



GPCM LNG Exports Modeling

November 13, 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**

GPCM LNG Exports Modeling

GPCM North American LNG Exports Modeling (Operation and Maintenance)

November 13, 2024

Bethel King

Senior Director, Market
Analysis

David Brooks

Natural Gas Analyst



GPCM LNG Modeling Topics

- Recent changes in LNG modeling defaults
- What Scheduled Maintenance looks like in Input Assumptions/Outputs
- What Unscheduled Maintenance looks like in Input Assumptions/Outputs

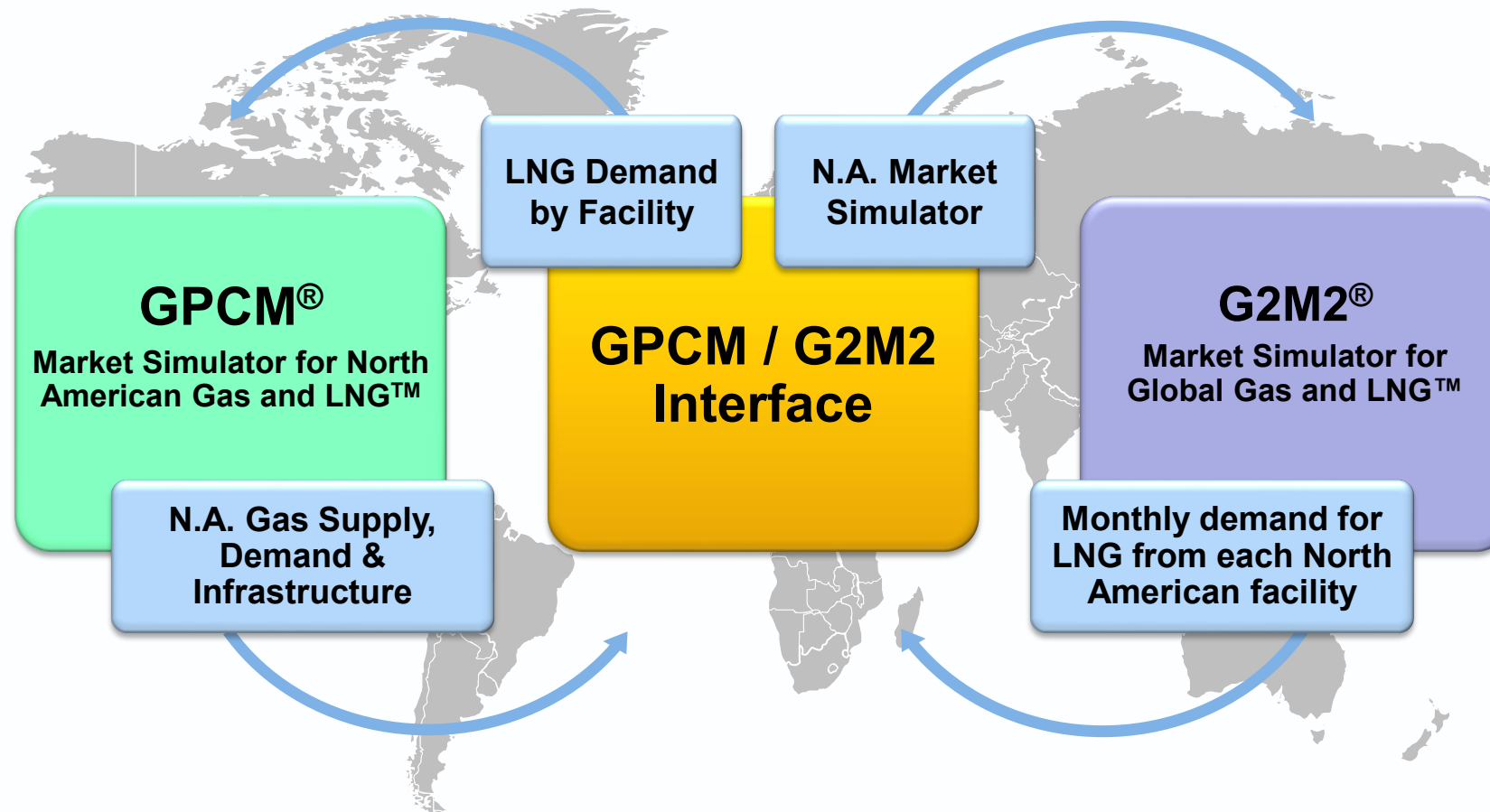


GPCM LNG Modeling Topics

- Recent changes in LNG modeling defaults
- What Scheduled Maintenance looks like in Input Assumptions/Outputs
- What Unscheduled Maintenance looks like in Input Assumptions/Outputs

Consistency with the Global Gas Market

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



Recent Changes in LNG Modeling Defaults

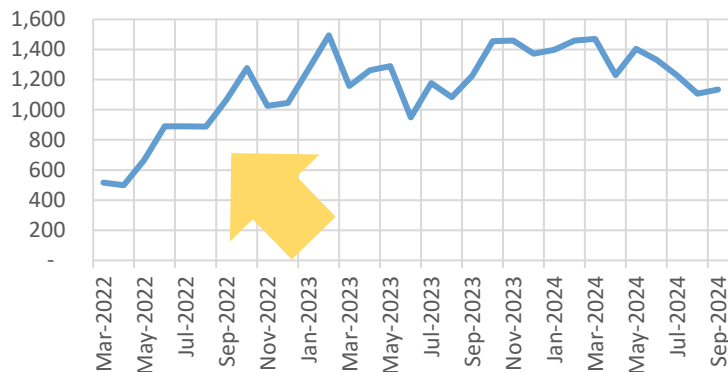
Transport or Pipe Zone for LNG Header Pipelines

Liquefaction costs captured in LNG Header Export zone:

Min \$ = Max \$ → most around \$3.00 - \$3.50

Fuel = 11% for most, if some Electric Liquefaction then 6% (example = LNG Cedar)

LNG Calcasieu (mmcf/d)



Ramp up of capacity handled in Zone Data records now, not in the Demand curve records

Each train or set of trains are generally ramped up over 10 months

LNG Pipeline Zone Data Records

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

FileGPCMHomeCreateExternal DataDatabase ToolsHelpTell me what you want to do

Database Scenario BuildersData_InputsExecute ReportsWindowsHelp

View

Form View

Datasheet View

Import from Excel

Export to Excel

Cut

Copy

Paste

Can't Undo

Refresh All

Ascending

Descending

Filter By Selection

Filter By Form

Toggle Filter

Visual Basic

Pipeline Zone Data

MonthlyCompareMake NewRenameDeleteClose

Pipeline_Zone	Pipe and Zone	Project	Eff Date	Mon	Min Flow	Max Flow	Loss Frac	Min Rate	Max Rate	FDQ	ZDQ	FDQ%	ZDQ%	NDQ%	NDQ Mult	Exclude
24Q3base	LNG CP2 Header	LNG CP2 Header	Jul-2028	0	0	219	11.000%	\$3.500	\$3.500	164	215	75.0%	98.0%	99.0%	4.00	
	LNG CP2 Export															
24Q3base	LNG CP2 Header	LNG CP2 Header	Aug-2028	0	0	439	11.000%	\$3.500	\$3.500	329	430	75.0%	98.0%	99.0%	4.00	
	LNG CP2 Export															
24Q3base	LNG CP2 Header	LNG CP2 Header	Sep-2028	0	0	658	11.000%	\$3.500	\$3.500	494	645	75.0%	98.0%	99.0%	4.00	
	LNG CP2 Export															
24Q3base	LNG CP2 Header	LNG CP2 Header	Oct-2028	0	0	877	11.000%	\$3.500	\$3.500	658	859	75.0%	98.0%	99.0%	4.00	
	LNG CP2 Export															
24Q3base	LNG CP2 Header	LNG CP2 Header	Nov-2028	0	0	1,097	11.000%	\$3.500	\$3.500	823	1,075	75.0%	98.0%	99.0%	4.00	
	LNG CP2 Export															
24Q3base	LNG CP2 Header	LNG CP2 Header	Dec-2028	0	0	1,316	11.000%	\$3.500	\$3.500	987	1,290	75.0%	98.0%	99.0%	4.00	
	LNG CP2 Export															
24Q3base	LNG CP2 Header	LNG CP2 Header	Jan-2029	0	0	1,448	11.000%	\$3.500	\$3.500	1,086	1,419	75.0%	98.0%	99.0%	4.00	
	LNG CP2 Export															
24Q3base	LNG CP2 Header	LNG CP2 Header	Feb-2029	0	0	1,579	11.000%	\$3.500	\$3.500	1,184	1,547	75.0%	98.0%	99.0%	4.00	
	LNG CP2 Export															
24Q3base	LNG CP2 Header	LNG CP2 Header	Mar-2029	0	0	1,711	11.000%	\$3.500	\$3.500	1,283	1,677	75.0%	98.0%	99.0%	4.00	
	LNG CP2 Export															
24Q3base	LNG CP2 Header	LNG CP2 Header	Apr-2029	0	0	1,842	11.000%	\$3.500	\$3.500	1,382	1,805	75.0%	98.0%	99.0%	4.00	
	LNG CP2 Export															
24Q3base	LNG CP2 Header	LNG CP2 Header	May-2029	0	0	1,974	11.000%	\$3.500	\$3.500	1,481	1,935	75.0%	98.0%	99.0%	4.00	
	LNG CP2 Export															
24Q3base	LNG CP2 Header	LNG CP2 Header	Jun-2029	0	0	2,106	11.000%	\$3.500	\$3.500	1,580	2,064	75.0%	98.0%	99.0%	4.00	
	LNG CP2 Export															

Record: 141 of 16FilteredSearch

Recent Changes in LNG Modeling Defaults

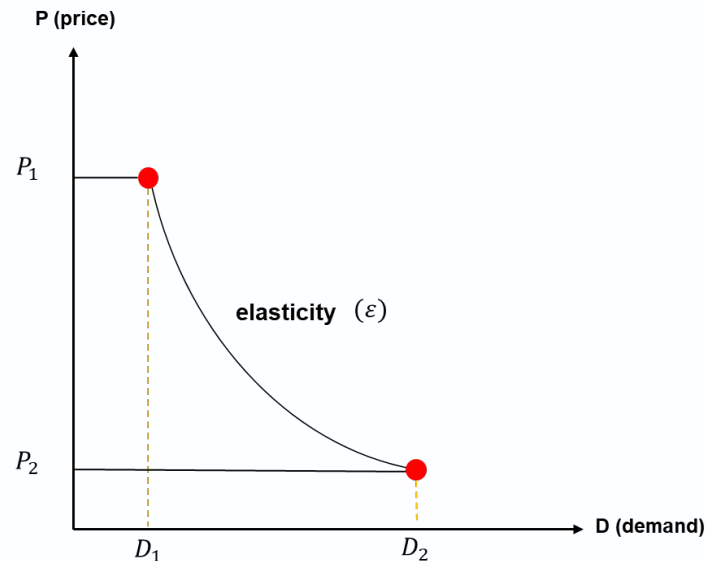
Demand Curve Records for LNG Header

Demand2 = volumes determined by latest G2M2 iteration

Historical Utilization is calculated from 2021 – 2024

Demand1 (if in service) = facility's historical Utilization%

Demand 1 (for all future LNG) = historical average Utilization% for Gulf LNG facilities (86%)



Facility	'21 - '24 Utilization
Cove Point LNG	73%
Elba Island LNG	71%
Freeport LNG	70%
Cameron LNG	89%
Corpus Christi LNG	82%
Sabine Pass LNG	89%

Gulf Facility Average*	87%
-------------------------------	------------

*does not include Freeport LNG

LNG Demand Records

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

FileGPCMHomeCreateExternal DataDatabase ToolsHelpTell me what you want to do

Database Scenario Builders Data_Inputs Execute Reports Windows Help

View

Form View

Datasheet View

Import from Excel to Excel

Export to Excel

CutCopyPaste

Can't Undo

Refresh All

AscendingDescending

Filter

Demand													
SummaryIsopricesIsogramsExport IsoShiftAppendRecompCompareImportExportMake NewRenameDeleteClose													
Demand	Customer	Location	Sector	Period	Segment	Demd1 mmcf/d	Price1 \$/mmbtu	Demd2 mmcf/d	Price2 \$/mmbtu	Elast	Funct		
24Q3base		LA CP2 LNG Exports	EXP			283	15.000	329	5.000	0.262	Pwr		
24Q3base	LNGEXP-GLF	LA CP2 LNG Exports	EXP	Jul-2028	0	283	15.000	329	5.000	0.262	Pwr		
24Q3base	LNGEXP-GLF	LA CP2 LNG Exports	EXP	Aug-2028	0	375	15.000	456	5.000	0.262	Pwr		
24Q3base	LNGEXP-GLF	LA CP2 LNG Exports	EXP	Sep-2028	0	566	15.000	658	5.000	0.262	Pwr		
24Q3base	LNGEXP-GLF	LA CP2 LNG Exports	EXP	Oct-2028	0	754	15.000	877	5.000	0.262	Pwr		
24Q3base	LNGEXP-GLF	LA CP2 LNG Exports	EXP	Nov-2028	0	943	15.000	1,096	5.000	0.262	Pwr		
24Q3base	LNGEXP-GLF	LA CP2 LNG Exports	EXP	Dec-2028	0	1,107	15.000	1,287	5.000	0.262	Pwr		
24Q3base	LNGEXP-GLF	LA CP2 LNG Exports	EXP	Jan-2029	0	1,241	15.000	1,443	5.000	0.262	Pwr		
24Q3base	LNGEXP-GLF	LA CP2 LNG Exports	EXP	Feb-2029	0	1,358	15.000	1,579	5.000	0.262	Pwr		
24Q3base	LNGEXP-GLF	LA CP2 LNG Exports	EXP	Mar-2029	0	1,473	15.000	1,713	5.000	0.262	Pwr		
24Q3base	LNGEXP-GLF	LA CP2 LNG Exports	EXP	Apr-2029	0	1,584	15.000	1,842	5.000	0.262	Pwr		
24Q3base	LNGEXP-GLF	LA CP2 LNG Exports	EXP	May-2029	0	1,697	15.000	1,974	5.000	0.262	Pwr		
24Q3base	LNGEXP-GLF	LA CP2 LNG Exports	EXP	Jun-2029	0	1,810	15.000	2,105	5.000	0.262	Pwr		
24Q3base	LNGEXP-GLF	LA CP2 LNG Exports	EXP	Jul-2029	0	1,925	15.000	2,238	5.000	0.262	Pwr		
24Q3base	LNGEXP-GLF	LA CP2 LNG Exports	EXP	Aug-2029	0	2,035	15.000	2,367	5.000	0.262	Pwr		
24Q3base	LNGEXP-GLF	LA CP2 LNG Exports	EXP	Sep-2029	0	2,150	15.000	2,500	5.000	0.262	Pwr		
24Q3base	LNGEXP-GLF	LA CP2 LNG Exports	EXP	Oct-2029	0	2,226	15.000	2,588	5.000	0.262	Pwr		
24Q3base	LNGEXP-GLF	LA CP2 LNG Exports	EXP	Nov-2029	0	2,263	15.000	2,631	5.000	0.262	Pwr		
24Q3base	LNGEXP-GLF	LA CP2 LNG Exports	EXP	Dec-2029	0	2,263	15.000	2,631	5.000	0.262	Pwr		
24Q3base	LNGEXP-GLF	LA CP2 LNG Exports	EXP	Jan-2030	0	2,263	15.000	2,631	5.000	0.262	Pwr		
24Q3base	LNGEXP-GLF	LA CP2 LNG Exports	EXP	Feb-2030	0	2,263	15.000	2,631	5.000	0.262	Pwr		
24Q3base	LNGEXP-GLF	LA CP2 LNG Exports	EXP	Mar-2030	0	2,263	15.000	2,631	5.000	0.262	Pwr		
24Q3base	LNGEXP-GLF	LA CP2 LNG Exports	EXP	Apr-2030	0	2,263	15.000	2,631	5.000	0.262	Pwr		
24Q3base	LNGEXP-GLF	LA CP2 LNG Exports	EXP	May-2030	0	2,263	15.000	2,631	5.000	0.262	Pwr		

Record: 1 of 270

Filtered

Search



GPCM LNG Modeling Topics

- Recent changes in LNG modeling defaults
- What Scheduled Maintenance looks like in Input Assumptions/Outputs
- What Unscheduled Maintenance looks like in Input Assumptions/Outputs

Cove Point LNG Monthly Exports

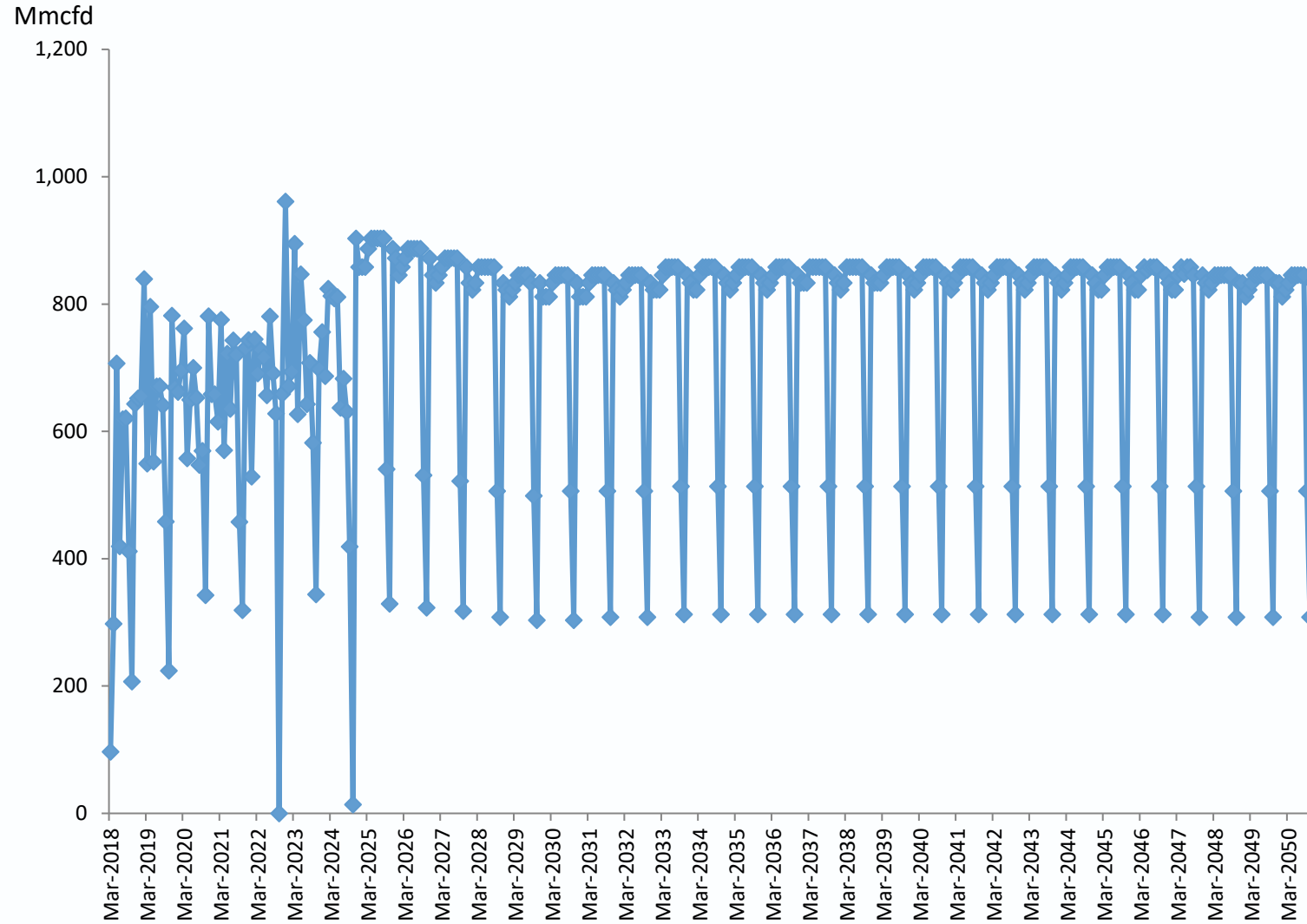
Month	2021	2022	2023	2024
Jan	658	529	671	687
Feb	616	745	694	824
Mar	776	691	895	813
Apr	571	728	627	809
May	722	717	847	811
Jun	635	657	775	637
Jul	743	781	643	683
Aug	721	691	708	631
Sep	458	628	582	419
Oct	319	-	344	14
Nov	731	659	698	903
Dec	743	961	756	858

Cove Point LNG
schedules maintenance
for September/October
time frame

Scheduled Maintenance in 24Q3 Basecase

Demand	Customer	Location	Sector	Period	Segment	Demd1 mmcf/d	Price1 \$/mmbtu	Demd2 mmcf/d	Price2 \$/mmbtu	Elast	Funct
24Q3base		MD Cove Point LNG Exports	EXP								
24Q3base	LNGEXP-ATL	MD Cove Point LNG Exports	EXP	Jul-2023	0	643	15.000	643	5.000	0.000	Pwr
24Q3base	LNGEXP-ATL	MD Cove Point LNG Exports	EXP	Aug-2023	0	708	15.000	708	5.000	0.000	Pwr
24Q3base	LNGEXP-ATL	MD Cove Point LNG Exports	EXP	Sep-2023	0	582	15.000	582	5.000	0.000	Pwr
24Q3base	LNGEXP-ATL	MD Cove Point LNG Exports	EXP	Oct-2023	0	344	15.000	344	5.000	0.000	Pwr
24Q3base	LNGEXP-ATL	MD Cove Point LNG Exports	EXP	Nov-2023	0	698	15.000	698	5.000	0.000	Pwr
24Q3base	LNGEXP-ATL	MD Cove Point LNG Exports	EXP	Dec-2023	0	756	15.000	756	5.000	0.000	Pwr
Demand	Customer	Location	Sector	Period	Segment	Demd1 mmcf/d	Price1 \$/mmbtu	Demd2 mmcf/d	Price2 \$/mmbtu	Elast	Funct
24Q3base		MD Cove Point LNG Exports	EXP								
24Q3base	LNGEXP-ATL	MD Cove Point LNG Exports	EXP	Jul-2024	0	683	15.000	683	5.000	0.000	Pwr
24Q3base	LNGEXP-ATL	MD Cove Point LNG Exports	EXP	Aug-2024	0	631	15.000	631	5.000	0.000	Pwr
24Q3base	LNGEXP-ATL	MD Cove Point LNG Exports	EXP	Sep-2024	0	419	15.000	419	5.000	0.000	Pwr
24Q3base	LNGEXP-ATL	MD Cove Point LNG Exports	EXP	Oct-2024	0	14	15.000	14	5.000	0.000	Pwr
24Q3base	LNGEXP-ATL	MD Cove Point LNG Exports	EXP	Nov-2024	0	701	15.000	960	5.000	0.286	Pwr
24Q3base	LNGEXP-ATL	MD Cove Point LNG Exports	EXP	Dec-2024	0	701	15.000	960	5.000	0.286	Pwr
Demand	Customer	Location	Sector	Period	Segment	Demd1 mmcf/d	Price1 \$/mmbtu	Demd2 mmcf/d	Price2 \$/mmbtu	Elast	Funct
24Q3base		MD Cove Point LNG Exports	EXP								
24Q3base	LNGEXP-ATL	MD Cove Point LNG Exports	EXP	Jul-2025	0	701	15.000	960	5.000	0.286	Pwr
24Q3base	LNGEXP-ATL	MD Cove Point LNG Exports	EXP	Aug-2025	0	701	15.000	960	5.000	0.286	Pwr
24Q3base	LNGEXP-ATL	MD Cove Point LNG Exports	EXP	Sep-2025	0	420	15.000	575	5.000	0.286	Pwr
24Q3base	LNGEXP-ATL	MD Cove Point LNG Exports	EXP	Oct-2025	0	256	15.000	350	5.000	0.286	Pwr
24Q3base	LNGEXP-ATL	MD Cove Point LNG Exports	EXP	Nov-2025	0	701	15.000	960	5.000	0.286	Pwr
24Q3base	LNGEXP-ATL	MD Cove Point LNG Exports	EXP	Dec-2025	0	701	15.000	960	5.000	0.286	Pwr

LNG Cove Point Dispatch in 24Q3 with Maintenance





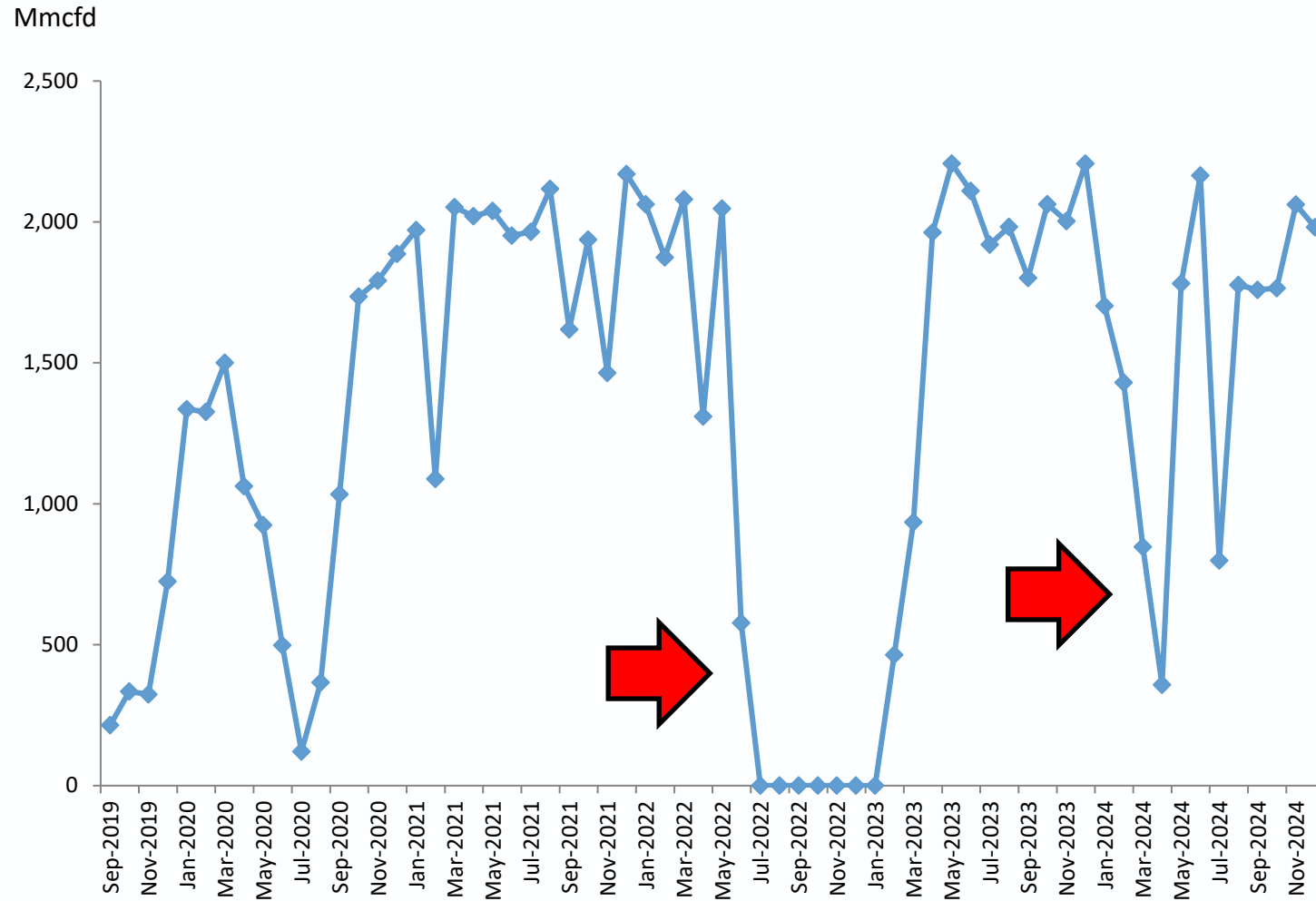
GPCM LNG Modeling Topics

- Recent changes in LNG modeling defaults
- What Scheduled Maintenance looks like in Input Assumptions/Outputs
- What Unscheduled Maintenance looks like in Input Assumptions/Outputs

Freeport LNG Unscheduled Maintenance

Demand	Customer	Location	Sector	Period	Segment	Demd1 mmcf/d	Price1 \$/mmbtu	Demd2 mmcf/d	Price2 \$/mmbtu	Elast	Funct
24Q3base		TX Freeport LNG Exports	EXP								
24Q3base	LNGEXP-GLF	TX Freeport LNG Exports	EXP	Dec-2023	0	2,298	15.000	2,298	5.000	0.000	Pwr
24Q3base	LNGEXP-GLF	TX Freeport LNG Exports	EXP	Jan-2024	0	1,702	15.000	1,702	5.000	0.000	Pwr
24Q3base	LNGEXP-GLF	TX Freeport LNG Exports	EXP	Feb-2024	0	1,430	15.000	1,430	5.000	0.000	Pwr
24Q3base	LNGEXP-GLF	TX Freeport LNG Exports	EXP	Mar-2024	0	847	15.000	847	5.000	0.000	Pwr
24Q3base	LNGEXP-GLF	TX Freeport LNG Exports	EXP	Apr-2024	0	358	15.000	358	5.000	0.000	Pwr
24Q3base	LNGEXP-GLF	TX Freeport LNG Exports	EXP	May-2024	0	1,782	15.000	1,782	5.000	0.000	Pwr
24Q3base	LNGEXP-GLF	TX Freeport LNG Exports	EXP	Jun-2024	0	2,165	15.000	2,165	5.000	0.000	Pwr
24Q3base	LNGEXP-GLF	TX Freeport LNG Exports	EXP	Jul-2024	0	799	15.000	799	5.000	0.000	Pwr
24Q3base	LNGEXP-GLF	TX Freeport LNG Exports	EXP	Aug-2024	0	1,776	15.000	1,776	5.000	0.000	Pwr
24Q3base	LNGEXP-GLF	TX Freeport LNG Exports	EXP	Sep-2024	0	1,759	15.000	1,759	5.000	0.000	Pwr

LNG Freeport Dispatch in 24Q3 with Unscheduled Maintenance



Modeling LNG Maintenance



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