Global Impacts on NA Gas Market

November 19, 2025

The Leader in Energy Market Simulation Systems

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Global Impacts on NA Gas Market

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Global Impacts on NA Gas Markets

1. Global Drivers
2. G2M2 Scenario Set-up
3. G2M2 Scenario Results
4. GPCM Scenario Development
5. LNG Exports
6. Prices
7. Supply
8. Demand

Global Drivers

- Rapid increase in US LNG Export Terminal capacity
  - Doubling of capacity from 2025 to 2030
  - Trump Admin open window for FID pursuit
  - Strong push to get FID before potential policy change → 2028 elections
- Other regions moving toward increased export capacity
  - Middle East
  - Africa
- Growing concerns of Global Gas supply glut in early 2030s

Global Drivers

- What might change the potential supply glut dynamics?
  - Increased demand?
    - From where?
  - Slower / delayed pipe and LNG export projects?
    - What projects?
- Could these individually lead to supply glut ease?
- Are both needed?
- What are the implications globally and for North America?
- How do you assess such questions?
- **Welcome to GPCM and G2M2 integration!**

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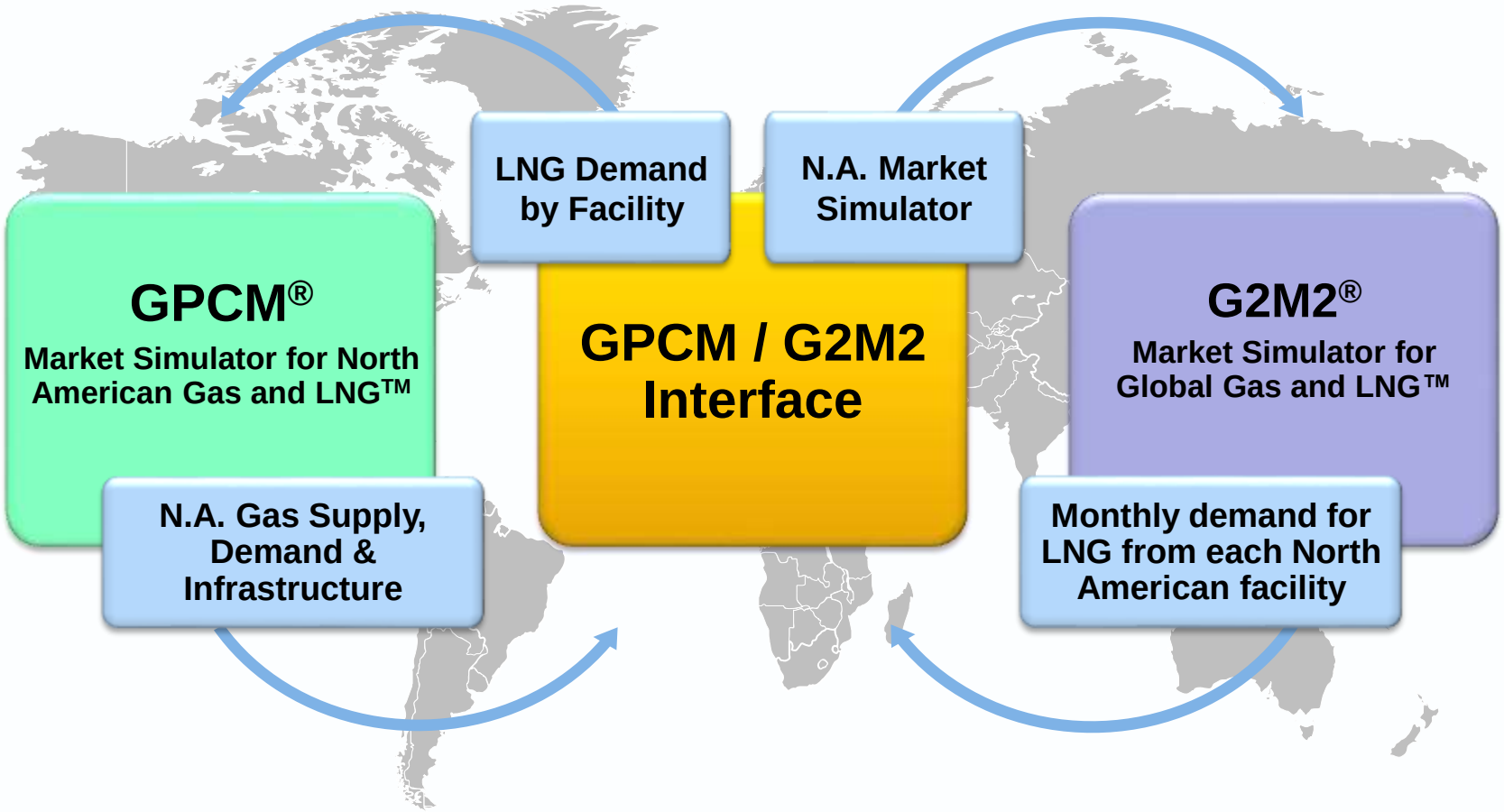
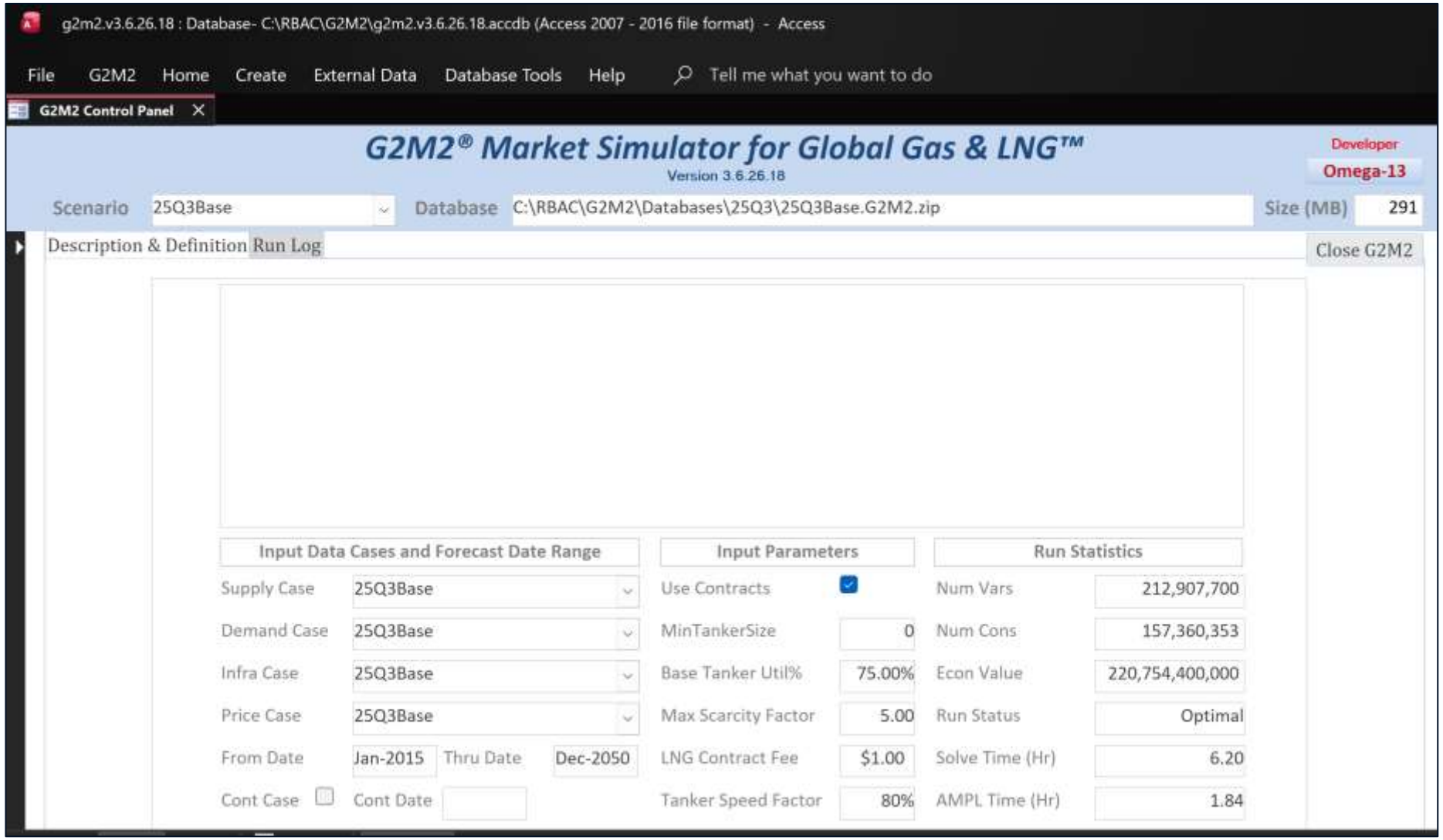
Consistency with the Global Gas Market

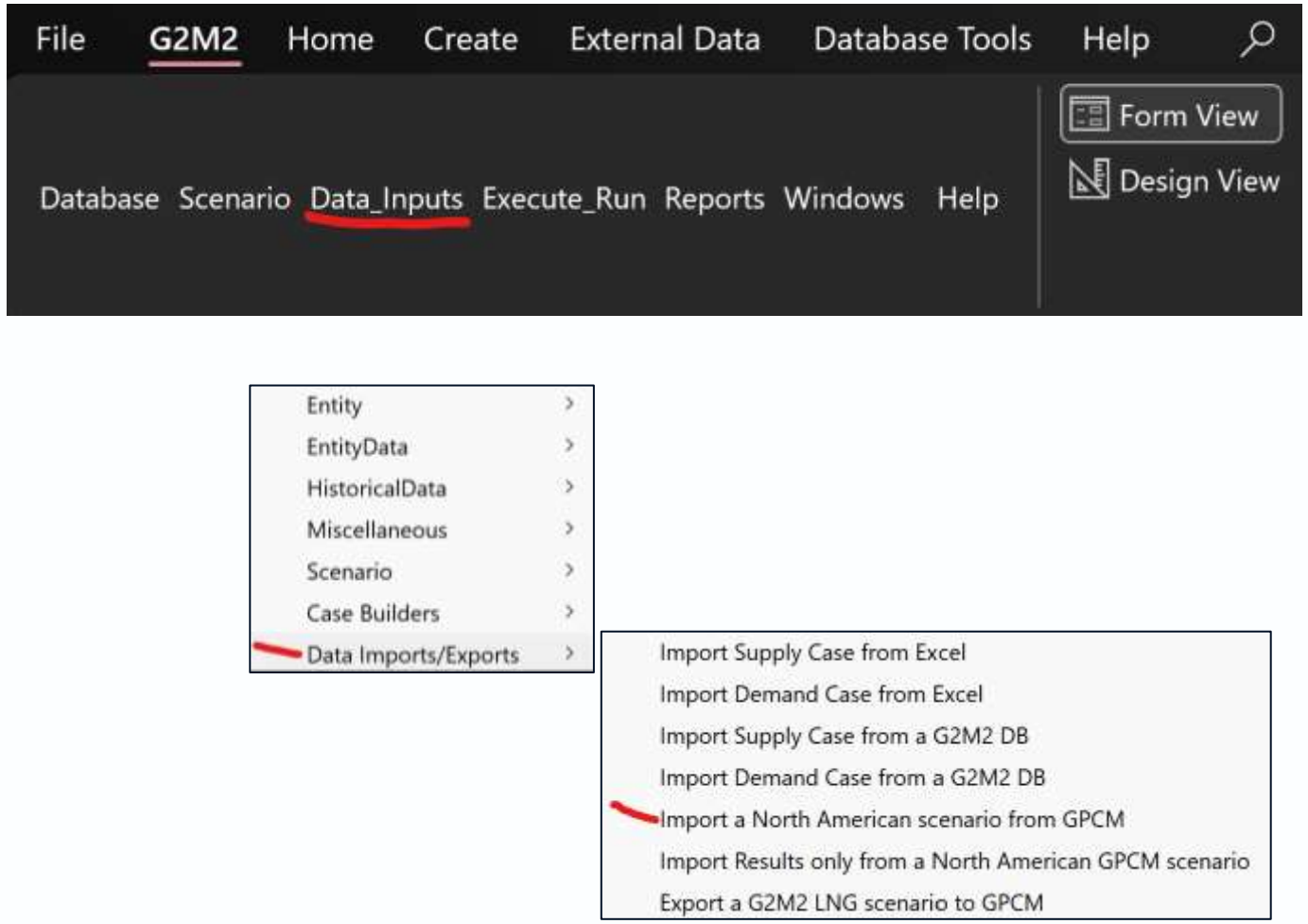
Integration of GPCM with the G2M2 Market Simulator for Global Gas and LNG



G2M2 User Interface



Importing a GPCM Scenario



Census Region Level of Granularity for North America

GPCM → G2M2 North America Integration

- **Geopolitical Units (GPUs):**
  G2M2 aggregates all North American fundamentals to GPU level (U.S. Census Divisions + GPCM Canada/Mexico regions).
- **Supply & Demand:**
  GPCM supply and demand curves are imported and **aggregated by sector and GPU**.
- **Pipelines:**
  All GPCM pipelines included; **interstate/interprovincial lines are grouped into GPU-to-GPU segments**.
- **Storage:**
  Each storage facility is modeled individually, linked to GPU-level balances.
- **LNG Terminals:**
  All LNG import/export terminals appear in G2M2 as **individual facilities with** facility level **capacity** matching **GPCM Assumptions**.

LNG: Input in GPCM, Output in G2M2

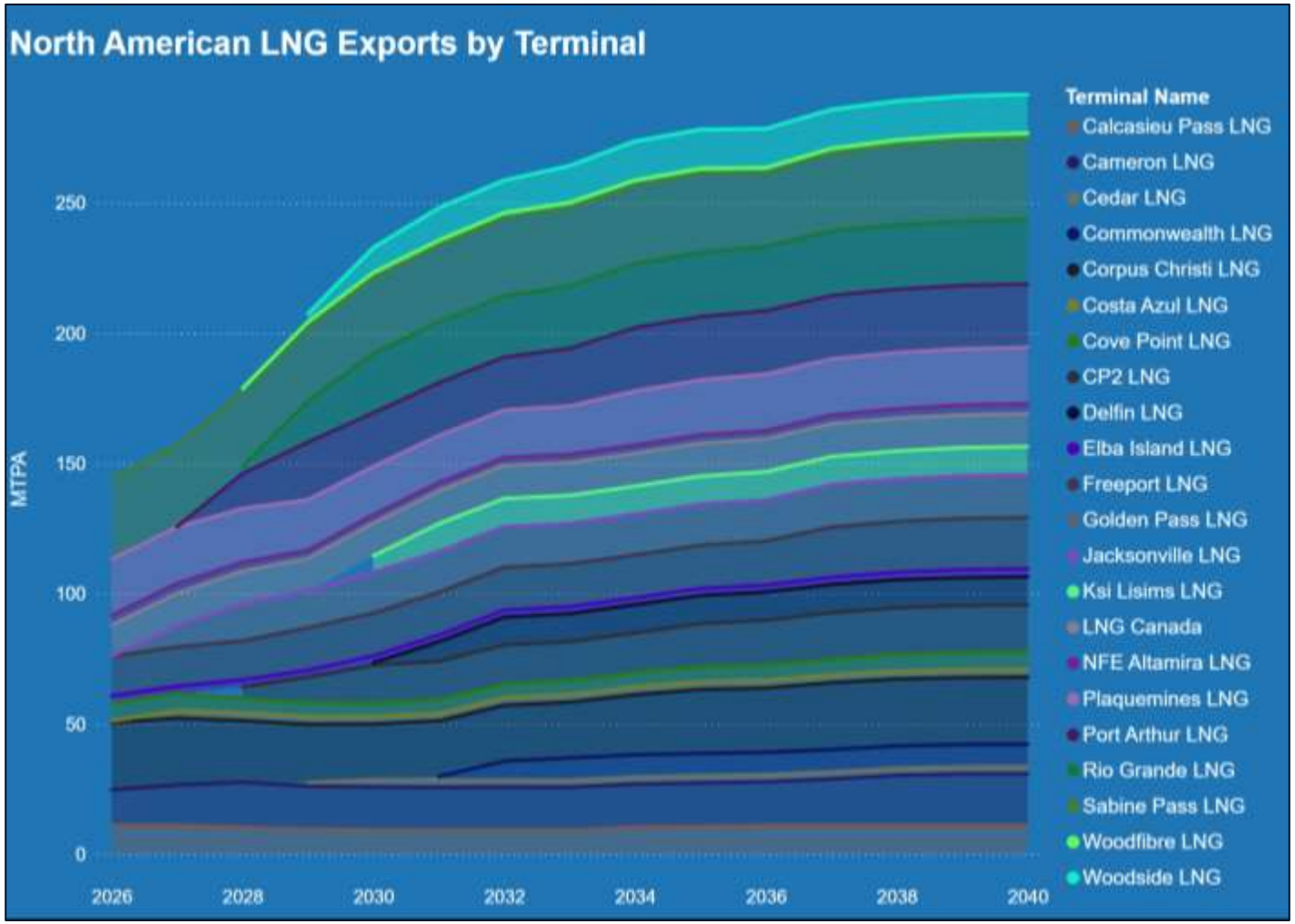
GPCM vs G2M2 Treatment of LNG

- **GPCM: LNG Volumes** determined from user-set **demand curves**
  - LNG exports are determined by **demand curves with price sensitivity**, similar to industrial or electric sectors.
  - LNG regas facilities are modeled with **supply curves**, just like other North American producing regions.
- **G2M2: LNG volumes** determined by **capacity** and **global gas balances**:
  - LNG import and export terminals have **capacity and cost parameters only** (no supply or demand curves).
  - Actual LNG flows are **solved endogenously** based on **global supply–demand balances** at the **GPU level**.

G2M2 LNG Exports Set Demand Curves in GPCM

GPCM ↔ G2M2 Integration Process

- **Step 1 — Import GPCM Data into G2M2**
  - GPCM provides all **North American supply, demand, and infrastructure** assumptions, mapped into G2M2 at the **GPU level**.
- **Step 2 — Run G2M2**
  - G2M2 solves the **global supply–demand balance** and determines **monthly LNG export volumes** for each facility.
- **Step 3 — Update GPCM**
  - The solved **monthly LNG exports** are fed back into GPCM to **set or update LNG demand curves**.
- **Outcome — Maintain Consistency**
  - This loop keeps both models aligned and ensures **GPCM's LNG export** assumptions reflect global **supply–demand realities**.



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Scenario Set-up

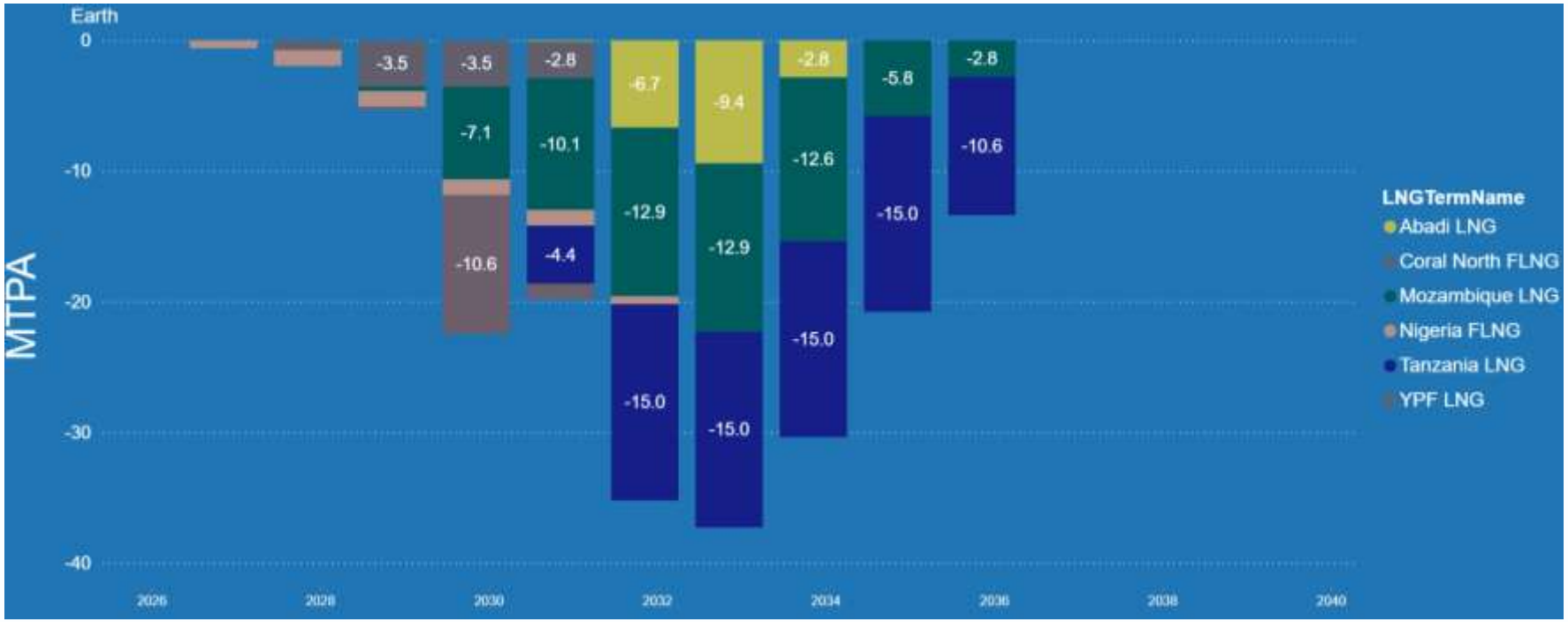
Scenario: Asia Growth, Supply Delay

- **Delayed online dates** for higher-risk LNG projects without FID
- **Postponed startup** of higher-risk pipeline projects in India and China
- **Stronger demand growth** in India and China through 2040

LNG Export Delays

- Delayed **six** Non-North American LNG Export projects
- Projects in **Africa** accounts for most of the **delayed capacity**

Change in LNG export Capacity Compared to our Base case



Pipeline Assumption

- **Delayed TAPI Pipeline**
  - 30 bcm Turkmenistan → India pipeline
  - Security and transit risks in Afghanistan
  - Unresolved financing + routing issues
  - Under discussion since the 1990s
  - Shifted to post-2040
- **Delayed Power of Siberia 2**
  - 50 bcm Russia–China pipeline
  - Pricing + contract negotiations not finalized
  - High geopolitical risk and sanctions-related constraints
  - Mongolia route and terrain challenges
  - China demand timing still uncertain

High Demand

High Asia Demand Scenario

- **China:** demand increased by **~55 BCM in 2035** and **~72 BCM in 2040**
- **India:** demand increased by **~58 BCM in 2035** and **~89 BCM in 2040**
- **Total** increase of **161 BCM or 15.6 Bcfd**
- Increases informed by estimates from **OIES** and **India's PNGRB**

70 BCM = 6.8 Bcfd

80 BCM = 7.7 Bcfd

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Impacts to US LNG (MTPA)

U.S. LNG Exports Increase the Most

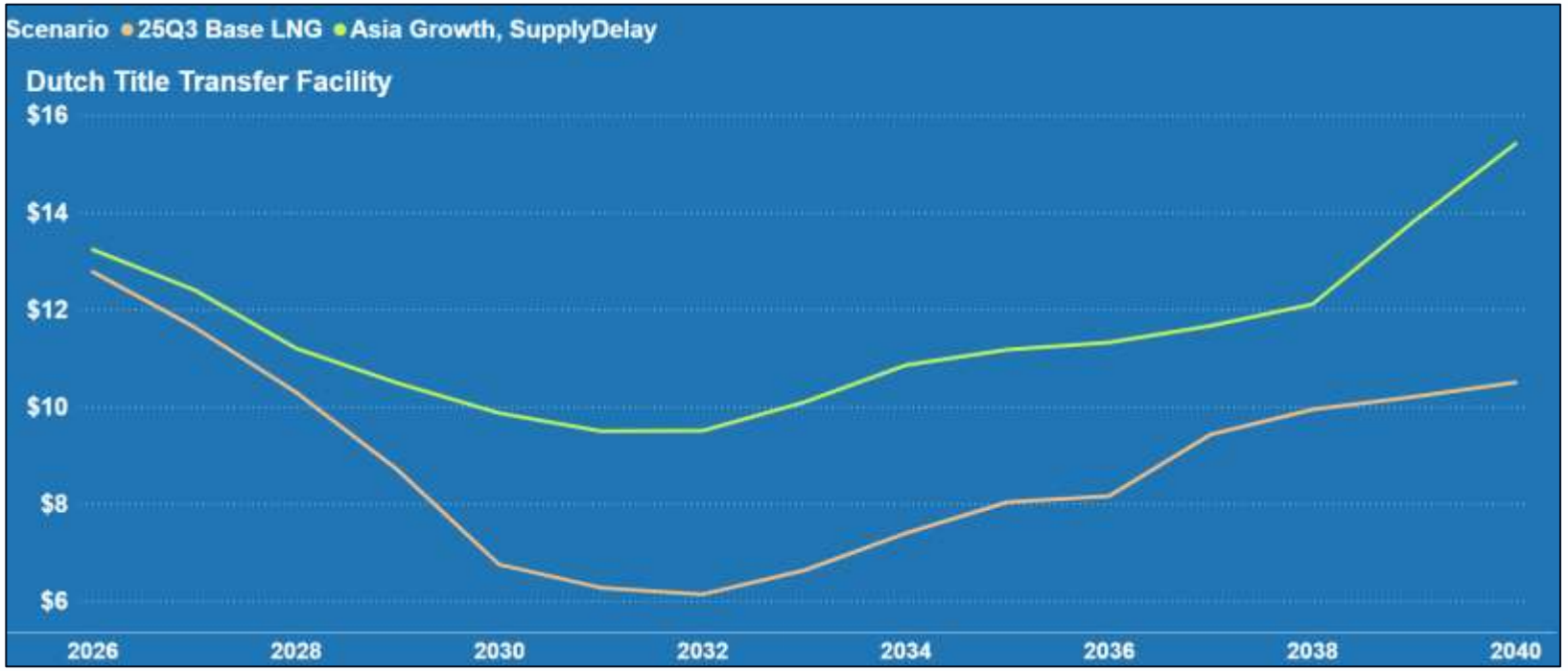
- **Limited impact before 2033**, when exports rise by **~7.9 MTPA** *(≈10.7 bcm or 1.0 Bcf/d)*
- **Large increase in the late 2030s**, adding **~30 MTPA** *(≈4.0 Bcf/d)*

5 MTPA = 6.8 BCM = 0.66 Bcfd
30 MTPA = 41 BCM = 3.95 Bcfd

Price Response

High demand and **lower supply** have **limited impact** on U.S. LNG exports in 2030–2033, but **prices rise noticeably** during this period

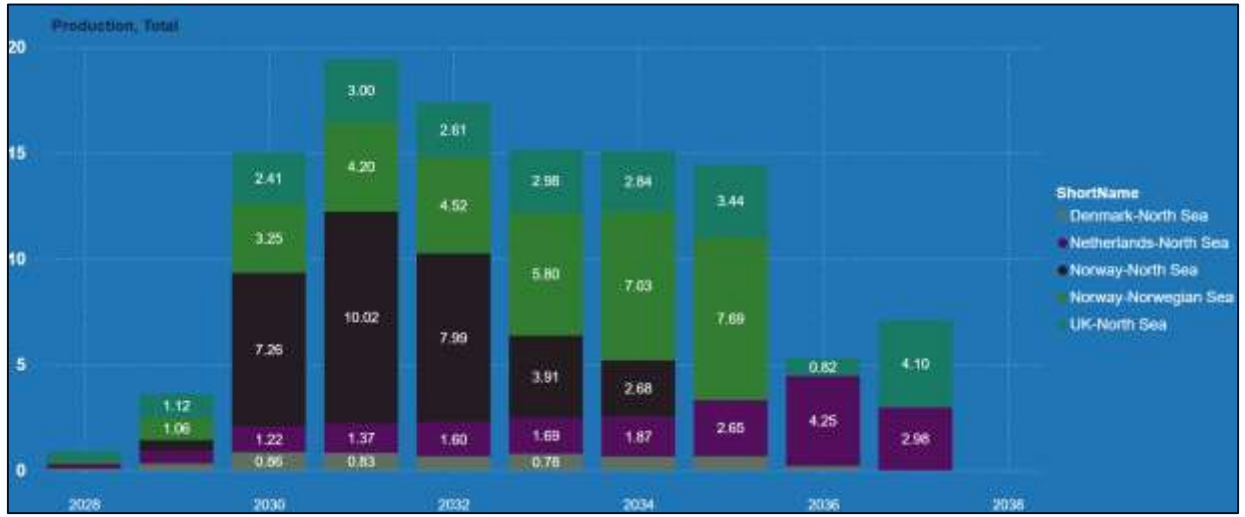
Tighter market is expected to keep prices higher at TTF (Real US$/MMBTU)



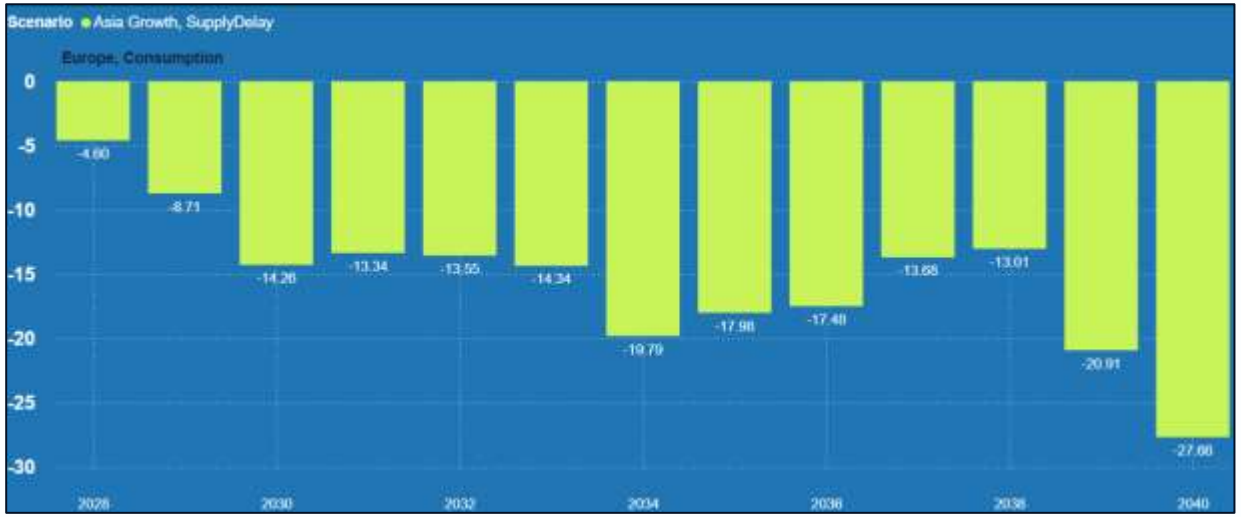
Price-Driven: More North Sea Production, Less Demand

Higher prices stimulate **additional** North Sea **production** while also **reducing European** natural gas **demand**

Change in North Sea production by Producing Country (BCM)



High Prices Lower Natural Gas Demand (BCM)

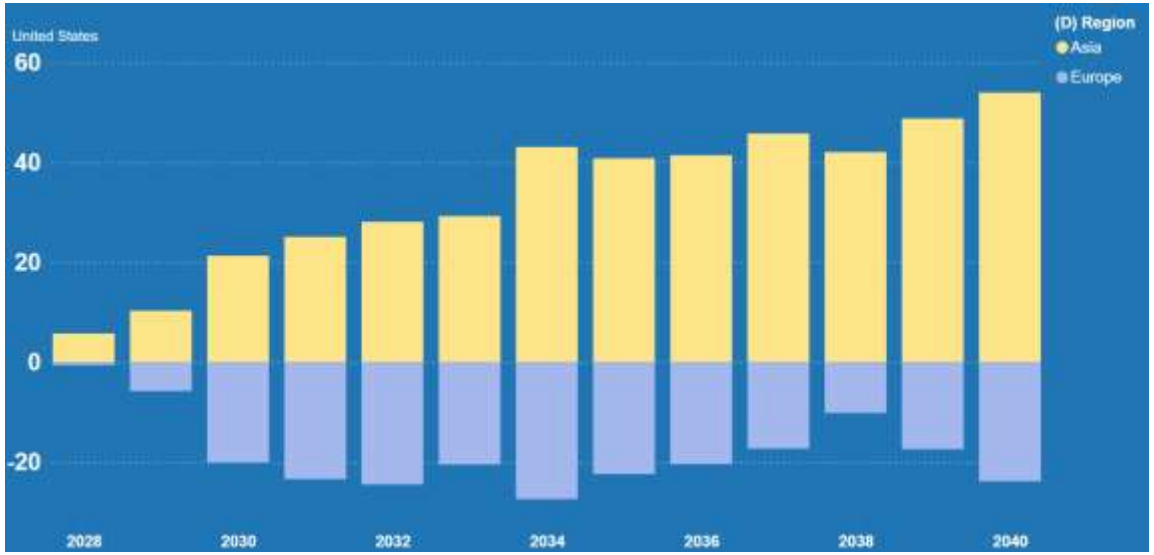


Change in US LNG Exports from Base Case

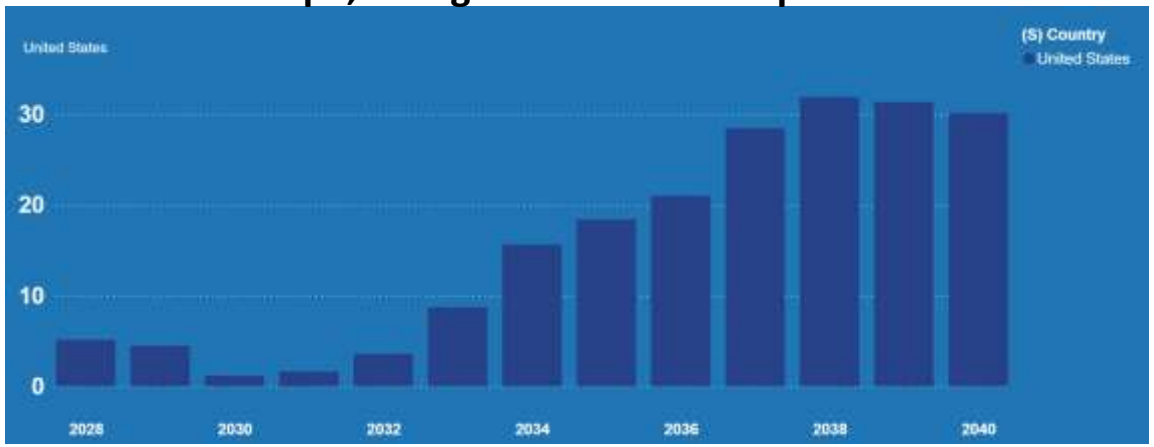
U.S. LNG Export Impacts

- **Overall U.S. LNG exports rise** in the *Asia Growth, Supply Delay* scenario, though higher prices limit some demand growth.
- **European LNG imports decline** due to elevated prices.
- **Stronger Asian demand more than offsets Europe's decline**, redirecting additional U.S. LNG toward Asia.

Change in LNG Flows from U.S. to Europe and Asia



Asia offsets Europe, lifting total U.S. LNG exports



Key Takeaways

- **Takeaways**
  - Tighter balances push **global LNG prices higher**.
  - Higher prices lead to **more European production** and **lower European demand**.
  - Post-2033, **higher demand** begins to **materially impact** U.S. LNG **exports**

A global, price-responsive model like G2M2 captures these feedback effects, showing that demand increases do *not* translate into a simple 1-to-1 rise in LNG flows.

G2M2 Scenario LNG Exports are Inputs to GPCM

Now that we have developed a global gas scenario, the new LNG volumes are ready to use as inputs to GPCM

Scenario	11/1/2025	12/1/2025	1/1/2026	2/1/2026	3/1/2026	4/1/2026	5/1/2026	6/1/2026	7/1/2026	8/1/2026	9/1/2026	10/1/2026	11/1/2026	12/1
Asia Growth, SupplyDelay	**11.35**	**11.84**	**11.95**	**10.91**	**12.19**	**11.91**	**12.32**	**11.94**	**12.37**	**12.40**	**11.78**	**12.05**	**12.07**	
Canada	**0.52**	**0.64**	**0.75**	**0.77**	**0.96**	**1.04**	**1.07**	**1.04**	**1.07**	**1.07**	**1.04**	**1.07**	**1.04**	
Cedar LNG														
Ksi Lisims LNG														
LNG Canada	0.52	0.64	0.75	0.77	0.96	1.04	1.07	1.04	1.07	1.07	1.04	1.07	1.04	
Woodfibre LNG														
Mexico	**0.25**	**0.27**	**0.28**	**0.26**	**0.30**	**0.30**	**0.32**	**0.33**	**0.37**	**0.40**	**0.41**	**0.44**	**0.46**	
Costa Azul LNG								0.02	0.05	0.08	0.10	0.12	0.15	
NFE Altamira LNG	0.25	0.27	0.28	0.26	0.30	0.30	0.32	0.31	0.32	0.32	0.31	0.32	0.31	
United States	**10.58**	**10.93**	**10.93**	**9.87**	**10.93**	**10.58**	**10.93**	**10.58**	**10.93**	**10.93**	**10.33**	**10.53**	**10.58**	
Calcasieu Pass LNG	0.90	0.93	0.93	0.84	0.93	0.90	0.93	0.90	0.93	0.93	0.90	0.93	0.90	
Cameron LNG	1.12	1.16	1.16	1.05	1.16	1.12	1.16	1.12	1.16	1.16	1.12	1.16	1.12	
Commonwealth LNG														
Corpus Christi LNG	2.12	2.19	2.19	1.97	2.19	2.12	2.19	2.12	2.19	2.19	2.12	2.19	2.12	
Cove Point LNG	0.60	0.62	0.62	0.56	0.62	0.60	0.62	0.60	0.62	0.62	0.36	0.23	0.60	
CP2 LNG														
Delfin LNG														
Elba Island LNG	0.24	0.25	0.25	0.23	0.25	0.24	0.25	0.24	0.25	0.25	0.24	0.25	0.24	
Freeport LNG	1.24	1.28	1.28	1.16	1.28	1.24	1.28	1.24	1.28	1.28	1.24	1.28	1.24	
Golden Pass LNG														
Jacksonville LNG	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Kenai LNG	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Plaquemines LNG	1.78	1.83	1.83	1.66	1.83	1.78	1.83	1.78	1.83	1.83	1.78	1.83	1.78	
Port Arthur LNG														
Rio Grande LNG														
Sabine Pass LNG	2.57	2.65	2.65	2.40	2.65	2.57	2.65	2.57	2.65	2.65	2.57	2.65	2.57	
Woodside LNG														
Total	**11.35**	**11.84**	**11.95**	**10.91**	**12.19**	**11.91**	**12.32**	**11.94**	**12.37**	**12.40**	**11.78**	**12.05**	**12.07**	

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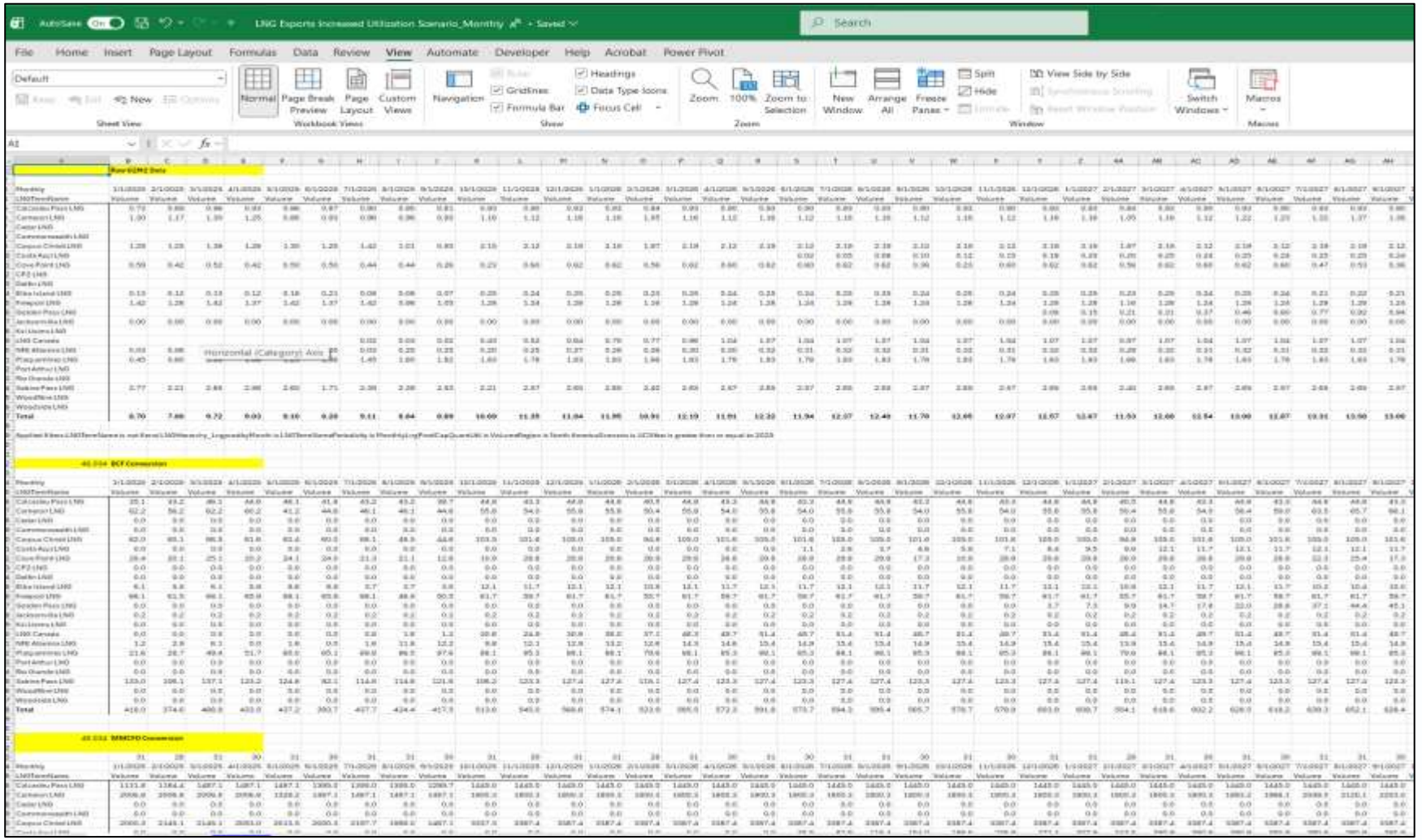
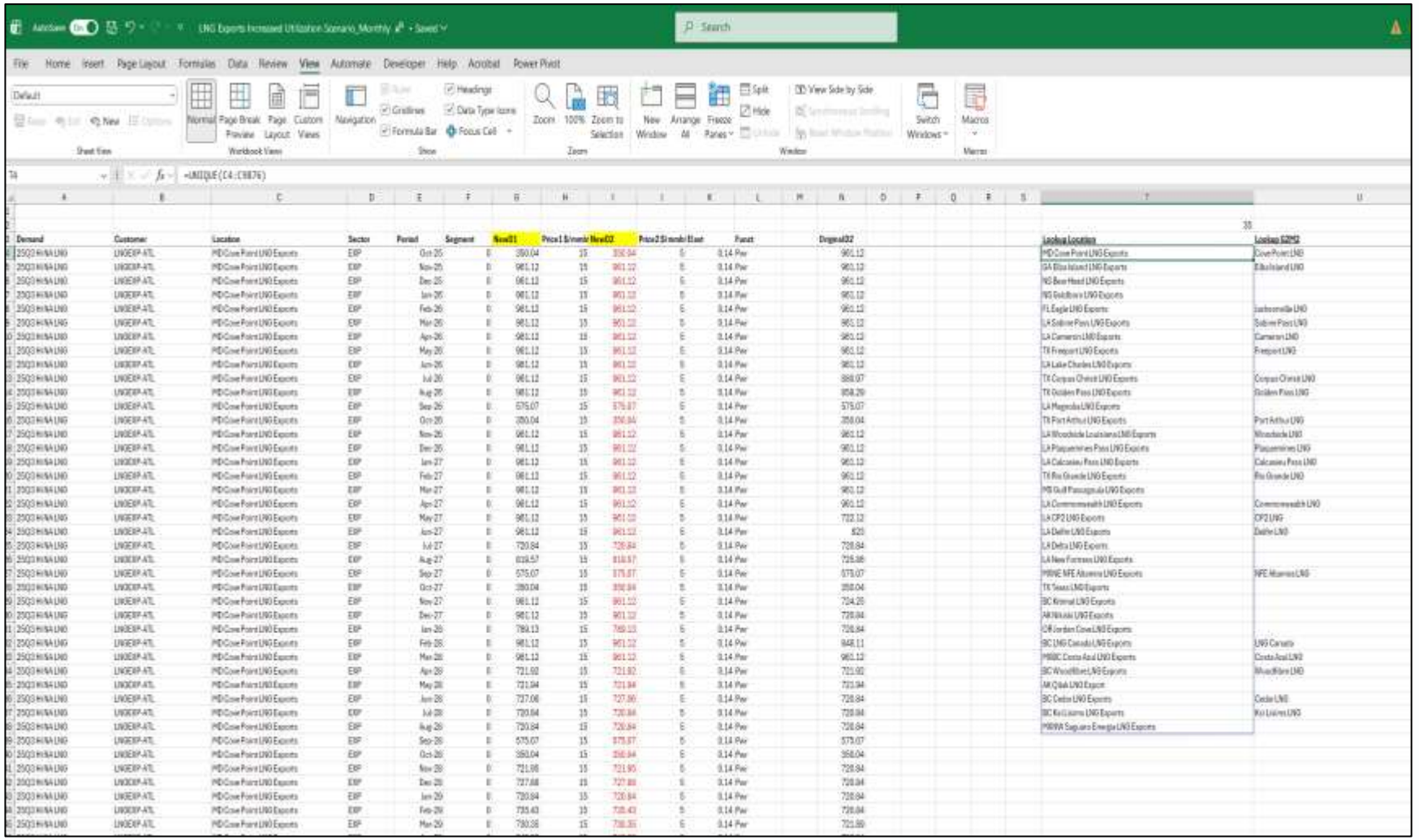
Convert G2M2 Output to MMcf/d

- G2M2 provides demand for NA LNG Exports
  - Monthly
  - x Terminal
- G2M2 standard output in mtpa
- Conversion required for GPCM Demand Curves – MMcf/d



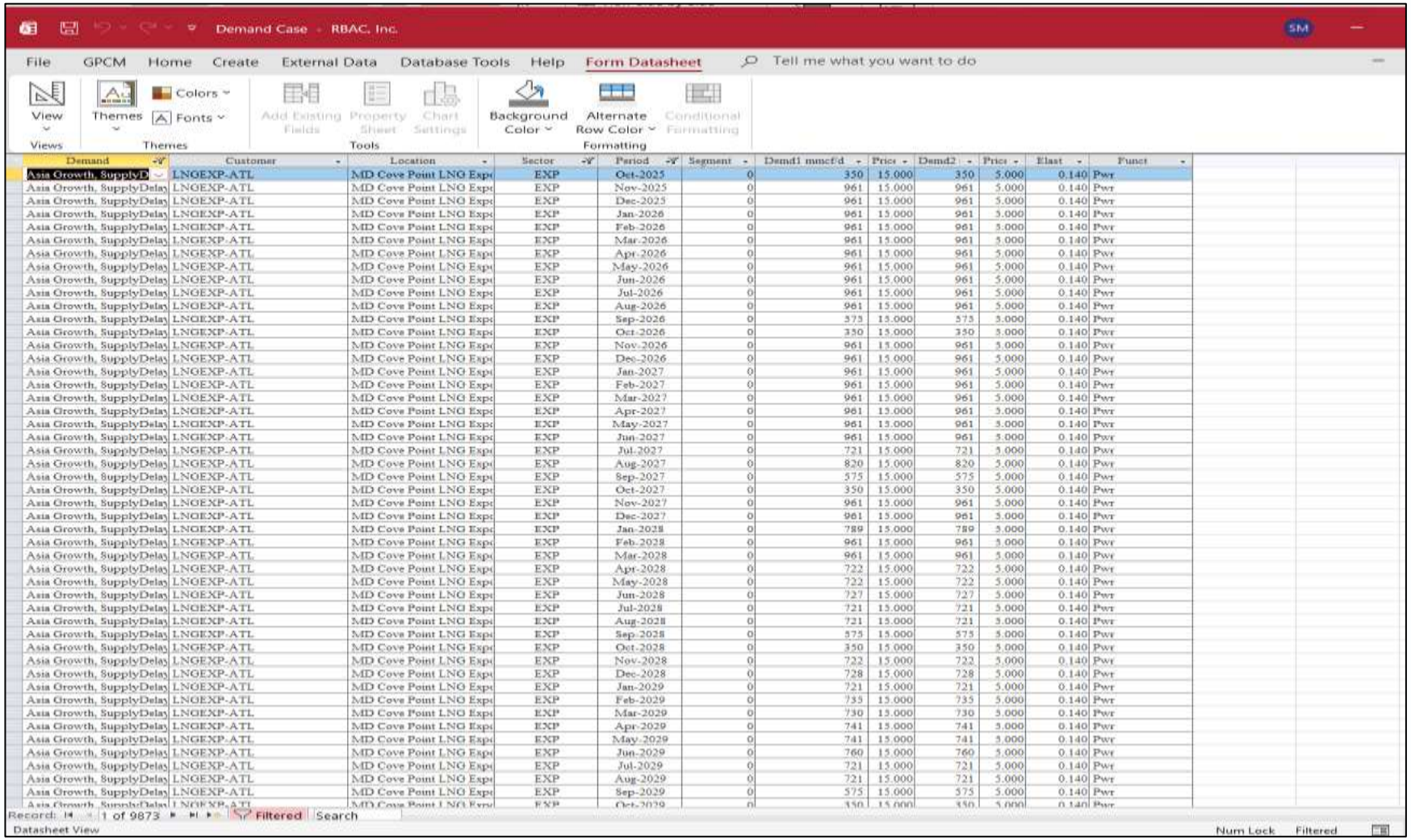
Setup GPCM Format and Set D1 = D2 = G2M2

- GPCM Demand Curves for “EXP” sector extracted to Excel
- Spreadsheet structures converted data to Demand Curve file format
- Match Terminal IDs
- Pull converted data into Demand Curve formatted structure



Demand Records Update

- Datasheet View of Demand Curves – filtered for
  - Sector = “EXP”
  - Period ≥ Oct-25
- Copy dataset to Excel
- Original dataset deleted
- New Excel dataset copy/paste into this Datasheet View



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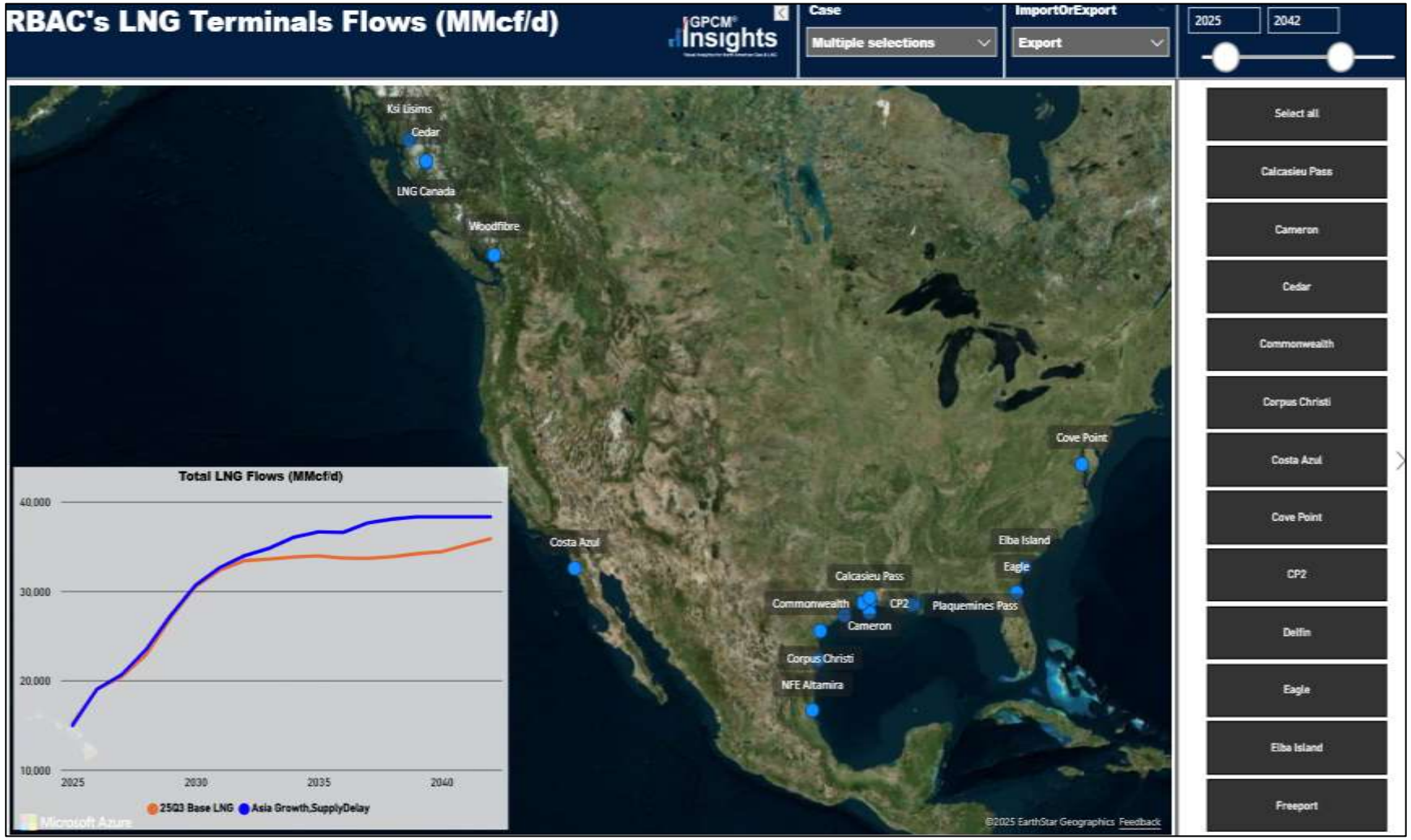
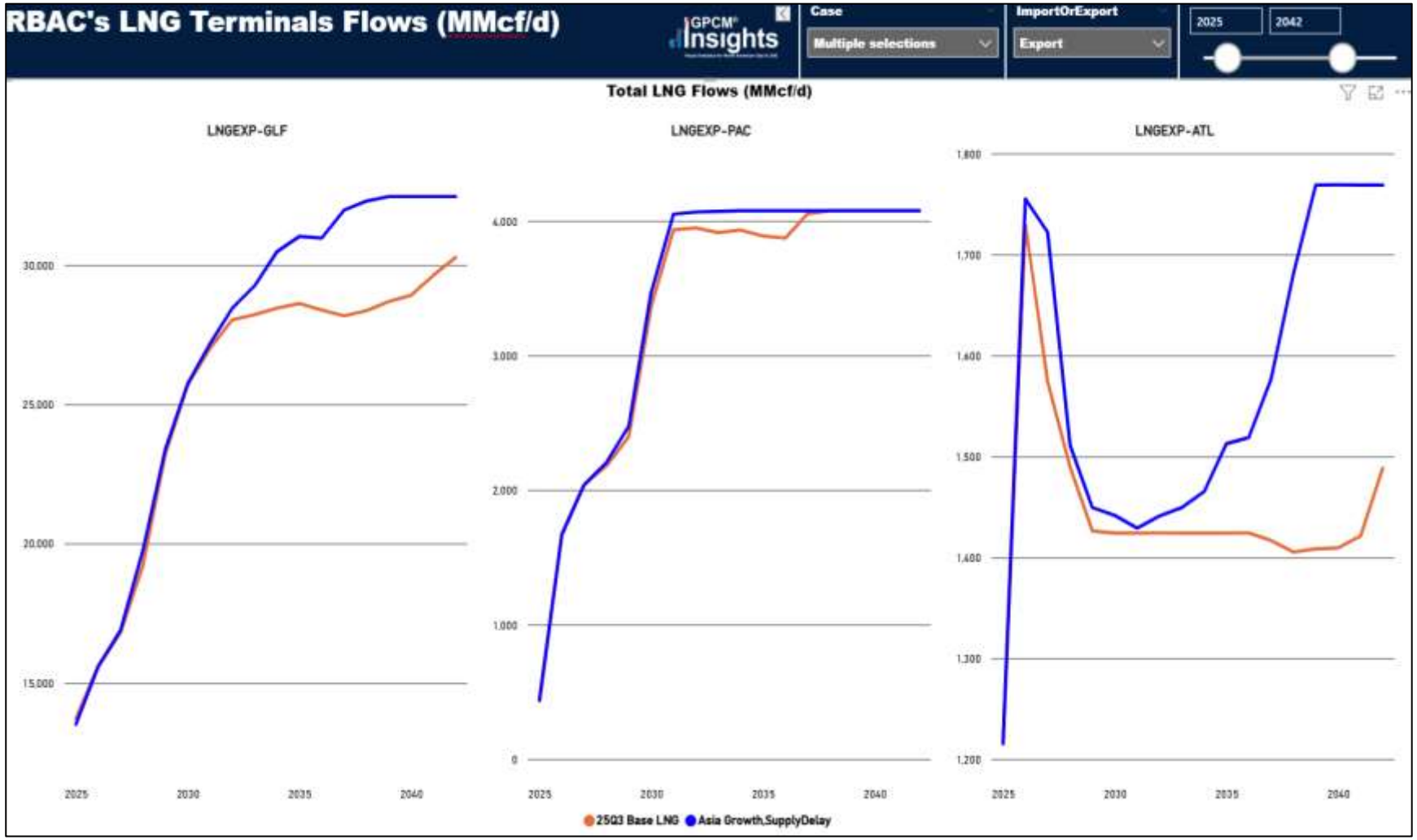
Higher LNG Exports

- Minimal variance between scenarios during 2025 – 2030 period
- Variance grows thereafter
- Variance peaks in 2037 at 4 Bcf/d
- By 2042, spread between scenarios is ≈ 2.5 Bcf/d



Across ALL NA LNG Regions – Dominated by USGC

- No surprises here…
- USGC is primary beneficiary of higher call on NA LNG Terminals
- Minimal early period impact on PAC (CAN and MEX) terminals
- Significant increase, albeit small volume/capacity, Atlantic terminals



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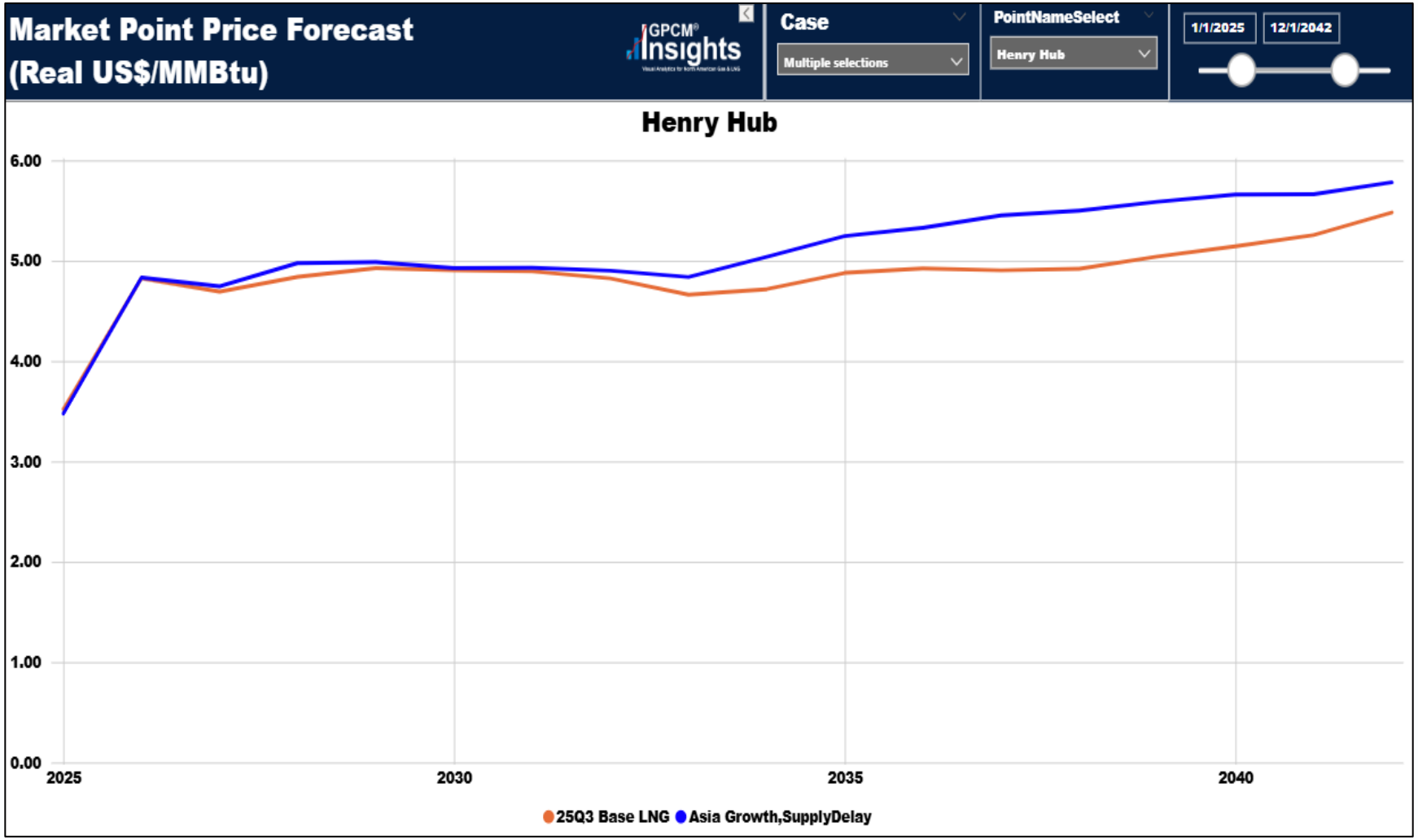
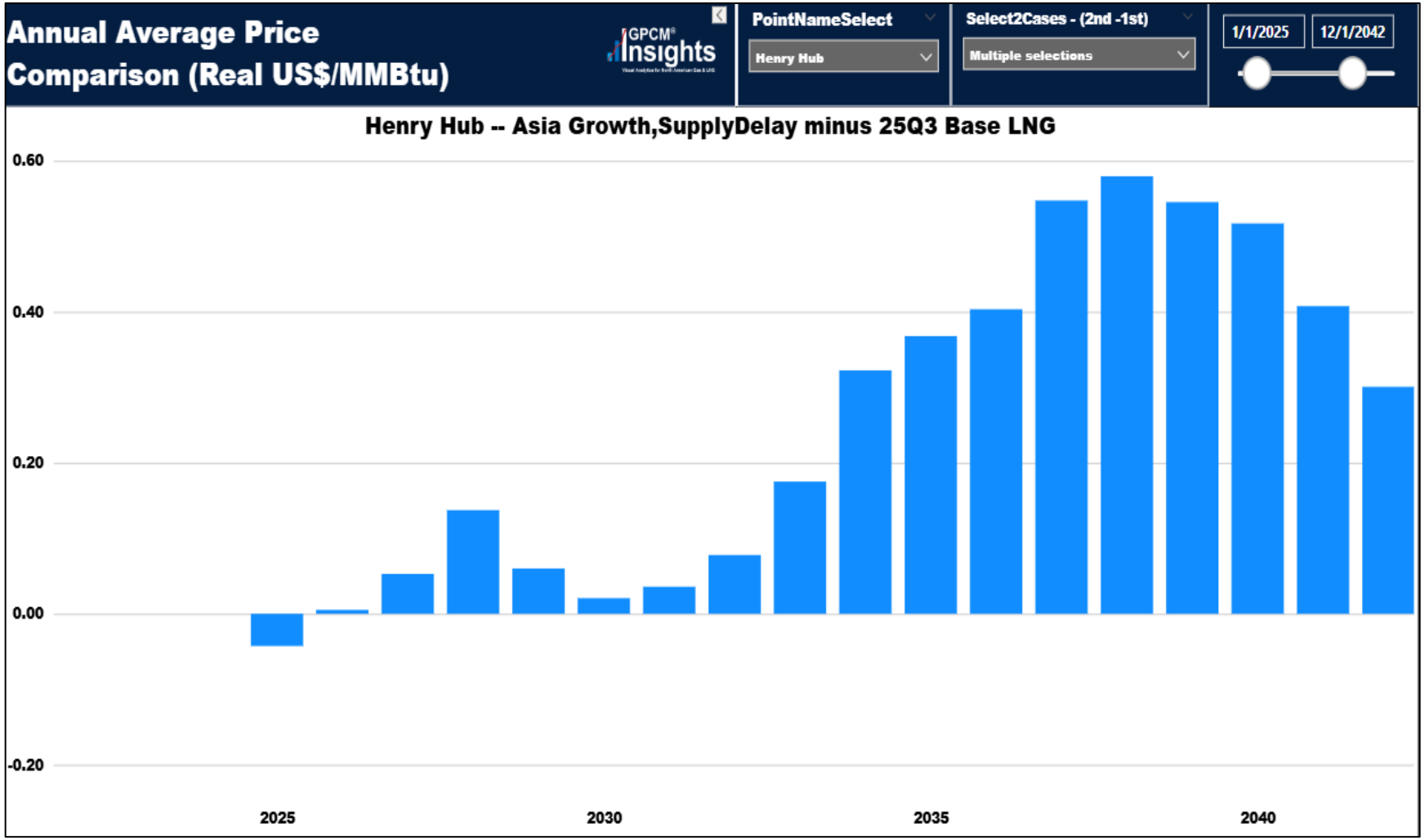
Henry Hub Prices → Higher

- Similarly, minimal variance in 2025 – 2030 period
- Higher prices from 2033 forward
  - 18c higher to start
  - Grow to 58c higher in 2038
- By 2042, price gap is 30c



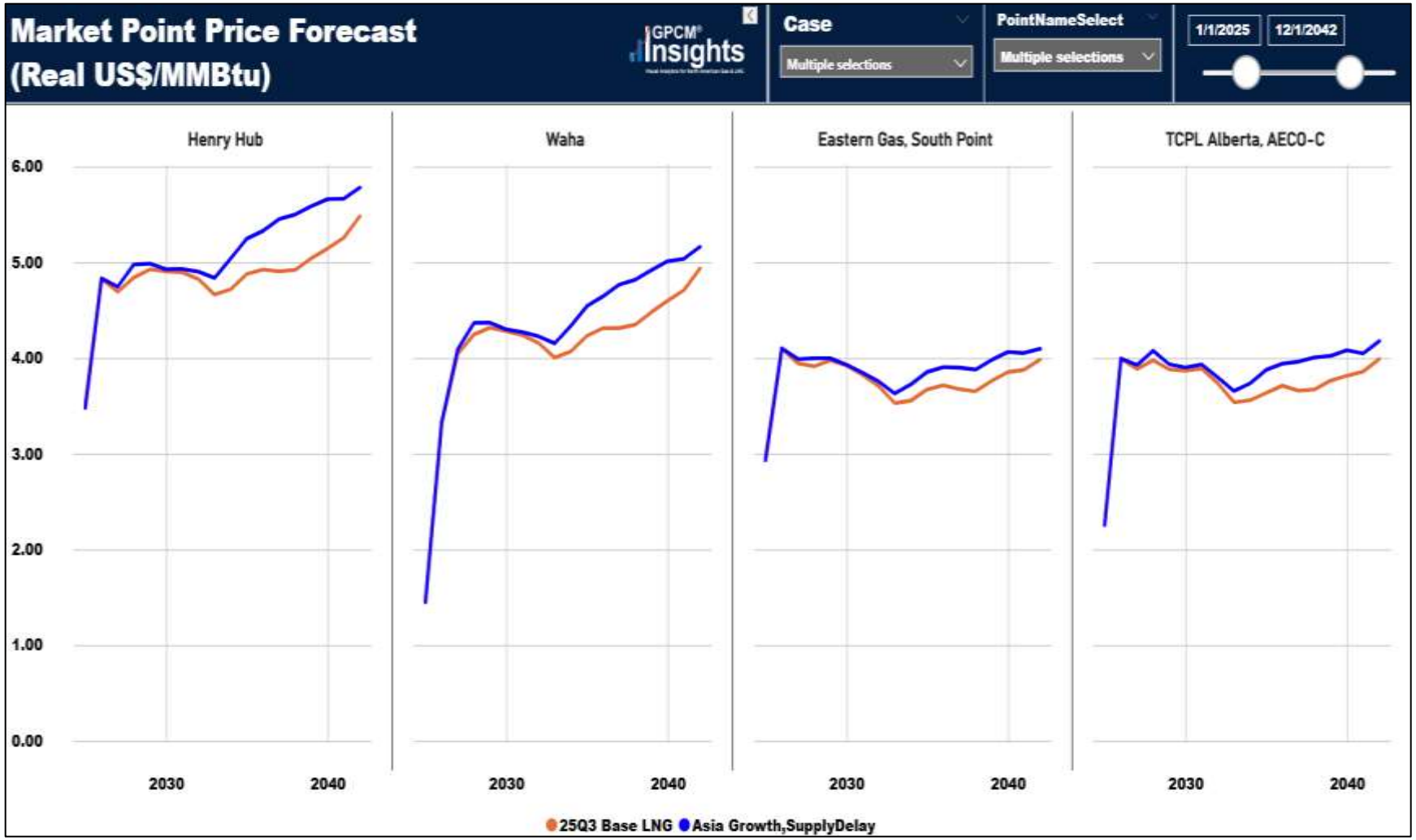
Annual Henry Hub Price Deltas to 25Q3

- Not dramatically higher prices in mid- to long-term, though still > 10% increase
- Seasonal prices show deltas near 70c



Regional Prices → Higher But Less So Further Away

- Unsurprisingly, USGC pricing locations see largest variance
- Other areas still impacted, though to lessor extent



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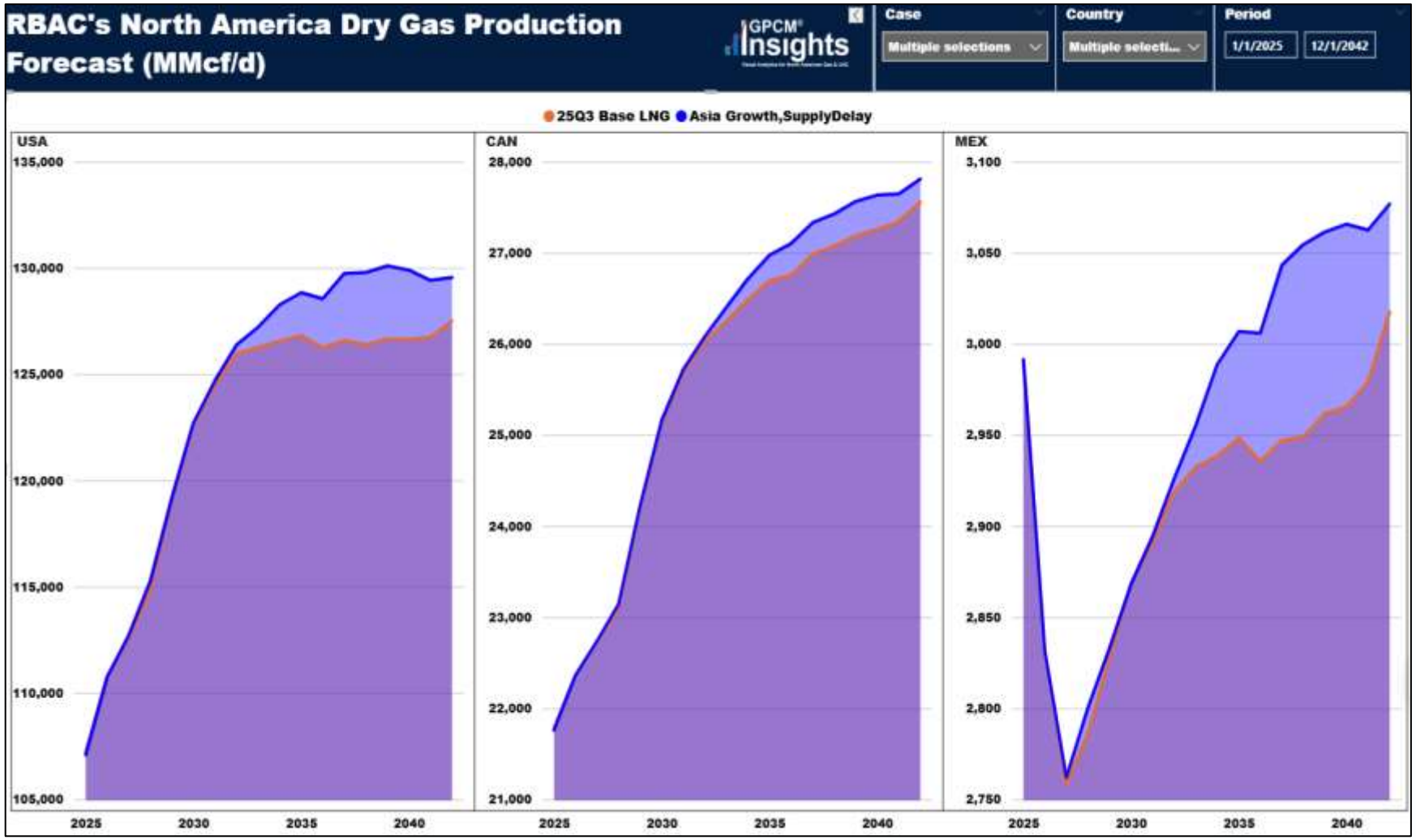
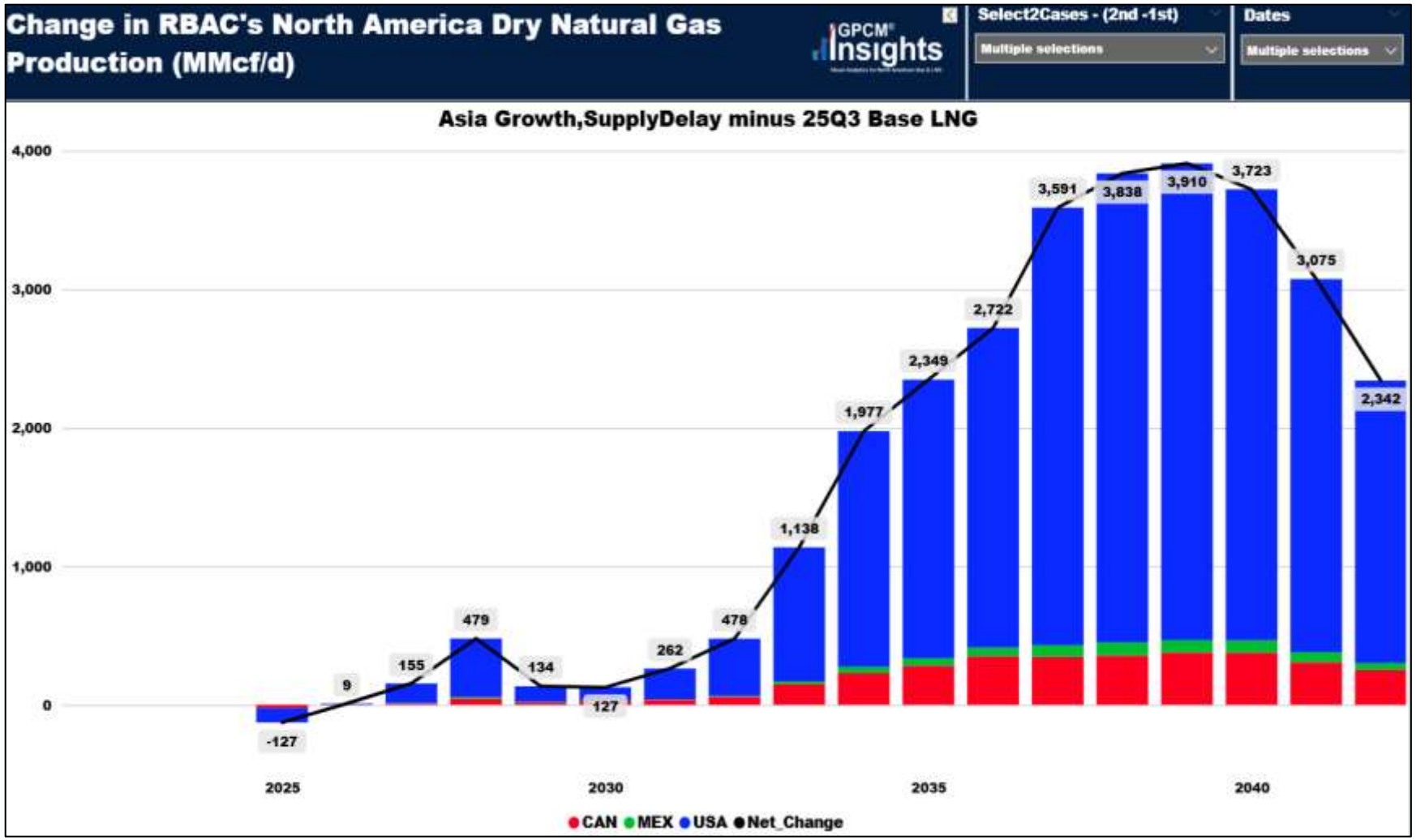
Higher Supply

- Call on USGC terminals dominates higher NA LNG Export → higher call on US production
- CAN and MEX see more modest calls on production



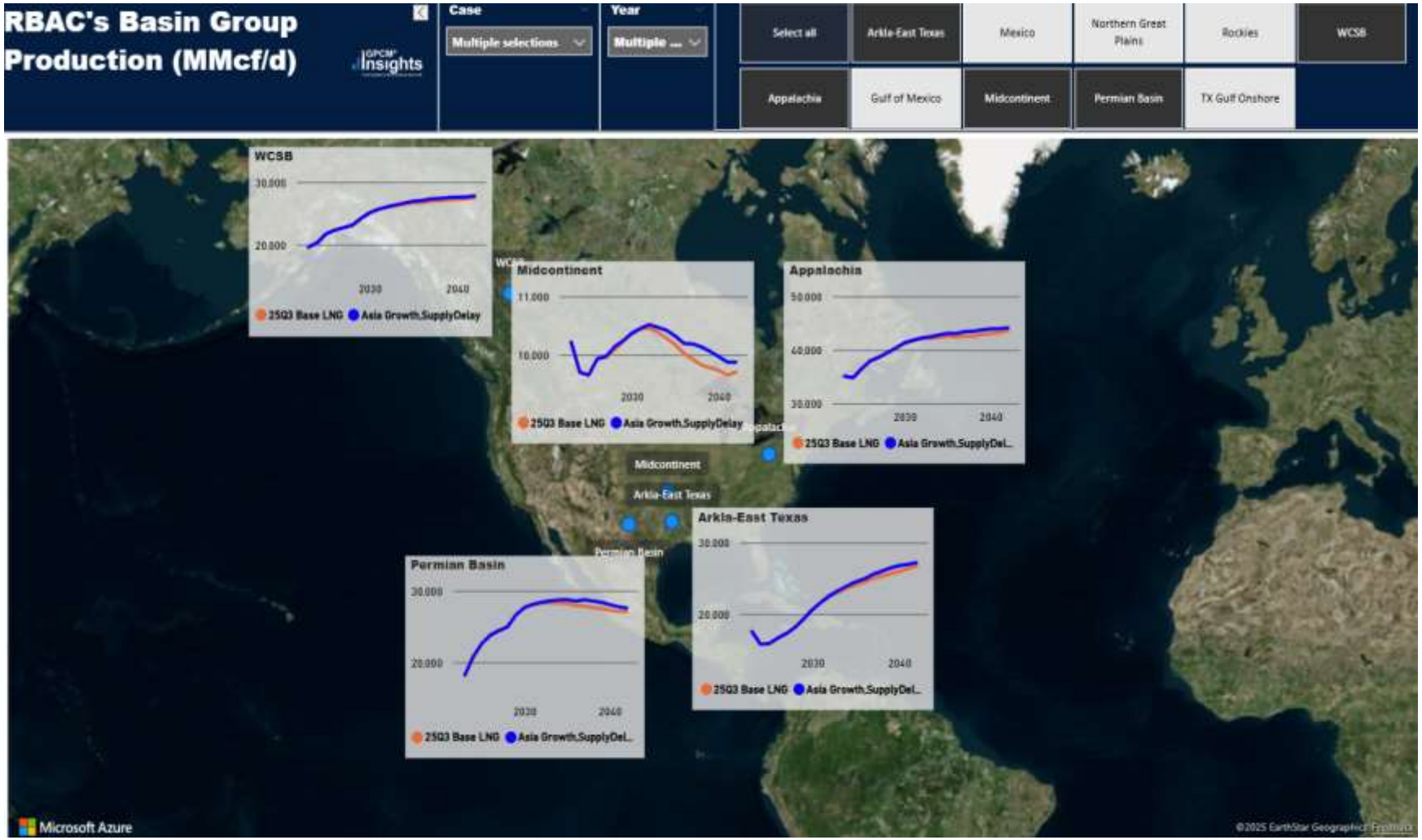
Higher Supply

- US production is higher by 0.5 Bcf/d in 2032
- Surplus peaks at 3.9 Bcf/d in 2039
- Recedes to 2.3 Bcf/d in 2042
- CAN surplus grows from 0.2 Bcf/d in 2033 to 0.4 Bcf/d in 2039, ending at 0.3 Bcf/d in 2042
- MEX surplus is minimal at 0.1 Bcf/d



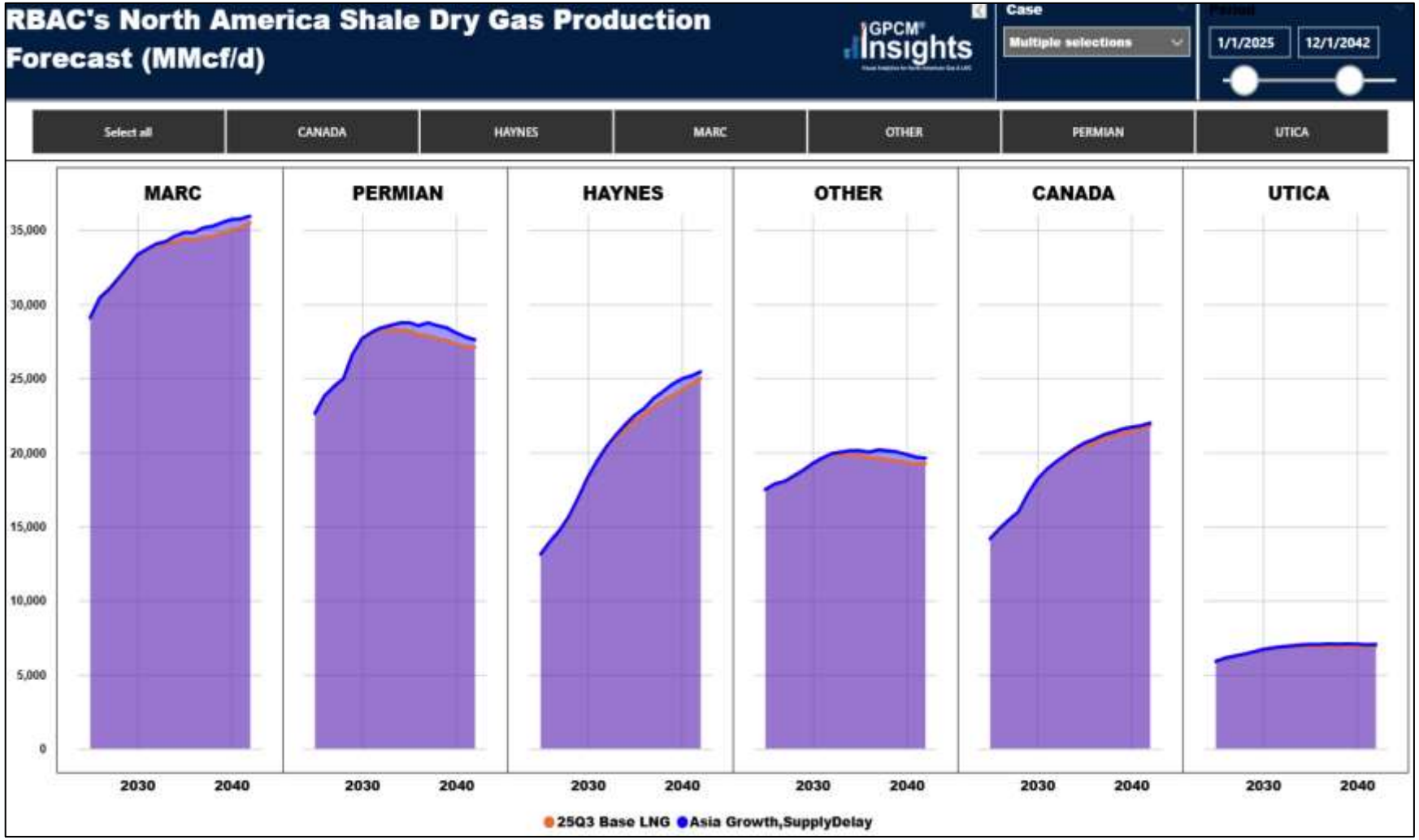
Higher Supply

- Proximity Matters
- Basin response as expected
- US primary basins see surpluses
- MidCon even gets in on the action -- somewhat
- More marginal response from WCSB



Higher Supply

- Permian 0.2 – 1.0 Bcf/d higher
- Hayne 0.2 – 0.7 Bcf/d higher
- Marcellus 0.2 – 0.7 Bcf/d higher
- Midcon ~ 0.2 Bcf/d higher
- WCSB ~ 0.2 Bcf/d higher



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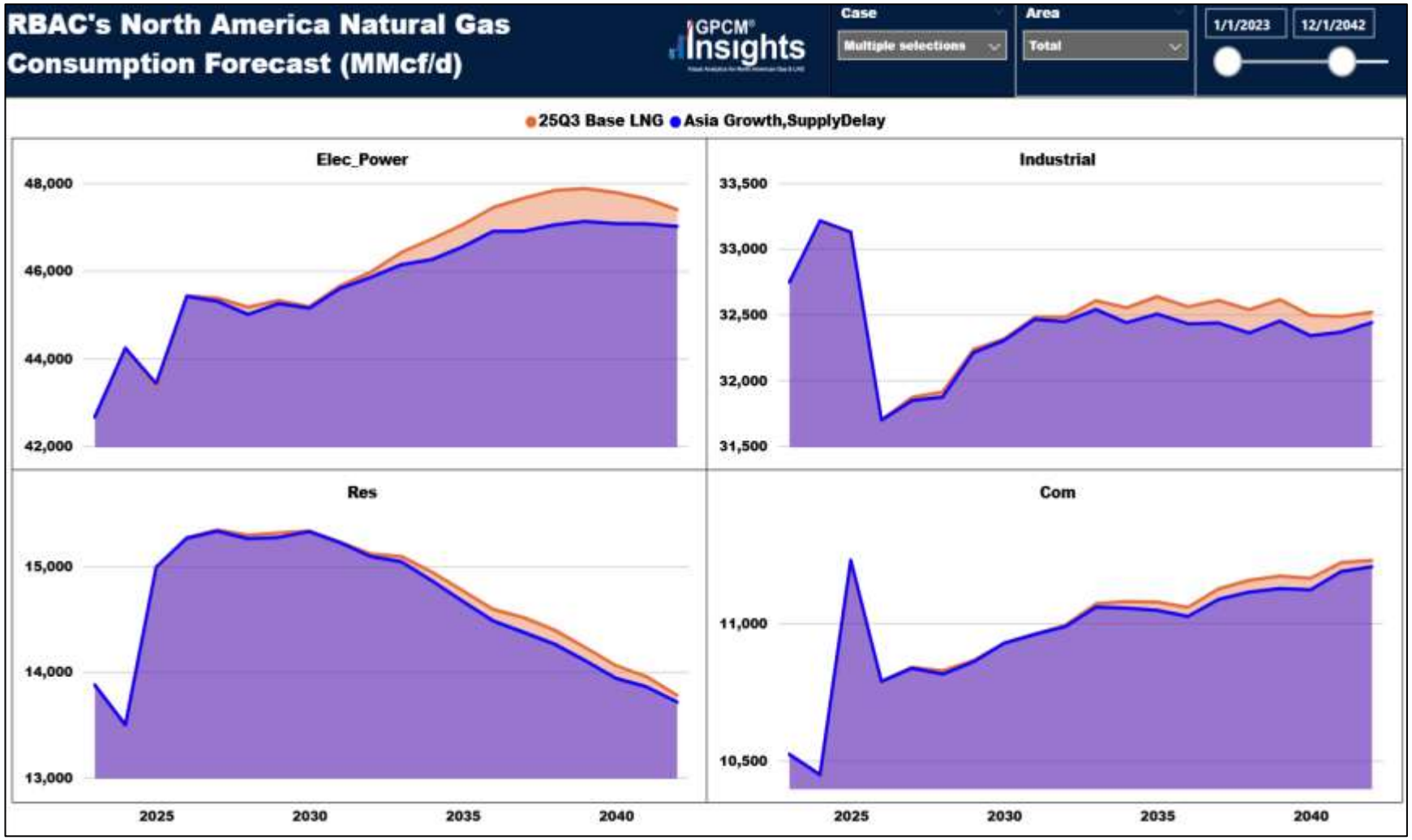
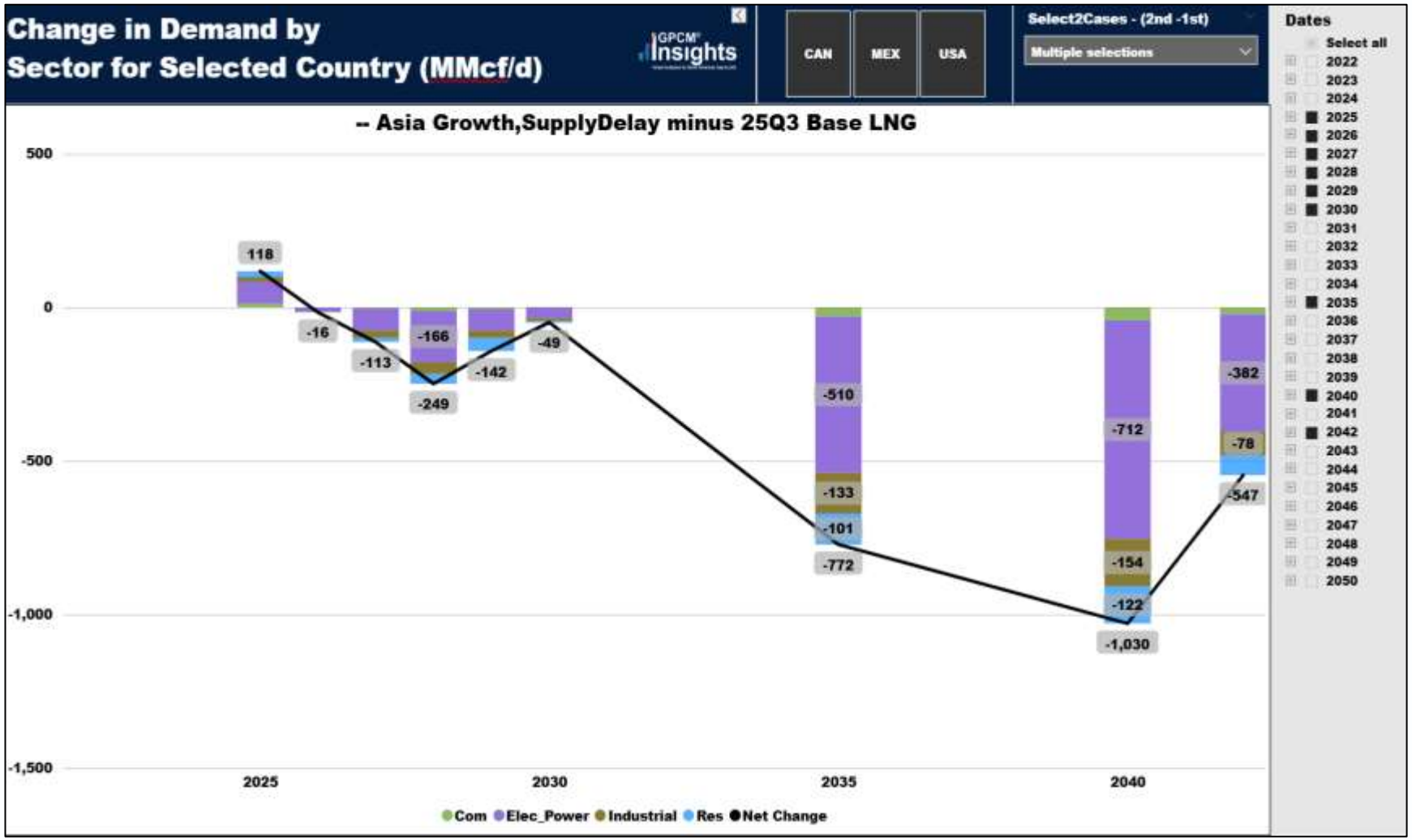
Lower Demand

- Elasticity…
- Higher prices do have impacts on other sector demand
- Predominately, ELC and IND sectors → more elastic
- Some marginal impacts on RES and COM → more inelastic



Lower Demand

- ELC sees between 0.4 – 0.7 Bcf/d lower demand
- IND is lower by 0.1 – 0.2 Bcf/d
- RES lower by 0.1 Bcf/d
- COM lower by < 0.05 Bcf/d



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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.