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2024 ERCOT ELECTRICITY MARKET OUTLOOK



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About this study

As part of an ongoing series, LCG Consulting has produced this study outlining our findings when we model 2024 in ERCOT based on the most likely weather, market, transmission, and generator conditions. The nodal market simulations for this study were performed with LCG's [UPLAN Network Power Model \(NPM\)](#)[™] and [PLATO-ERCOT](#)[™] Data Model using hourly dispatch. UPLAN-NPM is a full network model designed for electricity market simulation. It replicates the engineering protocols and market procedures of any system operator. It also captures commercial activities like bidding, trading, hedging, and contracting. The model performs coordinated marginal (opportunity) cost-based energy and ancillary service procurement, congestion management, and contingency analysis with Security Constrained Unit Commitment (SCUC) and Security Constrained Economic Dispatch (SCED), replicating those used by the ERCOT ISO.

LCG Consulting, based in Los Altos, California, is a widely recognized leader in the electricity industry and a pioneer in modeling energy markets. Since its founding in 1978, LCG has played a leadership role in providing the utility industry with specialized software and consulting services in electric and gas deregulation. Our clients include many public and private electric utilities, independent system operators, electricity traders, power marketers, federal and state agencies, and several energy research institutes across the United States and abroad. LCG has a long history in modeling Texas and serves many regional clients, including ERCOT.

ERCOT Outlook 2024

This outlook for 2024 is based on data available as of June 2023.

Texas has incorporated dramatic fuel mix and transmission changes over recent years. As of 2023 Q1 data, ERCOT's total renewable output sees an increase of 26% from the previous year, averaging 406.046 GWh/day. The growth rate far surpasses other regions, as the second place goes to CAISO with a 7% percent increase to 266.841 GWh/d. Texas leads in the added total capacity of renewable generation.

Market players have been actively navigating the balance between incoming renewables, storage transmission changes, cryptocurrency, and rapid population growth. The 2021 Winter Storm Uri thrust Texas reliability into the national spotlight. The storm precipitated the widespread electricity failure of critical natural gas infrastructure - that should have been exempt from blackouts - and lost power, further exacerbating the crisis and thrusting Texas demand-supply management into the public eye and subsequently in front of the legislature. A [300-page federal report](#) was released in November 2021, outlining the events and remedies.

On June 12, 2023, ERCOT launched the ERCOT Contingency Reserve Service (ECRS), the first new daily-procured ancillary service introduced to ERCOT in over 20 years. Through it, ERCOT pays generators to forgo revenue from generating at a particular moment. Instead, generators hold their supply in reserve under conditions where they can deploy it with 10 minutes' notice and keep it online for two hours. ECRS represents a significant revenue opportunity for flexible generators able to meet those requirements. Since its introduction, ECRS has consistently cleared higher than all other ancillary services.

Both residential and commercial demand continue to grow. In the summer of 2023, ERCOT set 10 new all-time peak demand records due to an extreme heat wave. As of the publication of this outlook, ERCOT has developed a new unofficial September peak demand record of 84,182 MW on September 8. Before 2023, the September record peak was 72,370 MW, set in 2021. ERCOT saw 11 new peak demand records and surpassed 80 GWs in 2022.

The industrial load growth along the coast and West Texas and the increased oil and gas production activity in the Permian Basin have contributed to the above-normal growth. Growth continues in significant load centers like Dallas-Fort Worth and Houston. Texas has the country’s fastest-growing population, according to the U.S. Census.

The 2024 peak demand is forecasted to be 86,130 MW by ERCOT, and the energy demand is 465 TWh. Figure 1 shows the peak load and energy demand from 2018 to 2024 (forecasted). The annual average growth for peak load is 2.3% and 3.6% for energy demand.

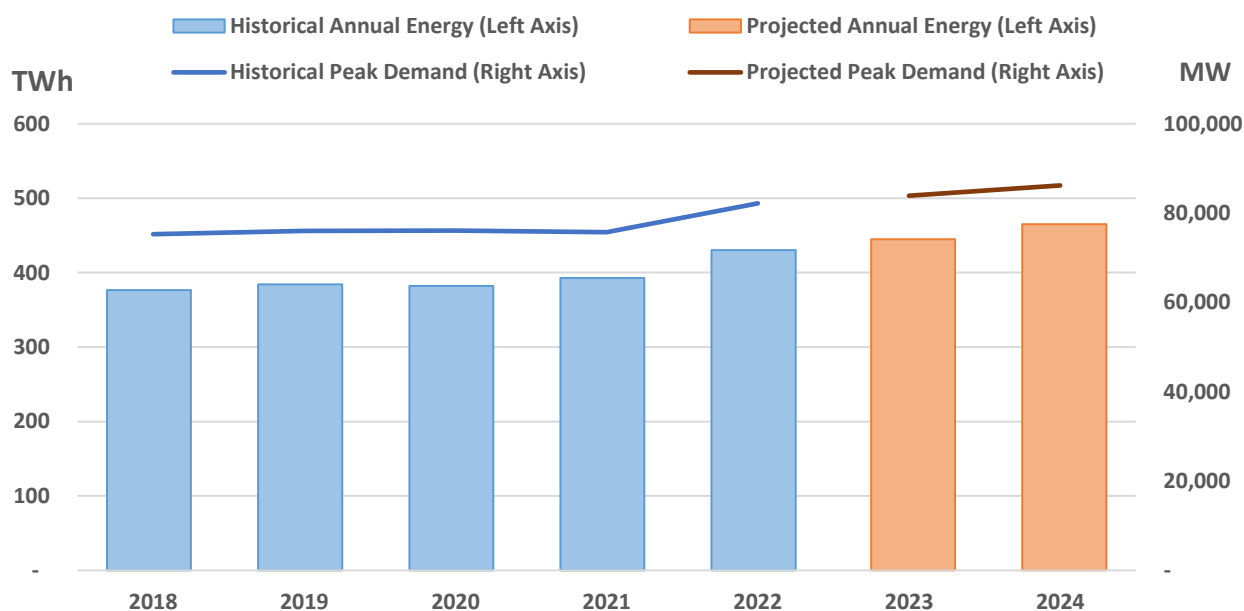


Figure 1 Peak load and energy demand from 2018 to 2024

ERCOT’s competitive electricity prices and limited regulation have attracted cryptocurrency miners. By mid-2023, ERCOT expects crypto mining activities to increase electricity demand by as much as 6 GW, an extraordinary 7.6% of the forecasted 79 GW peak demand for the entire ERCOT region.

ERCOT offers a demand-response program with bitcoin producers, allowing them credits for power curtailment based on spot prices. In August 2023, a single Bitcoin miner, Riot Platforms, earned roughly triple its typical earnings by not producing Bitcoin, taking in more than \$31 million in demand response and power curtailment from ERCOT.

However, crypto mining can be flexible and take orders from the grid operator to ramp up or down demand. While maintaining its open and welcoming position to crypto miners, in March 2022, ERCOT began requiring crypto miners to get approval before they can connect to the grid.

Transmission continues to be a hot topic in Texas: where and when upgrades happen is essential to predict economic patterns. After roughly seven years of deliberations, Lubbock Power & Light (LP&L) finally joined ERCOT in June 2021, a change that market participants expected would help export renewable generation from the Panhandle region. Transmission upgrades in Far West Texas have been implemented before the start of 2022, and the improvements will continue. The number of Generic Transmission Constraints (GTC) has increased in recent years, especially in West Texas and South Texas, as a temporary measure to address the stability constraints associated with the long-distance power transfer from these areas to urban centers. In total, 16 GTCs are in effect.

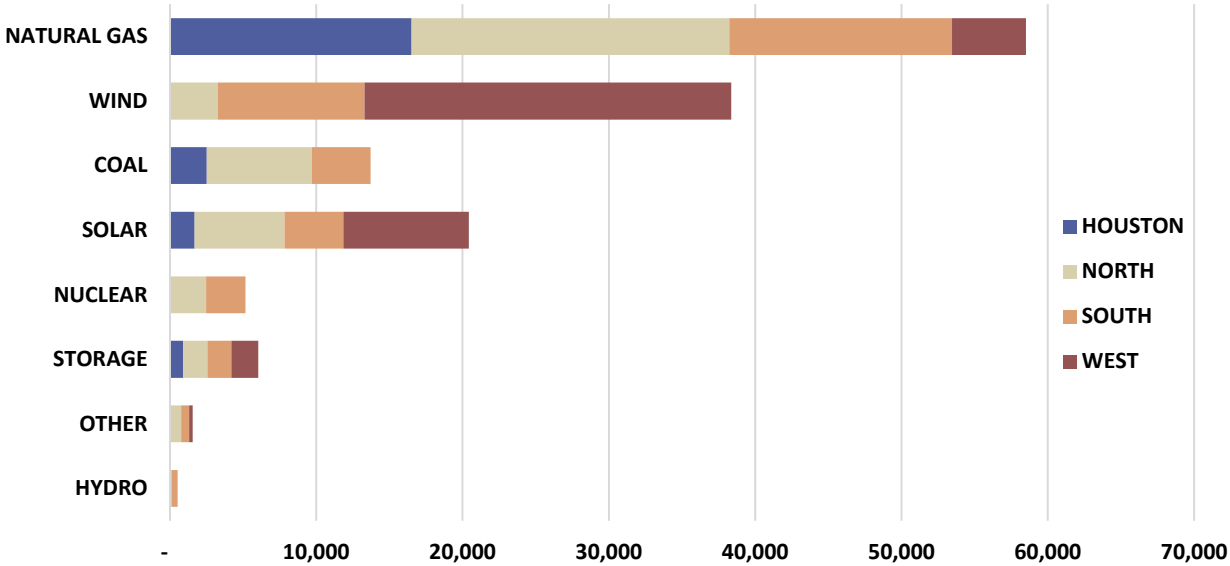


Figure 2 ERCOT Installed Capacity by Fuel Type in 2024 (MW)

The generation mix is on a constant trajectory, and we don't see a significant difference between 2023 and 2024. In 2024, we expect natural gas-powered generators will continue to be the majority of installed capacity, followed by wind and solar resources. Wind energy plays an essential role in the capacity mix, with a total nameplate capacity of 40,200 MW, not adjusted for Effective Load Carrying Capability (ELCC). The planning reserve margin for summer 2023 is forecasted to be 26.10%, based on resource updates provided to ERCOT from generation developers and an updated peak demand forecast. Figure 2 shows installed capacity by fuel type, as modeled in UPLAN.

Table 1 Capacity Expansion by Fuel Type and Zone by 2024 (MW)

Zone	STORAGE	SOLAR	WIND	NATURAL GAS	TOTAL
HOUSTON	1,229	2,048	-	623	3,900
NORTH	2,049	4,993	-	-	7,042
SOUTH	2,621	5,669	1,000	-	9,290
WEST	1,503	2,518	1,208	-	5,229
TOTAL	7,402	15,229	2,208	623	25,461

Approximately 25.5 GW of new capacity will enter the ERCOT network from Q3 2023 to 2024. The new capacity by 2024 is outlined below in Table 1.

Energy in ERCOT continues to come primarily from fossil fuels but is increasingly being replaced by wind and solar. Fossil fuels are expected to generate 52% of the electricity, similar to the 2023 outlook. It is a sharp decrease of 7% from 2022. The growth of solar generation has been picking up speed. Solar generation doubled from 1.0% in 2019 to 2.3% in 2020, nearly doubled to 4% in 2021 and 5.6% in 2022. It is expected to double again to 10.7% in 2024. Wind generation is also likely to stay at about 27% in 2024. Coal generation continues to decline due to planned retirements.

Figure 3 shows the annual production by fuel in LCG’s 2024 simulation.

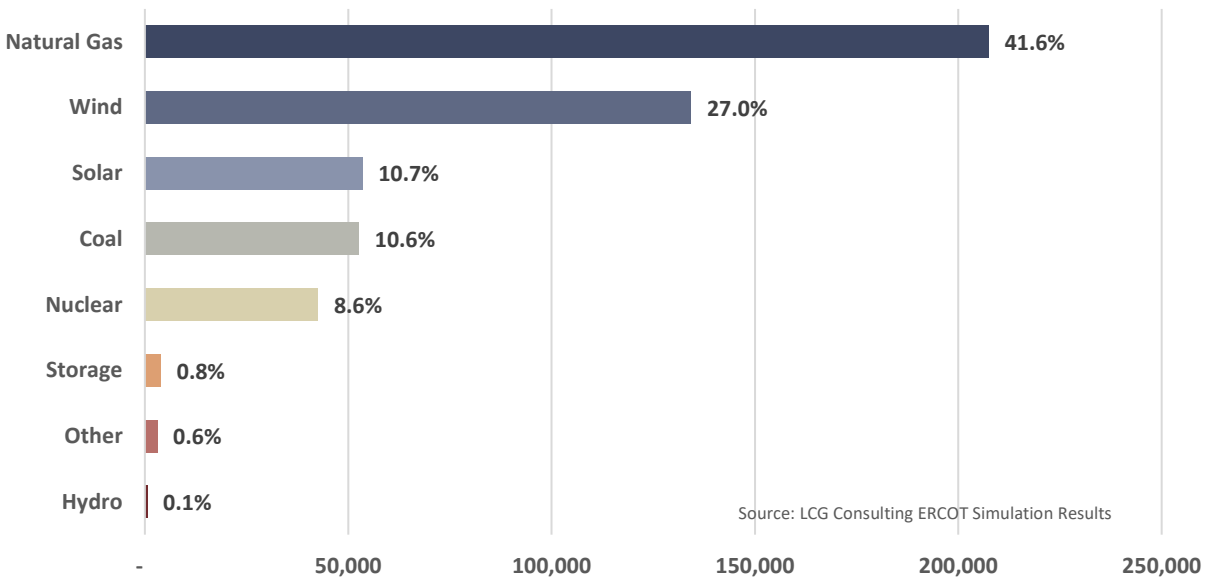


Figure 3 Annual Energy Production by Fuel Type (GWh)¹

¹ Contributions from other fuel types including hydro are considered under “Other” fuel type.

Figure 4 below shows a heat map of annual average bus LMPs in dollars and top constraints in the ERCOT region for 2023. North to Houston, North Edinburg to Lobo interfaces, and West Texas Export remain among the top constraints. The annual average zonal prices are the highest in the Houston zone, followed by the South, North, and West zones.

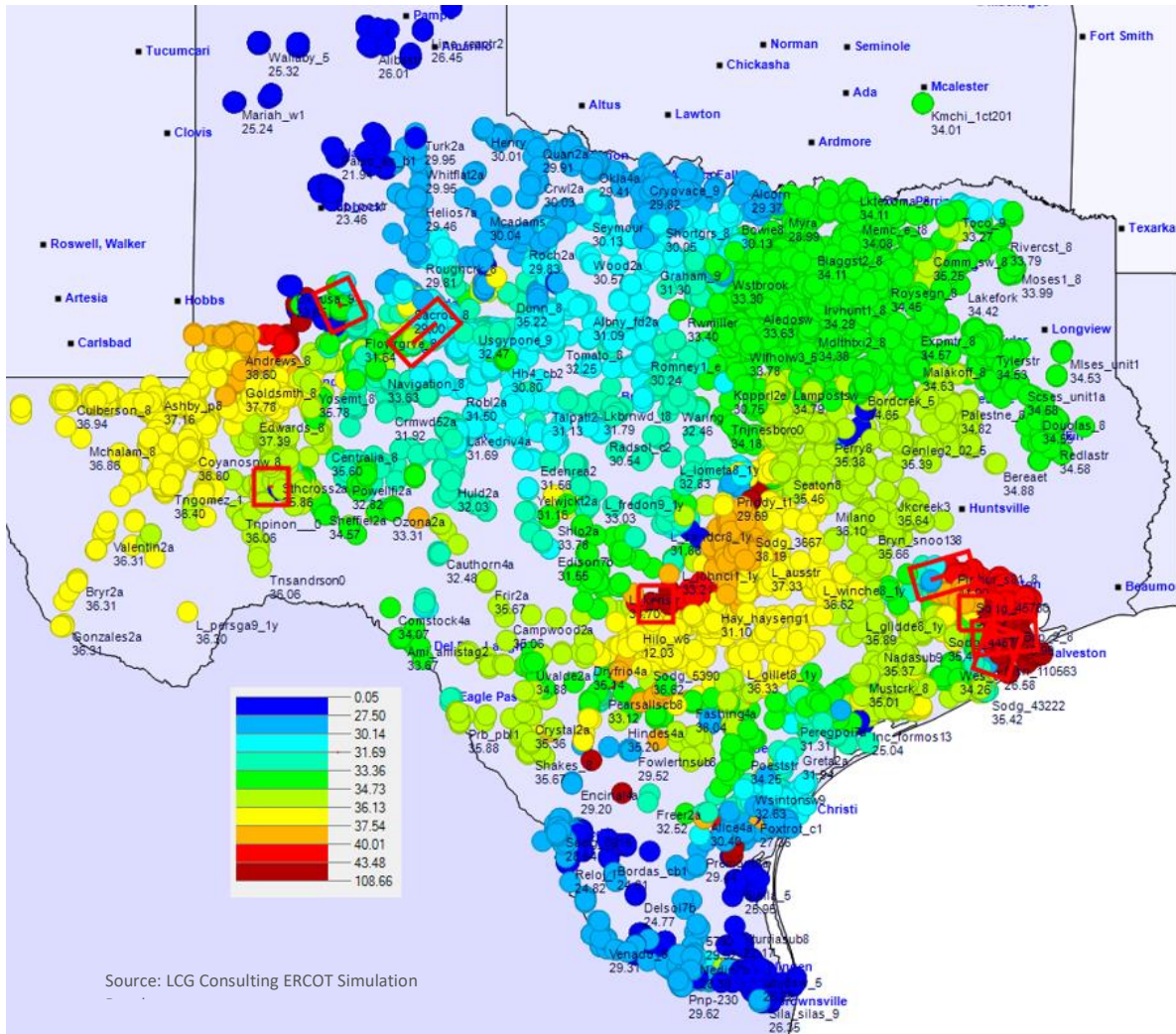


Figure 4 Annual average nodal price heat map and top constraints (\$/Mh)

Figure 5 shows the load-weighted monthly average prices by load zone. Prices are usually higher during the summer and winter months. The highest price from the simulation is around \$2,400/MWh, well below the new reduced offer cap of \$5,000/MWh.

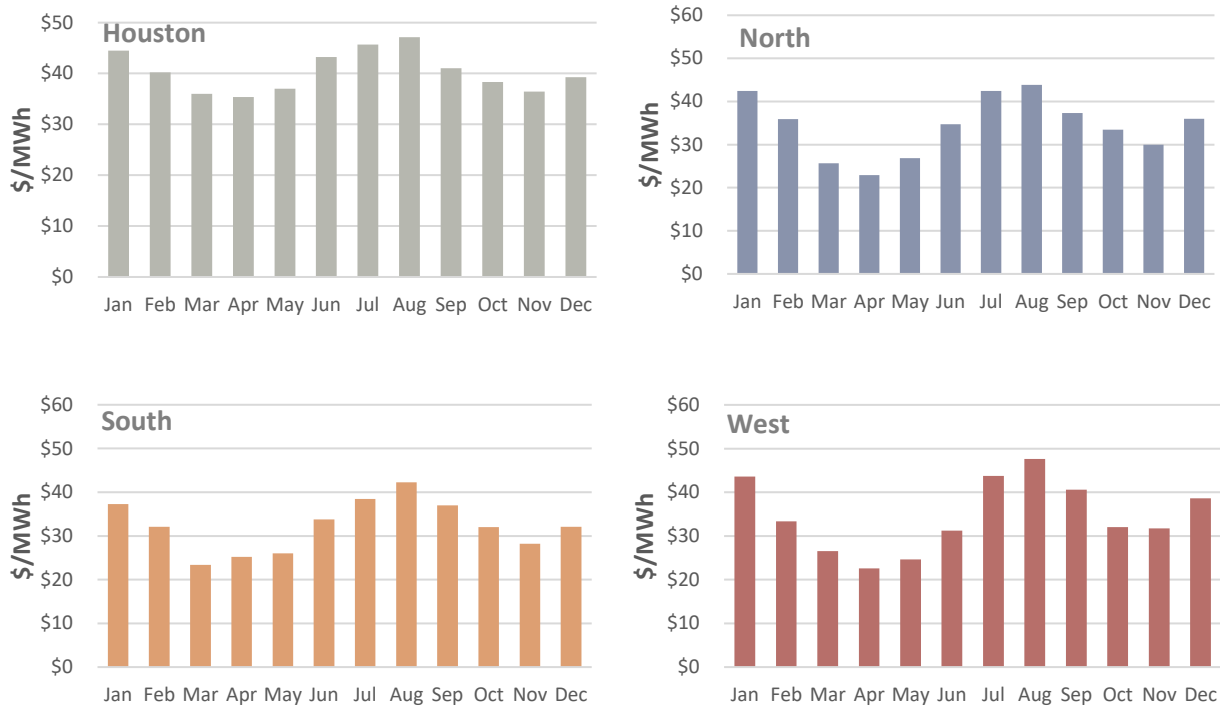


Figure 5 Monthly Load-Weighted Average Prices (\$/MWh) by Load Zone – 2024

Historical monthly load zone prices are shown in Figure 6. Note that the extreme weather events of February 2021 have been removed for better comparison.

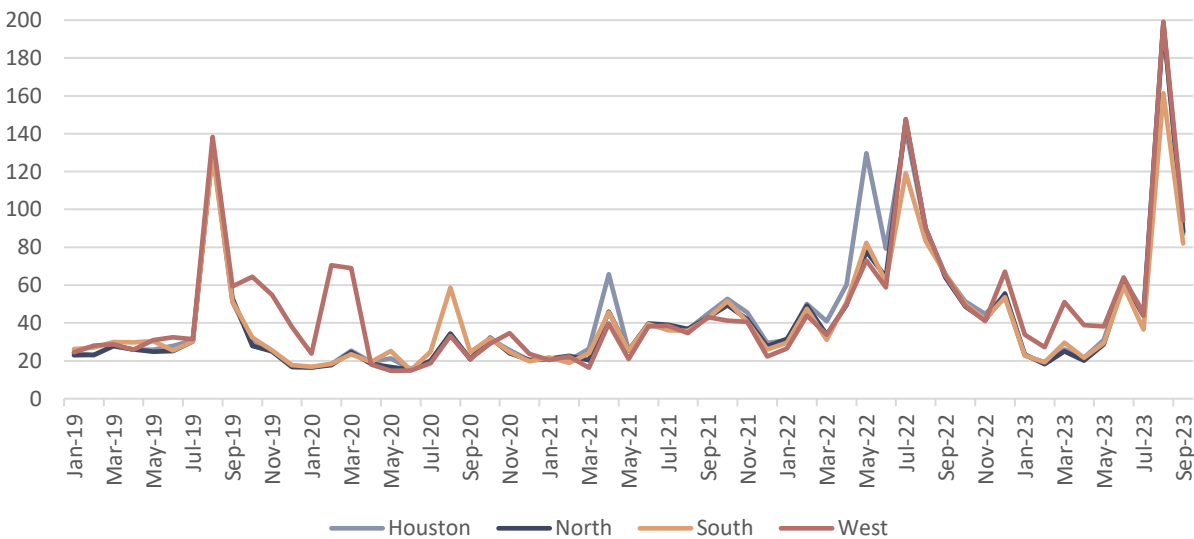
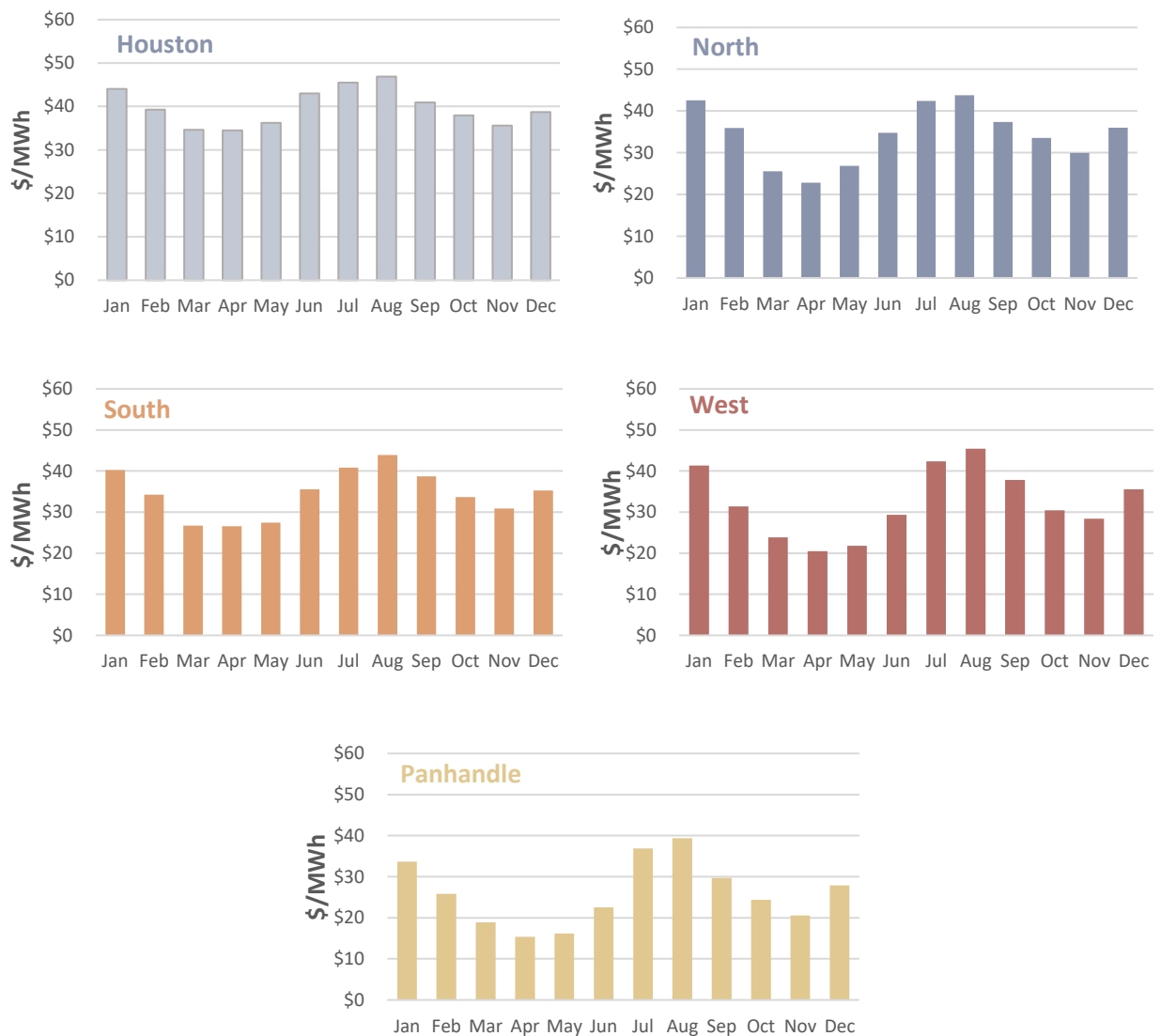


Figure 6 Historical Monthly Load-Weighted Average Prices (\$/MWh) by Load Zone

ERCOT has defined seven hubs for calculating average LMPs and assisting transactions between hubs, zones, and individual buses. Houston: 20 buses; North: 75 buses; South: 31 buses; West: 17 buses; ERCOT bus average: 143 buses; and ERCOT hub average: 143 buses. A Panhandle Hub was created in 2019 and has 12 buses. This Panhandle Hub is excluded from the existing ERCOT bus average and hub average.

Under expected conditions, the most competitive average hub price is observed in the West Hub, with progressively more expensive prices experienced in the North, South, and Houston Hubs. The hub price averages are higher during the summer and winter months, a trend similar to load zone prices. Monthly average prices in 2024 at Houston, North, South, West, and Panhandle Hubs are shown below in Figure 7.



Source: LCG Consulting ERCOT Simulation Results

Figure 7 Monthly Average Prices (\$/MWh) by Trading Hub – 2024

The implied heat rate is the electric price divided by the natural gas price. Only a natural gas generator with an operating heat rate, a measure of unit efficiency, less than the implied heat rate value, can be profitable. In-house natural gas price predictions show that the average natural gas price ranges from \$1.83/MMBTU to \$3.59/MMBTU among load zones. The lowest implied heat rate occurs in May in the North load zone. The implied heat rate averages 10-12 MMBtu/MWh during non-summer months. The monthly implied heat rate is shown in Figure 8.

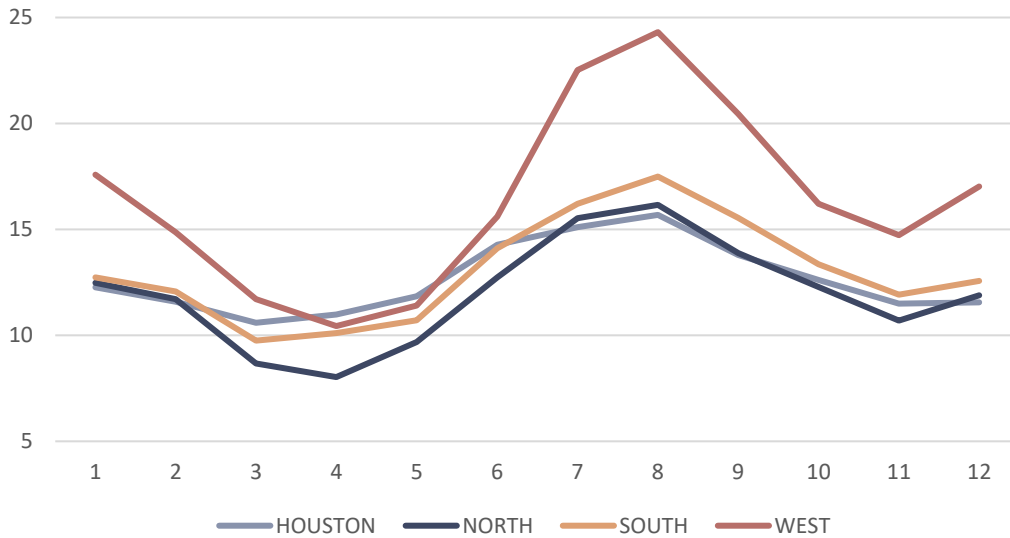


Figure 8 Monthly Implied Heat Rate by load zone - 2024 (MMBtu/MWh)

Overall, our outlook shows that the ERCOT region is accelerating toward more renewable energy resources while facing challenges such as maintaining grid resilience during extreme weather events and resource adequacy with high renewable penetration. Regulatory and market design innovations are needed as ERCOT pioneers a market that hosts non-conventional loads such as crypto miners and growing energy storage.