



North American Natural Gas Overview

November 13, 2024

The Leader in Energy Market Simulation Systems

Providing energy companies, consultants, and regulators advanced tools to support:

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- **Environmental and Sustainability Goals**
- **Credible Risk Analysis**
- **Trading Strategy**
- **Policy Development and Assessment**
- **Energy Security**

North American Natural Gas Overview

Highlights of GPCM 24Q3base Forecast

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North American Natural Gas Overview

1. Henry Hub Price & Basis
2. Supply
3. Demand
4. LNG Exports
5. Storage
6. Infrastructure

Henry Hub Price

Near term Henry Hub price starts from a similarly low base as 24Q2base due to the continued storage overhang coming out of both last winter season's warmer than normal winter; despite summer 2024's heat which resulted in continued strong gas-for-power demand.

Significant storage surpluses relative to last year and the 5-year average remain and are pressuring prices significantly lower.

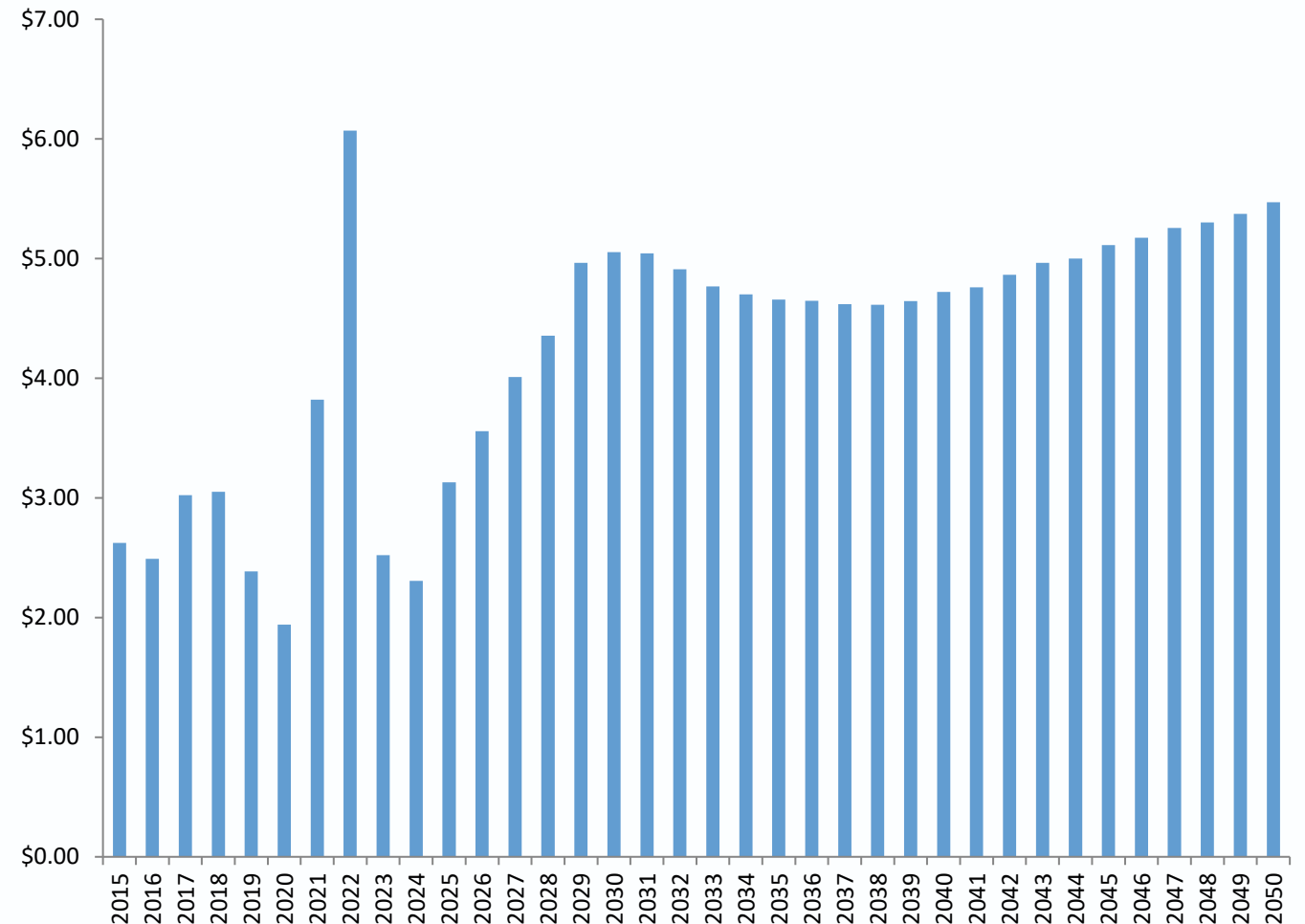
Prices remain lower than 24Q2base through 2030 as supply/demand balances skew to the loose side. Lower near term LNG exports are the driver for this near-term pricing pressure – lower by approximately 1.5 – 2.0 Bcf/d.

Consumer demand (C/R/I/E) runs somewhat higher during this period but not enough to offset lower LNG exports.

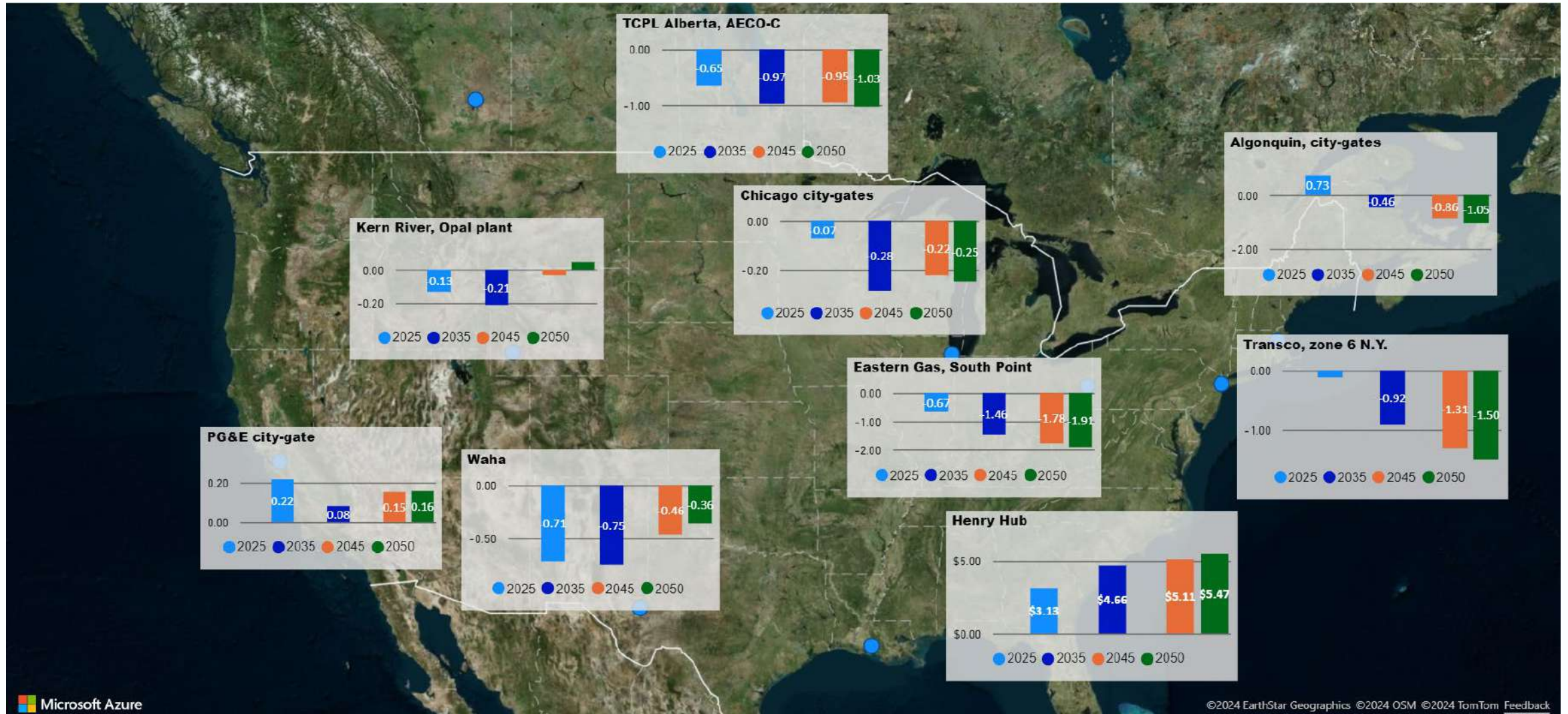
Mid-term Henry Hub price trend largely the same as 24Q2base from 2030 onward. LNG exports begin to exceed 24Q2 by 0.5 – 1.0 Bcf/d while consumer demand, and specifically, ELC demand, converges to 24Q2 levels by 2030.

Longer term Henry Hub price continues to trend in line with 24Q2 due to higher LNG exports and similar consumer demand.

Henry Hub Prices



Yearly Price and Basis Map -- 2025/2035/2045/2050





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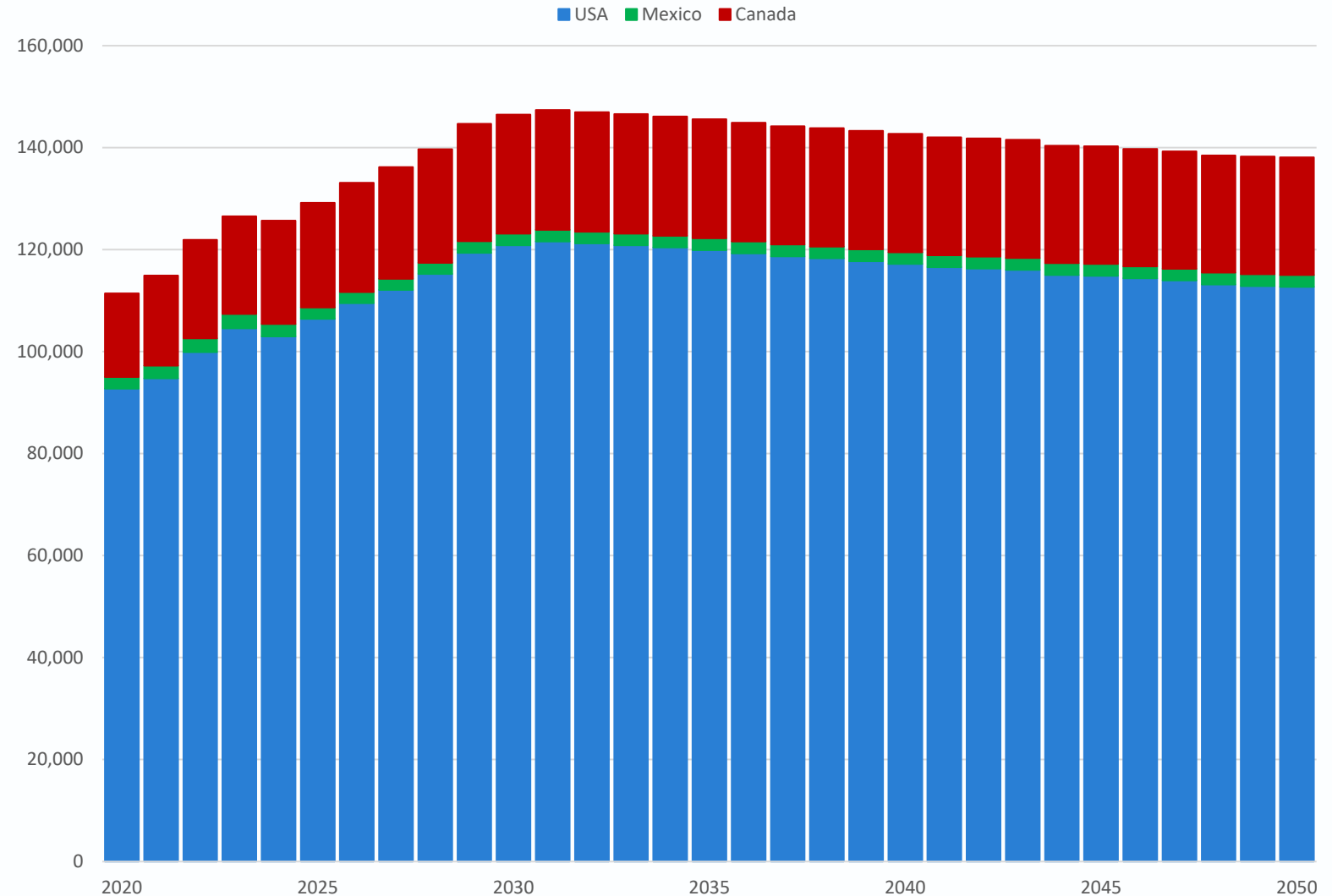
North American Supply

Total North American supply was robust through 2023 driven by strong **Permian**, **Haynesville** and **Appalachia** production

Dramatically lower prices impacted producers earlier this year with several reducing production volumes (e.g., Chesapeake, EQT).

Prices increased after these reductions were announced and producers started to ramp production back up as summer began.

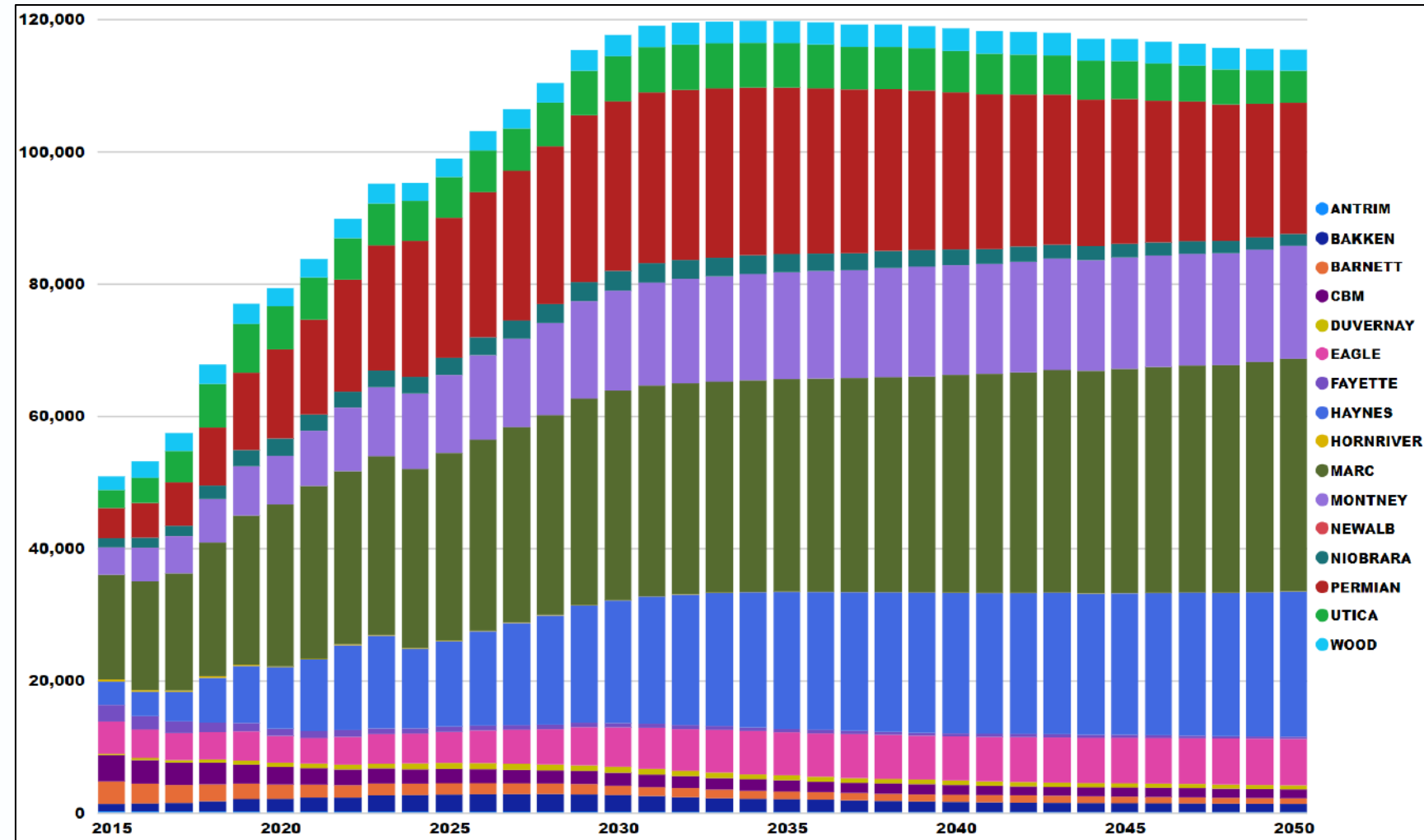
However, gas prices are once again flirting with the \$2.00/MMBtu level, but it is less clear that producers will again throttle back production especially now that the market is on the cusp of new LNG export capacity coming online.



North American Supply by Selected Basins

Production growth is expected throughout the forecast with gains coming primarily from **Permian**, **Haynesville**, and **WCSB's Montney Shale** and to a lesser extent **Marcellus** and **Eagle Ford** shales.

Continued issues at the Freeport LNG export terminal have lowered demand, even impacting geographically favored producers, specifically in **Haynesville**, but also in the **Midcontinent**.

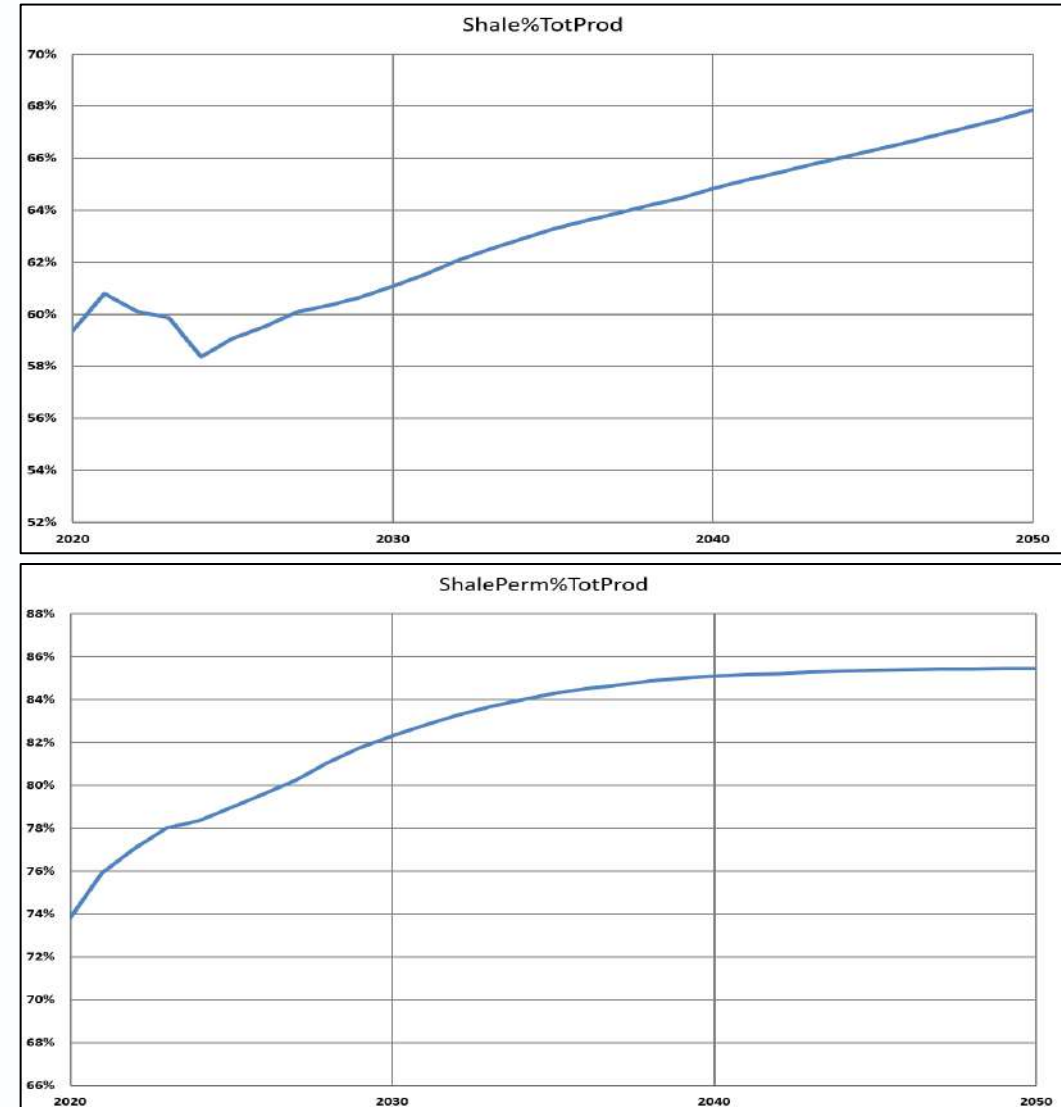


US Supply by Type

Shale production represents **59%** of the total production by 2025.

Shale production grows to **68%** of the total production by 2050.

With Permian production included, the percentage increases to **85%** by 2050.





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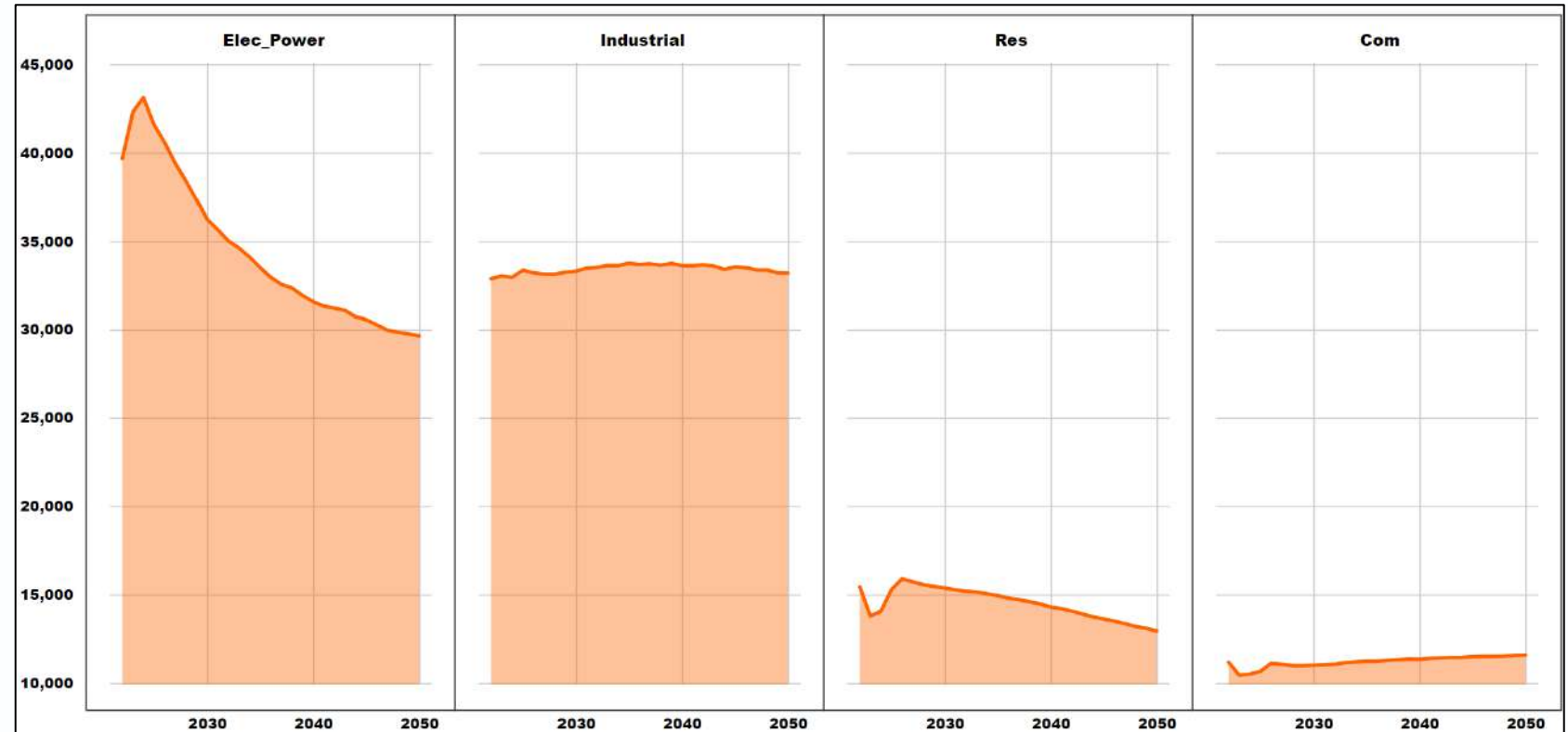
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North American Demand by Sector

ELC gas demand is forecast to decline over time as electrification and renewables market share grows – the rate of this decline has been significantly dampened vs previous base case releases to capture AI/Data Center demand and recent strong gas burns.

IND demand remains relatively flat – increased USGC Petchem demand offsets other regional IND demand losses.

RES demand declines over time due to increased electrification and efficiency gains while **COM** demand sees modest increases.

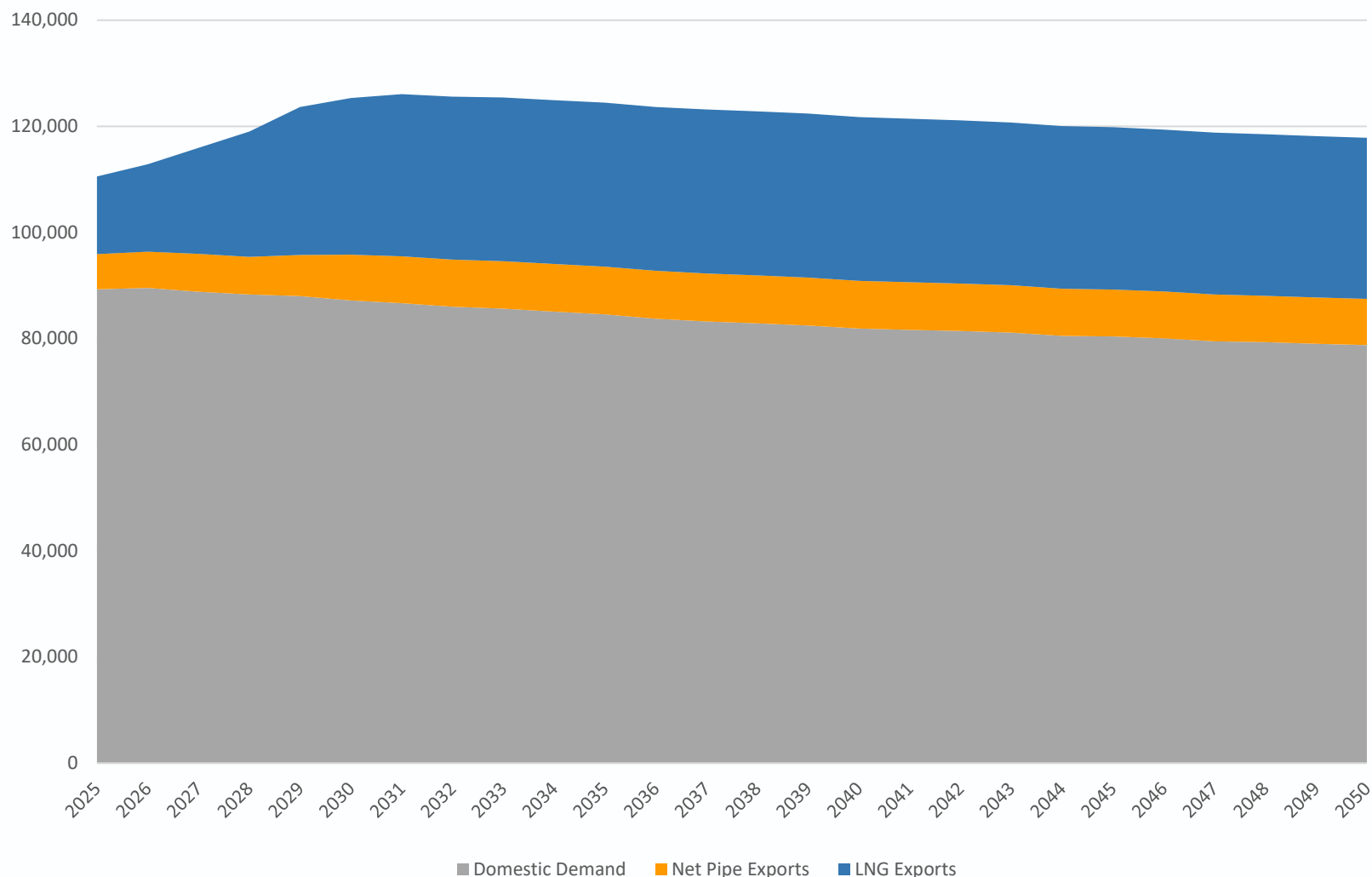


US Demand by Sector

LNG Export demand becomes an increasingly important variable in the Supply/Demand balance equation.

As noted, traditional sectoral demand is forecast to decline throughout the forecast, but increased LNG export demand offsets these declines.

Annualized demand exceeds 120 Bcf/d beginning in 2028 and holds above this level throughout the forecast.

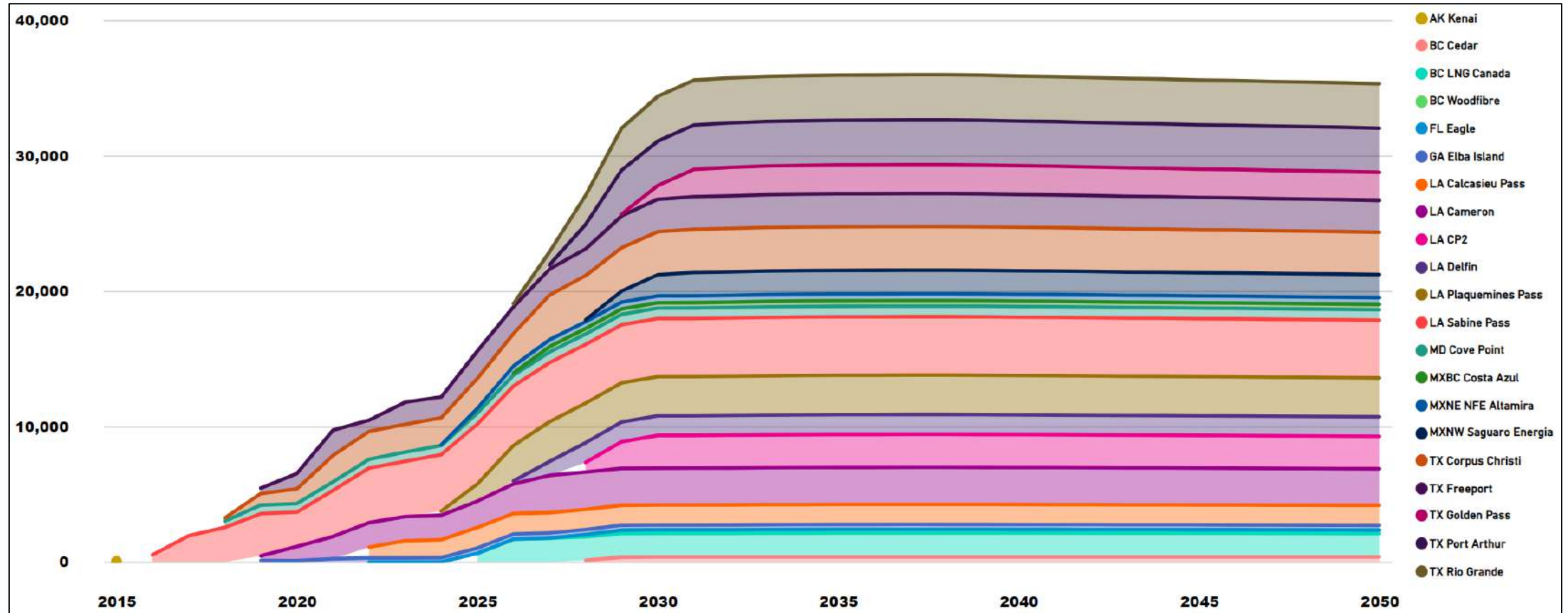




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North American LNG Exports

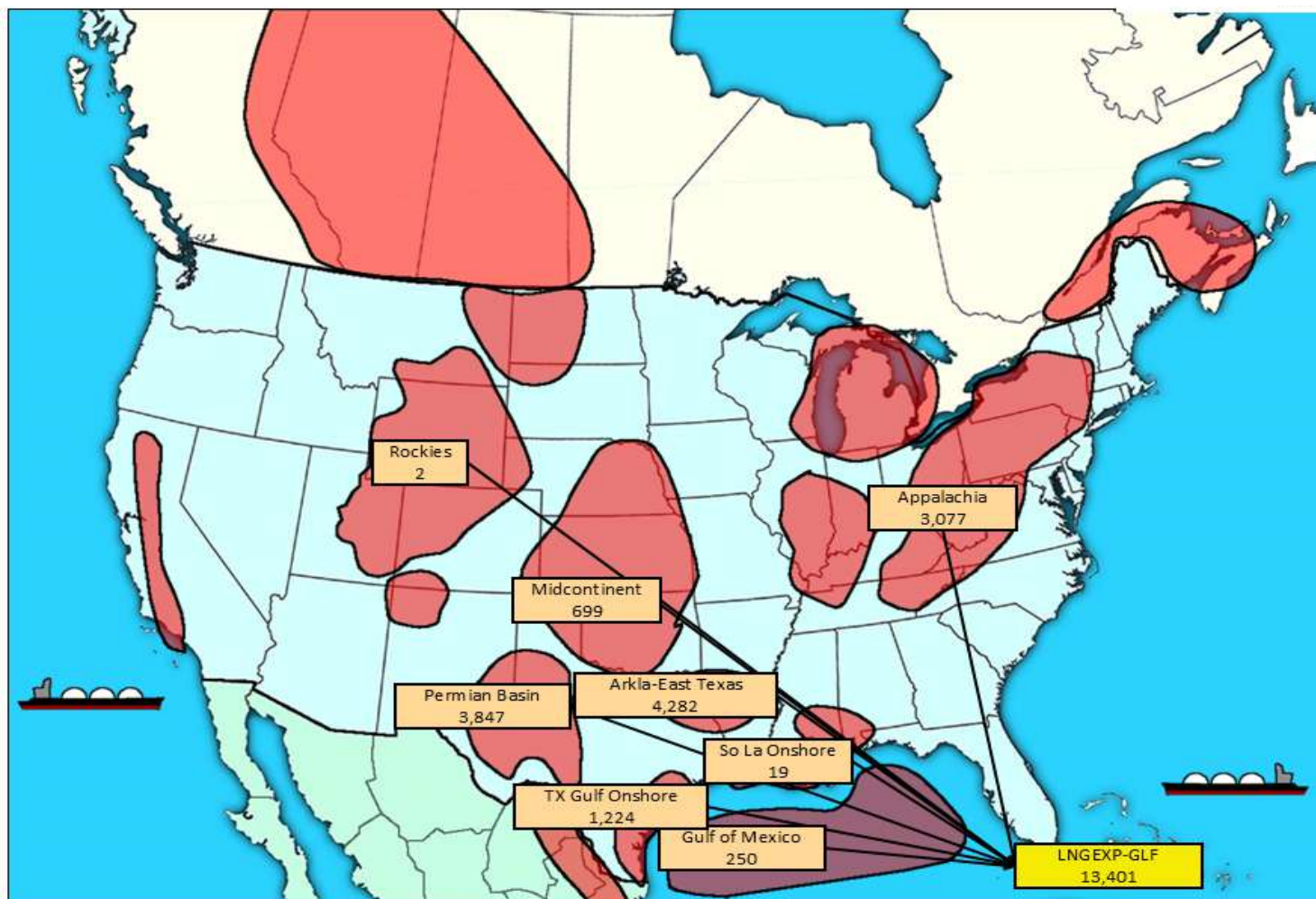


- 40+ North American LNG facilities built into our GPCM
- LNG Sabine Pass, LNG Canada, and LNG Saguaro Energia expansions have been turned off in 24Q3 basecase

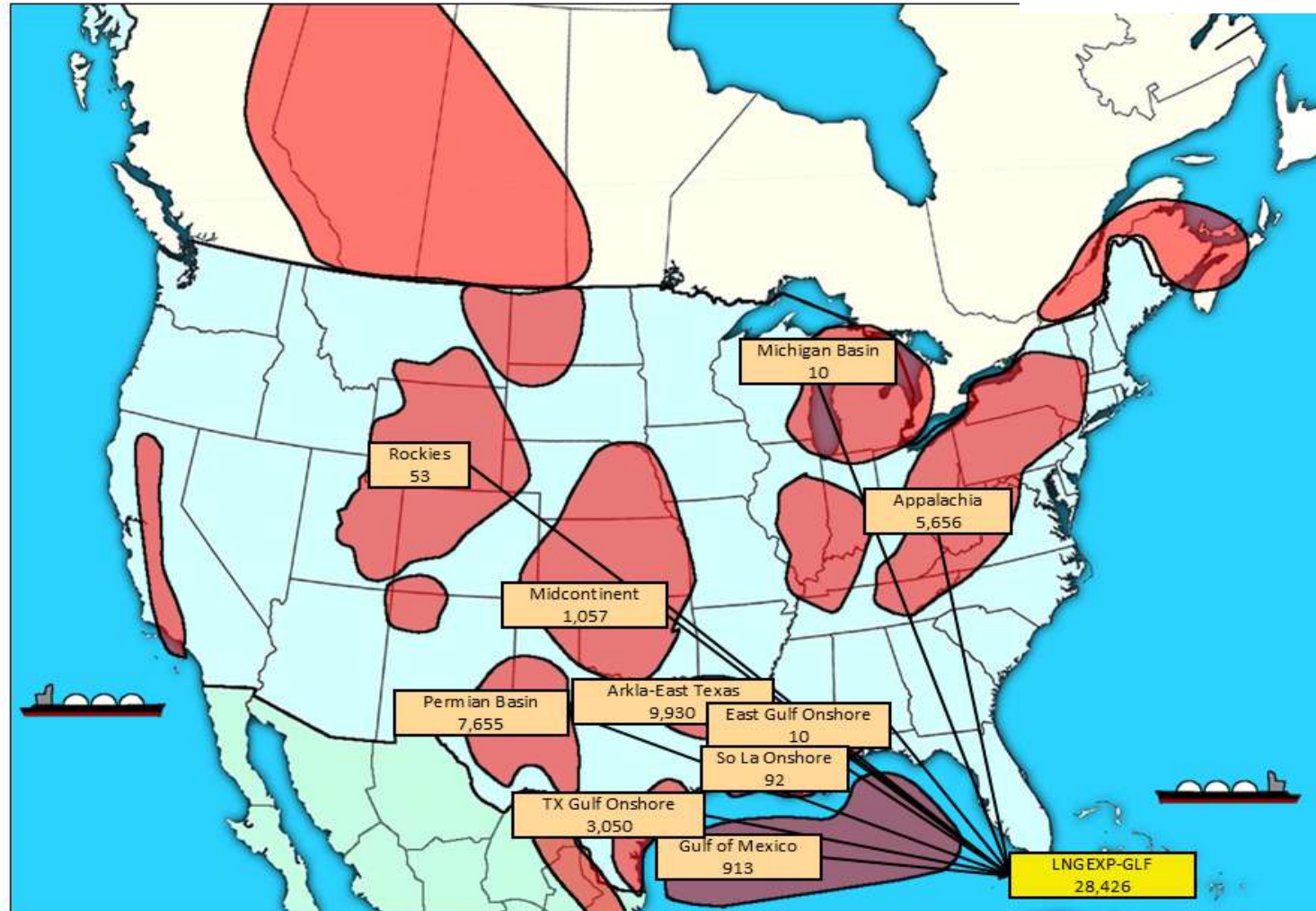
Future North American LNG Exports

Export Facility	Start Date
LNG Canada	Jul-2025
LNG Cedar	Jul-2028
LNG Costa Azul	Jun-2026
LNG CP2	Jul-2028
LNG Delfin	Jun-2026
LNG Golden Pass	Dec-2029
LNG Plaquemines	Oct-2024
LNG Port Arthur	Dec-2027
LNG Rio Grande	Oct-2026
LNG Saguaro Energia	Dec-2028
LNG Woodfibre	Jan-2028

Supply Sources for Gulf LNG Exports - 2025



Supply Sources for Gulf LNG Exports - 2030

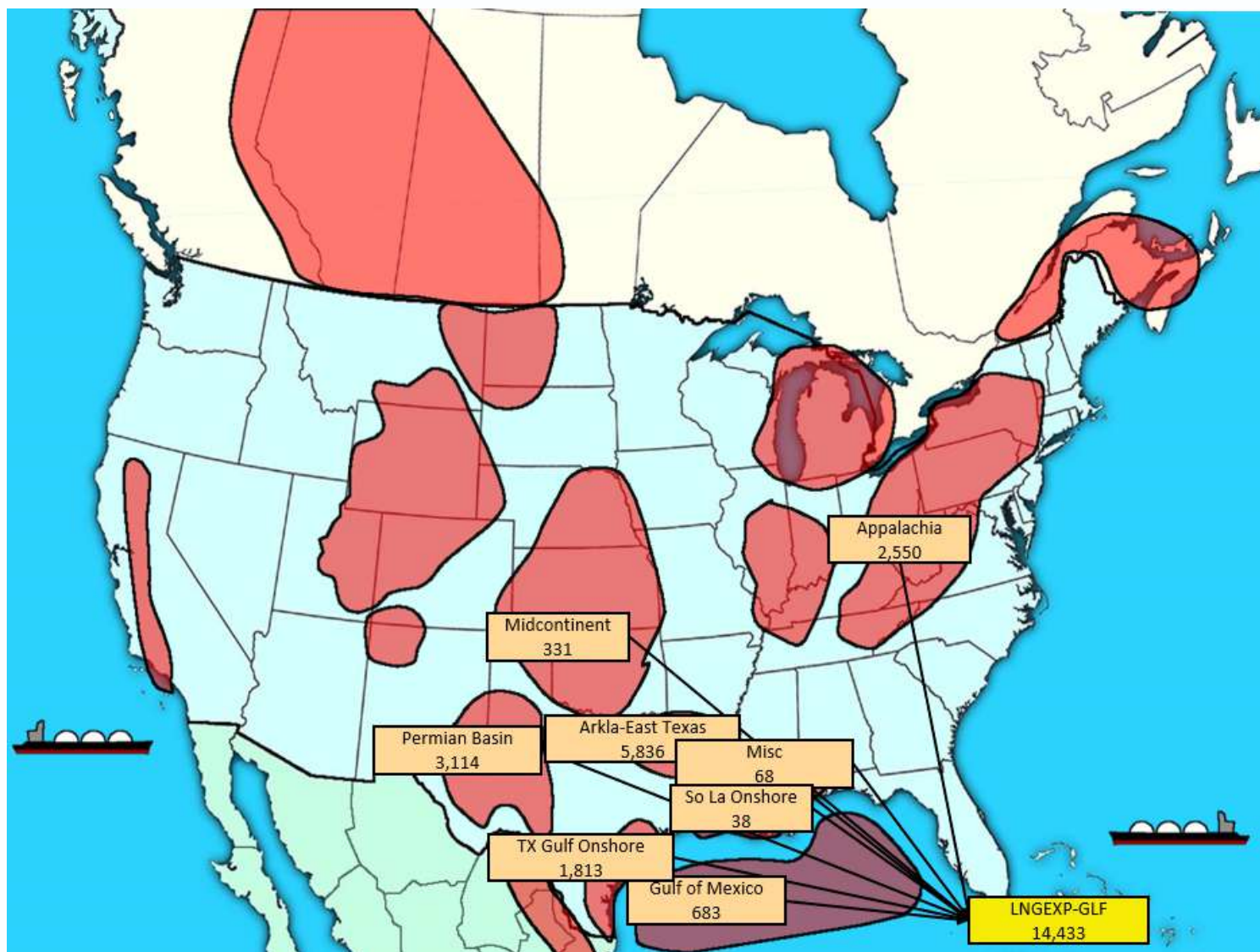


Supply Sources for Gulf LNG Exports - Delta

Proximity to the US Gulf Coast LNG terminals clearly benefits Haynesville, Eagle Ford, and Permian producers.

Appalachia (Marcellus) contributes significantly as well – due largely to GPCM's auto-expand feature which begins April 2028.

Alternative scenarios can easily be constructed to simulate more stringent regulatory burdens – e.g., turn off Mid-Atlantic auto-expand, increase the economic hurdles, etc.





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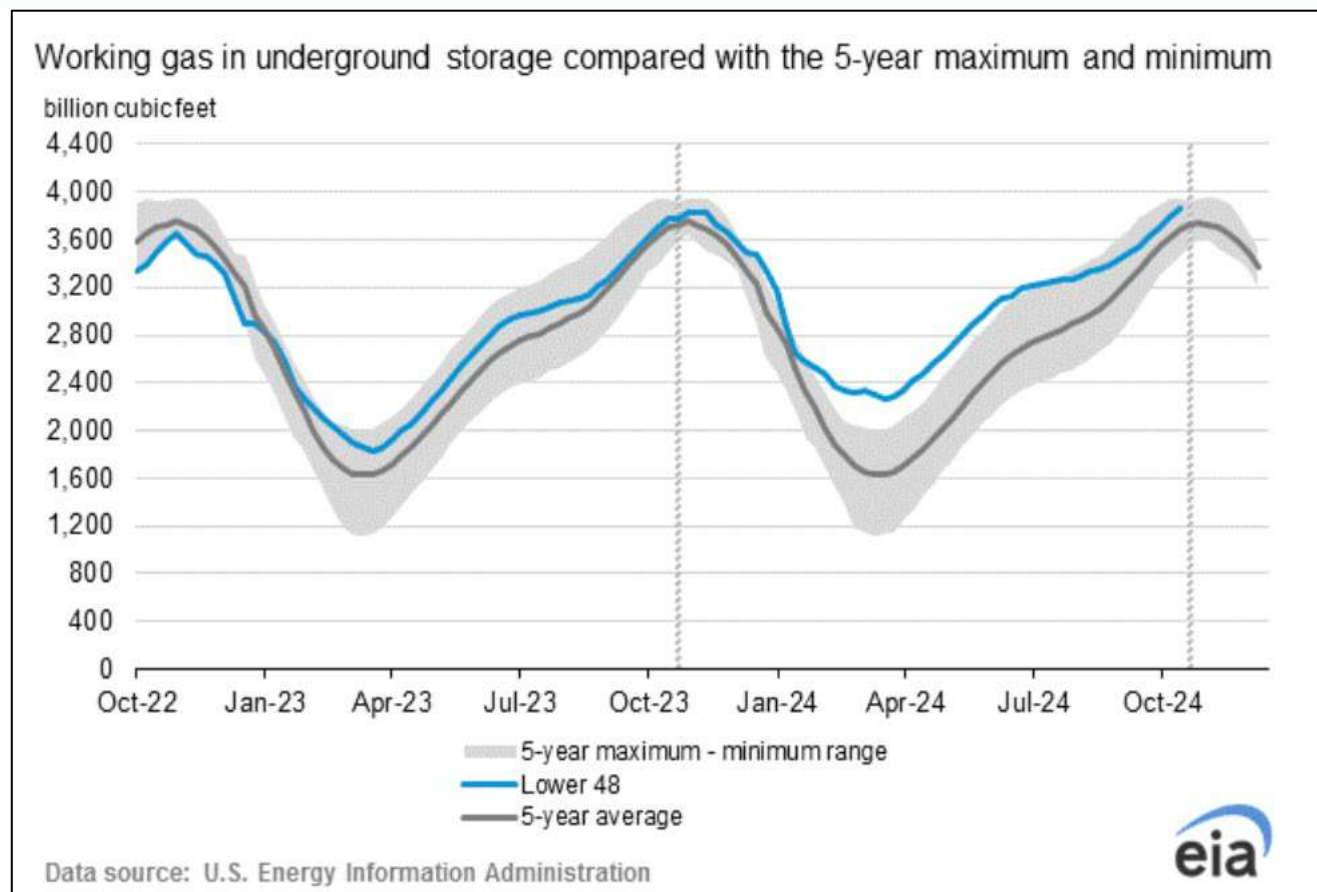
Storage Levels vs 5-Year Average

High storage levels tend to put downward pressure on natural gas prices.

Strong production levels and a warmer than normal 2023-24 winter led to storage levels exceeding the 5-year average and 5-year maximum prior to the 2024 summer season.

Low gas prices in early 2024 led to production curtailments prior to summer 2024.

Strong summer ELC gas burns, more consistent LNG export volumes and lower production have moved storage levels back toward the 5-year average and back within the 5-year min/max range





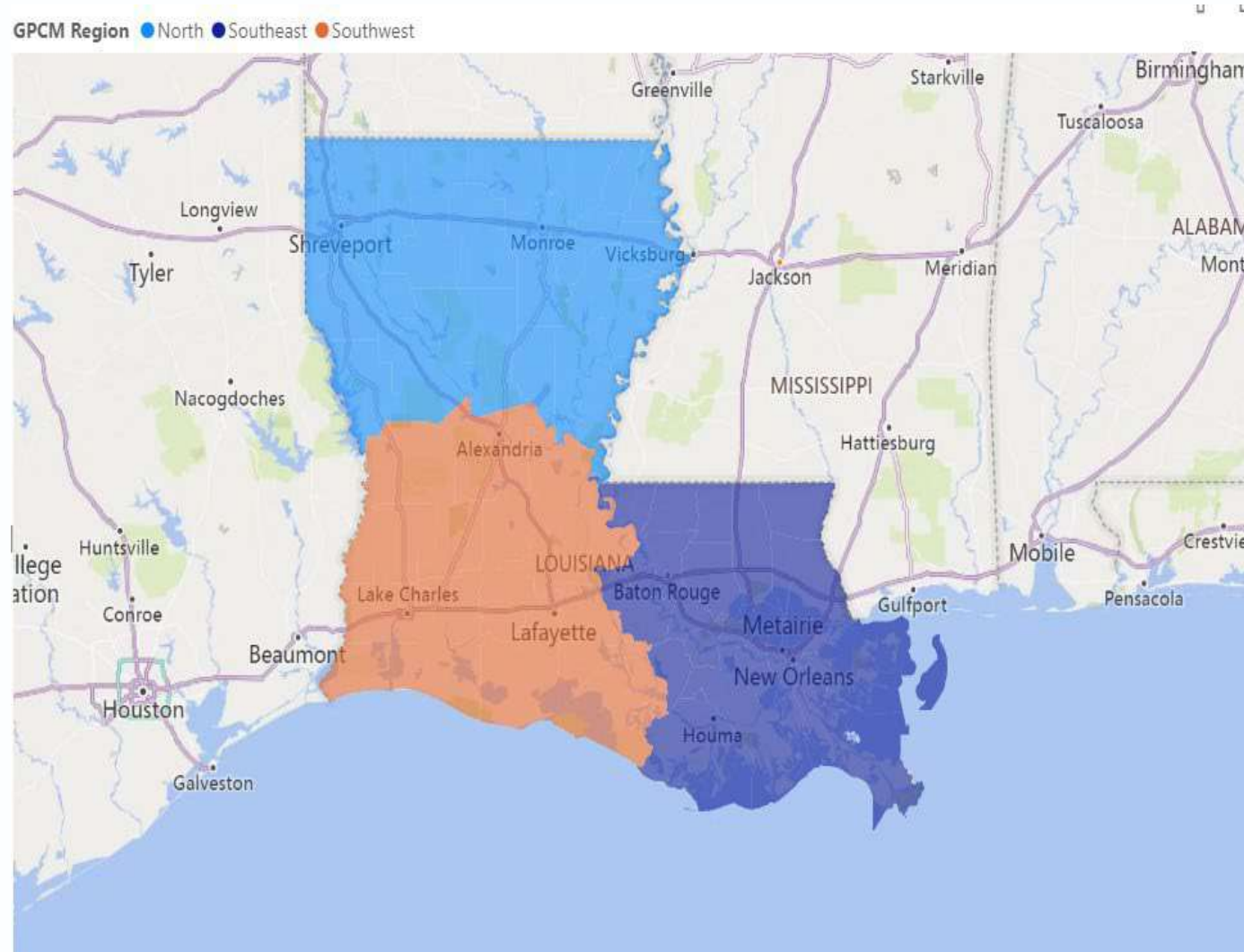
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Split South Louisiana to Better Represent New Infrastructure

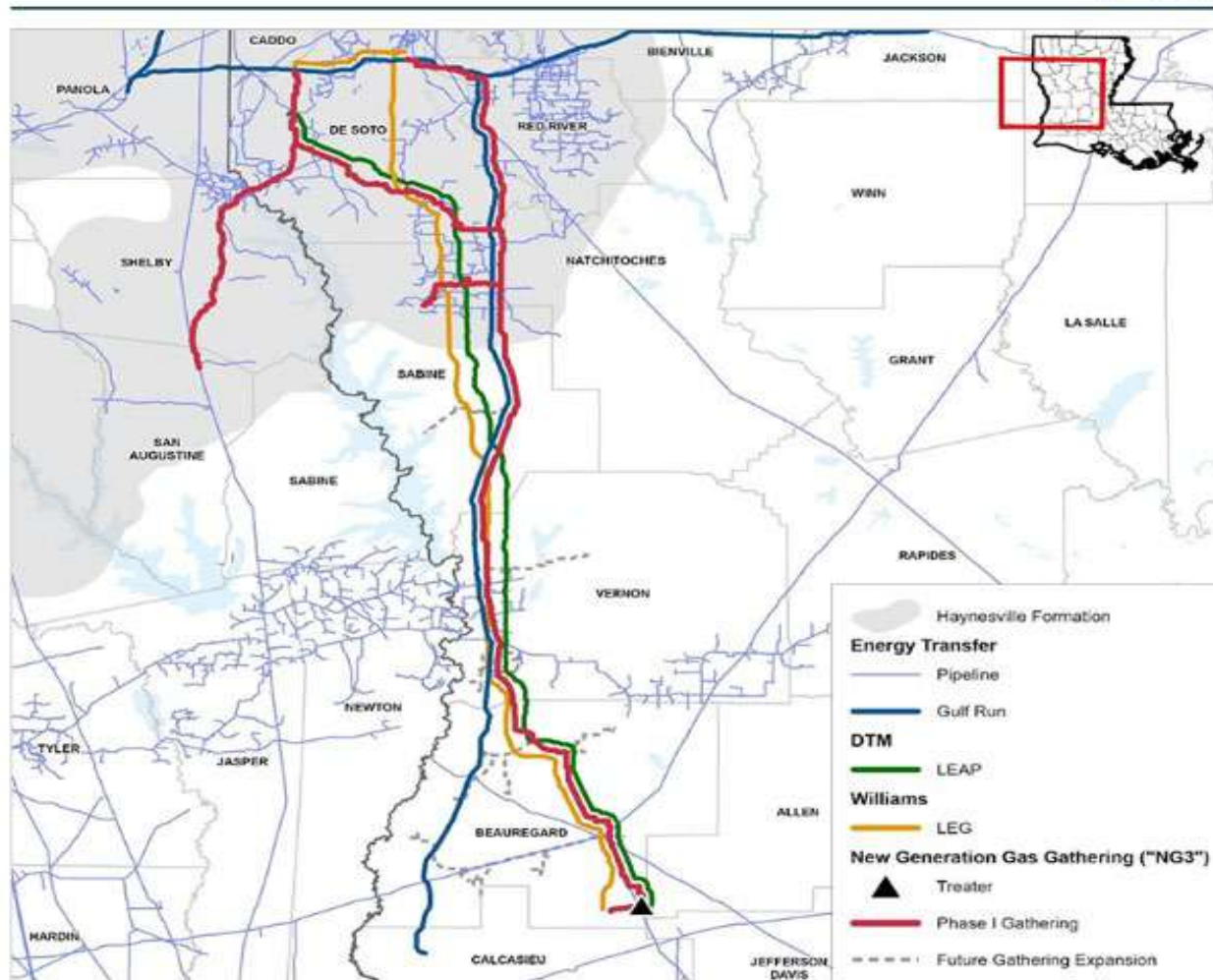
Split up South Louisiana into 2 pieces, Southeast and Southwest for both supply and demand, extensive scrubbing was done to link up supply links, demand links, and interconnect links correctly. This included:

Acadian, American Midstream, ANR, Bridgeline, Columbia Gulf, Creole Trail, Discovery, FGT, Golden Pass, Gulf Run, Gulf South, KM Louisiana, LGS, LIG, Nautilus, NGPL, Sabine, Sea Robin, Southern Natural, Stingray, Tennessee, Texas Eastern, Texas Gas, TransCameron, Transco, Trunkline



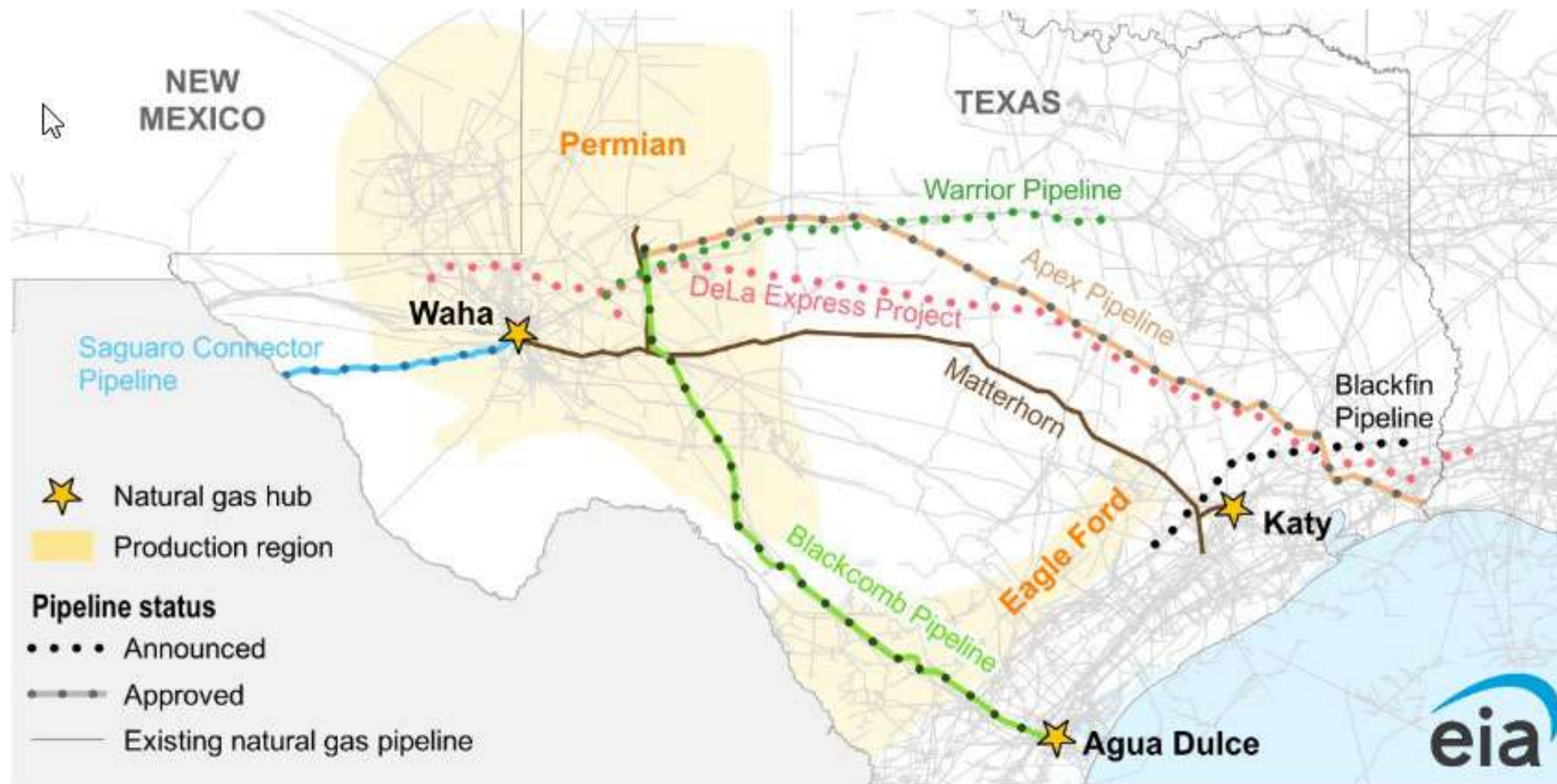
Haynesville Infrastructure

Competing Haynesville Shale Takeaway Projects

NGI

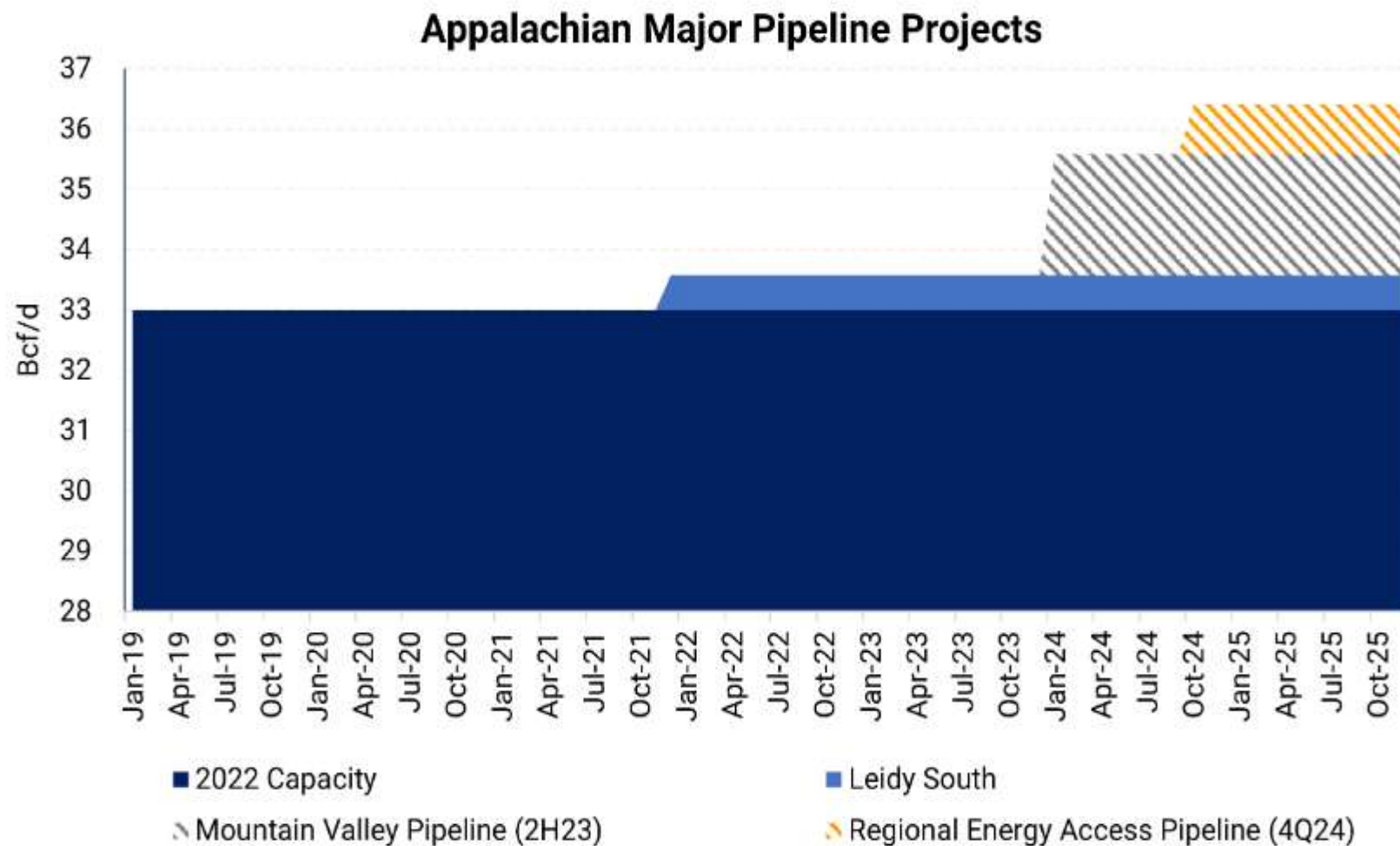
Source: 42nd Judicial District Court filing by New Generation Gas Gathering LLC

Permian Infrastructure



Data source: U.S. Energy Information Administration, [Natural Gas Pipeline Project Tracker](#)

Appalachia Infrastructure



Source: AEGIS, PointLogic, company filings

Modeling LNG Maintenance



Questions?



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RBAC leads the market in global and regional gas and LNG market simulation and predictive analytics in support of corporate investment and M&A strategy, ESG, risk analysis, planning, and commodity trading. Our products and expertise help companies go beyond the narratives and hype to identify the opportunities and define the risks inherent in the uncertainties of energy transition using reality and fact-based fundamentals and analysis.

We continuously enhance our market simulation systems with the latest software and computer technology while applying the best of mathematical economics to assist our clients achieve their goals. This is especially needed as we see fundamental shifts taking place in the energy industry to achieve energy transition goals and meet increasingly demanding requirements of ESG. We provide regularly scheduled updates of our simulation systems and databases to keep our clients up-to-date with the most current market information. We enhance the functionality of our systems to enable our customers to simulate the effect of new regulations or industry requirements.

Our aim is to continue to lead the market in best practices which raise the standard of market simulation, enabling rapid and flexible scenario generation, sensitivity analysis, risk-assessment and forecasting, giving clients the edge in the rapidly changing energy market.

Those using RBAC's products and services include energy industry firms and consultants, as well as government agencies involved with energy, transportation, and the environment.

RBAC's principal products include:

- **GPCM® Market Simulator for North American Gas and LNG™** focused on the North American gas & LNG markets. GPCM is the industry standard market simulator for North American gas.
- **G2M2® Market Simulator for Global Gas and LNG™** for simulating increasingly integrated gas and LNG markets worldwide.
- **Gas4Power®** for integrating gas and power market fundamentals to produce credible forecasts for both.
- **NGL-NA®** Market Simulator for North American Natural Gas Liquids

With RBAC's advanced simulation systems, licensees can create and run scenarios involving bio-methane (Renewable Natural Gas – RNG) mixed with natural gas and to assess the implications of carbon taxes and markets on supply, demand, and prices. Future enhancements will include the ability to simulate the advent of a future hydrogen market with both pure hydrogen pipelines as well as mixtures with methane. The Energy Analyst of today and the future needs these kinds of tools to conduct realistic assessments and help develop realistic strategies and plans to achieve the goals of the energy transition.

Dr. Robert Brooks founded RBAC in 1987 based on experience developing several well-respected predictive models for government and industry. He designed the first gas transportation model while getting his PhD at MIT and has led the industry ever since.

RBAC's staff includes industry-trained experts in natural gas supply and demand, transportation, storage, marketing, and trading. Our team applies its world-class expertise in mathematical modeling, statistical analysis, mathematical algorithm development, software engineering, and database design to current and future challenges, risks and opportunities in energy.

To find out more information about **GPCM** scan:



To schedule a meeting with RBAC email: contact@rbac.com