) and demand using Real-Time data, as well as projected power supply (capacity) and demand from hourly forecasts and seasonal forecasts.

**Note: The 6-Day Forecast graph should only be used as a relative indication of future system conditions. Due to uncertainties associated with the longer-term nature of the forecasts used, both the Available Seasonal Capacity and Demand Forecast may adjust significantly as the Operating Day approaches.*

**Note: Capacity available from demand response programs is not reflected in the Current Day and the 6-Day Forecast graphs unless these programs have been deployed.*

Last Updated: Aug 20, 2024 10:00 CT

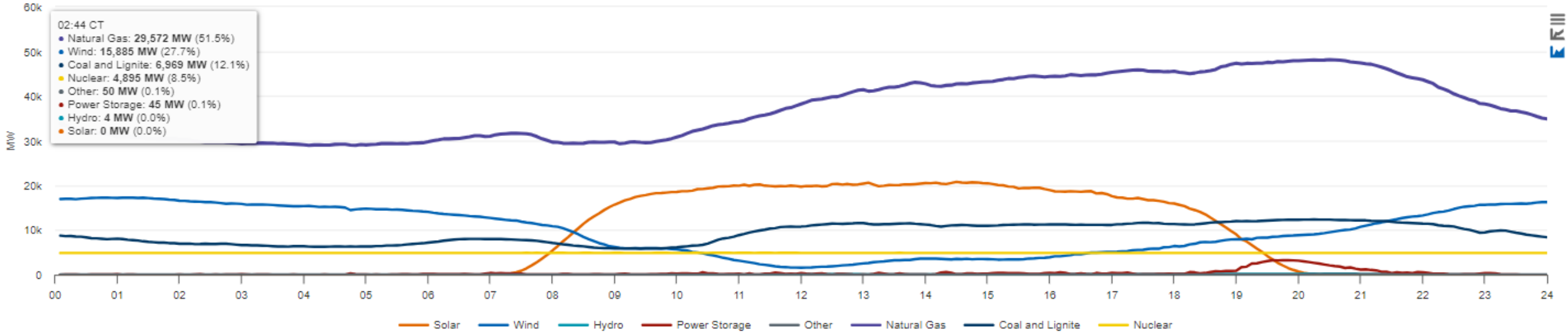


Fundamental Concept – Generation / Load Balancing

Fuel Mix

Fuel Mix is a graphical representation of energy generation broken down by resource type in Real-Time as well as for the Previous Day and Current Day.

Last Updated: Aug 20, 2024 09:59 CT



HOUSTON HUB IMPORTS POWER FROM OUTLYING REGIONS DAILY AND IT SIMPLY BECOMES CONSTRAINED

KUT NEWS RELIABLY AUSTIN

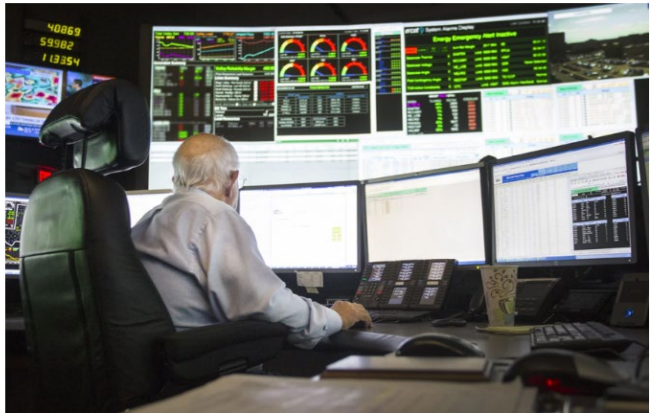
KUT
All Things Considered

Energy & Environment

ERCOT can't move energy where it needs to go, and it's putting the grid at risk

KUT 90.5 | By Mose Buchele
Published September 8, 2023 at 9:14 AM CDT

▶ LISTEN • 3:42



RICE UNIVERSITY'S Baker Institute for Public Policy

Center for Energy Studies | Report

ERCOT and the Future of Electric Reliability in Texas

February 7, 2024 | Peter R. Hartley, Kenneth B. Medlock III, Shih Yu (Elsie) Hung

How ERCOT Can Enhance Reliability

Reliability can be enhanced with proper "insurance," and ERCOT has a portfolio of options available. But policy will ultimately influence which options can be profitably exercised. These include:

- Investment in dispatchable forms of generation that can be called upon when intermittent resources are not available while load is high.
- Investment in storage capacity in utility areas and/or alongside industrial consumers to facilitate a reduction of purchases from the grid during periods of high demand.
- Investment in production area storage capacity alongside wind and solar generation to allow a "smoothing" of sales from intermittent resources and promote a more efficient use of transmission capacity.
- Expansion of transmission capacity to alleviate existing constraints, fully recognizing that the frequency and severity of constraints matter for the economic feasibility of the transmission capacity investment.
- Siting future generation capacity closer to load centers to avoid grid-level bottlenecks.

HOUSTON, TEXAS - JUNE 15: Transmission towers are shown on June 15, 2021 in Houston, Texas. The ... [+] GETTY IMAGES

Two Critical Grid Weak Spots

The failure of the plan – and the need to devise it to begin with – highlights a pair of key weaknesses in the Texas grid as currently constructed:

- The fact that the construction of new thermal generation capacity in high-demand regions like the DFW market has failed to keep pace with demand growth; and
- The heavy reliance on costly transmission lines to move power generated by wind or solar industrial sites hundreds of miles to those demand centers.

Black Start Capability

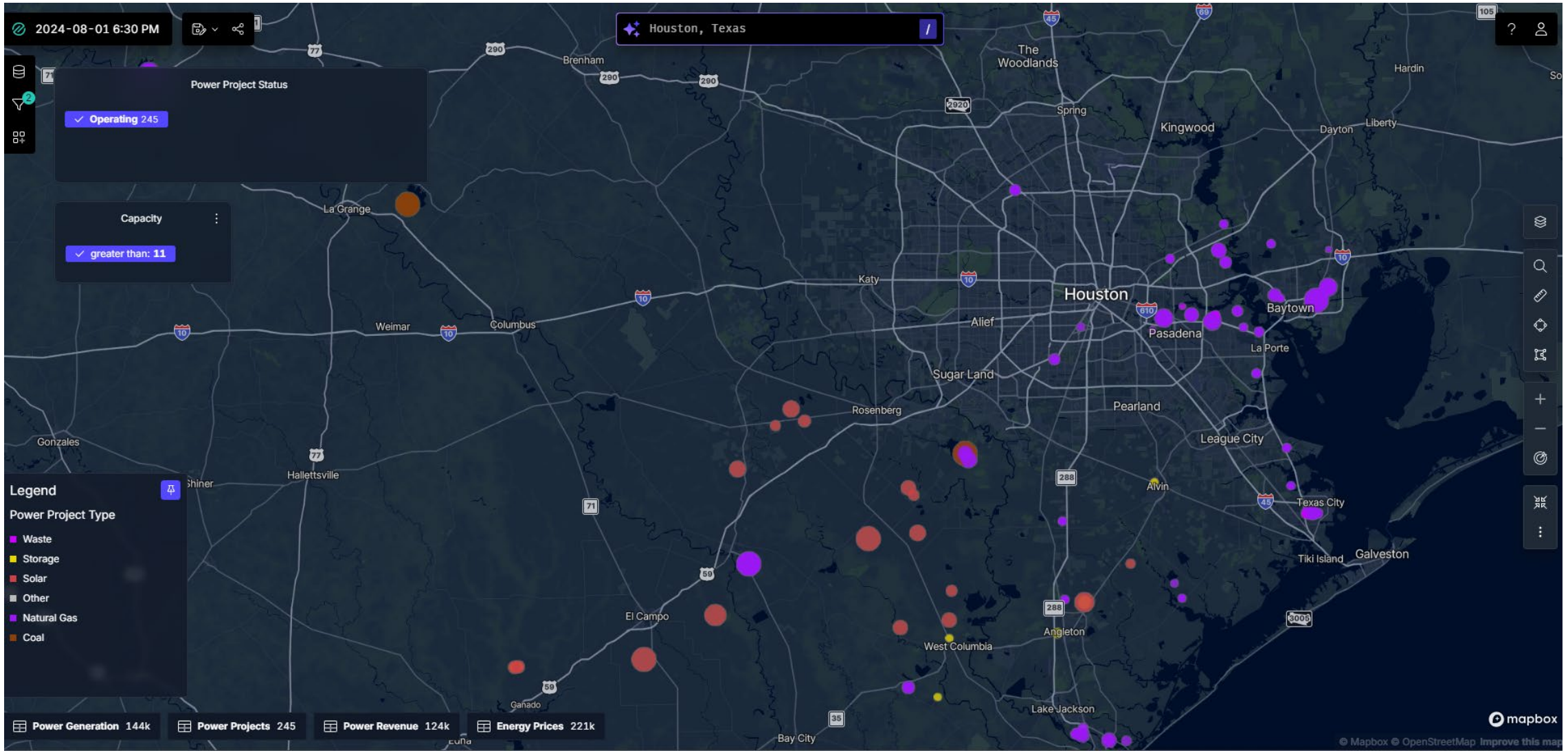
Black start is the ability of generation to restart parts of the power system to recover from a blackout.

This entails isolated power stations being started individually and gradually reconnected to one another to form an interconnected system again.

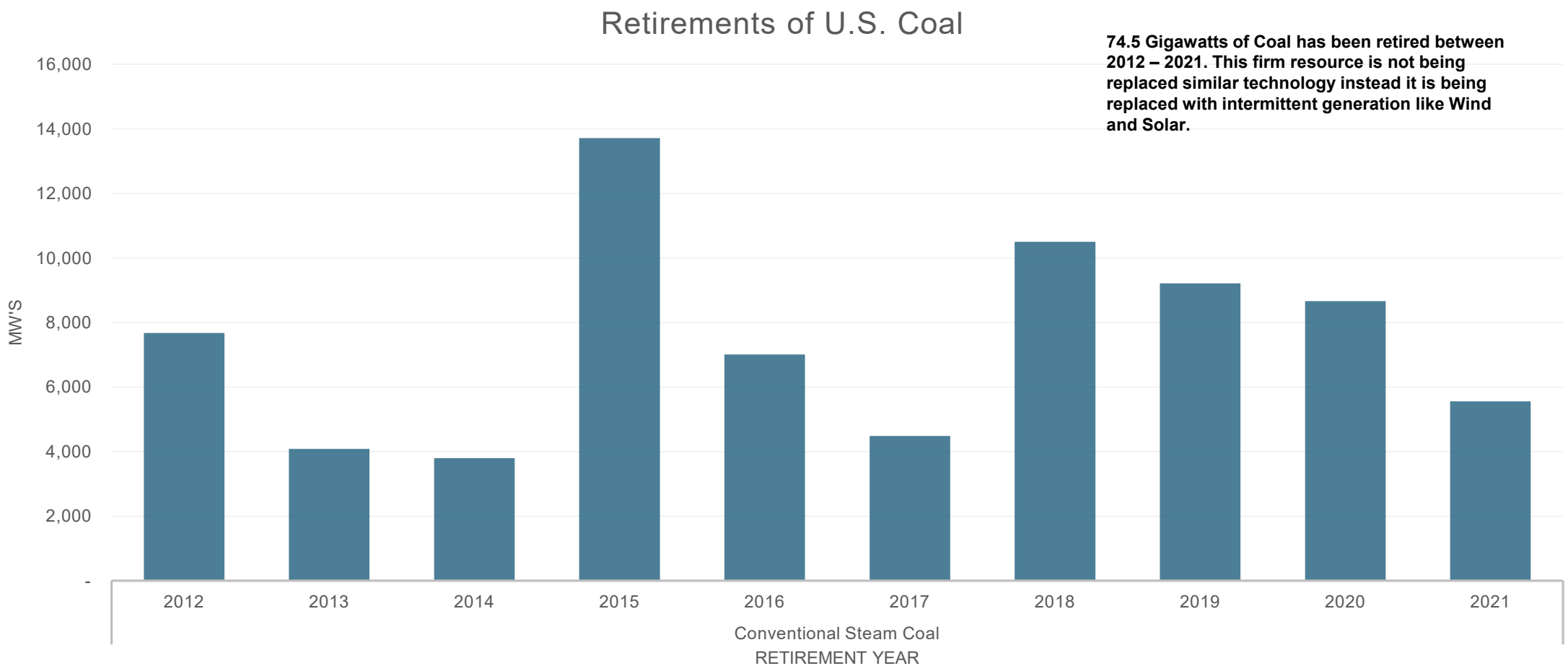
As such, black start is a critical resource for maintaining the reliability and resilience of the electric power system and is central to system restoration and recovery plans for system operators.

Technology Characteristics Matter! – Flexible , Modular, and Dispatchable

Houston Area Power Plants – Balancing Power



U.S. Coal Retirements and Impacts on Firm Deliverable Energy as the Nation Decarbonizes



74.5 Gigawatts of Coal has been retired between 2012 – 2021. This firm resource is not being replaced similar technology instead it is being replaced with intermittent generation like Wind and Solar.

Plant Operation – Balancing Power Plants

- The plant is intended to be used as a “balancing” power plant”.
  - “Peaking” means it will be utilized heavily during heavy load hours, typically during the hottest days of the summer and the coldest days in the winter.
  - “Balancing” means it will be often “quick started” to compensate for the intermittent output of ERCOT’s renewable fleet.
    - Ex. The wind dies off unexpectedly, and the system needs energy quickly.

Learn more about flexibility

Learn more about flexibility

ERCOT Dispatch for the Sugar Land Power Plant

- ERCOT dispatches the power plant based on price signals.
  - The price of power is a function of supply and demand conditions on the system, cleared every five minutes
- ERCOT also utilizes a price adder deployed when the system is short on resources to deploy the Operating Reserve Demand Curve (ORDC). This can spike prices up to $5,000/megawatt-hour.
- How Frequently will this plant run?
  - Currently forecasted models are showing between 30 - 35% capacity factor
  - Unit will only produce power when it is needed

Plant Benefit: Performance

The Sugar Land Plant's innovative engine technology is designed to **respond to grid needs** and **strengthen reliability** in all conditions.

Resilient	Weather-tolerant technology keeps the plant running in extreme cold or heat, from -40°F to 113°F.
Flexible	Fuel flexibility allows the plant to operate when gas supply is limited and supports conversion to future sustainable fuels.
Responsive	Quick-start technology can supply power to the grid in 30 seconds and can start up and turn off in less than a minute.
Efficient	The plant maintains fuel efficiency when the temperature rises and uses just a gallon of water per week to cool the engines.
Available	The plant can self-start without any external power if the grid experiences a blackout.

99%

Availability Potential

The Sugar Land Power Plant will deliver resilient, reliable, and flexible electricity to the grid when it's needed most.

Plant Benefit: Performance and Safety

The technology manufacturer has over **a century of experience** constructing safe engine power plants in **more than 180 countries**.

- Proactive maintenance
- Redundant design
- Fault detection system
- Digital status outputs
- Wärtsilä dedicated staff and systems within the Houston, Area

5,000

Power Plants Worldwide

97% Equivalent Availability Factor (EAF)

Technology with smart systems and protections

Wärtsilä puts safety first fostering a culture where employees make operational decisions with safety in mind.

Non-Attainment Zone – Fort Bend County

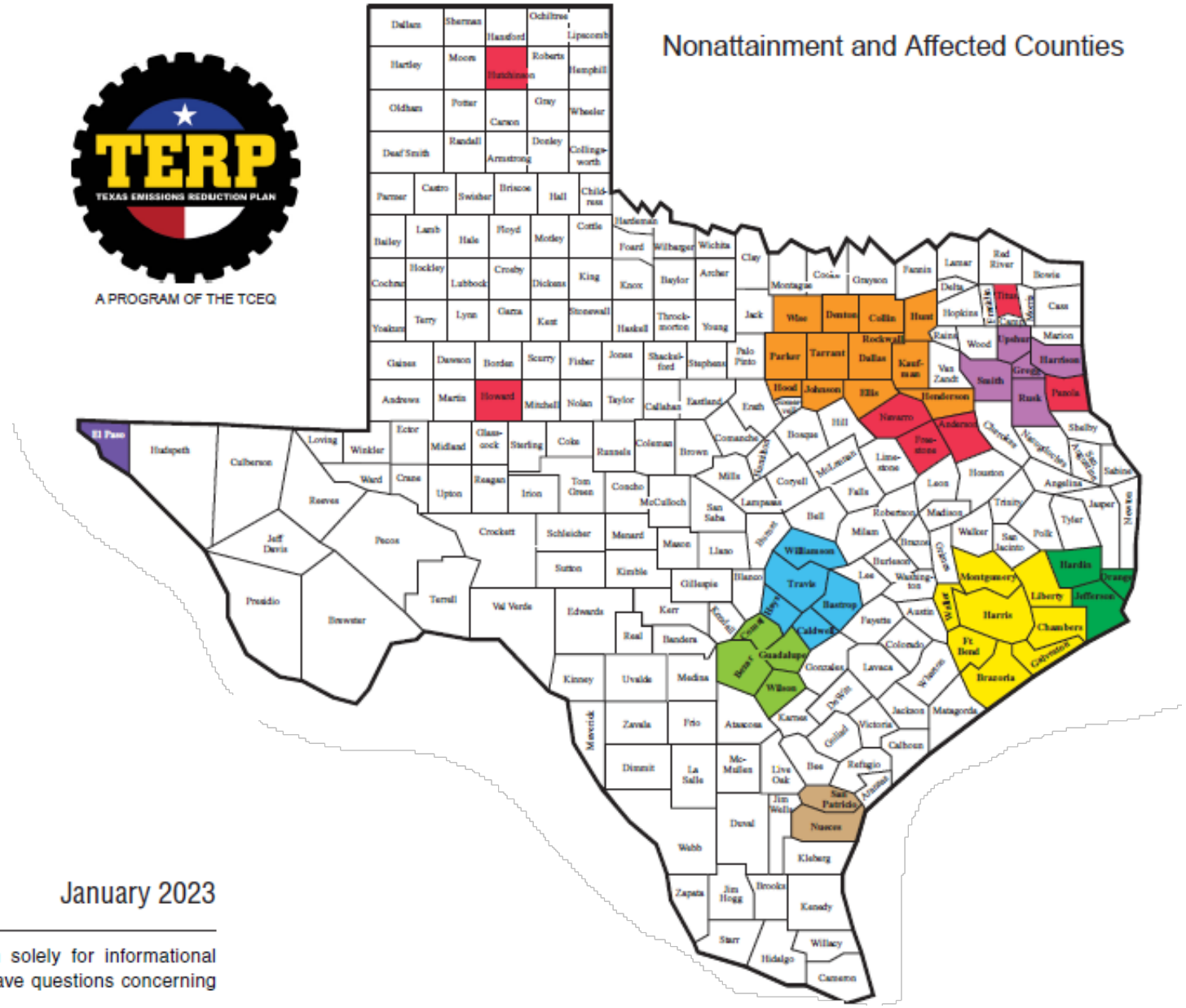
- **Fort Bend County is in a non-attainment zone**
  - In Texas, a "non-attainment zone" refers to areas that do not meet the National Ambient Air Quality Standards (NAAQS) set by the Environmental Protection Agency (EPA) for specific pollutants. These standards are established to protect public health and the environment. Areas that fall short of meeting these standards are designated as "non-attainment" zones.

- **What does that mean for the plant?**
  - This means the requirements to permit the power plant are much more restrictive
  - To meet these stringent requirements the plant has had to be outfitted with large SCR (Selective Catalytic Reduction) units

- **How frequently will this plant run**
  - Currently it is estimated that this plant will run between 30% -35% of the year

TERP
TEXAS EMISSIONS REDUCTION PLAN
A PROGRAM OF THE TCEQ

Nonattainment and Affected Counties



TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

January 2023

This map was generated by the TCEQ's Air Grants Division solely for informational purposes and does not represent property boundaries. If you have questions concerning this map, contact the division at 800-919-TERP.

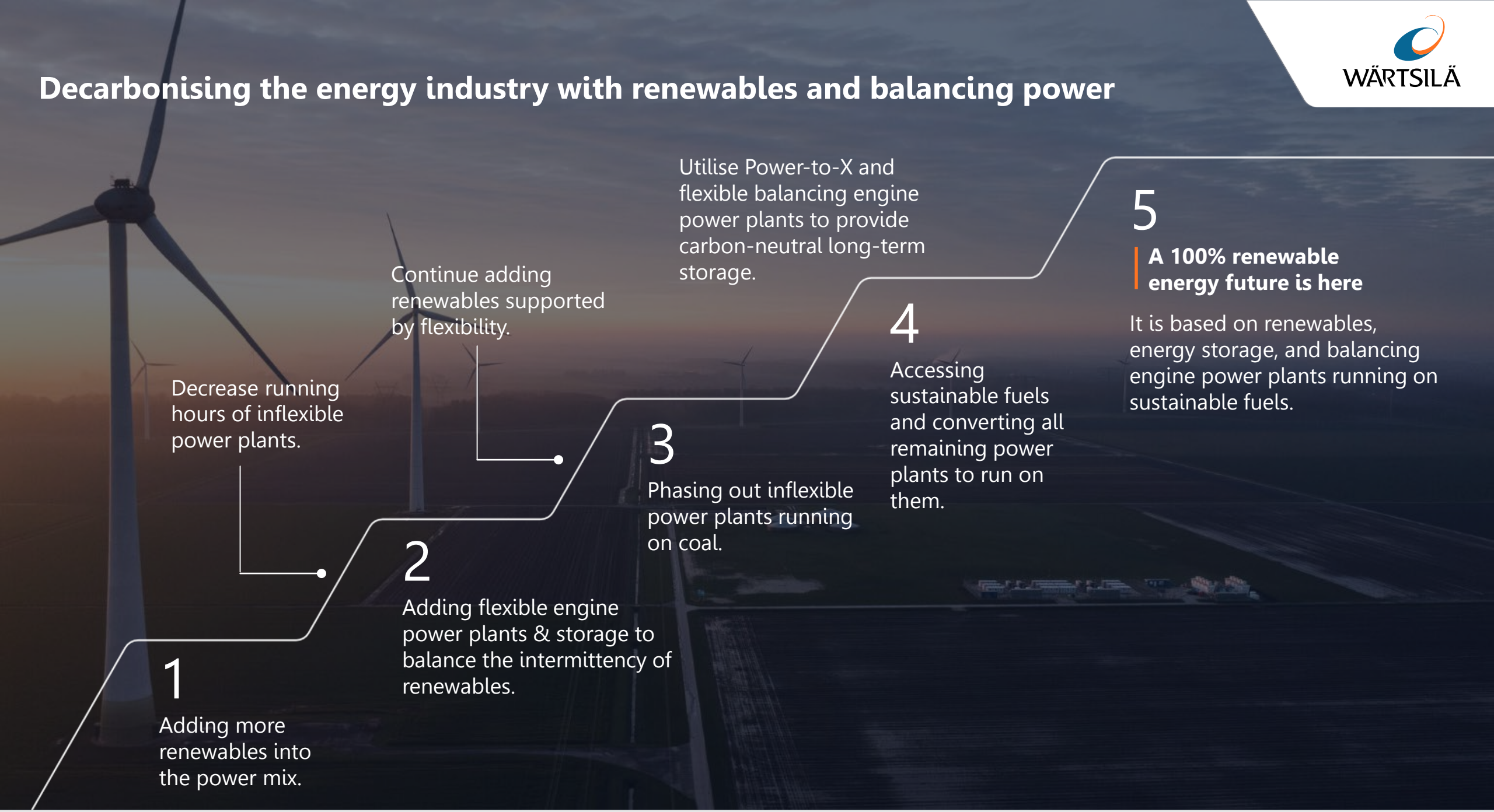
Houston-Galveston-Brazoria Area:

- Brazoria
- Chambers
- Fort Bend
- Galveston
- Harris
- Liberty
- Montgomery
- Waller

Carbon Capture – Sugar Land Power Plant

- **Carbon Capture: how much is this plant projected to capture?**
  - There is no current plan to capture carbon from this facility. Carbon Capture is more suited for continuous duration plants like coal or combined cycle.
  - Reciprocating Engines are best for renewable integration due to its ability to start, stop, and ramp quickly
- **Will the wind take pollution a certain way?**
  - Wind and temperature can affect the dispersion of emissions from the plant. A dispersion model will be produced by our environmental permitting company to analyze the Sugar Land Location.

Decarbonising the energy industry with renewables and balancing power



1

Adding more renewables into the power mix.

Decrease running hours of inflexible power plants.

2

Adding flexible engine power plants & storage to balance the intermittency of renewables.

Continue adding renewables supported by flexibility.

3

Phasing out inflexible power plants running on coal.

Utilise Power-to-X and flexible balancing engine power plants to provide carbon-neutral long-term storage.

4

Accessing sustainable fuels and converting all remaining power plants to run on them.

5

A 100% renewable energy future is here

It is based on renewables, energy storage, and balancing engine power plants running on sustainable fuels.

Plant Benefit: Emissions Reduction

The Sugar Land Plant's ability to stop and start quickly allows the plant to **minimize unnecessary running time** and **mitigate emissions**.

- The quick-start engines can be turned on and off in less than one minute, so the Plant comes on when it's needed and turns off when it's not
- Highly-efficient engine technology minimizes fuel consumption and carbon dioxide emissions
- The Plant's fuel-flexible units can be adapted to operate on a blend of carbon-neutral fuels
- In the future, the Plant's engines can be converted to use 100% carbon-neutral fuels to further support decarbonization
- The engines feature silencing technology to minimize noise emissions

>50%

Electrical Efficiency

The plant will provide flexible power to complement a renewable grid, so the lowest cost and lowest emission energy technology can provide power as often as possible.

WÄRTSILÄ POWER PLANTS UTILIZE A CLOSED LOOP COOLING SYSTEM

12 Engines
~83 Gallons/Day

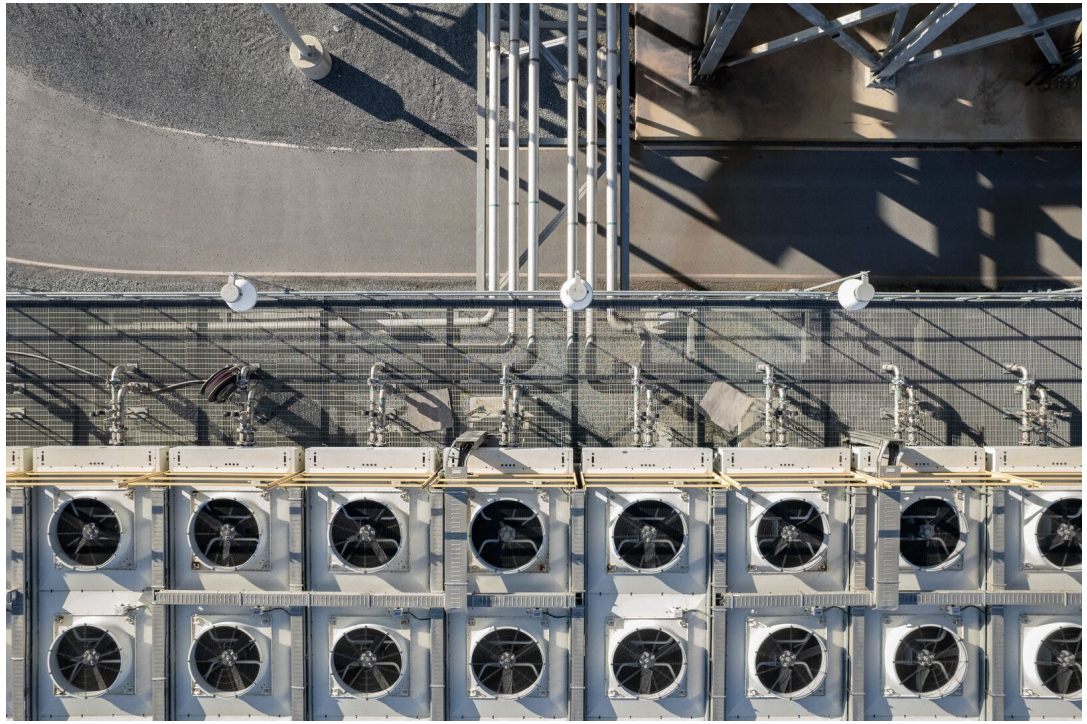
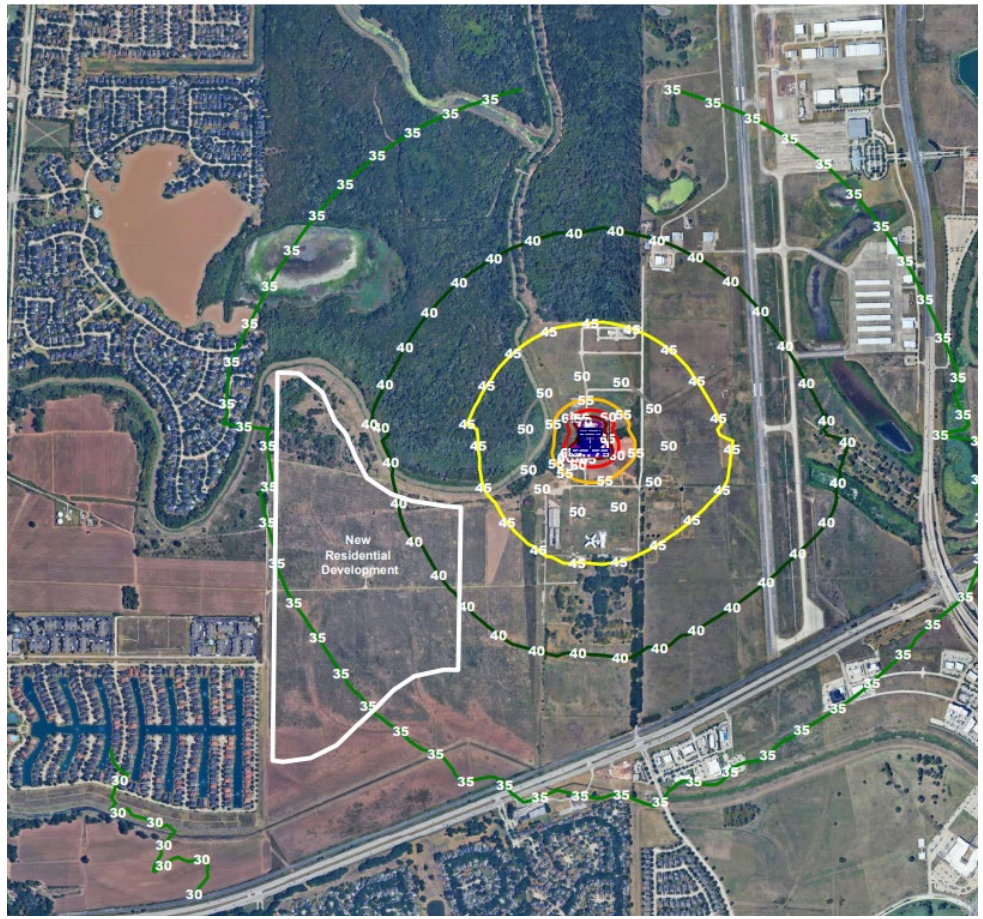


Table 3 – Average per-connection daily water use by sector and utility size, 2019 (gallons)

	Medium	Medium-large	Large	Metropolitan	All analyzed utilities
Single-family residential	228	240	229	198	220
Multifamily residential	229	168	197	554	296
Commercial	744	946	1,355	1,636	1,259
Industrial	10,294	28,640	32,729	180,925[5]	41,996
Institutional	1,647	1,811	2,242	1,457	1,770
Agricultural	936	698	585	0	724
Total water use	296	331	342	457	364

Texas Water Development Board. (2021). Table 3 – Average per-connection daily water use by sector and utility size, 2019 (gallons) In *Water Use of Texas Water Utilities, January 1, 2021* (p. 10)

NOISE STUDY – PERFORMED BY ENERGY LINK SHOWING THE EQUIPMENT AND CONSTRUCTION NECESSARY TO ABATE SOUND FROM THE FACILITY

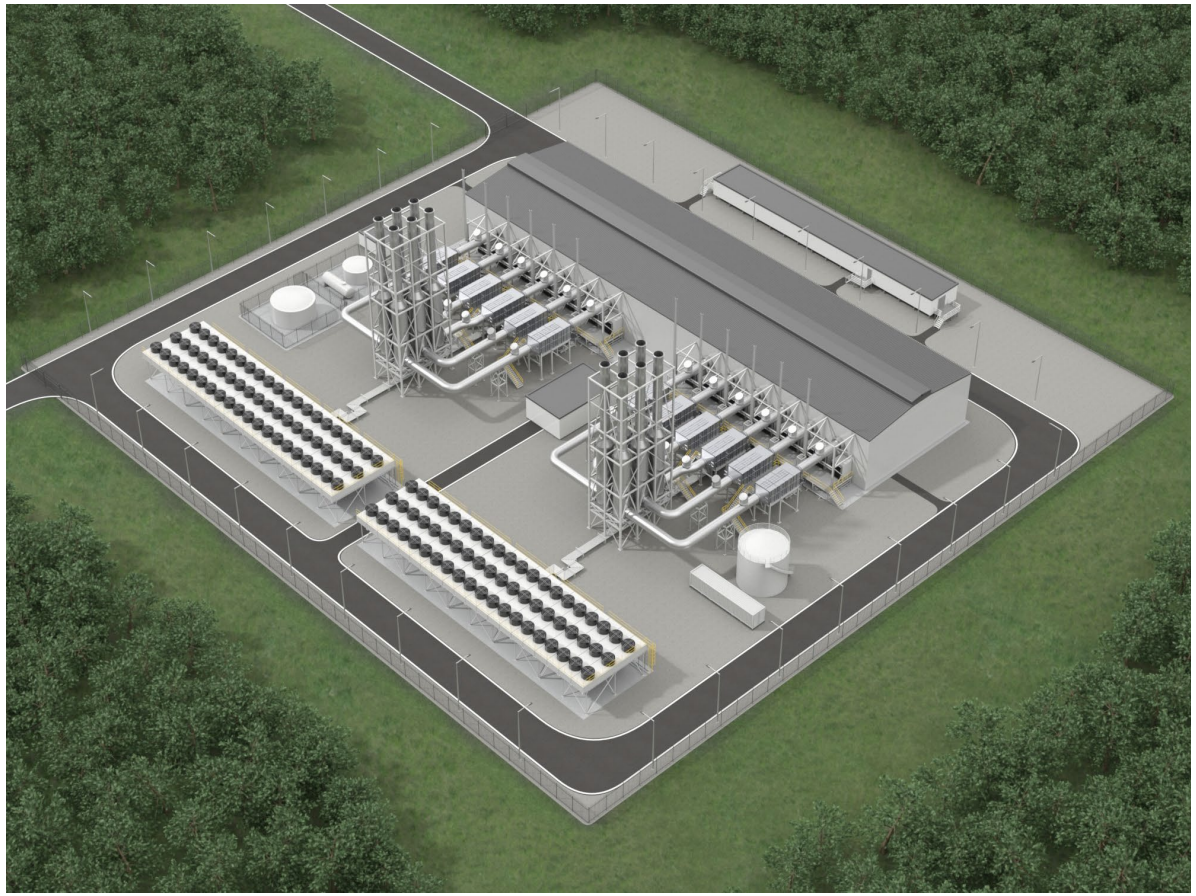


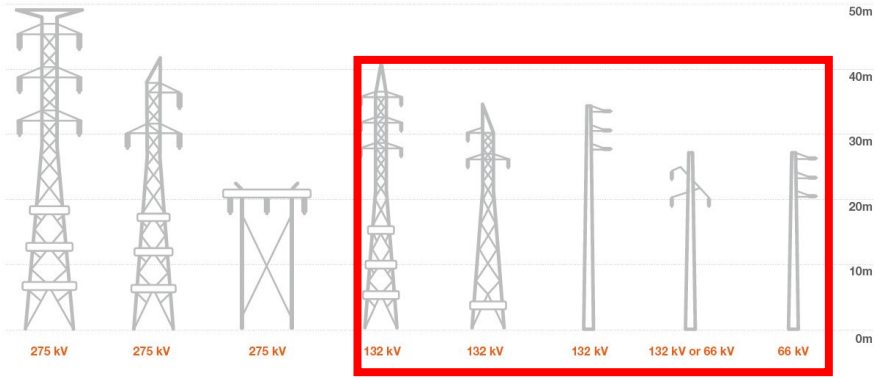
Safe and Unsafe Decibel Levels

nco | Adviser

Decibel (dB SPL)	Sound
140 dB	Aircraft carrier deck, fireworks, custom car stereo system, gunshot / shotgun
130 dB	Jet taking off, jackhammer, loudest music / sporting events ever recorded
120 dB	Steel mill, car horn, emergency vehicle siren
110 dB	Concert, sporting events, maximum output of Apple Airpods
100 dB	Dog's bark, snowmobile, hand dryer
90 dB	Motorcycle at 25 feet, power tools, lawn mower, hair dryer
80 dB	Garbage disposal, food blender, alarm clock
[sound below this line is considered safe; sound above this line is considered harmful]	
70 dB	Vacuum cleaner, washing machine, average "non-quiet" dishwasher, average maximum television
60 dB	Normal conversation, air conditioning unit, background music
50 dB	Certified "quiet" dishwasher, moderate rainfall, refrigerator
40 dB	Quiet library, average room noise
30 dB	Whisper from nearby (more than 5 feet away)
20 dB	Rustling leaves, ticking watch, whispering from 5 feet away
10 dB	Breathing
0 dB	Threshold of human hearing

Plant Renderings – Mono Poles

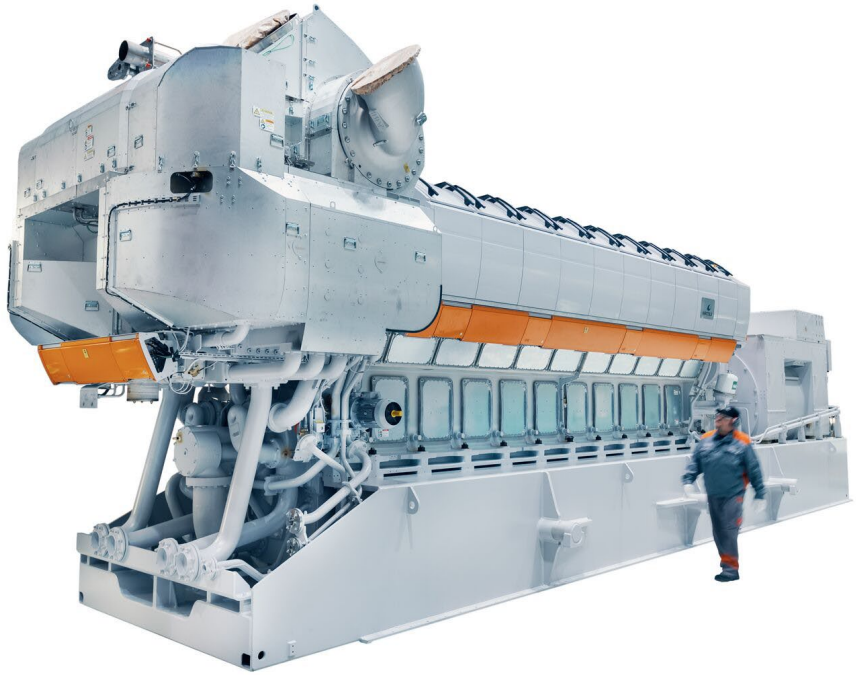




Example of Monopole lines installed in Hutchinson, Kansas 83’ Height AGL Barker Inlet Facility in Australia.
CenterPoint has not selected a power tower design at this time.

Wärtsilä 20V31SG – Balancer Platform

Engine hall at Lea County Electric Cooperative, Inc. (LCEC) Generation Plant, New Mexico, USA



20 Valve in V formation 31 Centimeter Bore Spark Gas Engine – Vasa, Finland

Q&A

Q&A

THANK YOU!

SugarLandtx.gov/RapidStartPower

Questions about the Sugar Land Power Plant

Why is the plant necessary?

Texas is growing. The Electric Reliability Council of Texas (ERCOT) recently projected that by 2030, system wide demand could reach 152 gigawatts – an increase of over 50%.

Why is the plant being built in Sugar Land?

High demand in Houston area, access to infrastructure to deliver power

Who is financing the project?

This is a public-private partnership project, and project financing is still being negotiated at this time.

Will the plant be loud or disruptive?

No, state-of-the-art technology features charge air silencers to reduce the noise from the engine and turbochargers.

Will the plant bring new jobs to Sugar Land?

Yes