

Gas and Electric Coordination: Evolution or Revolution?

Improving Price Signals in the Gas Market to Foster Contracting, Electric Reliability and Channel Investment

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Summary

- FERC's gas market evolution (e.g., Order 636 [1992]) to unbundle transportation services and maximize competition have been successful, but require updating.
- Vestigial gas market design elements, predating the new largest gas user (power generation), are preventing contractual relationships and effective scarcity pricing, causing inefficient allocation of capital.
- Market rules which facilitate contracting and improve scarcity pricing for power generation takes, will stimulate investment and innovation to eliminate scarcity.

Unbundled Pipeline Rate Design

Cost of Service + ROE

Straight Fixed Variable

Reservation	Usage
Fixed Costs Return on Equity Related Taxes Long-Term Debt A&G DDA Other Taxes O&M	Variable Costs Nonlabor O&M Other O&M

Capacity is the primary commodity in natural gas markets.

Cost of capacity reflected in 24/7 Demand/reservation charge.

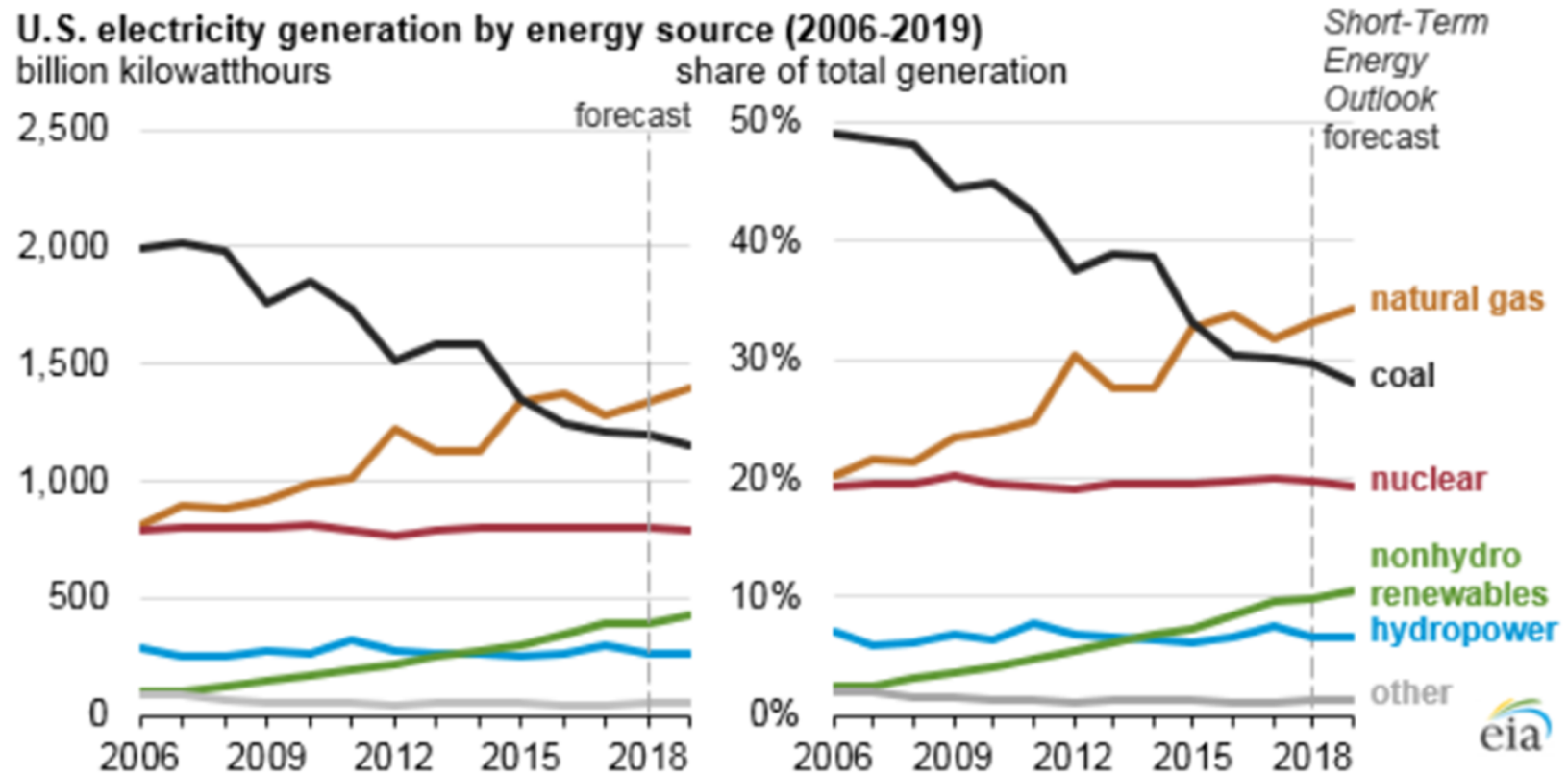
Interruptible capacity relied on by competitive generators pays “commodity charge” and avoids fixed capacity cost.

↑
e.g., \$1.50 mmbtu

↑
e.g., \$.035 mmbtu

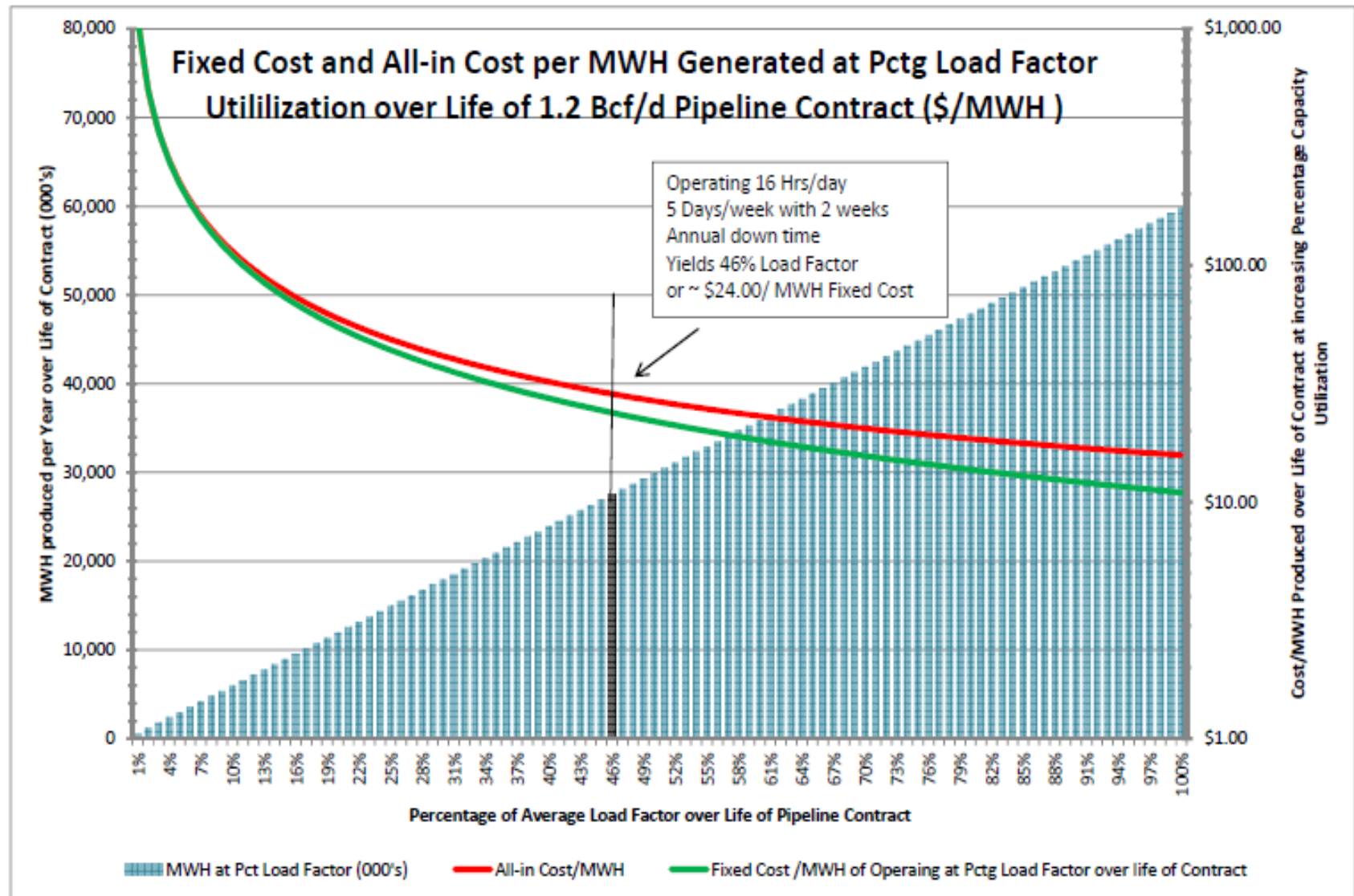
Power Generation Takes Growing

EIA forecasts natural gas to remain primary energy source for electricity generation

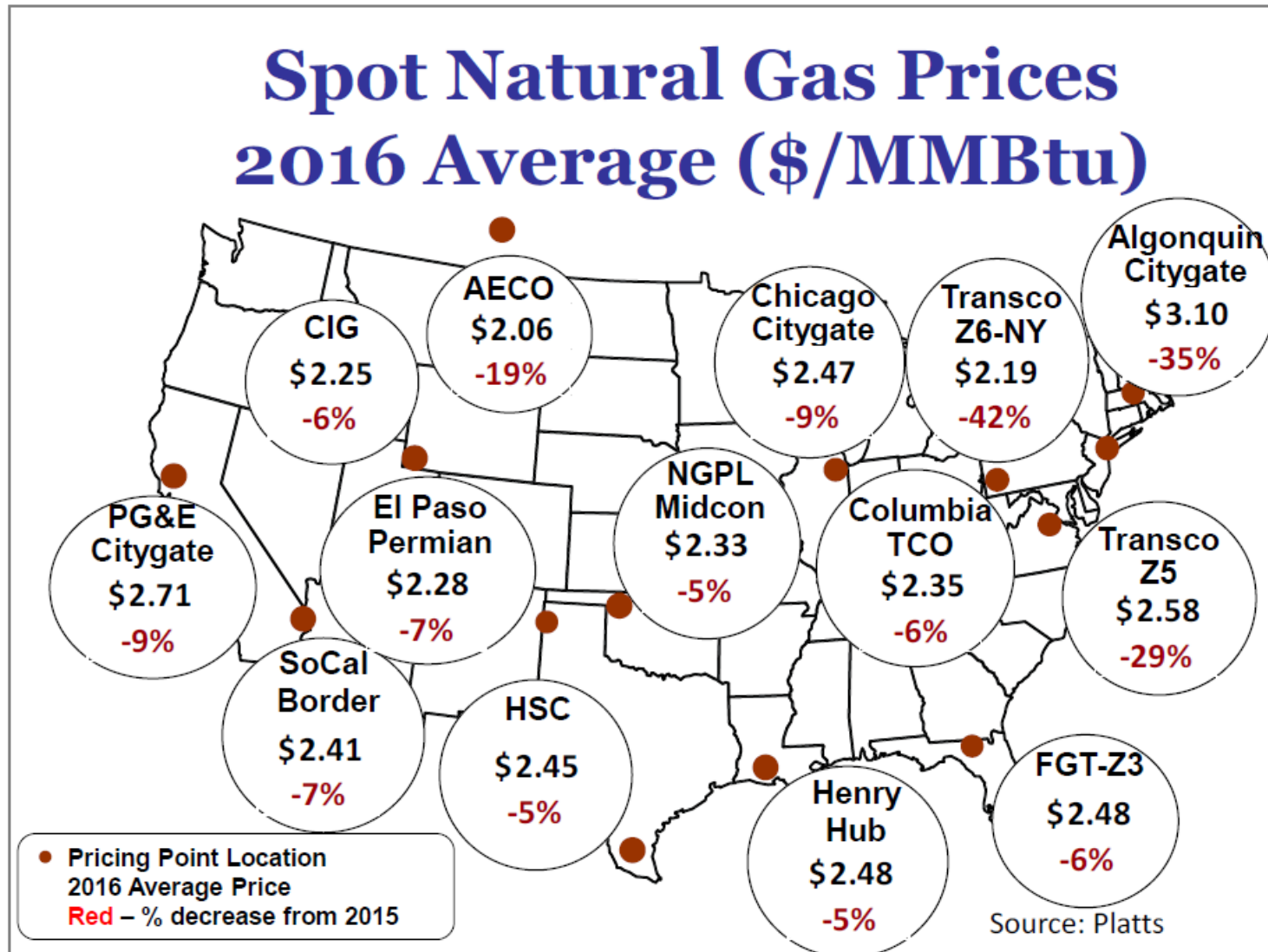


Source: U.S. Energy Information Administration, *Short-Term Energy Outlook*

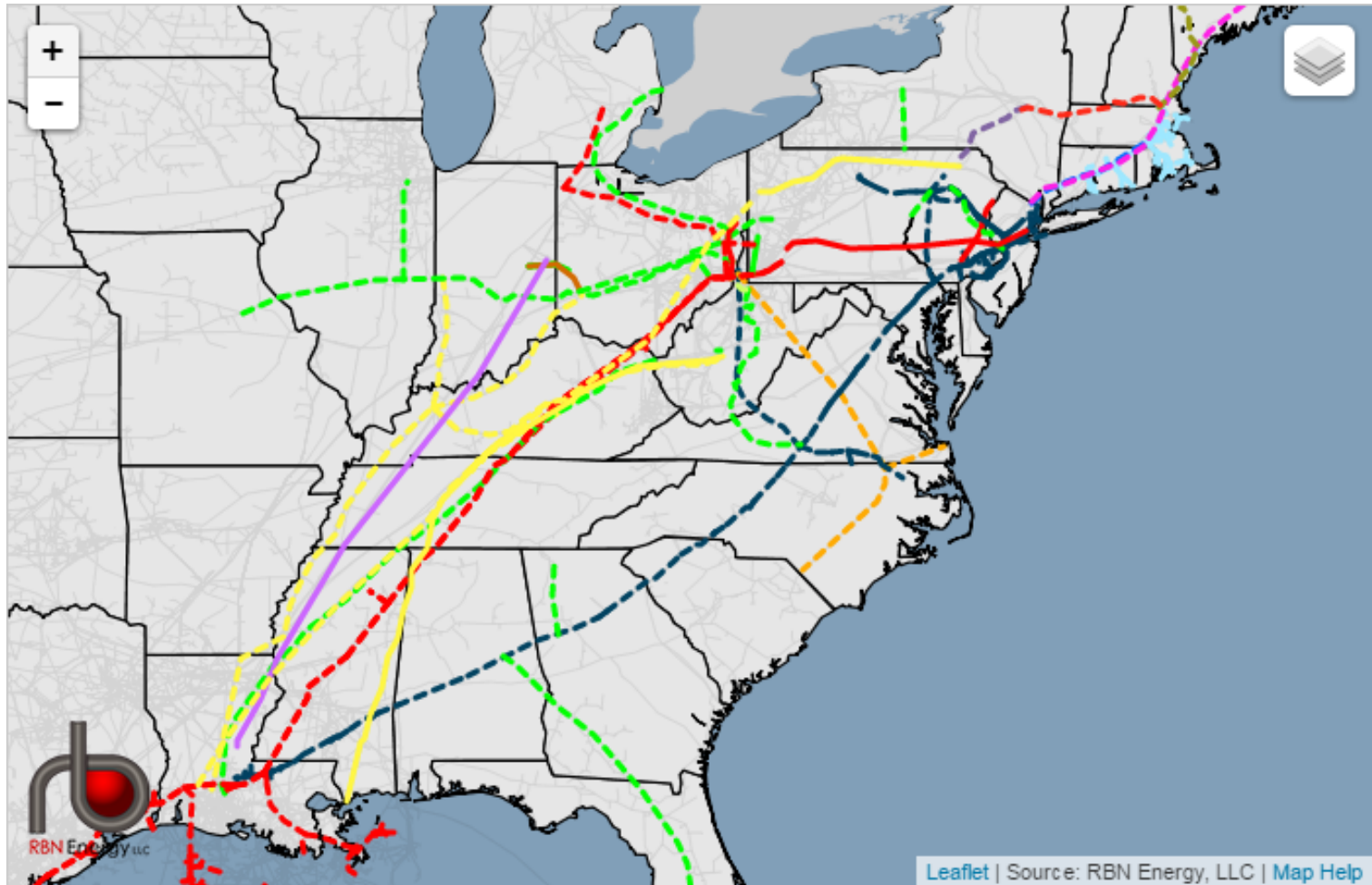
Pipeline cost in use - Recouping pipeline capacity costs is often uneconomic for merchant generator.



Price Signals Inform Capacity but Not Deliverability

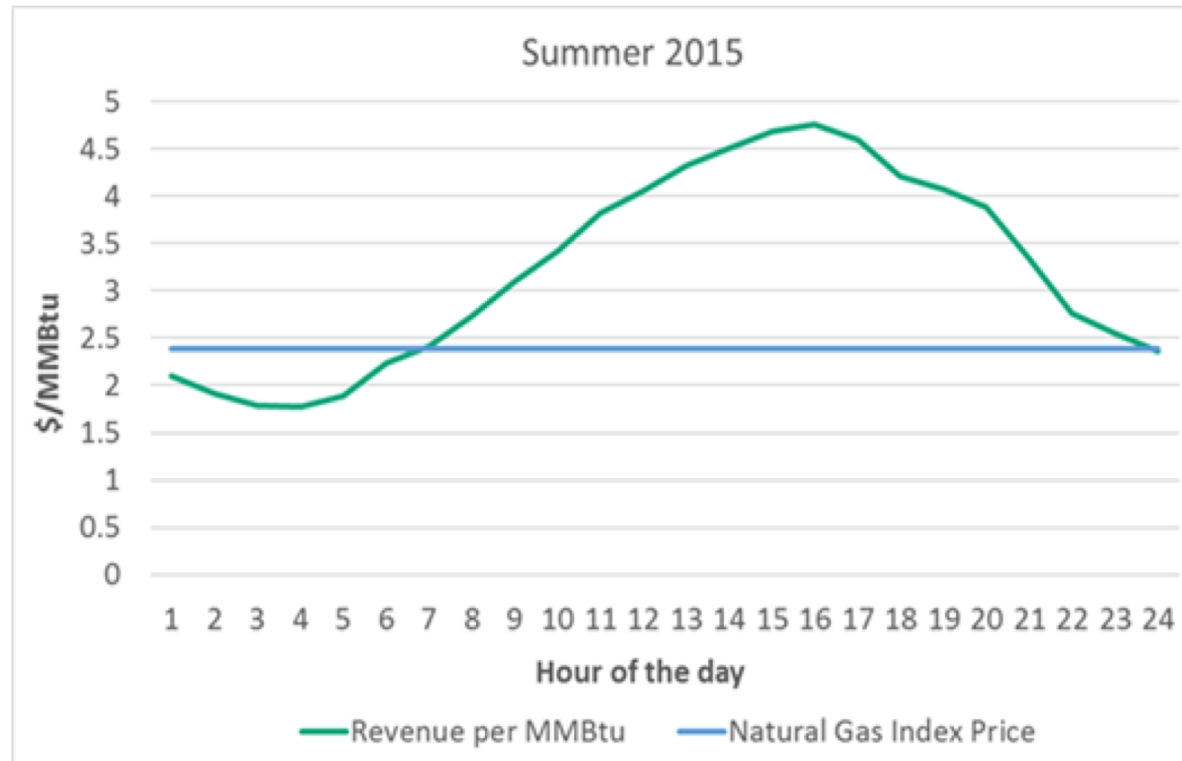


The system is becoming more reticulated and basis is dissipating.



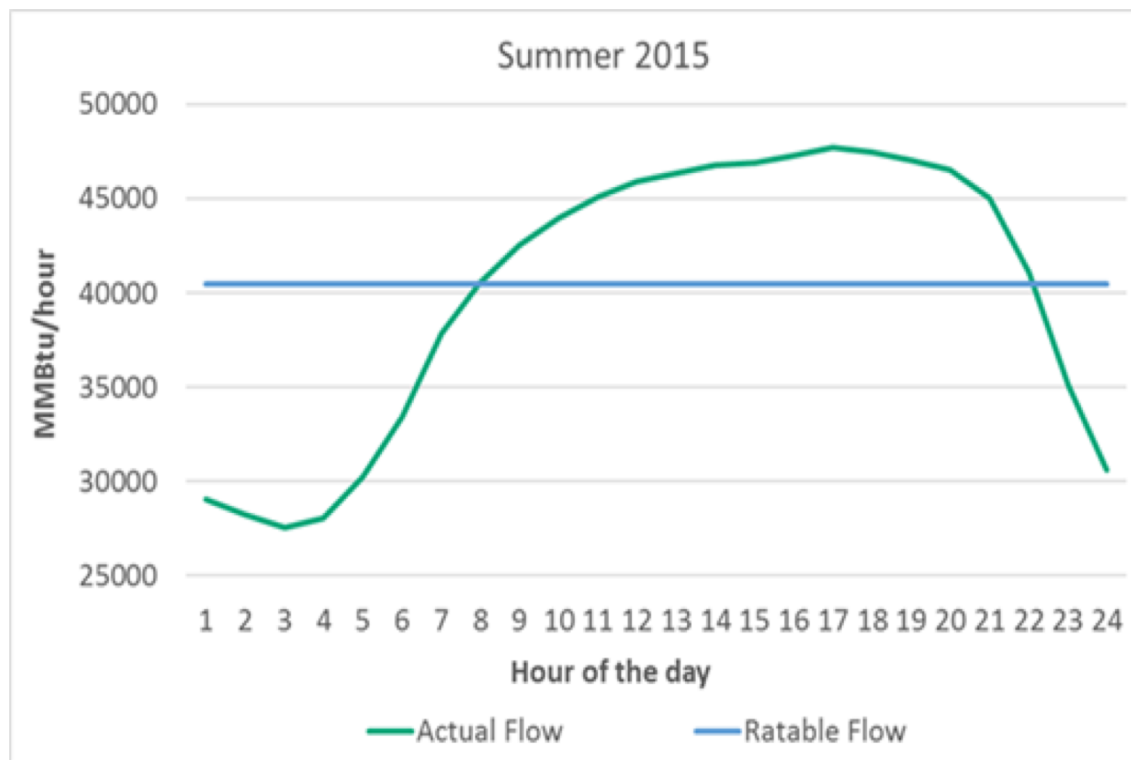
A reticulated system should offer enhanced receipt and delivery services to power generators such as peak and draft over short periods, providing the intraday flexibility needed to meet the needs of a peakier and more dynamic electric system. But those services are largely unpriced.

Misalignment Impairing Scarcity Pricing – Daily Index Rather Than Real Time Prices



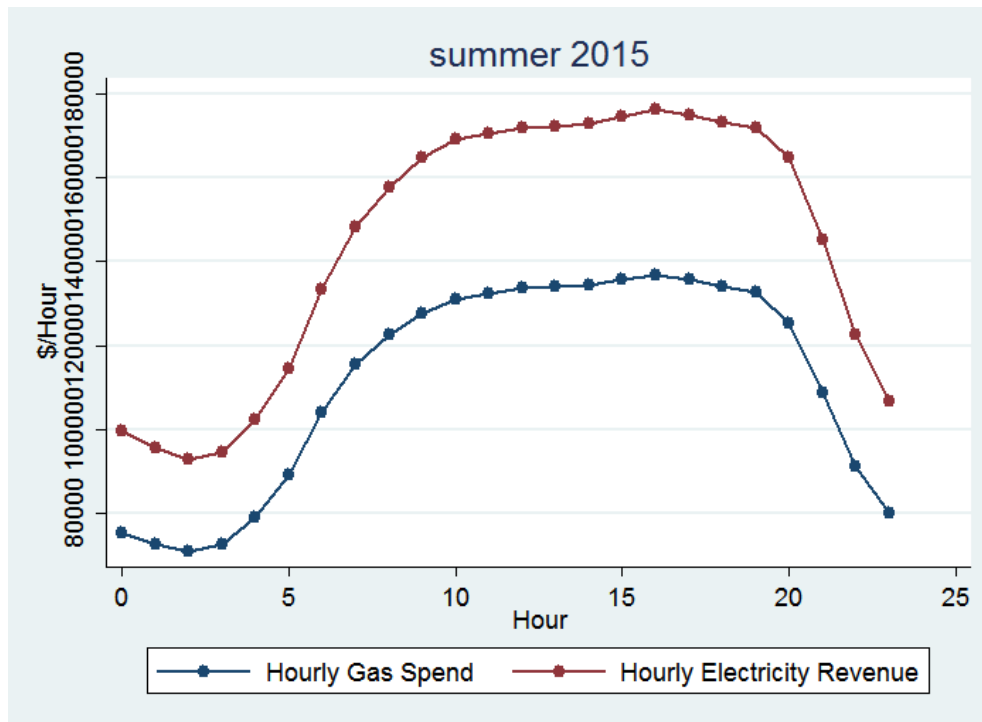
The value of natural gas supply fluctuates over the course of the day, but the natural gas market primarily relies on a single daily “index” price. It lacks a structure for efficient and transparent pricing of the sub-day and time sensitive spot market value of supply.

Misalignment Impairing Scarcity Pricing – Assumed (Priced) Steady Flows Are Incompatible with Generator Takes



The gas market design generally assumes uniform hourly flow, despite the fact that the flow used by generators is far more shaped over the course of the day. It lacks a means to price and convey value for the just in time delivery required for system operation.

Summer Hourly Patterns for Gas Costs and Electricity Revenue



Generators' hourly gas spend based on unpriced variable hourly delivery service is the blue line. In general, the electric market provides sufficient margin to facilitate price formation for the value of peak and sub-day (non-ratable) services (both peak and draft).

Perspectives of Market Participants

- API (filing to FERC): “energy pricing reflective of real-time market fundamentals enhances price formation and allows power prices to reflect the actual cost of fuel. Stale day-ahead energy pricing produces inefficient rates [...].”
- PJM: “Today’s natural gas market appears to lack sufficient tools and services to dynamically respond to the reliability needs of gas-fired units servicing electric load.”
- Desert Southwest Pipeline Stakeholders: obtaining timely access to natural gas that is needed to backstop the intermittent nature of these renewable resources and respond to unexpected operational contingencies.
- *If reliable operation of the electric system depends on variable hourly delivery service, shouldn’t the value of that service be reflected in the markets?*

Impaired Scarcity Price - Algonquin Pipeline OFO

As previously posted, AGT requests that customers/point operators on AGT be aware of the impact non-ratable hourly takes from the system may have in causing delivery pressures reaching lower than desired levels. As a reminder, AGT's system is not designed to sustain delivery pressures above contract levels while making non-ratable/accelerated deliveries above scheduled quantities for more than 6 consecutive hours, to be followed by flows below scheduled quantity for the balance of any 24 hour period.

Although AGT currently has a system wide imbalance management OFO in effect, if customers/point operators don't manage hourly takes from the system, 1) delivery pressures will be impacted and /or 2) AGT may be required to impose further restrictions or courses of action in order to maintain the operational integrity of the system.

Additionally, AGT requires all Power Plant Operators to provide information mandated by FERC Order No. 698. Information required includes the hourly consumption profile of directly connected power generation facilities.

Customers are advised that capacity may become available as the nomination and confirmation process continues throughout the day.

- Generators primarily rely on non-ratable takes.
- But during constrained hours, market forces are not allocating scarce pipeline capacity.
- Supply and demand are moderated not by hourly pricing but instead by data exchange between ISONE and AGT.
- An unpriced but valuable service assures scarcity.

Improving Price Formation to Resolve Scarcity and Express the Value of Expansion

- The pricing disconnects prevent an expression of the value of investment (or innovation) in the next needed increment of capacity.
- Akin to inadequate scarcity pricing on the electric market side and the missing money/missing incentive problem (see Hogan, 2014).
- Out of market resource allocation to resolve fuel supply challenges impairs price formation and investment signals.
- EDF presents a set of solutions (shaped flow contracting) for improving price formation, incentivizing investment and more efficiently allocating capital.

EDF Proposed Contracting Tools

- Order No. 809 directed NAESB to explore new options and standards for faster and more flexible pipeline scheduling.
- EDF proposed standards for provision of “mutual agreement” scheduling for natural gas pipeline transportation that is:
 - a) scheduled outside of the standard grid-wide nomination cycles,
 - b) permits flow changes outside of standard schedule flow periods; and/or
 - c) involves Shaped Flow Transactions (allow generators to schedule varying flow quantities of gas for delivery the next day that correlate to their anticipated output levels).

Suggestions

- Need to standardize terms for generators and pipelines to contract.
 - Adopt shaped flow protocol to germinate just in time deliverability market price.
 - And foster bid/marginal cost recovery in wholesale electricity markets.
- Invite pipeline tariff provisions and a framework for pipelines to charge for shaped flow transactions and earn incentive returns.
- As recommended by PJM, examine these issues on an individual pipeline basis