



# Gas Market Model

Since the mid-1990s, the proprietary *Gas Market Model (GMM®)* has been used to analyze the North American natural gas market. This non-linear programming model is a forecasting and market analysis tool that has been applied in hundreds of studies to forecast the North American natural gas market under different assumptions. The model has proven successful in helping to:

- Simulate changes in the gas market that occur when major new sources of gas supply are delivered into the marketplace
- Analyze various pipeline expansions
- Simulate the impact of gas-fired power generation growth on gas supply and transmission
- Assess the impact of low and high gas supply environments on gas prices
- Assess the impact of different regulatory environments on gas supply and demand
- Complete strategic planning studies for many private sector companies

GMM is a supply/demand equilibrium model that projects monthly natural gas prices, given different supply/demand assumptions specified by the user.

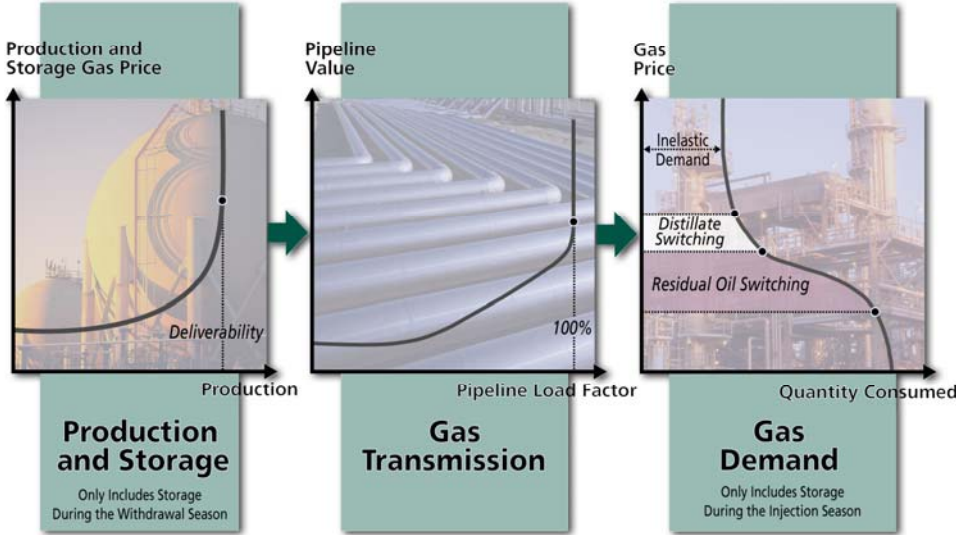
Supply and demand are balanced at all nodes in the model at market clearing prices determined by the shape of the supply and demand curves.

A strength of GMM is the calibration of the model's curves and relationships monthly to ensure they reflect the most recent gas market behavior.

In addition to its contributions to strategic planning studies, GMM has been widely used by institutional clients and advisory councils, including the Interstate Natural Gas Association of America, which relied on the model for the 30 Tcf market analyses completed in 1998 and 2004.

GMM was also the primary tool used to complete the frequently referenced study on the North American gas market that was conducted for the National Petroleum Council in 2003.

## Gas Market Model Gas Quantity and Price Response



## Our Approach

**Gas Production Analysis** evaluates exploration, development, and production for different types of gas (conventional versus unconventional) throughout North America. GMM projects wellhead prices for more than 70 distinct gas supply regions, all of which are major North American supply areas.

**End-Use Gas Demand** is modeled on a setoral (residential, commercial, and industrial) and monthly basis at more than 80 different market nodes throughout North America.

## Our Approach (cont.)

**Electric Generation** is modeled regionally with plant dispatch based on operating cost. Gas use for power generation is determined at more than 80 different market nodes throughout North America.

**Pipeline Transportation** is modeled by more than 300 transportation links between supply and demand regions, balancing monthly. Pipeline discount curves representing basis as a function of load factor determine the levels of gas transport on each of the model's links. Users may modify transport capacities to reflect the impact of capacity expansion over time.

**Liquefied Natural Gas (LNG) Imports** are projected for up to 100 different regasification facilities throughout North America. GMM includes LNG import supply curves for each facility that consider liquefaction development and global import/export activity and pricing of LNG in Europe and Asia.

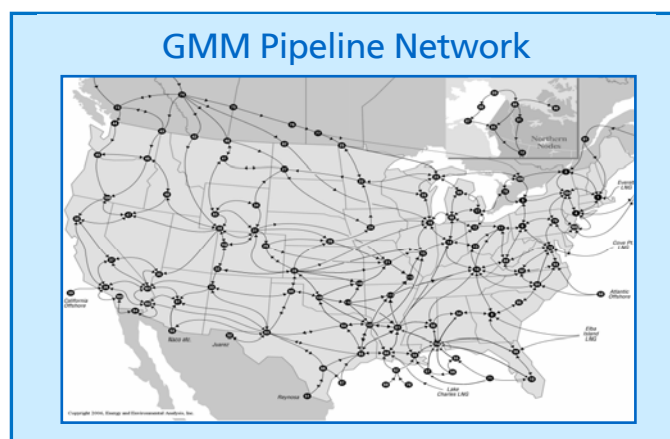
**Gas Storage** injection and withdrawal activity is projected for 50 different areas throughout North America. Injection relationships and storage withdrawal price curves consider working gas levels, available capacity, gas supply development, and market competition when projecting future market behavior.

## Featured Solutions

**Gas Price Forecasts for Electric Power Projects:** GMM is used routinely to develop forward price curves for gas in different regional markets of the United States and Canada. The model's output includes projected gas prices for more than 100 different locations on both a monthly and annual basis. These prices are used in project pro formas and financing decisions.

**Market for Pipeline Expansion:** EEA and ICF have been retained by many clients to provide market assessments for pipeline expansions throughout North America. Our projections have been used for due diligence, acquisition analysis, project financing, and strategic planning by pipeline companies, banks, and shippers contracting for pipeline capacity.

**Assessing LNG Import Projects:** EEA and ICF studied the price impacts of LNG imports for many clients, including gas producers, pipeline companies, and end users. In our gas modeling work, we have developed forecasts for future market conditions under alternative LNG import scenarios that investigate the supply, demand, and price impacts caused by LNG import deliveries at more than 40 LNG import terminals throughout North America.



## About ICF International

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