GPCM Case Study: Storage

November 15, 2024

The Leader in Energy Market Simulation Systems

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

- Investment and M&A Strategy
- Environmental and Sustainability Goals
- Credible Risk Analysis
- Trading Strategy
- Policy Development and Assessment
- Energy Security

Storage

November 15, 2024

Bethel King
Senior Director, Market Analysis

Robert Kachmar
Senior Natural Gas Analyst

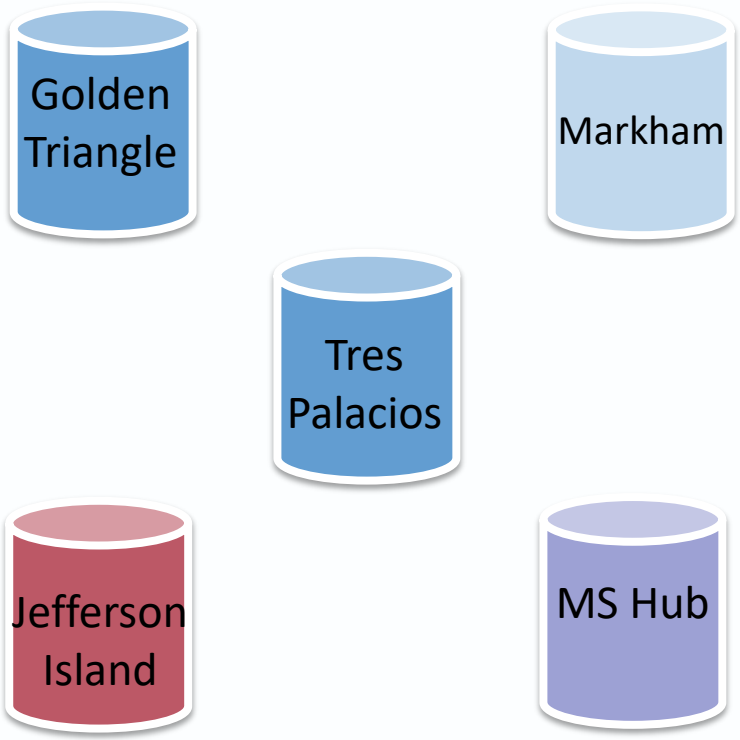
David Brooks
Natural Gas Analyst

Modeling the Impact of Hurricanes on LNG Exports

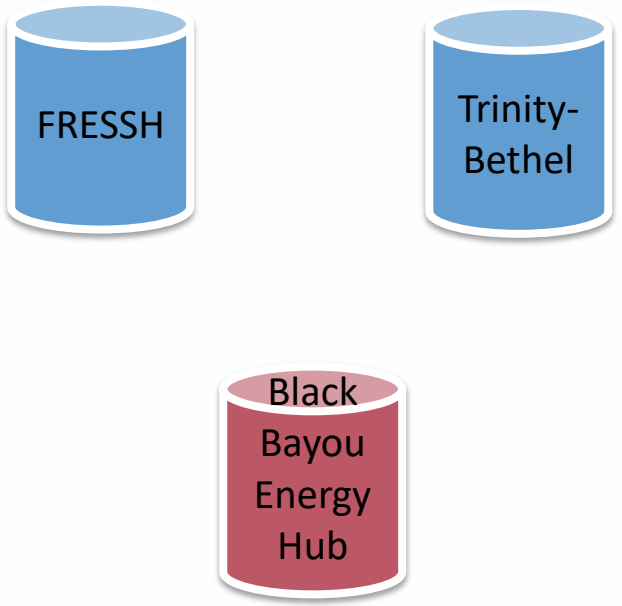
1. Adding Brownfield Storage Expansions
2. Adding Greenfield (or New) Storage facilities
3. Henry Hub Compare
4. Basis Compare
5. Production Area Price Compare
6. Summary

GPCM Case Study - Storage

Brownfield Storage Expansions

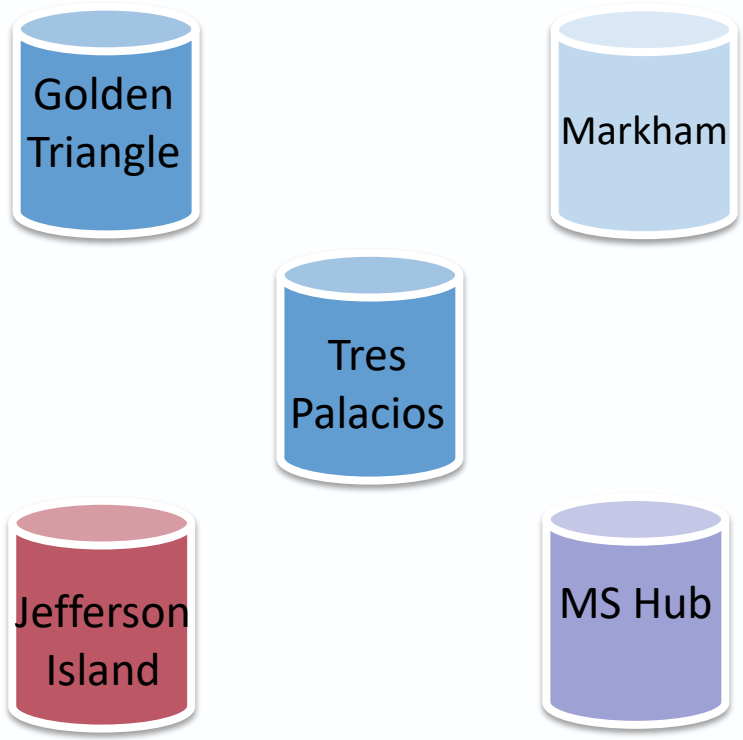


Greenfield Storage Additions



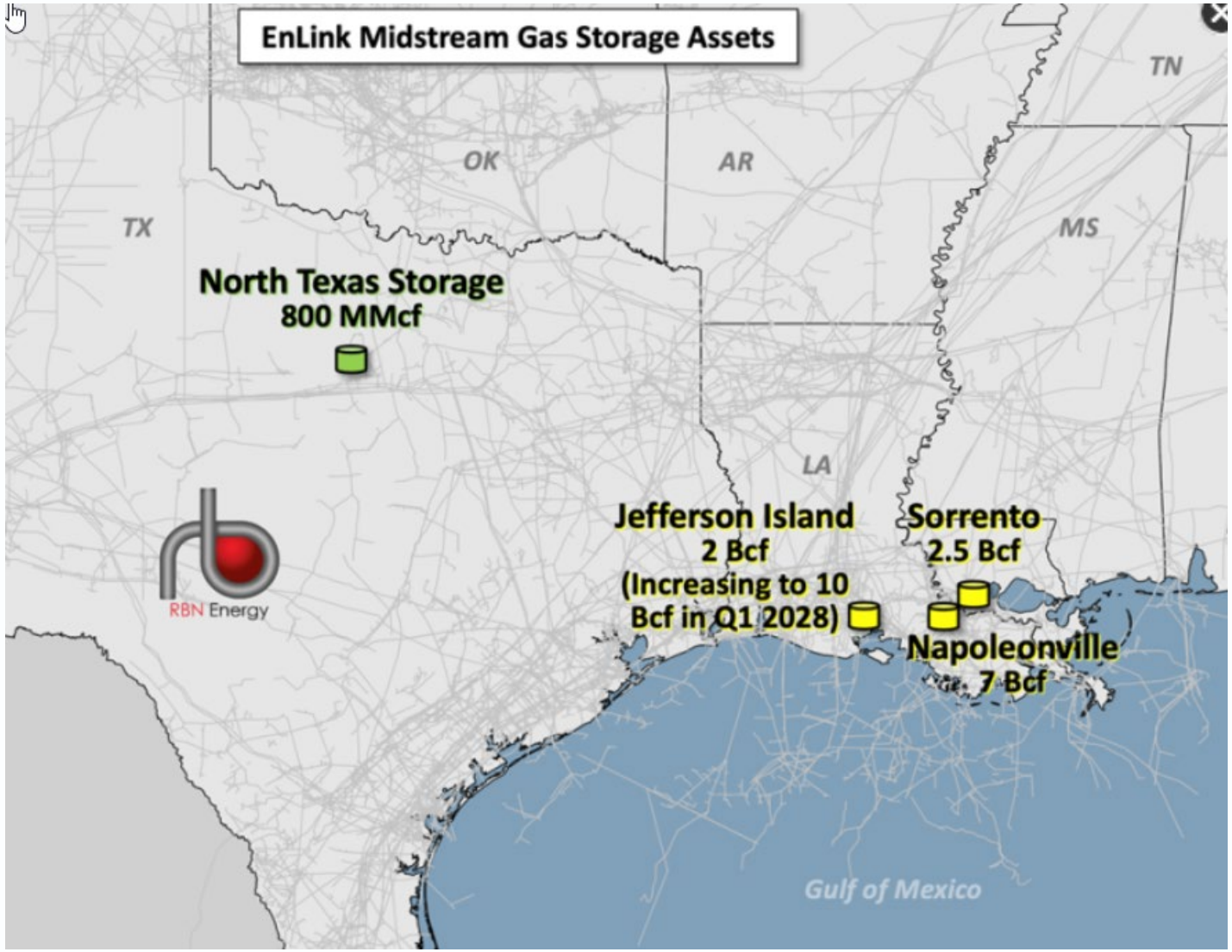
GPCM Case Study - Storage

Brownfield Storage Expansions

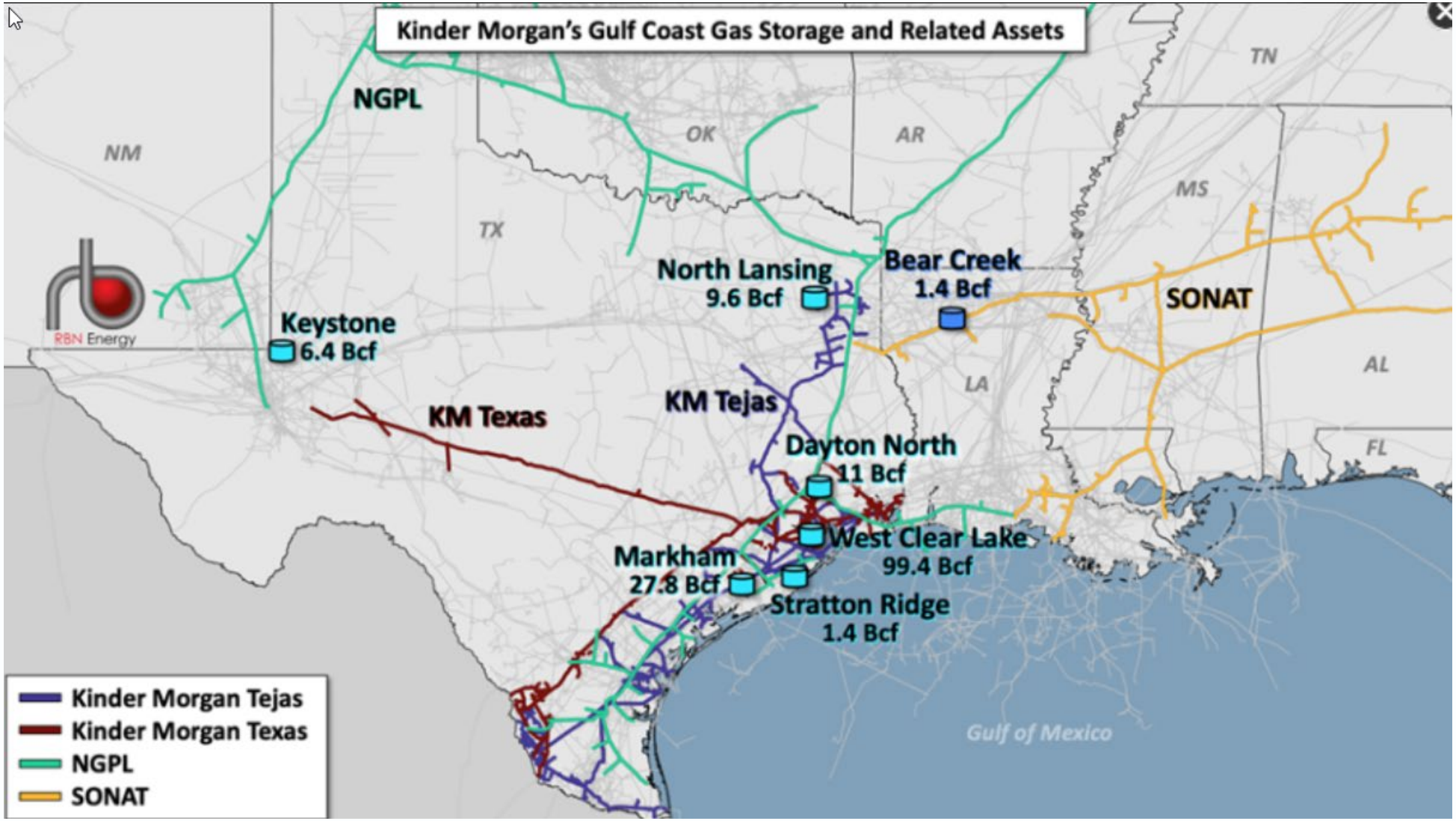


- **Markham**
  adding 6 BCF in Jun 2024
- **Golden Triangle**
  adding 8.2 BCF in Apr 2026
  Adding 6.2 BCF in Apr 2027
- **Tres Palacios**
  adding 6.5 BCF in Apr 2027
- **Jefferson Island**
  adding 4.27 BCF in Apr 2028
- **Mississippi Hub**
  adding 34 BCF over 4 years starting in 2028

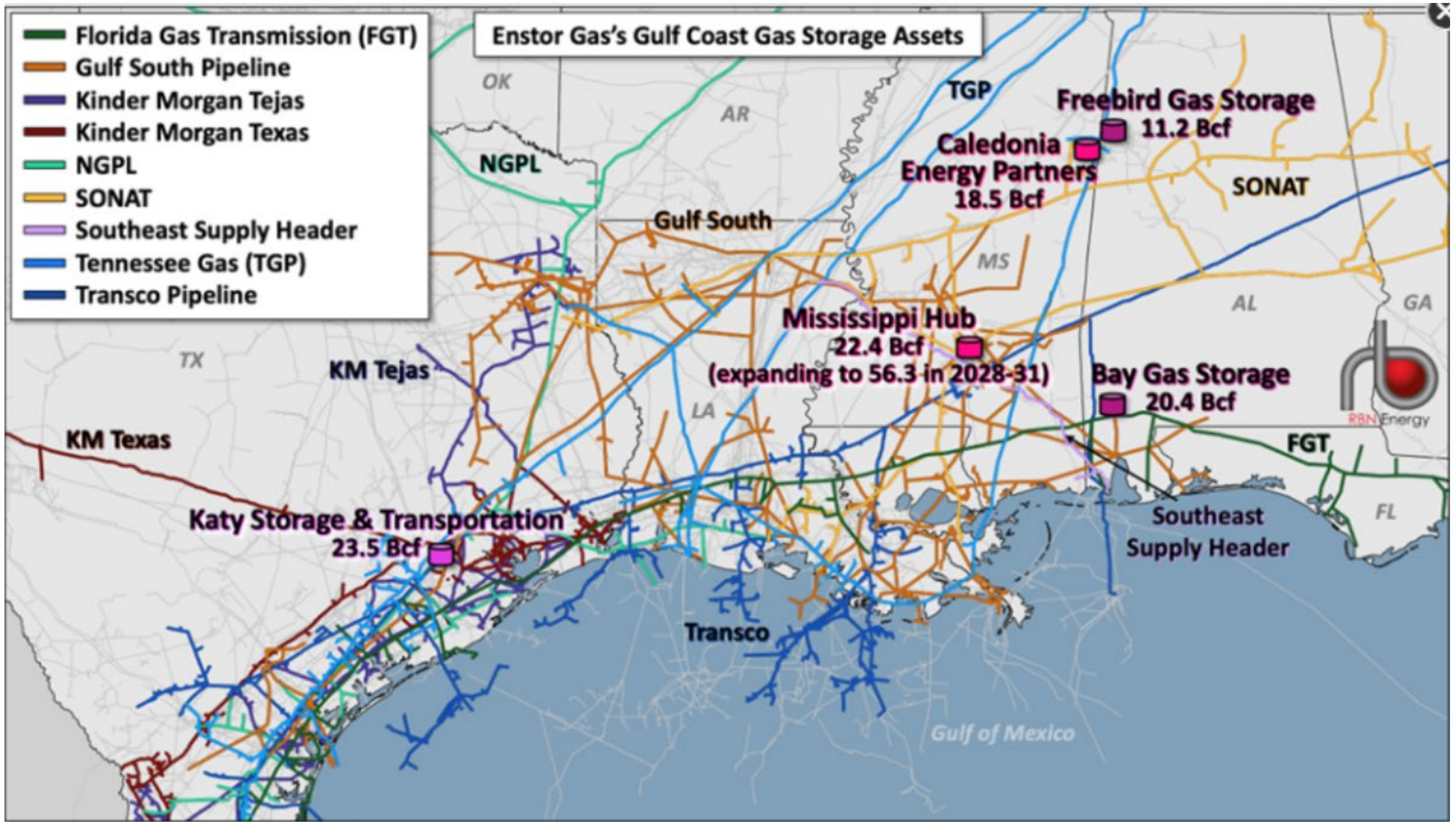
Jefferson Island Storage



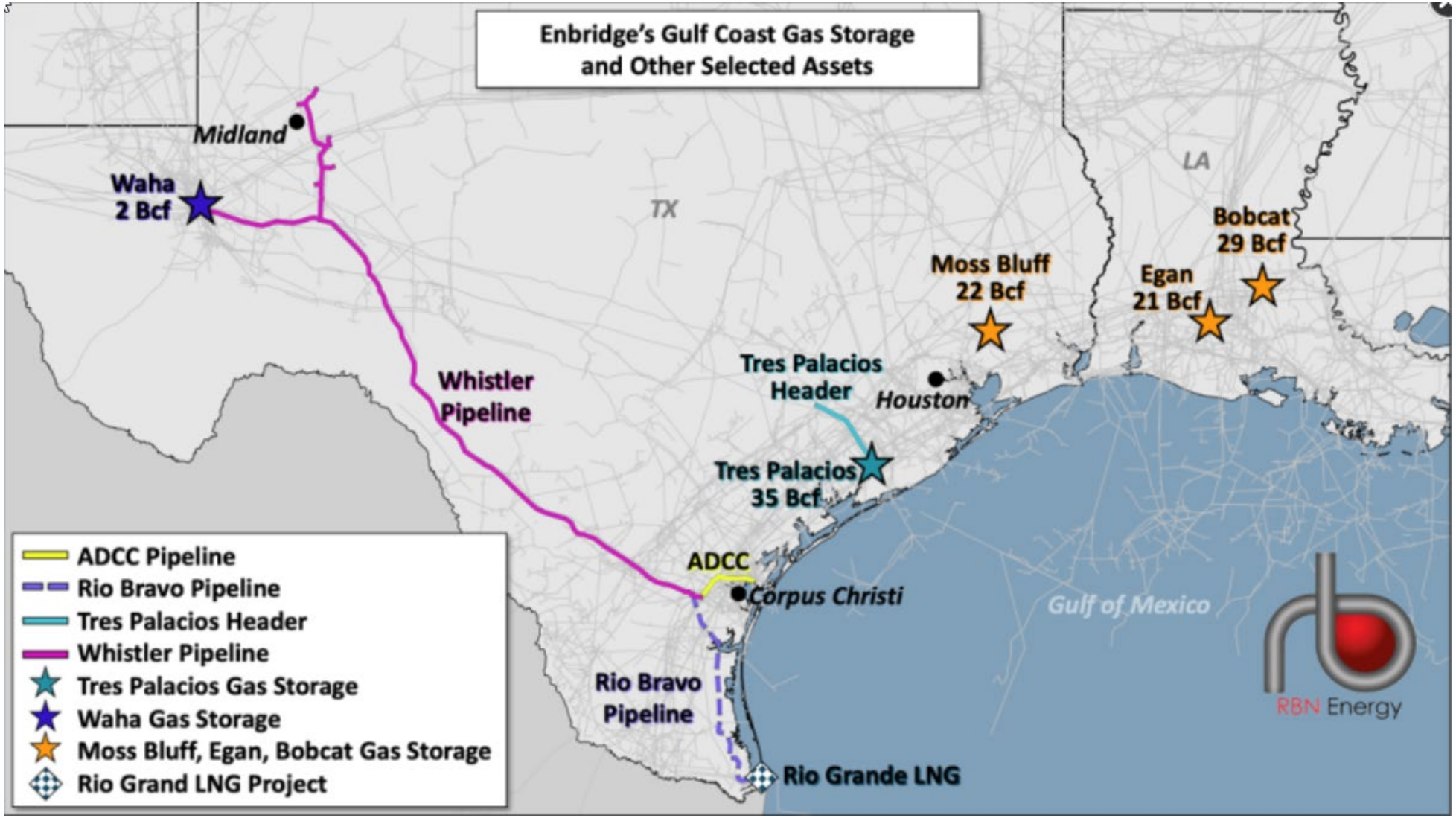
Markham Storage



Mississippi Hub Storage

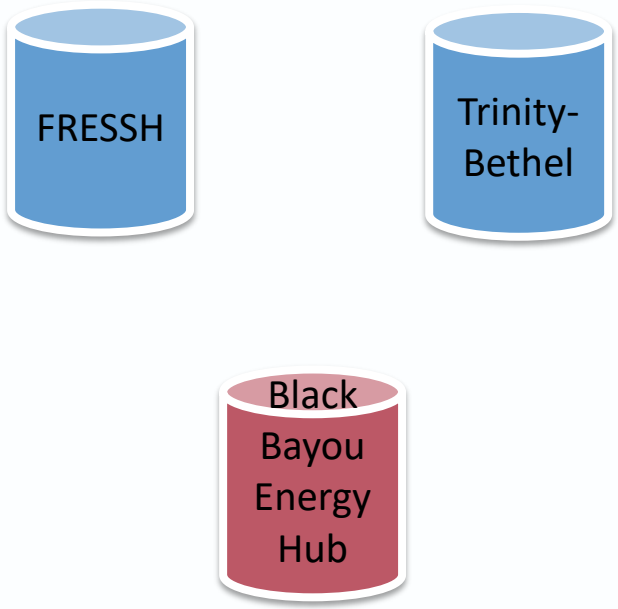


Tres Palacios Storage



GPCM Case Study - Storage

Greenfield Storage Additions



- **Freeport Energy Storage & Sequestration Hub (FRESSH)**

  adding 20 BCF in Jun 2028

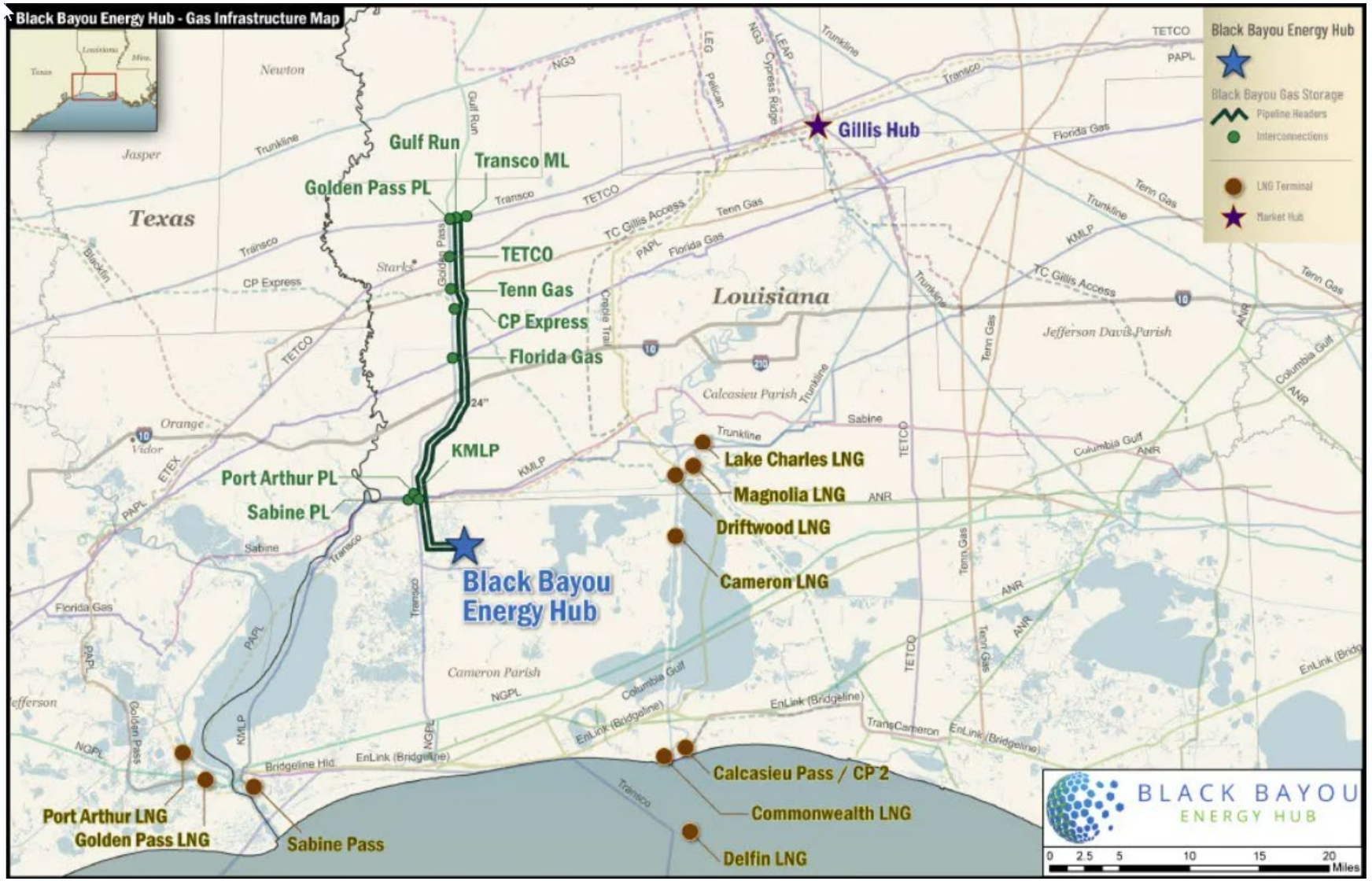
- **Trinity-Bethel Hub**

  adding 24 BCF in Apr 2025

- **Black Bayou Energy Hub**

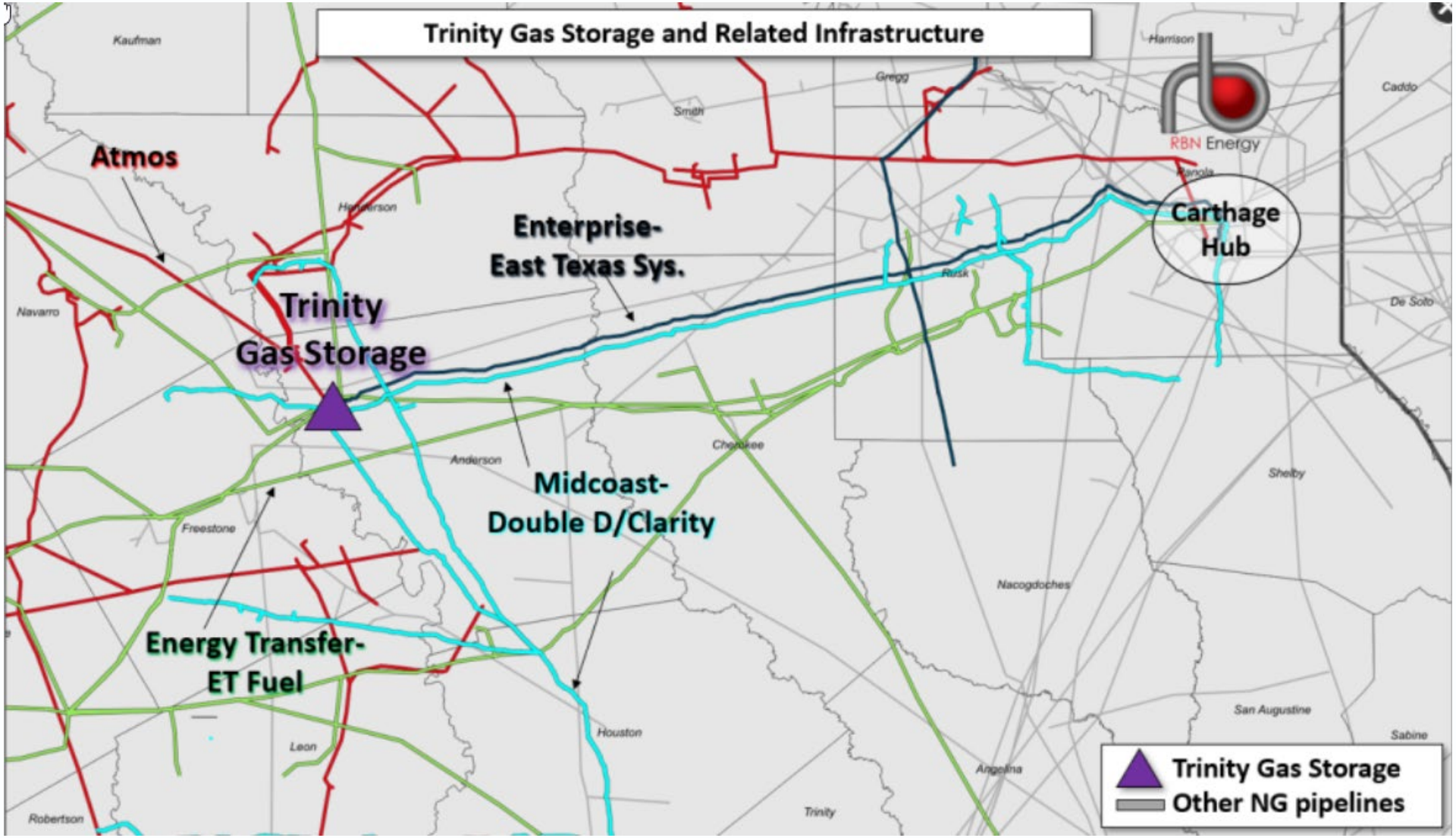
  adding 17.4 BCF in Nov 2028
  adding 17.4 BCF in Nov 2030

Black Bayou Energy Hub



Freeport Energy Storage & Sequestration Hub (FRESSH)

Trinity – Bethel Storage



GPCM Case Study – Storage Scenarios

24Q3base	Which includes Markham and all the new proposed storage additions
Roll Back Stor	Turns off all new storage additions with the exception of Markham

GPCM Case Study – Roll Back Stor Scenario

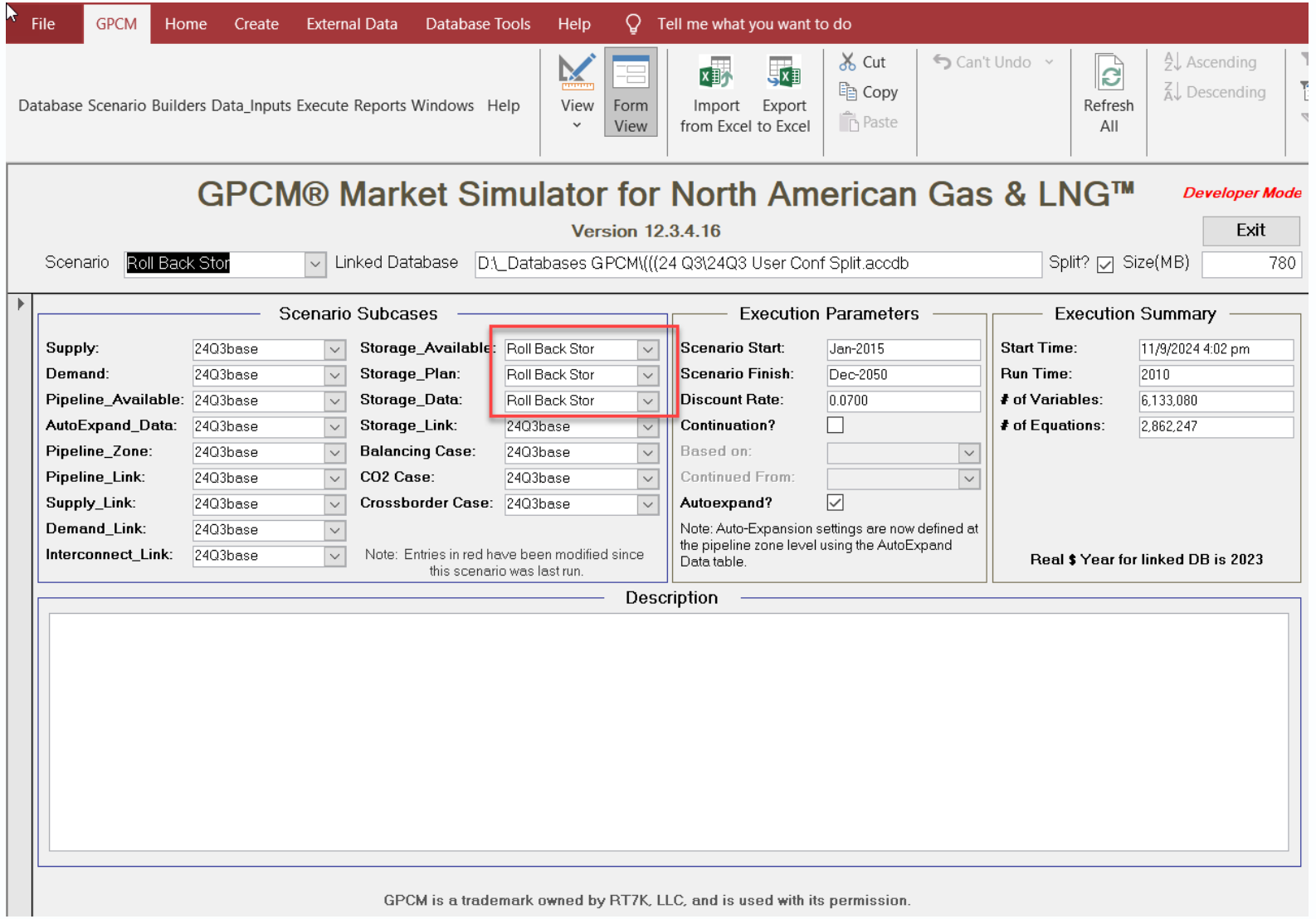
Turn off 3 Greenfield Storage

- Make new Storage Available case
- Turn off 3 storage facilities
- Select new Storage Available Case

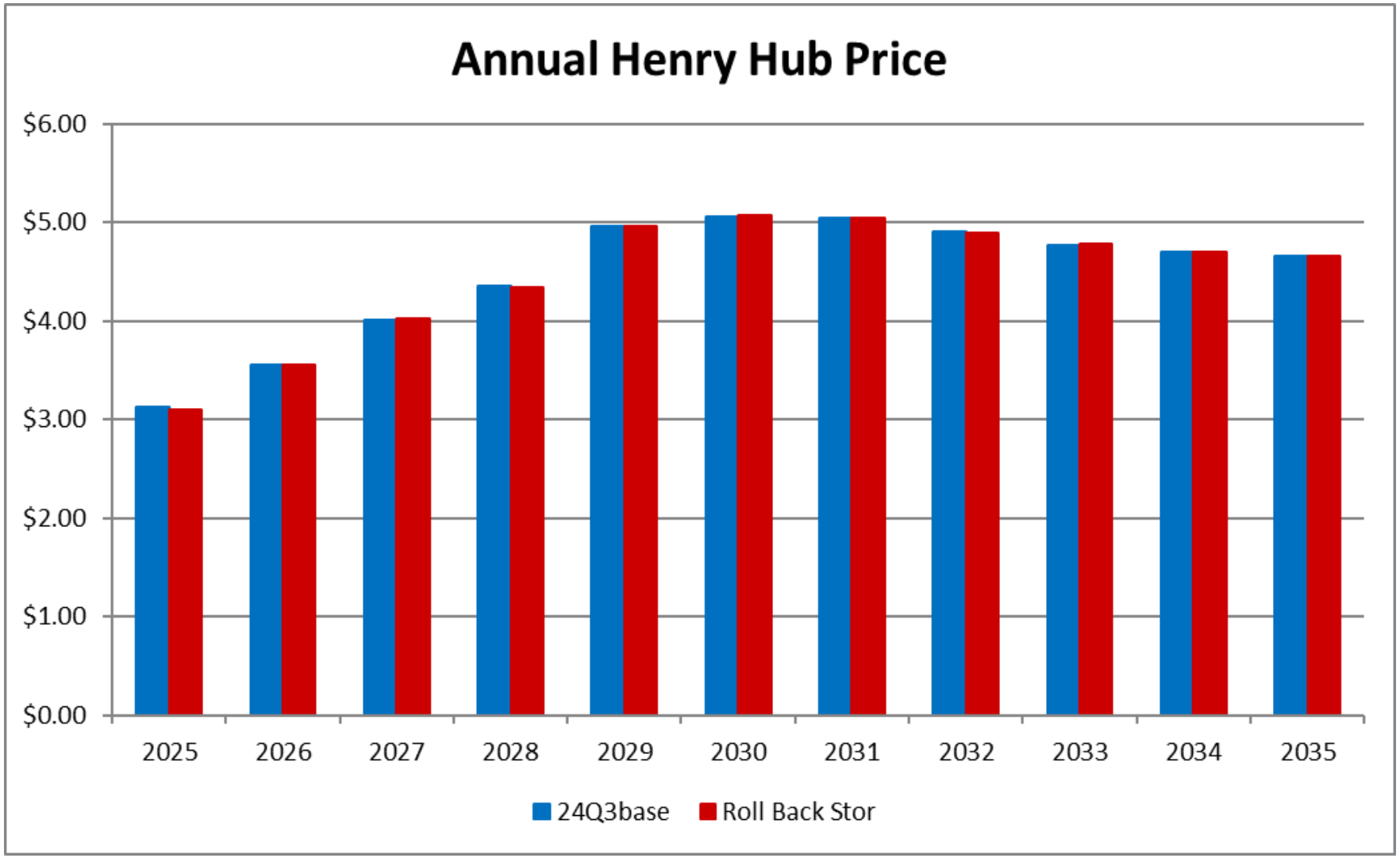
Change 4 Brownfield expansion effective dates

- Turn off all new storage additions with the exception of Markham by adding 100 years to the effective date
- Replace storage plan for all 4 with storage plan from 24Q2base
- Select new Storage Data & Storage Plan Cases

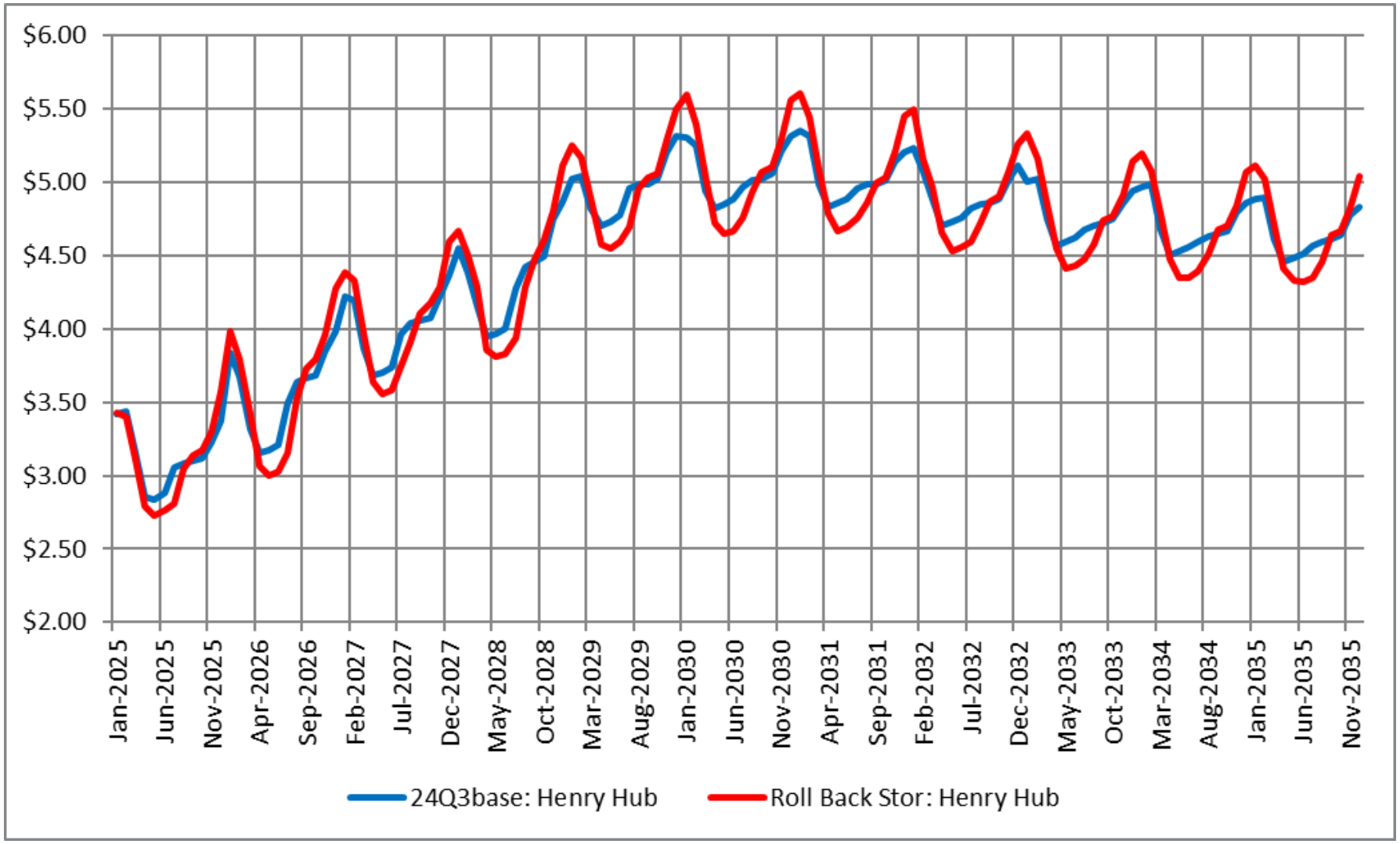
GPCM Case Study – Roll Back Stor Scenario



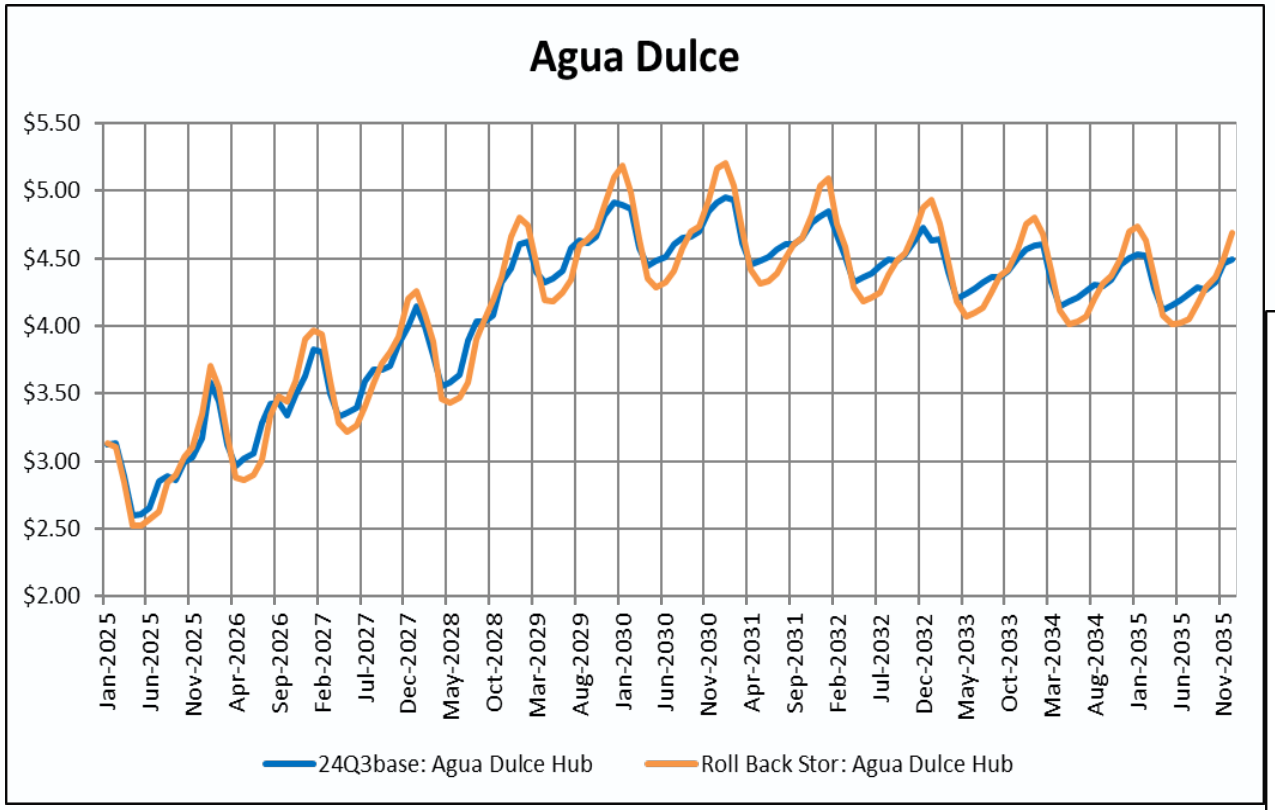
Annual Impact of Rolling Back Storage Additions on Henry Hub Prices

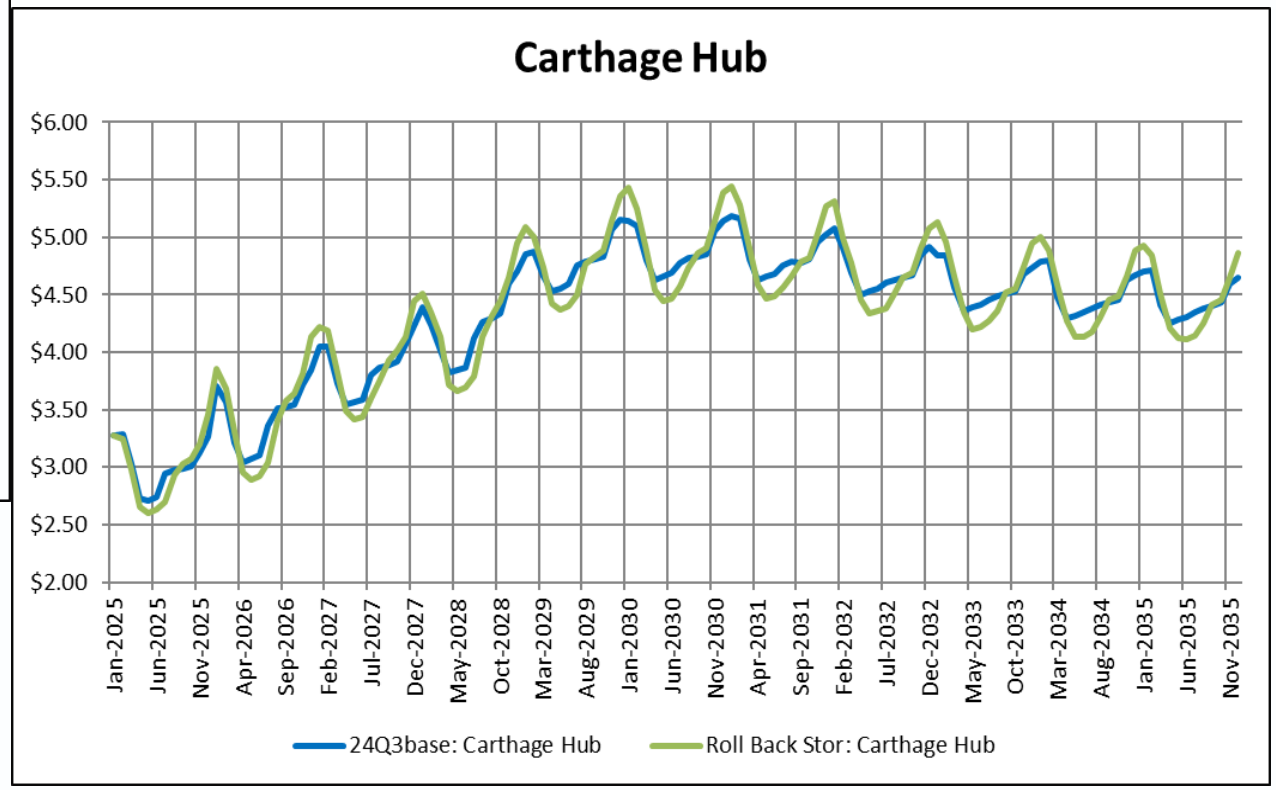


Seasonal Impact of Rolling Back Storage Additions on Henry Hub Prices[18]

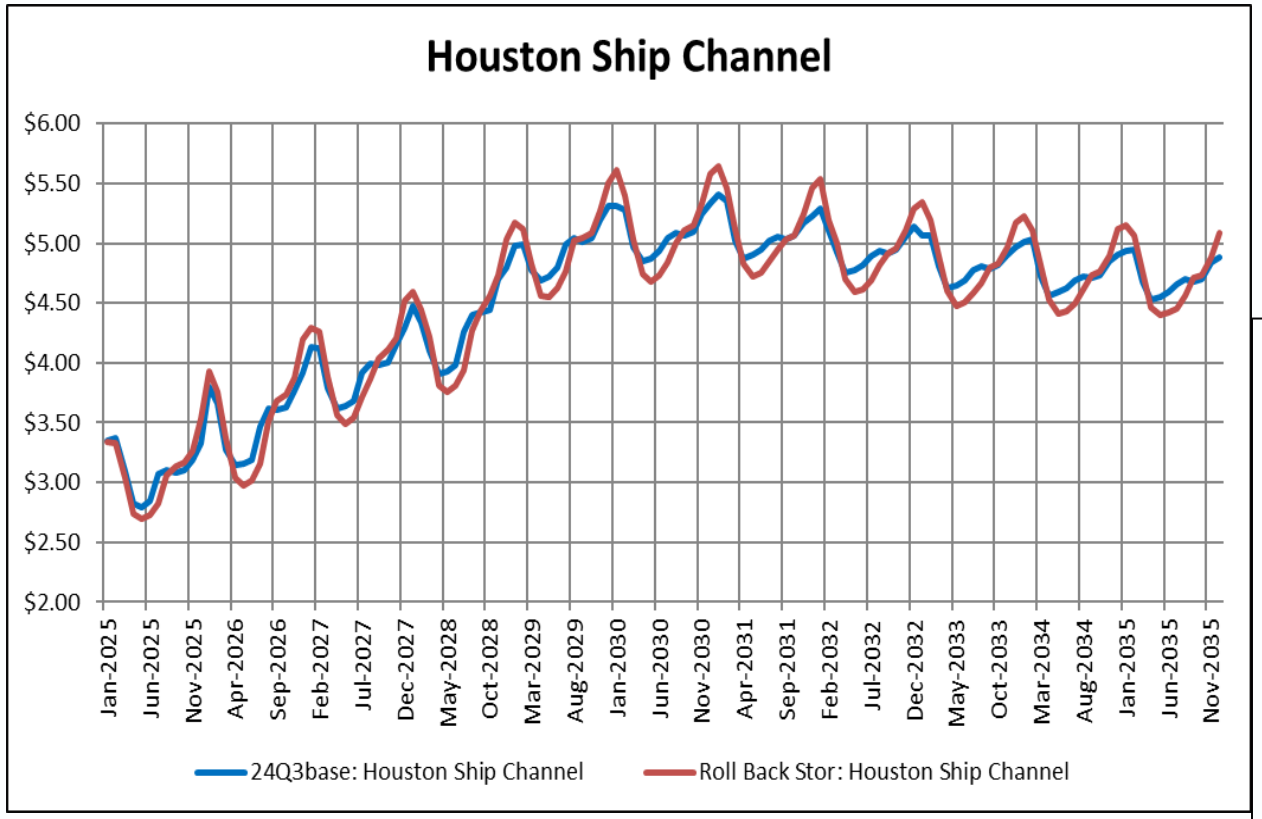


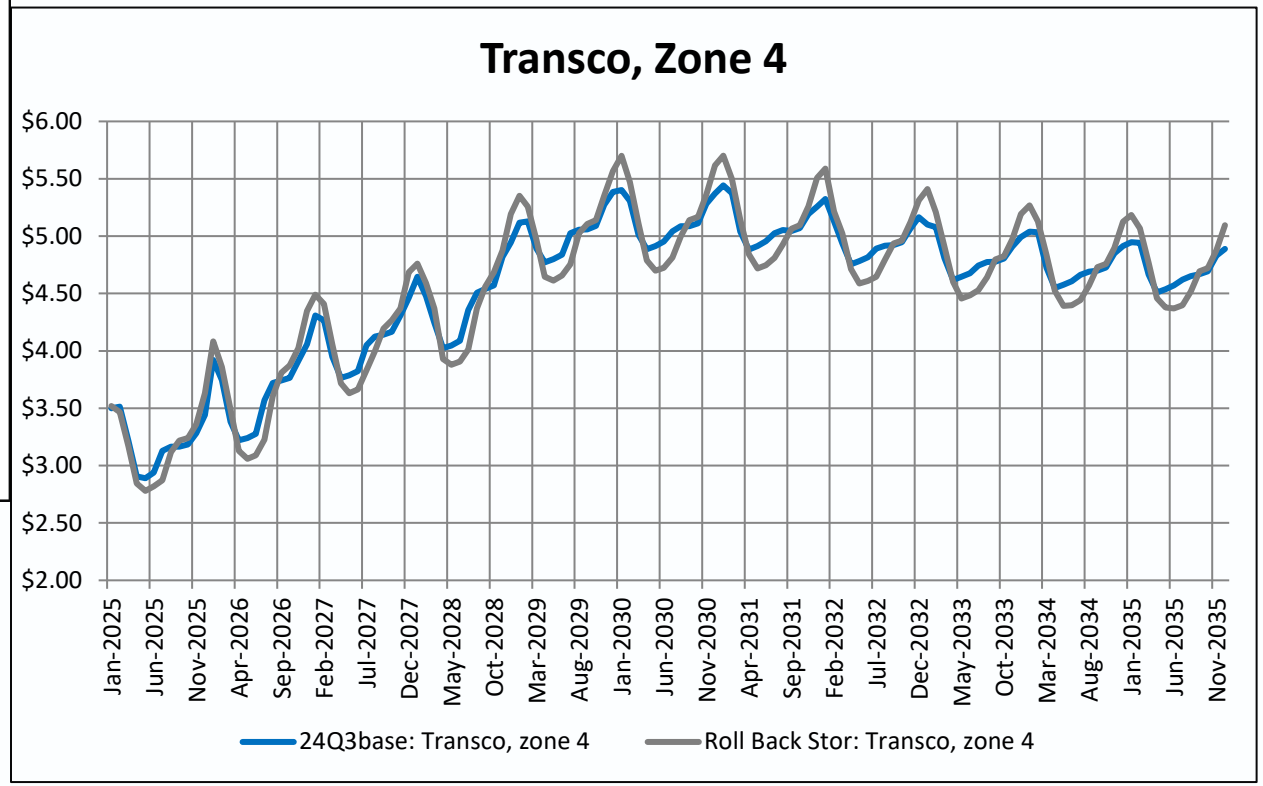
Storage Roll Back Impact on Agua Dulce & Carthage Hub



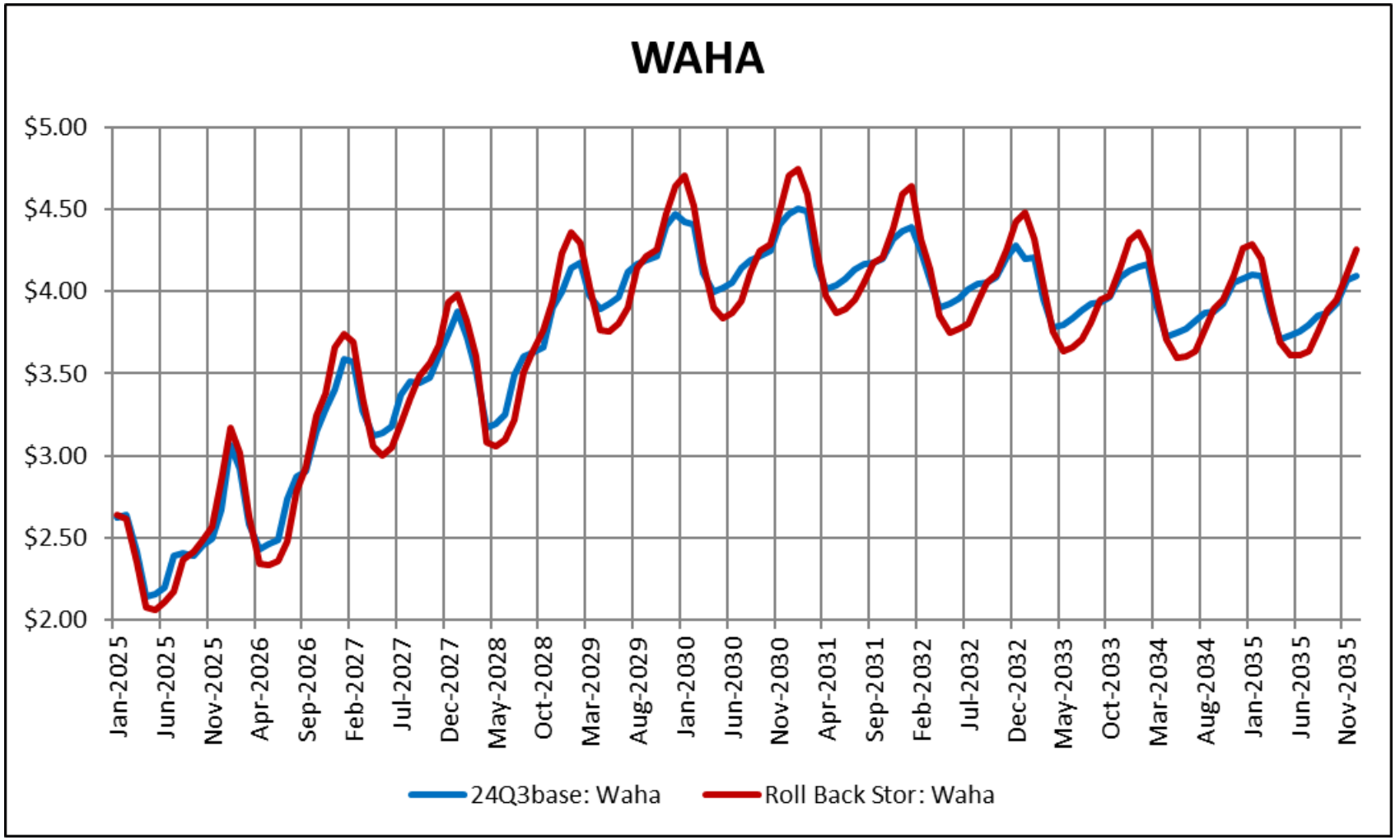


Storage Roll Back Impact on HSC & Transco Zone 4 Prices





Storage Roll Back Impact on Permian Supply Area Prices



GPCM Case Study - Storage

Summary

- The significant build-up of Gulf LNG Export Facilities adds another layer of seasonal and/or timing risk for tankers/demand that additional gulf-area storage can address
- Dallas-area AI/Data Center demand can be aided by near-by salt-dome storage
- Greenfield and Brownfield storage solutions are being aggressively developed – all developments are salt dome for optimal turns
- Significant smoothing of the winter/summer spread can be seen across the Gulf Coast pricing points – including Henry Hub

GPCM Case Study

Questions?

RBAC, Inc.

www.rbac.com

(281) 506-0588

contact@rbac.com

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**