Integrating Public Policy Goals into Energy Markets

Gas/Electric Harmonization and Price Formation

New England Power Pool

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EDF
ENVIRONMENTAL DEFENSE ACTION FUND™
Legislative arm of Environmental Defense Fund

Context for EDF's Perspective

- Fundamental belief that environmental goals can be achieved through properly structured and functioning energy markets
- The ongoing FERC dockets: (e.g., Nat Grid 7/28)

  "However, the industry restructuring of recent decades, while creating many advantages for customers, has also had the unintended side effect of rendering dysfunctional the linkage between natural gas infrastructure and electric systems in the region. The failure of market forces to stimulate expansion of gas pipeline infrastructure under current industry conditions is now beginning to be urgently felt."

Market Perspective on Gas/Elec Harmonization

Gas and electric wholesale markets should be economically and operationally coordinated so that products and services in each market generate effective and actionable price signals in and across these two markets, and so that appropriate, right sized, investments are called forth in a timely manner.

Regulations, wherever possible, should be aimed at establishing self-correcting market structures that will further serve to support the generation of appropriate price signals to incentivize market players to meet established policy goals.

Market Incompatibility

- **Vast majority of Gas-fired electric generation does not run at the same level of output every hour of the day.**
- Only 6% of Gas-fired Plants and 10% of Gas-fired output is from Plants that run at >80% load factor (Avg is 85%),
- 49% of Plants and 68% of output is from Plants that run at 40% to 80% Load-factors (Avg is 59%); and
- 45% of Plants and ~20% of output is from Plants that run at an average load factor of only 17%

- Skipping Stone (From EIA data for Plants that ran in the period Jan thru Nov 2015)

Market Incompatibility

Since Order 636:

Virtually all contracts have been ratable flow contracts.

- Ratable flow has meant 1/24th of nominated and scheduled daily quantity every hour.

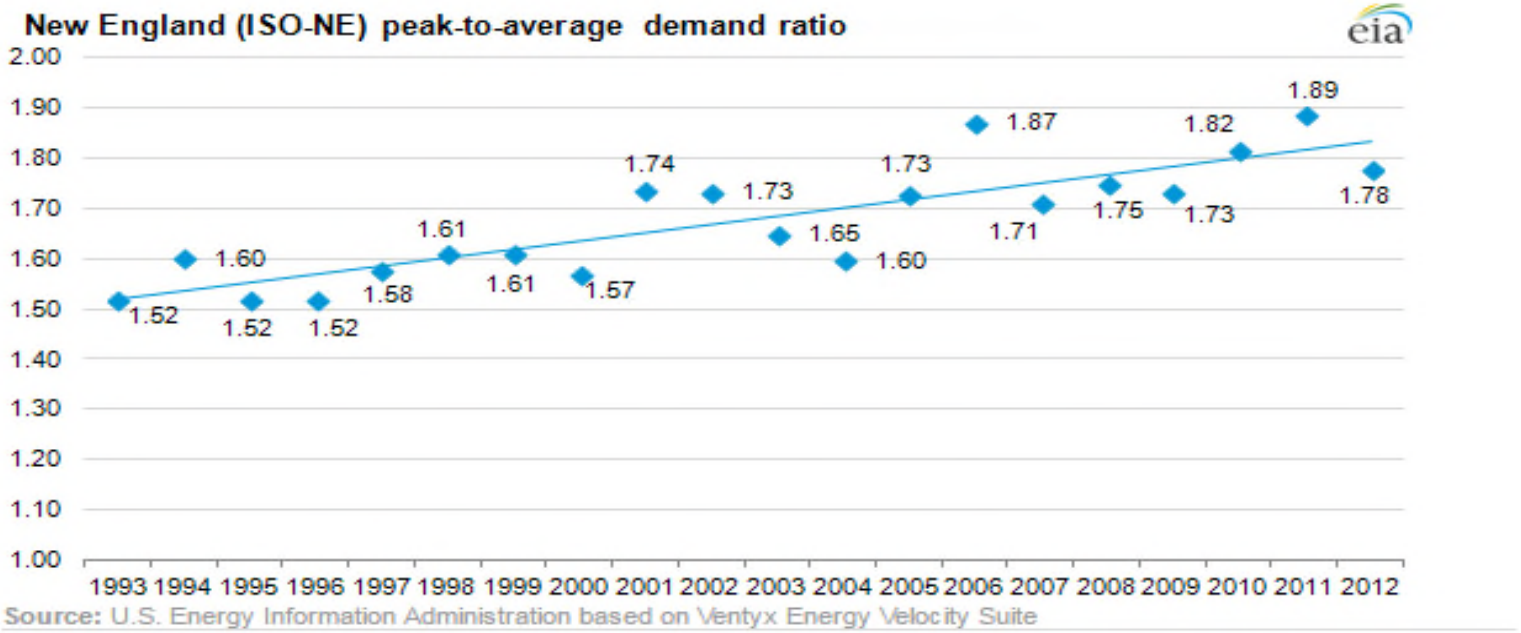
There is some carry over No-Notice on Pipelines that have these services.

- Comprises less than 15% of contracted transport service on Pipelines with No-Notice / Enhanced Services (i.e., non-1/24th hour services)
- Comprises ~17 Bcfd of the ~230 Bcfd of Total US contracted Transport services

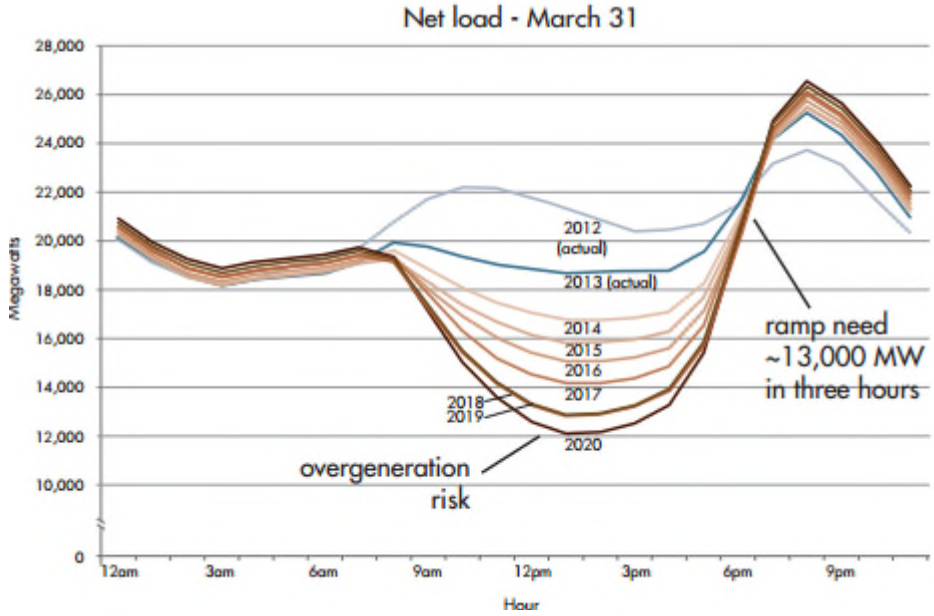
In essence, more frequent scheduling enables Shippers to achieve Intraday non-ratable flows versus the ratable flows that are associated with Day-Ahead scheduling

Source: Skipping Stone

Peak-to-average electricity demand ratio rising in New England and many other U.S. regions



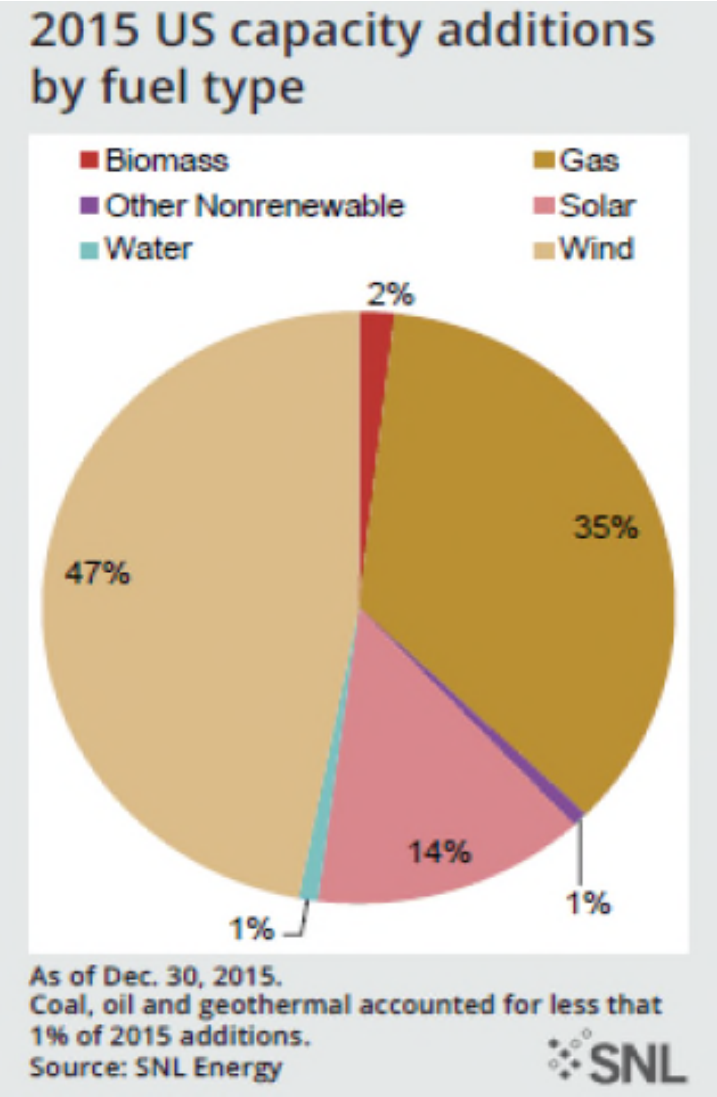
See also,
CAISO Duck Chart



Proposed standards for provision of "special efforts 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 (as defined in the proposed standard)." Note: shaped flows would allow generators to schedule varying flow quantities of gas for delivery the next day that correlate to their anticipated output levels.

-pending before NAESB

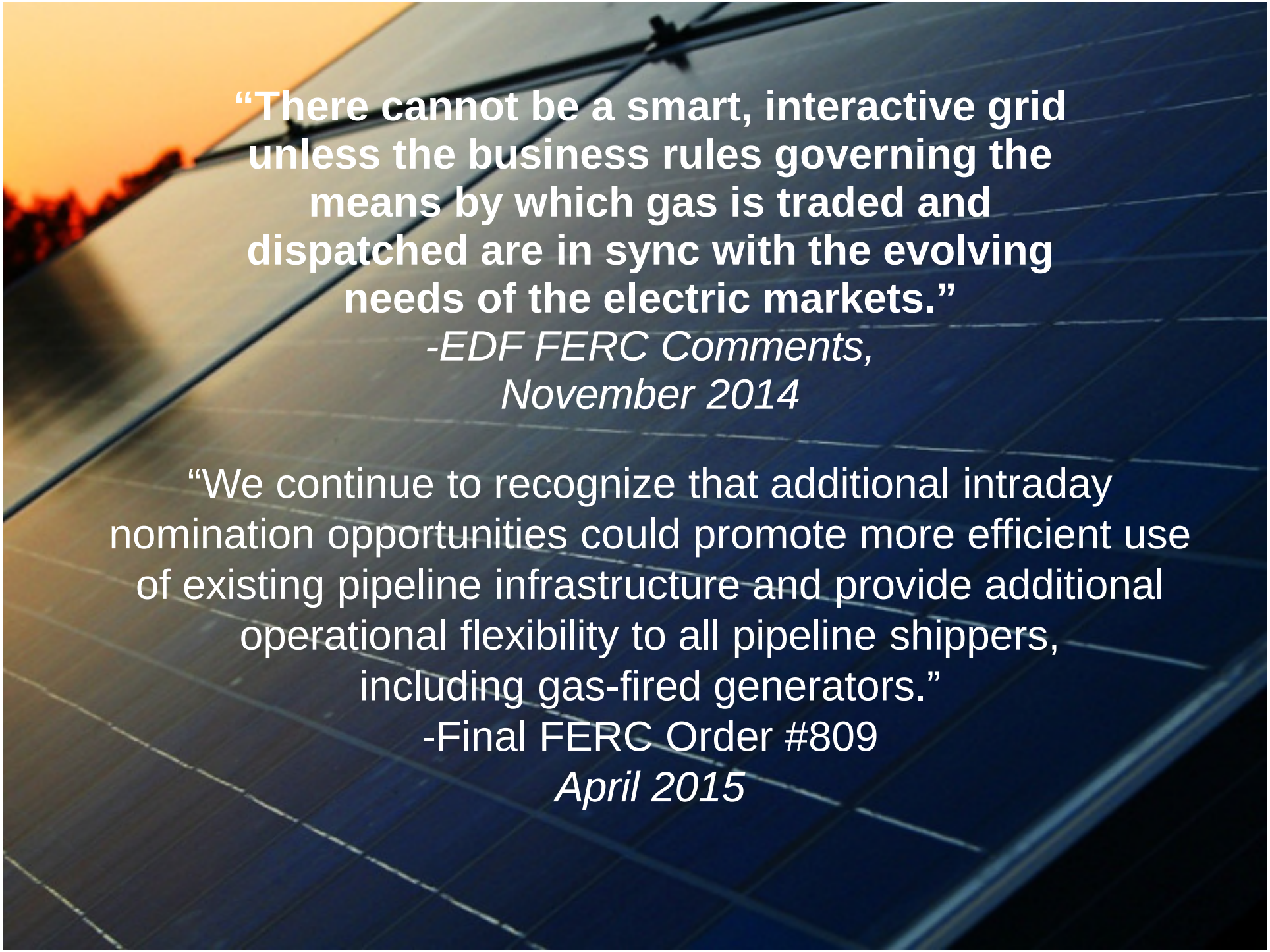
Optimized Market Design Considerations



- As the peak-to-average ratio rises, generators called on to meet peak-hour demand are running fewer hours and/or at lower output levels the rest of the year.
- As more renewables and DERs are added to the grid, ancillary services needs and values will increase.
- Efficient price formation and capturing that value require more scheduling cycles and sub-day services from the wholesale gas market (e.g., Cal-ISO FRP, Duck curve).
- A more dynamic, data driven grid will price based on the value of services.
- Electric – sub-hourly pricing and balancing; Gas ??

Pipeline Flexibility Pilot Program
(prepared by Skipping Stone 1/25/16)

The 3-year pilot program is designed to continue market design enhancements for coordination between the natural gas pipelines and electric generators. It will delineate and price new services for scheduling non-ratable flows and call forth competition in the provision of such services. Participation in the pilot would be voluntary.


“There cannot be a smart, interactive grid unless the business rules governing the means by which gas is traded and dispatched are in sync with the evolving needs of the electric markets.”
-EDF FERC Comments, November 2014
“We continue to recognize that additional intraday nomination opportunities could promote more efficient use of existing pipeline infrastructure and provide additional operational flexibility to all pipeline shippers, including gas-fired generators.”
-Final FERC Order #809
April 2015