



Synapse
Energy Economics, Inc.

Electricity Price Increases: Causes, Effects, and Solutions

Restructuring Roundtable

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Recent Electricity Price Increases for Small Customers in New England

	Price in ¢/kWh (prior period)	Price in ¢/kWh (new period)	Increase
Narragansett (RI)*	6.7 (8/04 to 9/06)	10.0 (1/07 to 5/07)	49%
CMP (ME)	6.9 (3/05 to 2/06)	8.4 (3/06 to 2/07)	21%
Bangor Hydro (ME)	7.1 (3/05 to 2/06)	8.7 (3/06 to 2/07)	22%
NSTAR/BEC _o (MA)**	7.7 (7/05 to 12/05)	12.7 (1/06 to 6/06)	65%
Granite State (NH)***	5.2 (7/05 to 4/06)	8.6 (5/06 to 10/06)	64%

Note: These prices are generation only (not including T, D, and CTC)

* Narragansett price for 10/06 to 12/06 was 8.2¢/kWh.

** NSTAR/BEC_o price is without the 12/6/05 Settlement which capped the increase.

*** Granite State price of 8.5 ¢/kWh is the simple average of monthly figures.

Cause and Effect: Boolean “AND” Function

Logical “AND” Gate



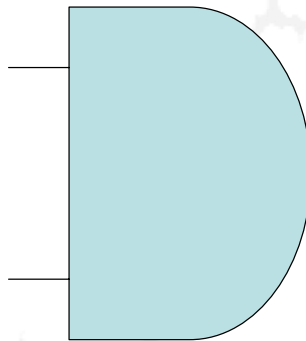
Truth Table

Input A	Input B	Output
0	0	0
1	0	0
0	1	0
1	1	1

Electricity Price Increases Cause and Effect

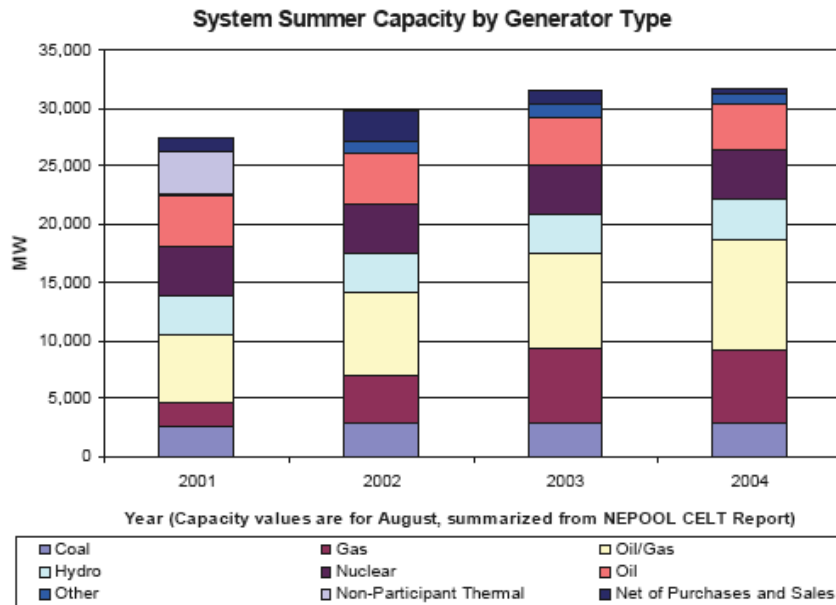
Gas price increases with gas “on the margin”

Electricity deregulation with reliance on “market”



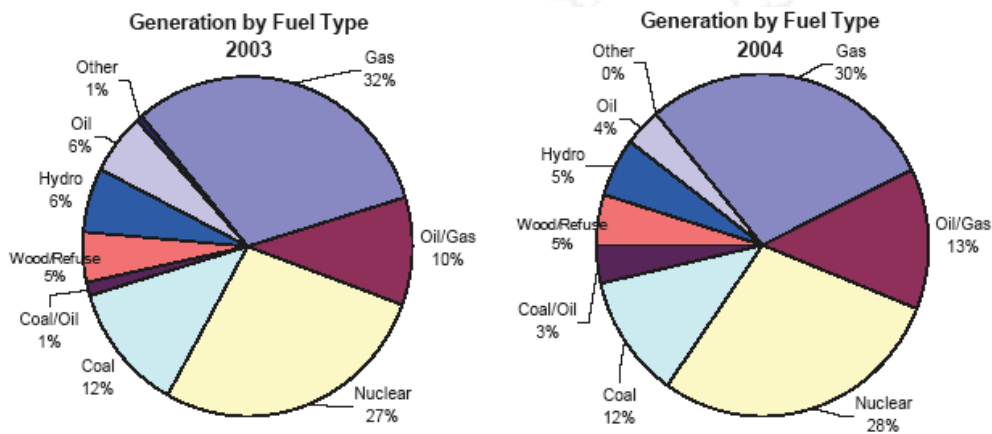
Electricity price increases with implications for the economy

New England Capacity Mix



Source: ISO-NE "2004 Annual Markets Report," page 22.

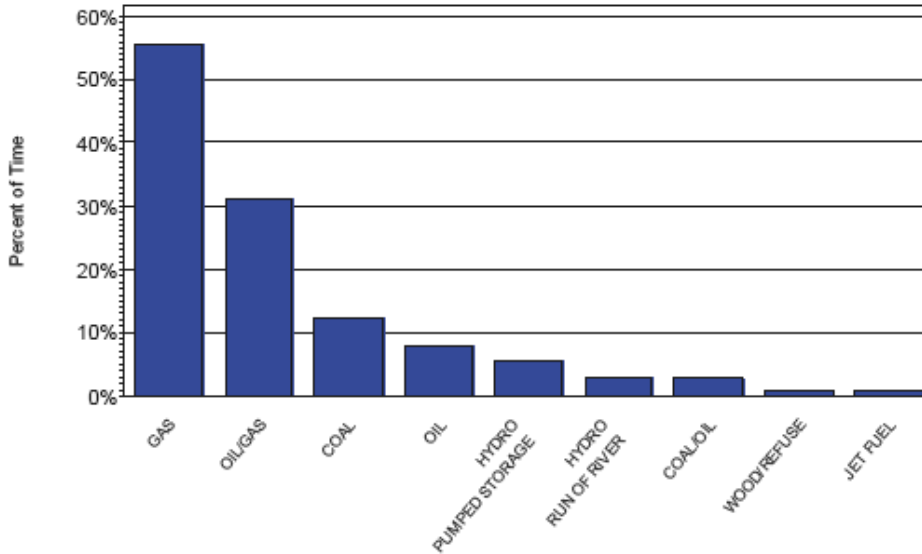
New England Fuel Mix for Electricity Generation



Source: ISO-NE "2004 Annual Markets Report," page 23.

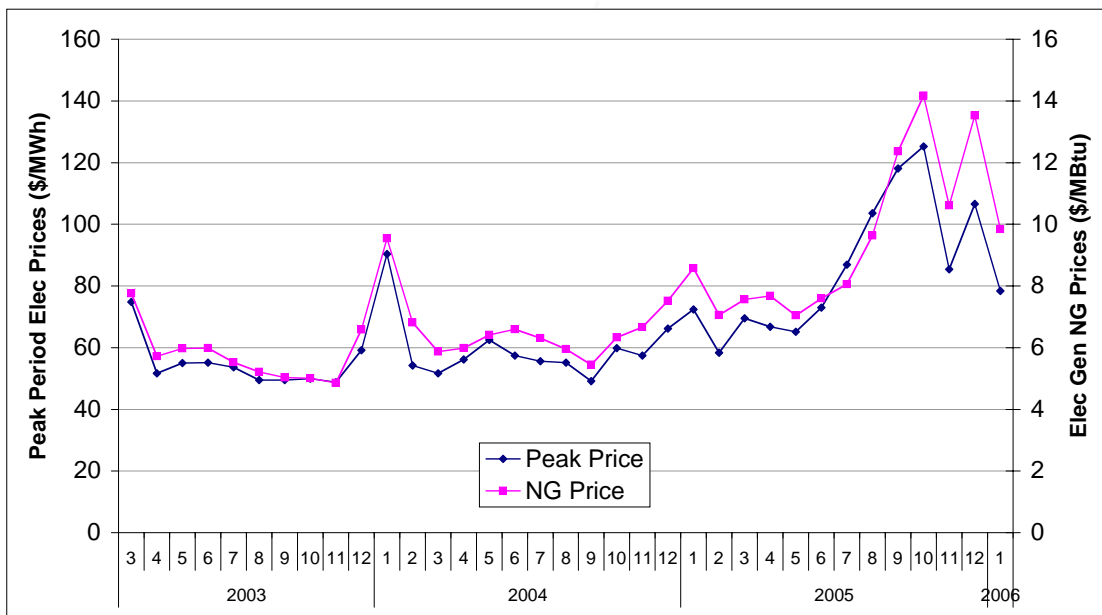
New England Marginal Fuel Mix for Electricity Generation

Marginal Input Fuels in Real-Time, 2004

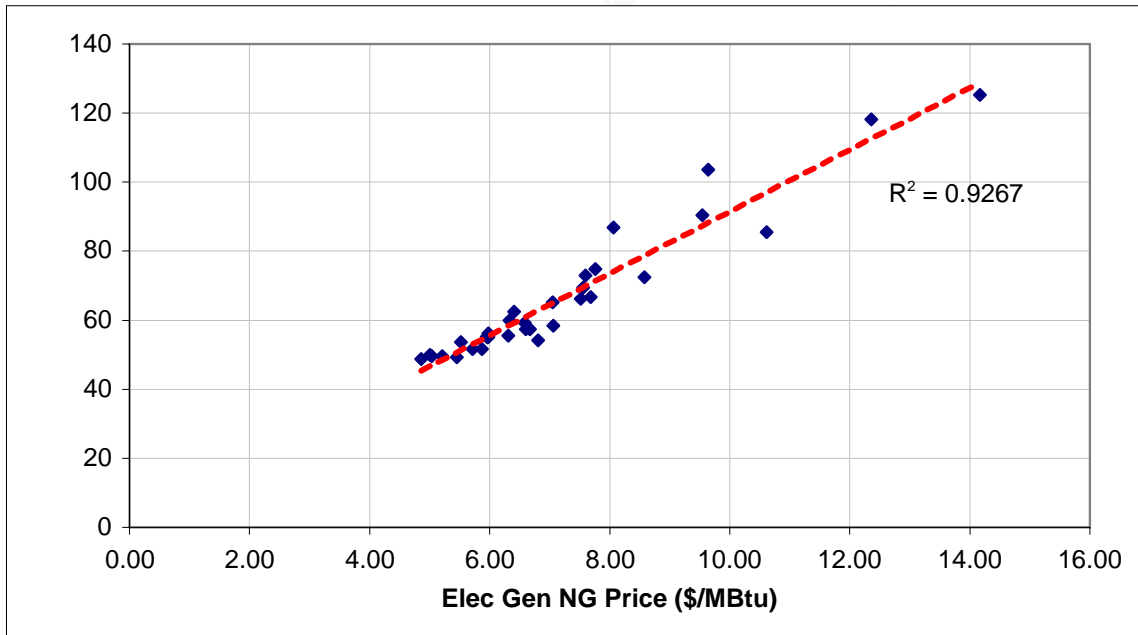


Source: ISO-NE "2004 Annual Markets Report," page 31.

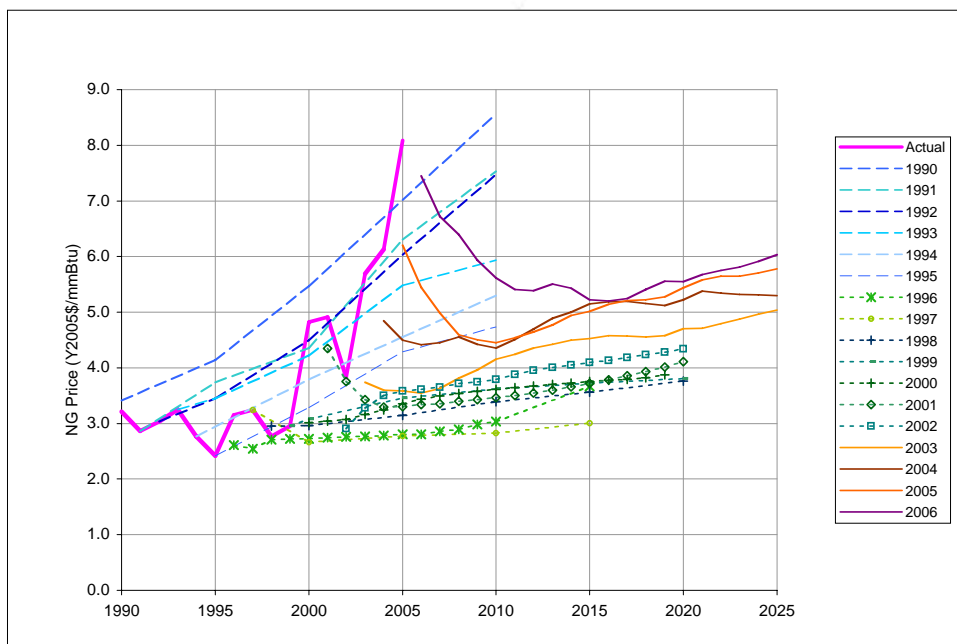
Natural Gas Prices Drive Wholesale Electricity Prices in New England: Time Series



Natural Gas Prices Drive Wholesale Electricity Prices in New England: Scatter Plot



Forecasts of Natural Gas Prices Have a Poor Track Record

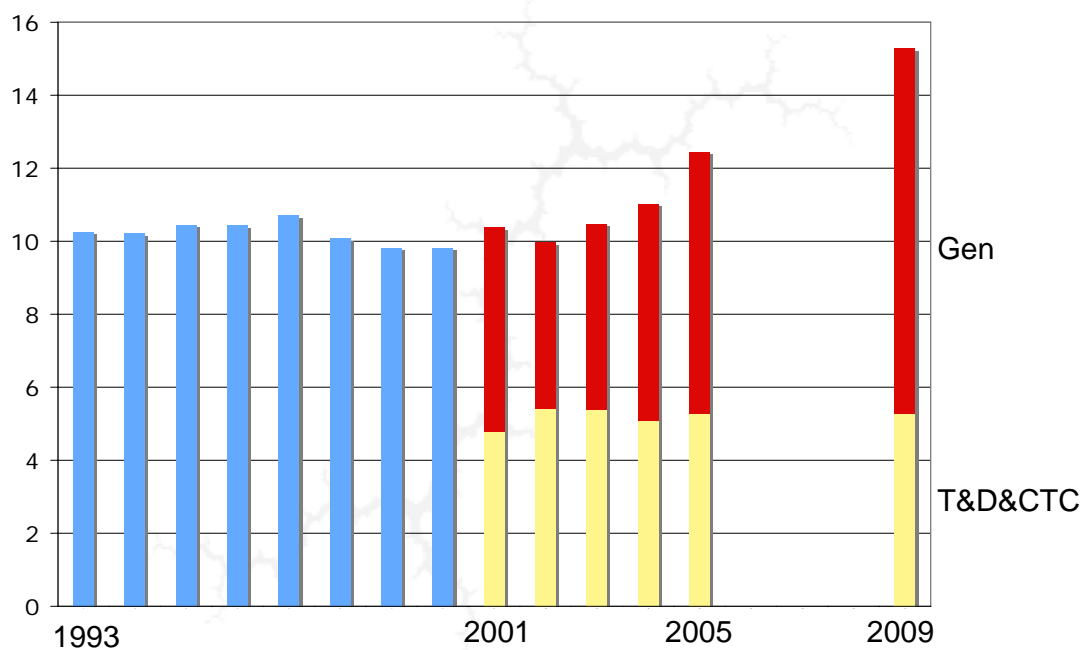


Source: Compiled by Synapse from EIA's Annual Energy Outlook reports.

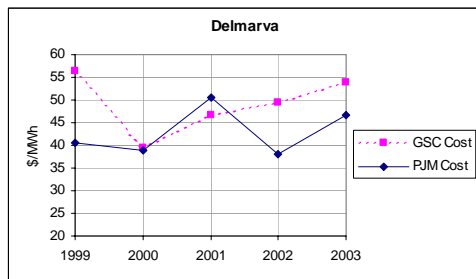
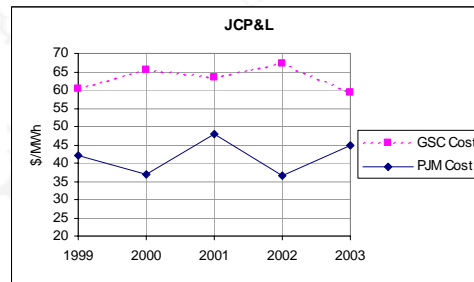
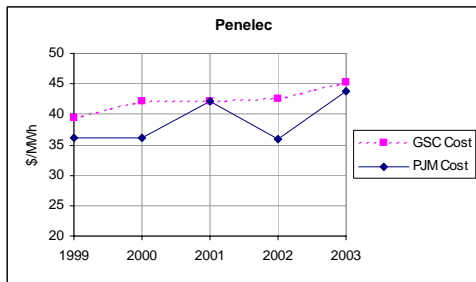
Gas prices on the rise:

- 1995 = \$2/MMBtu
- 2002 = \$4/MMBtu
- 2009 expected \$10/MMBtu
- Lots of volatility and uncertainty

Average Electricity Price in New England for Small Customers (¢/kWh)



Synapse's price analysis for PJM through 2003 found mixed results



Source:

Electricity Prices in PJM: A Comparison of Wholesale Power Costs in the PJM Market to Indexed Generation Service Costs, June 3, 2004.

Illustrative Calculation of the Effect of Gas Prices on Electricity Consumers (page 1 of 4)

Simplified system:

Energy = 130,000 GWh/year

Gas is 50% of the generation mix

Gas is on the margin 100% of the time

Gas heat rate = 7500 Btu/kWh (average) 8500 (marginal)

Bundled generation at 5 ¢/kWh (\$6.5 billion/year)

T&D&CTC at 5 ¢/kWh in all cases (\$6.5 billion/year)

Capacity and misc adders at 2.5 ¢/kWh in market cases

Illustrative Calculation of the Effect of Gas Prices on Electricity Consumers (page 2 of 4)

Calculations:

$$\begin{aligned} \text{Gas cost} &= \$4/\text{MMBtu} \times 7,500 \text{ Btu/kWh} \times 65,000 \text{ GWH/year} \\ &= \$2 \text{ billion/year} \end{aligned}$$

$$\text{Gas cost at } \$10/\text{MMBtu} = \$5 \text{ billion/year}$$

$$\begin{aligned} \text{Energy market price} &= \$4/\text{MMBtu} \times 8,500 \text{ Btu/kWh} = 3.4 \text{ ¢/kWh} \\ &\quad + \underline{2.5 \text{ ¢/kWh}} \\ &= 5.9 \text{ ¢/kWh} \end{aligned}$$

$$\begin{aligned} \text{Energy market price} &= \$10/\text{MMBtu} \times 8,500 \text{ Btu/kWh} = 8.5 \text{ ¢/kWh} \\ &\quad + \underline{2.5 \text{ ¢/kWh}} \\ &= 11.0 \text{ ¢/kWh} \end{aligned}$$

Illustrative Calculation of the Effect of Gas Prices on Electricity Consumers (page 3 of 4)

	Regulated		Market	
	¢/kWh	Billions of \$/year	¢/kWh	Billions of \$/year
\$4/MMBtu gas	5	6.5	5	6.5
	<u>+5</u>	<u>+6.5</u>	<u>+5.9</u>	<u>+7.7</u>
	10	13.0	10.9	14.2
\$10/MMBtu gas	5	6.5	5	6.5
	<u>+7.3</u>	<u>+9.5</u>	<u>+11</u>	<u>+14.3</u>
	12.3	16.0	16	20.8

In each cell, the items listed are: top = T&D&CTC
middle = generation
bottom = total

Illustrative Calculation of the Effect of Gas Prices on Electricity Consumers (page 4 of 4)

	Regulated		Market	
	Billions of \$/year		Billions of \$/year	
\$4/MMBtu gas	13	--	14.2	9% increase
\$10/MMBtu gas	16	23% increase	20.8	60% increase

Effect on the Regional Economy

- Plausible range of 10 to 20 jobs per million dollars of increase in electricity prices.
- Electricity cost increase of \$8 billion per year results in loss of 80,000 to 160,000 jobs.
- Note: Electricity price increases from efficiency programs and carbon policy can have benefits to the regional economy.

- Longer term resources
- Portfolio management
- Renewables and energy efficiency
- Challenge rates and market structures (just and reasonable?)