The Value of Natural Gas Energy Efficiency in Import Constrained Markets

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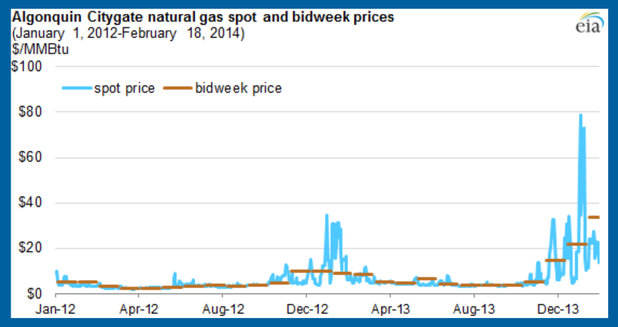
Introduction

Natural gas production and consumption patterns are changing rapidly due to hydraulic fracturing and the increased use of natural gas in electricity generation. The result is increased interstate pipeline congestion and price volatility during periods of peak demand.



Decision makers are aggressively pursuing policies that will allow the energy system to accept these new supply and demand patterns while maintaining affordability and reliability. Policies are primarily focused on enabling gas from production areas to reach demand centers without excessive price differentials. Proposed solutions include:

- Building more physical assets that can transport gas
  - E.g. Spectra AIM Project
- Change operational procedures to utilize existing capacity more efficiency
  - E.g. aligning bid schedules for "electric days" and "gas days"
- Reduce peak demand using energy efficiency
  - Known as "integrated resource planning" or "least cost planning"

Problem

Several barriers currently reduce the potential contribution of energy efficiency in managing peak demand (specifically in New England).

- Peak demand reductions from energy efficiency are undervalued when new pipelines are needed to provide marginal system capacity.
- Total potential peak demand reductions from energy efficiency are not well established

Research Question

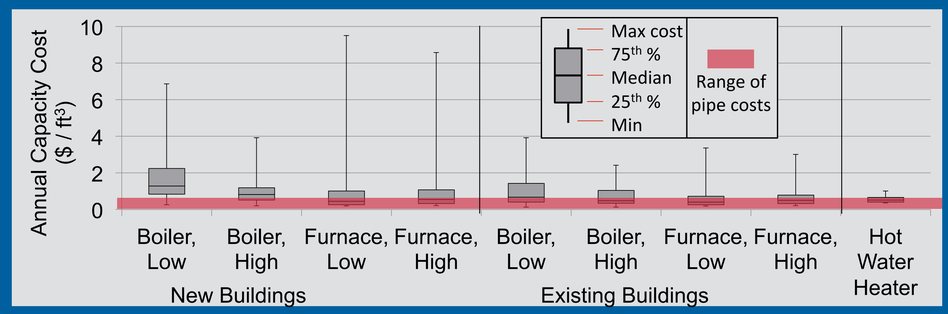
Is energy efficiency more cost effective than expanding natural gas pipelines in import constrained markets?

This research contributes towards the broader challenge of cost-effectively adapting our natural gas energy system to new production and consumption patterns.

Results

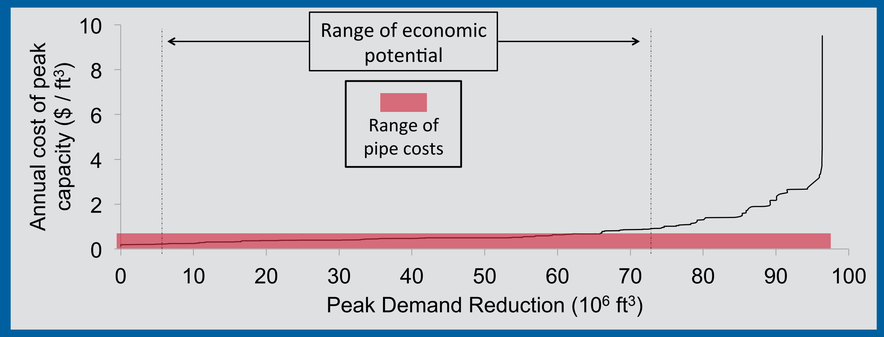
Finding 1: Obtaining peak period capacity through natural gas energy efficiency in commercial buildings is cost competitive with the cost of expanding natural gas import pipelines.

➢ The median cost of energy efficiency falls within the range of pipeline costs for all but one energy efficiency intervention scenario



Finding 2: The three commercial building efficiency interventions evaluated have a technical peak demand reduction potential of 80 - 100 million cubic feet (MCF) per day. The economic potential is 10 - 70 MCF per day or 4%-20% of the proposed Spectra AIM pipeline.

➢ Utility costs decrease by $0.2 - $25 million dollars annually



Recommendations:

➢ Utility commissions should ensure that the capacity value of efficiency is calculated using the marginal cost of system capacity.

➢ Additional studies should quantify the peak demand reduction potential of other efficiency measures, such as commercial building insulation or residential efficiency.

Methods

We compare the cost of reducing peak demand using efficiency and the cost of peak capacity by expanding interstate natural gas pipelines.

- We use commercial building energy efficiency in the import constrained market of New England as a case study.

We estimate:

1. Upper and lower bounds on the cost of expanding gas pipelines
2. Gas savings of efficiency measures in commercial buildings
   - We estimate building energy savings using the building energy simulation model EnergyPlus
     - 16 commercial building types across 7 New England cities
   - We account for differences between model predicted and program realized energy savings.
3. Cost to utilities of natural gas energy efficiency programs
   - We account for costs beyond the rebates paid to consumers (e.g. measurement and evaluation)
4. Total floor space available for efficiency improvements
   - Existing commercial building stock estimates from the CBECS survey.

From these data we create a peak demand reduction supply curve for comparison with the cost of expanding import pipelines.

- The price of peak demand reductions is gas savings divided by efficiency program cost
- The quantity of demand reductions is total commercial floor space available for efficiency upgrade

Acknowledgments

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