



Markets and Generator Fuel Security in New England

Harvard Electricity Policy Group

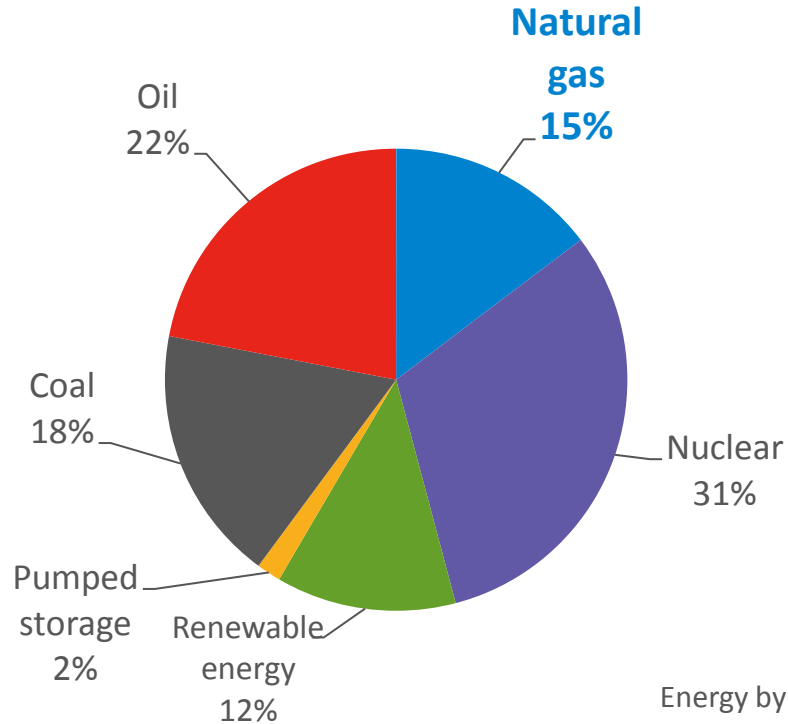
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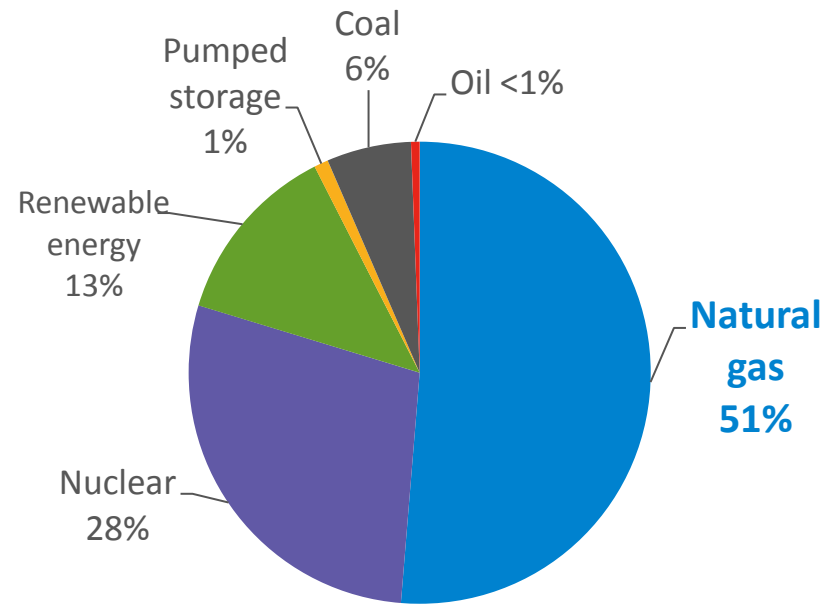


Natural Gas has Become the Dominant Fuel for Power Generation in New England

2000



2011



Energy by Fuel Type (GWh)

Lower Gas Prices have Lowered New England's Wholesale Market Costs

	2008	2009	2010	2011	2012 *
Total Energy Costs (\$B)	10.81	5.44	6.63	6.17	1.91
Total Wholesale Market Costs (\$B)	12.94	7.52	8.53	7.63	2.61

* 2012 costs are for the period 1/1/2012 to 6/31/2012

What's Different About Natural Gas as A Fuel for Electric Generation ?

- Before 2000, most electricity was produced using coal, oil, nuclear, and hydro
 - Until 1987, it was illegal to burn natural gas for electricity generation
- Fuel supply for coal, oil, and nuclear could be managed in a straightforward way, and on-site inventory meant fuel supply typically was not an issue
- Natural gas cannot be stored on-site and must be delivered “just in time” by scheduling on natural-gas pipelines
- Just-in-time delivery poses challenges for electric-system planning and operation
- Generator owners can increase inventories of coal or oil, but are limited by natural-gas pipelines in acquisition of natural gas

Challenges Posed by Increasing Amounts of Natural-Gas-Fired Generation

- Operational Challenges
 - Electric system operators assume all generators are available if they are not on maintenance; on-site fuel inventory made this assumption valid
 - The just-in-time nature of natural gas delivery means that some resources that are not on maintenance may not be available
 - ***Each day, system operators must make decisions about how many resources are needed and which resources are needed—taking into account this uncertainty***
 - Operational characteristics of New England’s generation fleet make this particularly challenging
 - Different gas and electric days increase the difficulty of generators procuring fuel on short notice
- Planning Challenge
 - As older coal and oil units retire (i.e., those with fuel inventory), how do we assure that existing and new gas-fired generators have fuel to operate when needed?

The Role of an RTO in Improving the Coordination of Gas and Electric Markets

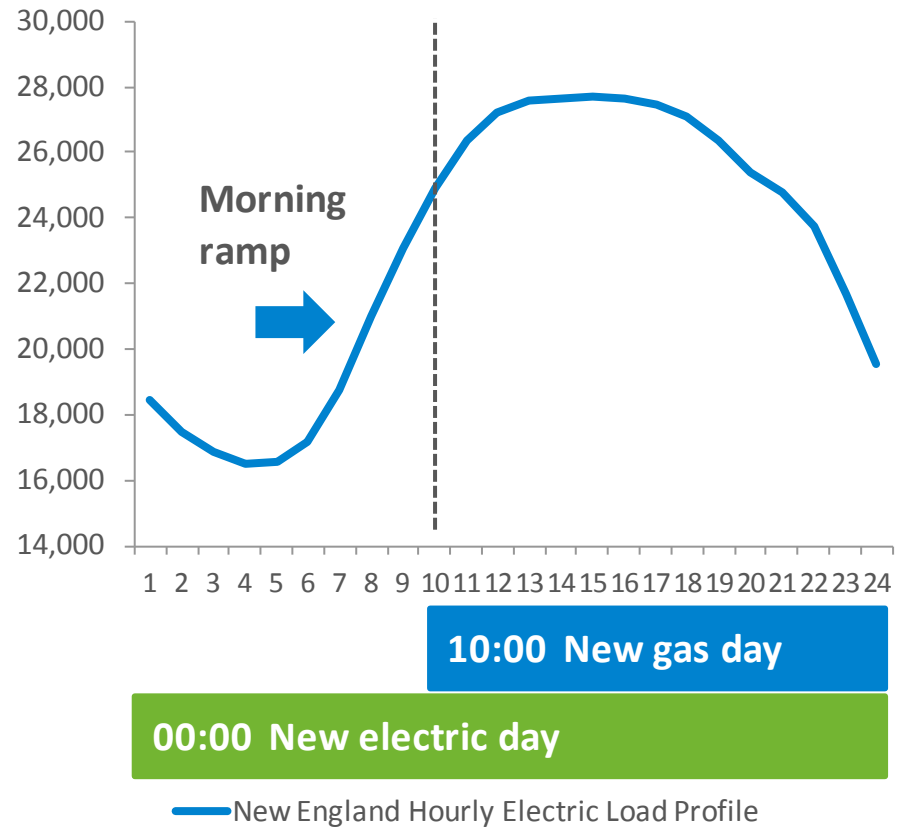
- **ISO cannot make investment or resource choices but can modify operational practices and improve incentives through market design changes to assure a reliable system at efficient prices**
- **Operational Changes**
 - Continue to improve short-term coordination with gas-pipeline operations (ongoing)
 - Change timing of day-ahead market to give resources committed for reliability better access to gas markets (2013)

Gas and Electric Markets are Not Aligned

- Currently, offers into the New England Electricity Market must be submitted at 12:00 PM. Day Ahead Market commitments are known at 4:00 PM. Resources can change offers at 6:00 PM. Reliability Commitments are made at 10:00 PM.
- Gas Generators must nominate gas by 12:30 PM to have the greatest chance of securing gas for the next day. They know the price at that time but not the quantity.
- Gas Generators that are committed for reliability may not be able to purchase gas because it is too late to contact suppliers or arrange transportation.

Different Operating Days Make it Difficult for Gas-Fired Generators to Satisfy Scheduling in Both Markets

- Some gas units needed for the electric system's morning ramp can't get gas until 10 AM—at the start of the new gas day



ISO Proposes to Shift the Energy Market Timeline

- Proposal:
 - Advance by *six hours* the results of the Day-Ahead Market (DAM) and Resource Adequacy Assessment (RAA); (produce results by 4 p.m.)
 - Move up by 3 hours the deadline to submit offers in the DAM (to 9 a.m.)
 - Move up by 3-1/2 hours the deadline to clear the DAM (to 12:30 p.m.)
 - Close the re-offer period 5 hours earlier (at 1 p.m.)
 - Publish the initial RAA 6 hours earlier (at 4 p.m.)
- Objectives:
 - Provide gas-fired generators more time to line up fuel for the operating day, and
 - Give ISO system operators more time to determine whether commitment of non-gas generation is required

Market Design Changes

- Allow resources to change offers during the operating day and offer hourly (2014)
 - Currently, resources cannot reflect actual costs of in-day gas purchases in their offer
- Change capacity market performance incentives to increase penalties for failure to supply energy (FCA 10 in 2015)
 - Current “shortage hour” pricing penalties have never been used
 - Resources have little incentive to firm up fuel supply in times because of a lack of penalties for non delivery

Possible Market Responses to The Market Alignment and Market Design Changes

- Operational
 - Procure intra-day gas to respond to in-day commitments
 - Contract for more flexible service and storage
 - New pipeline products
- Investments
 - Dual-fuel capability of gas-fired generators
 - On-site fuel (e.g., LNG or oil), especially for fast-start generators
 - Increased pipeline capacity into New England

Potential Gas Industry Improvements to Increase Coordination in New England and Nationally

- Gas industry should examine shifting to a 24-hour operation
 - Gas market is a five-day operation
 - Electricity market is a 24x7 operation
- Examine improved coordination of maintenance among pipelines and with the electric industry while maintaining reliable service to firm customers
- Examine whether increased operational coordination between pipelines can increase the throughput of existing pipelines
- The FERC could encourage review of these issues

Questions

