



Environmental Energy Technologies Division Lawrence Berkeley National Laboratory

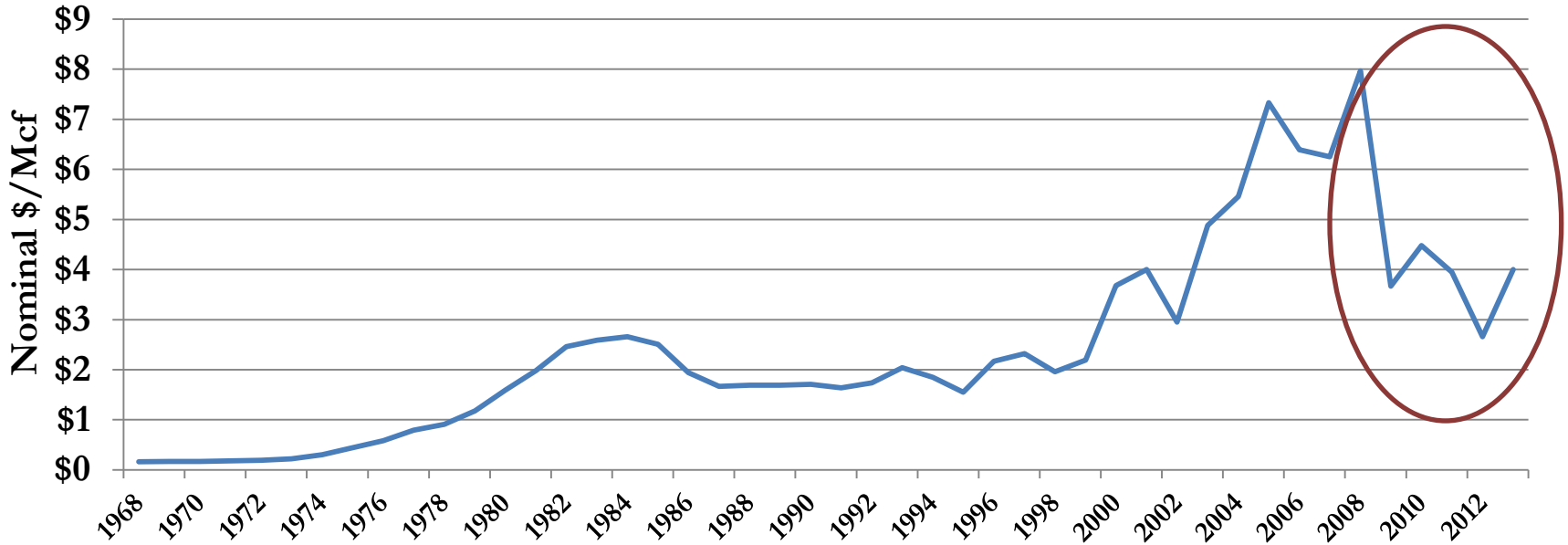
# The New Normal of Moderate Gas Prices: Challenges and Options for Gas Energy Efficiency Program Administrators

**September 23, 2013**

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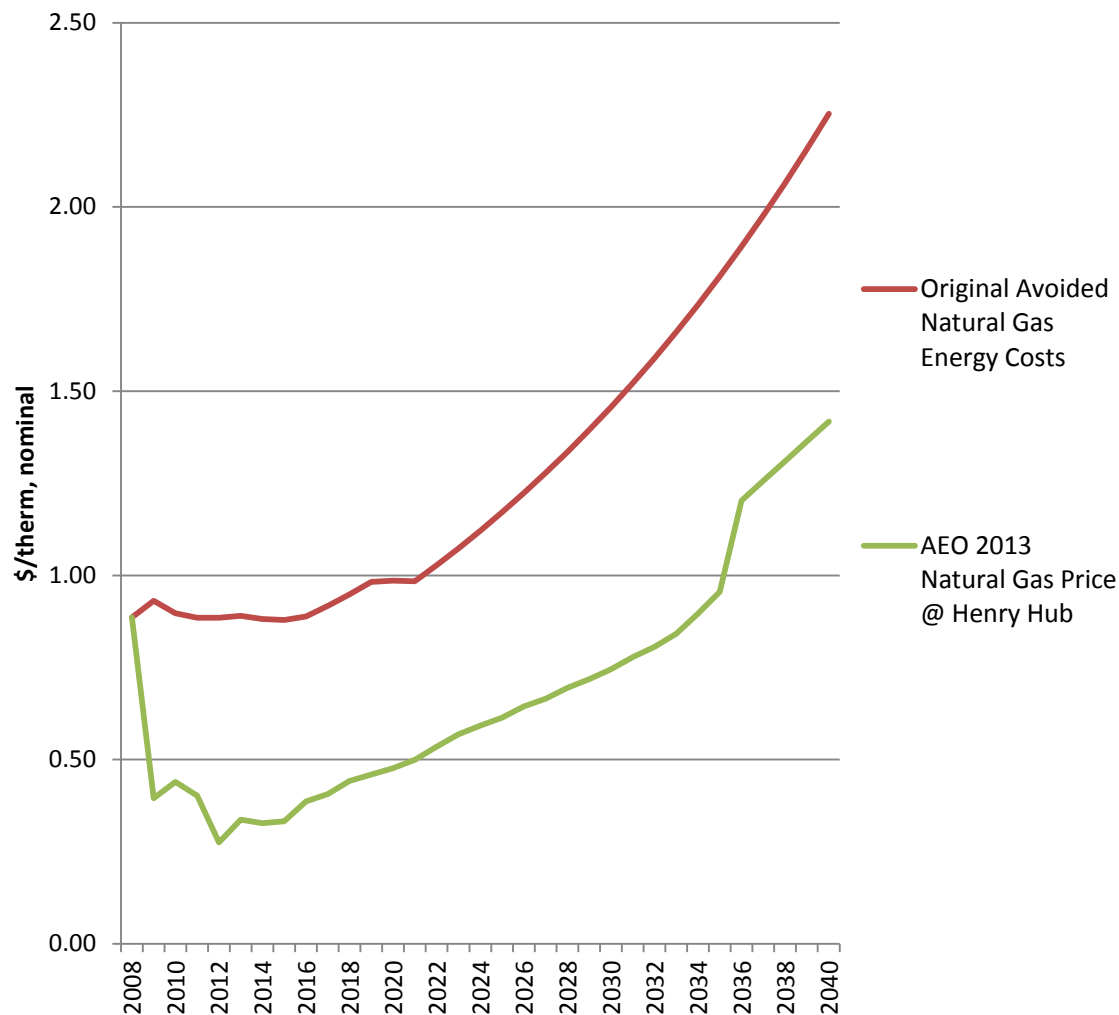
# Natural Gas Prices and EE Benefits



*Today's tight natural gas markets have been a long time in coming, and futures prices suggest that we are not apt to return to earlier periods of relative abundance and low prices anytime soon.*

- Allen Greenspan, Federal Reserve Chairman, 2003 testimony

# Steep Drop in Gas Avoided Cost Forecasts

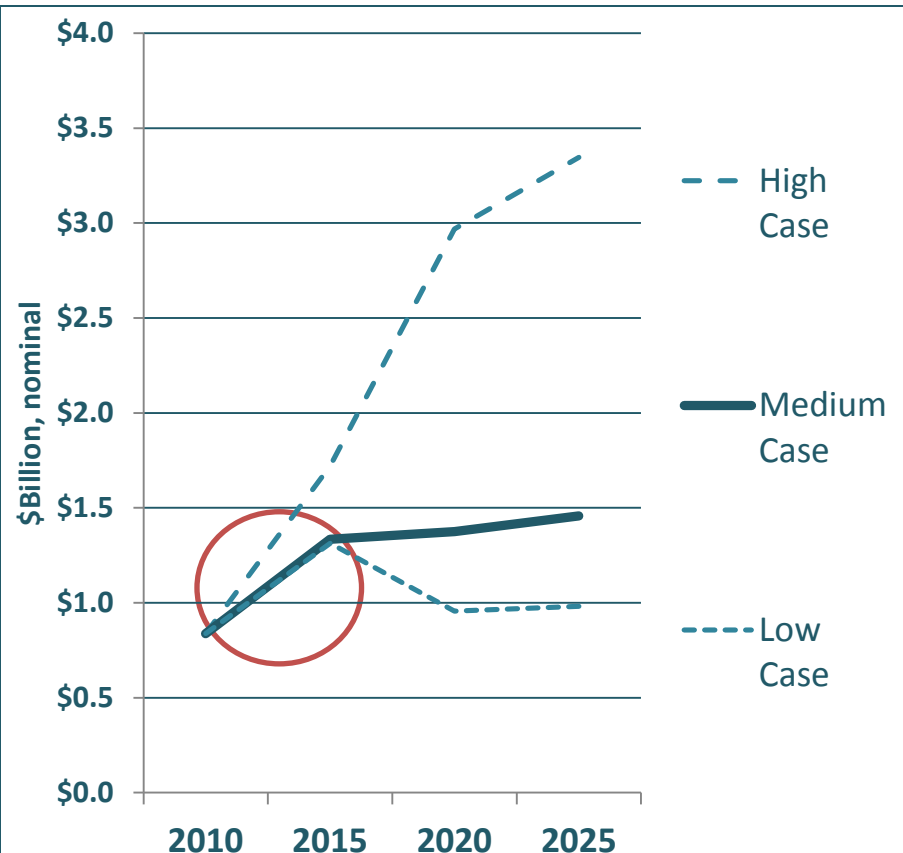


➤ Decline in wellhead gas prices from \$8.86/MMBtu in 2008 to \$2.75/MMBtu in 2012

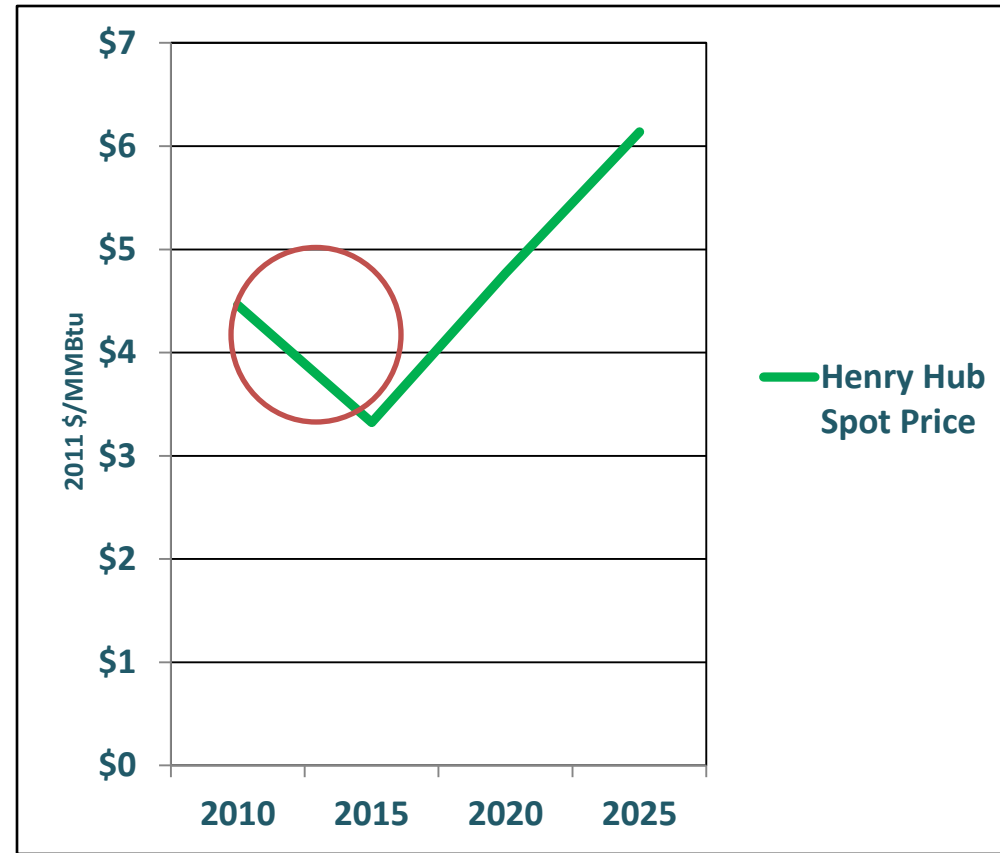
➤ Eliminated at least 40% of system benefits for natural gas energy efficiency programs – as conventionally defined – depending on delivery point and forecast method

# C/E Challenges Conflict with Savings Targets

## LBNL Projected Spending on Customer-Funded Gas EE Programs 2010-2025

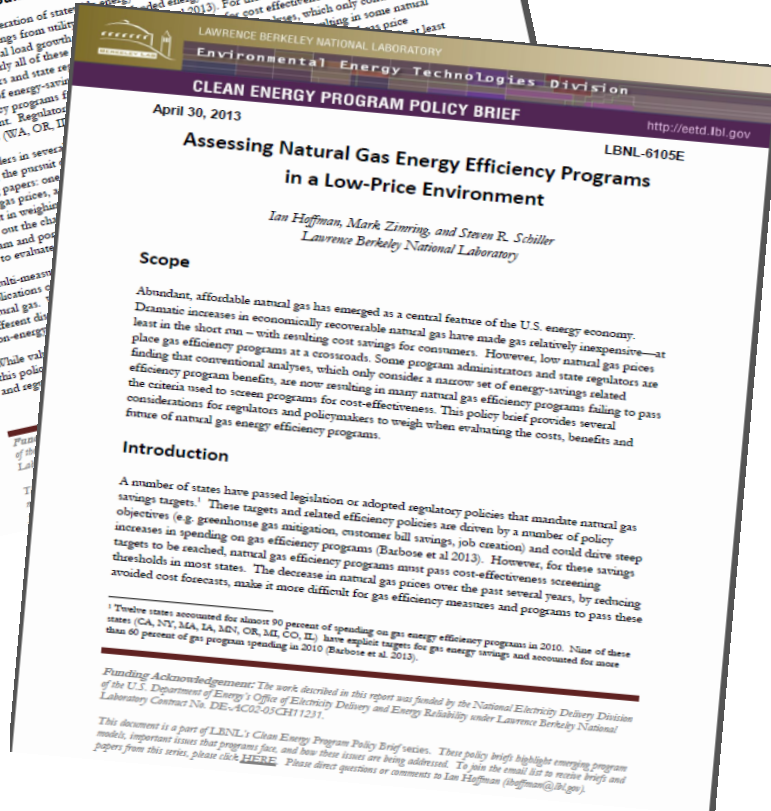


## AEO 2013: Current and Projected Wholesale Natural Gas Price to 2025



## Two Policy Briefs

- C/E challenges
- Relative impacts of C/E policy changes
- Updating gas benefits



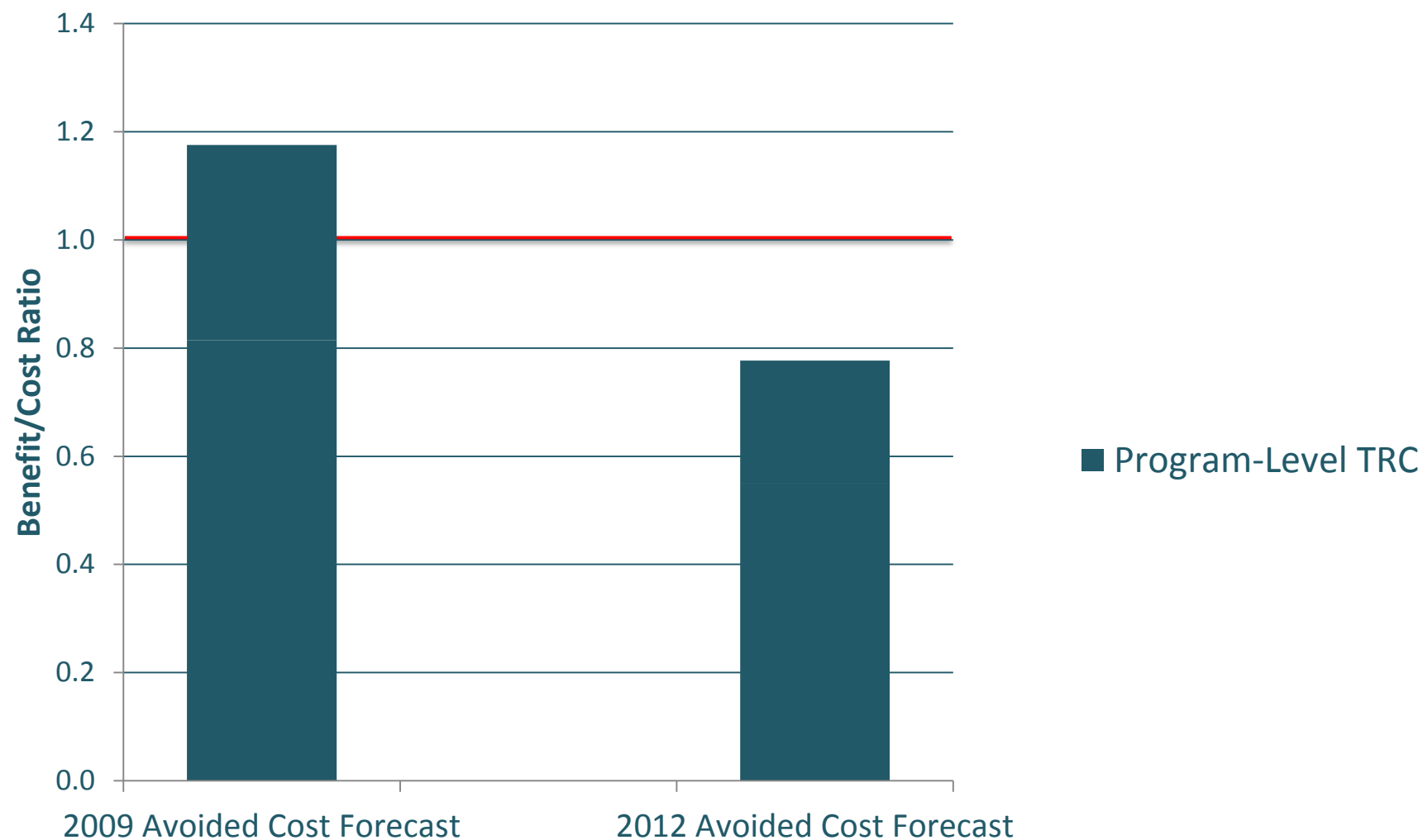
# Gas Prices & C/E: A Midwest Test Case

- Midwest combination electric-gas utility – chosen for moderate avoided costs
- Whole-home energy upgrade programs often on the margins of cost effectiveness and thus sensitive to gas prices



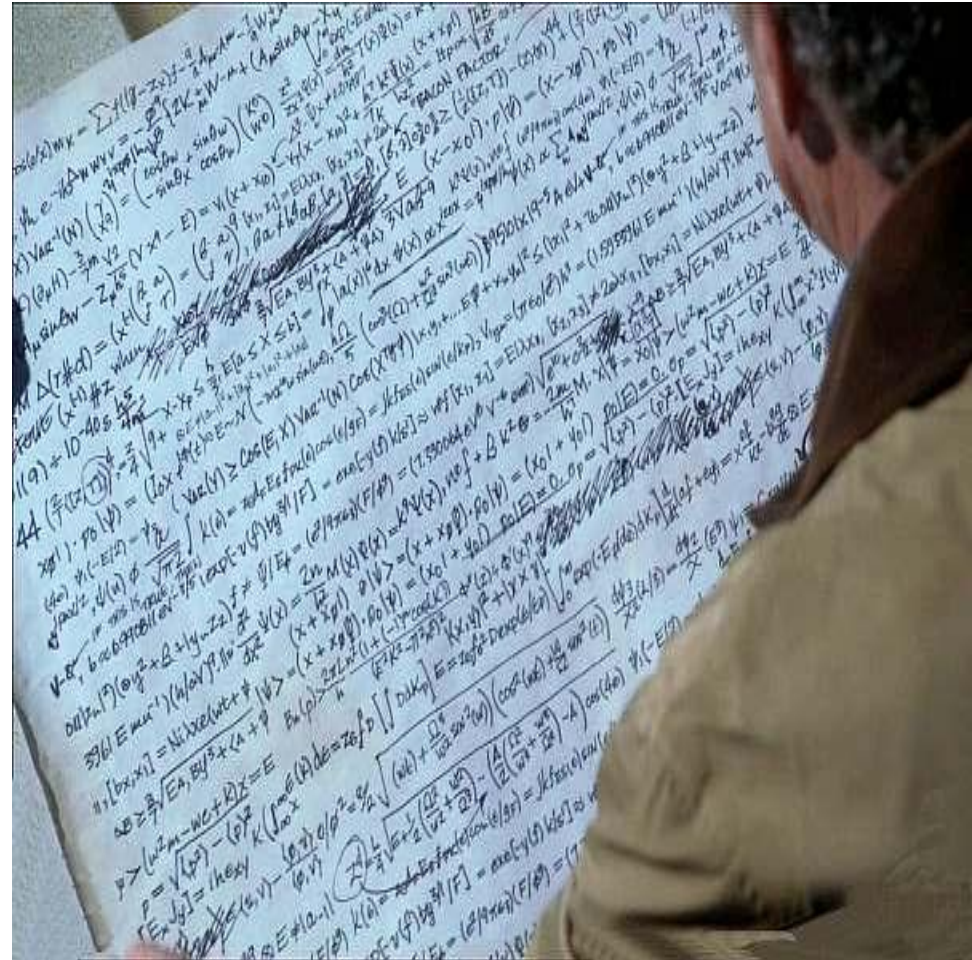
- “Direct install plus” program:
  - Audit, CFLs, WH wrap, pipe wrap, aerators, low-flow heads, insulation & air sealing
  - >70% incentive on an average project cost of about \$1,400

# Lower Avoided Costs Reduce Program Net Benefits



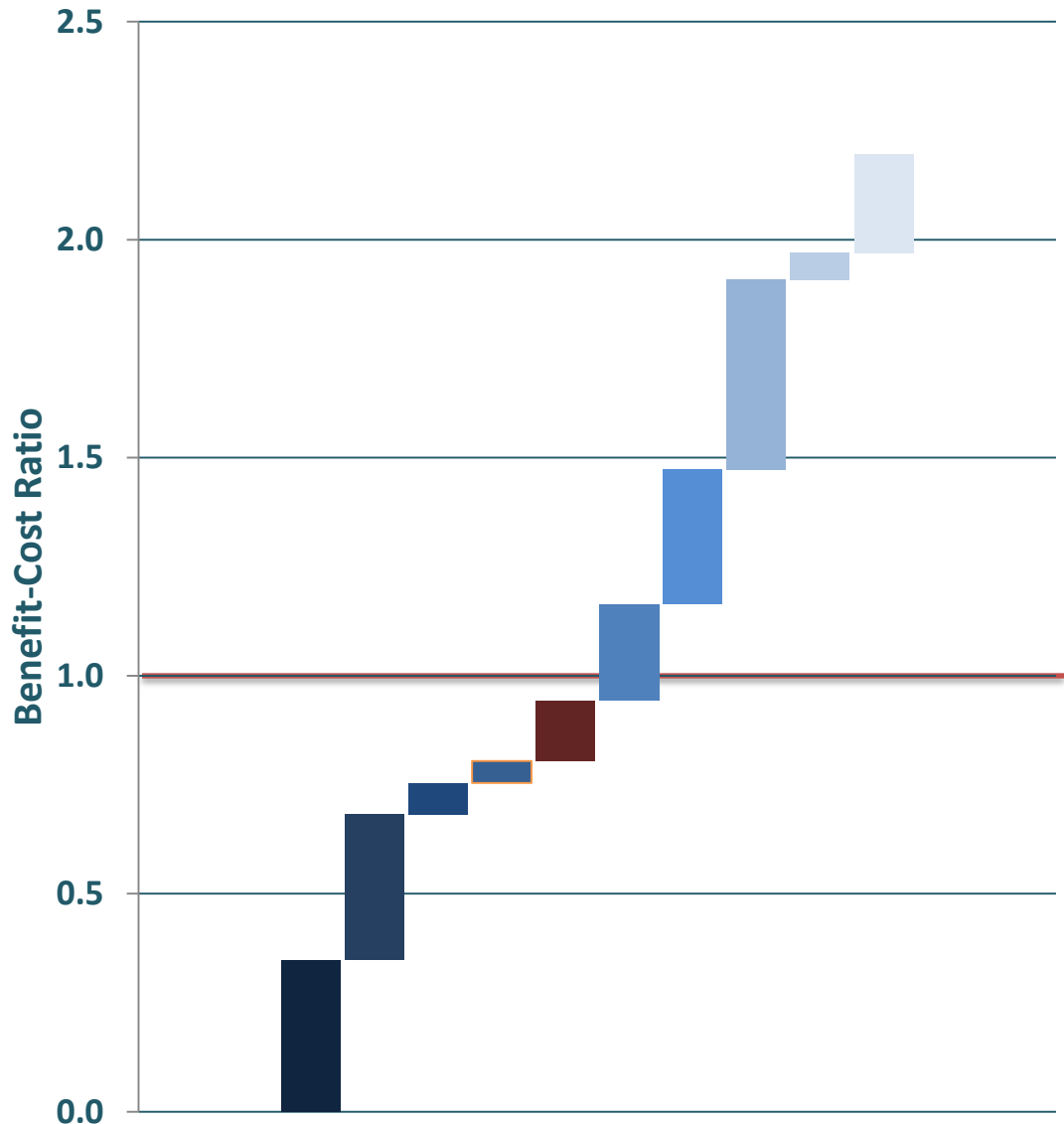
# Cost-Effectiveness Screening Policies

- Economic Test
- Discount Rate
- Level at Which Test is Applied



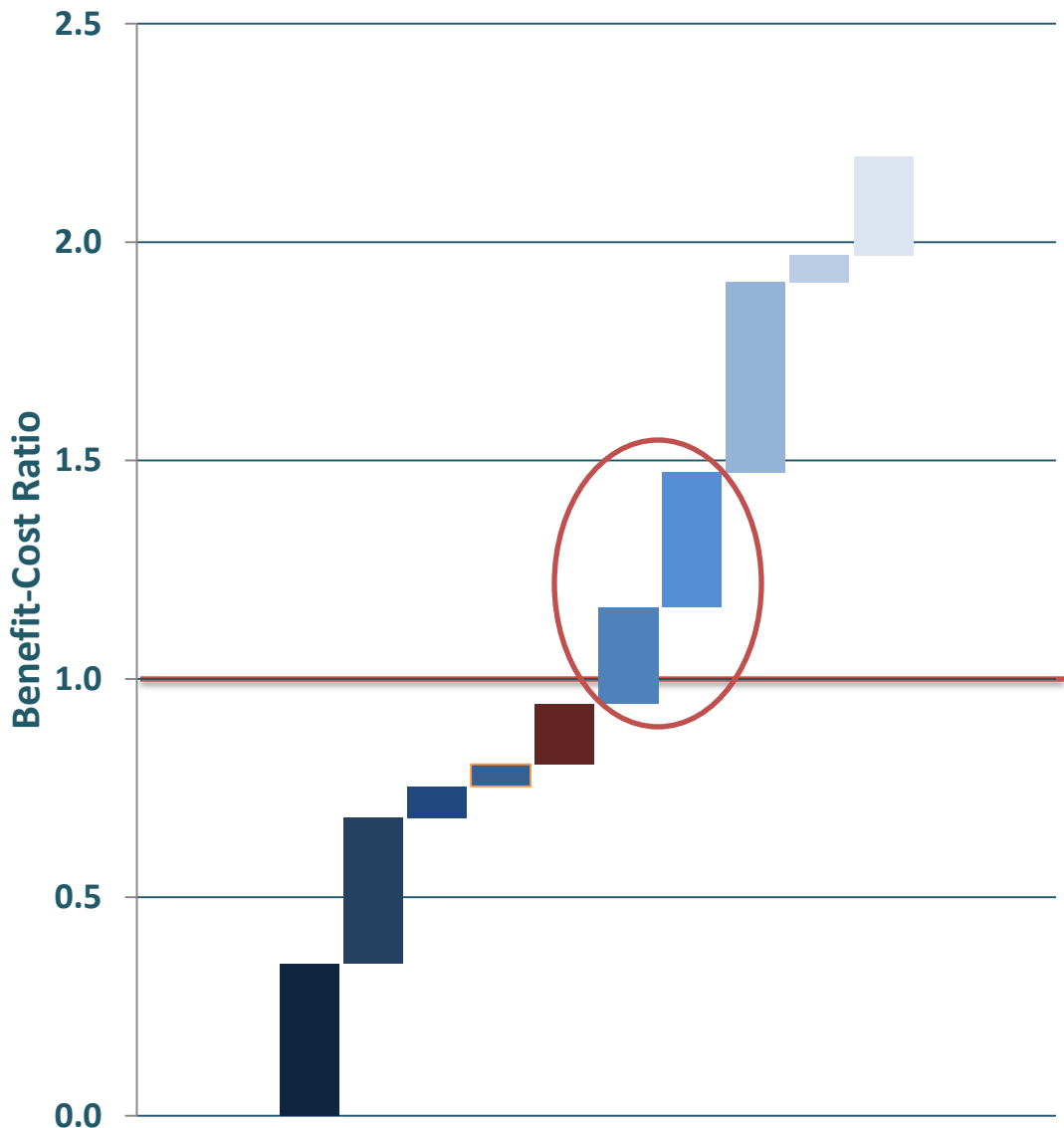


# BCR by Level, Test and Discount Rate



- Portfolio-Level SCT with 10% Externalities Adder
- Portfolio-Level TRC, discounting at 2.5% (20-year Treasury Bill)
- Portfolio-Level TRC, discounting at 3.2% risk-free WACC
- Portfolio-Level TRC, discounting at 7.5% after-tax WACC
- Program-Level TRC, discounted at 3.2% risk-free WACC
- Program-Level UCT/PACT, discounting at 7.5% after-tax WACC
- Program-Level TRC with water savings, discounting at 7.5% after-tax WACC
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## Standard Benefits for Gas EE Programs:

- Avoided gas commodity costs
- Avoided gas transmission and distribution costs

## Less Common TRC/PAC Test Benefits:

- Peak T&D capacity cost reductions
- Reduced bad debt and collections costs
- Participants' avoided O&M costs
- Water/sewer savings
- Other fuel savings (e.g., electricity)

## Benefits that are often not fully captured in conventional cost-benefit analysis:

- Hedge Value
- DRIPE
- Gas Transmission Capacity & Electricity Reliability Benefits
- Environmental Benefits
- Avoided Economic & Programmatic Costs of Ending/Suspending Programs
- Provision of Equitable Access to Energy Savings Opportunities
- Economic Development

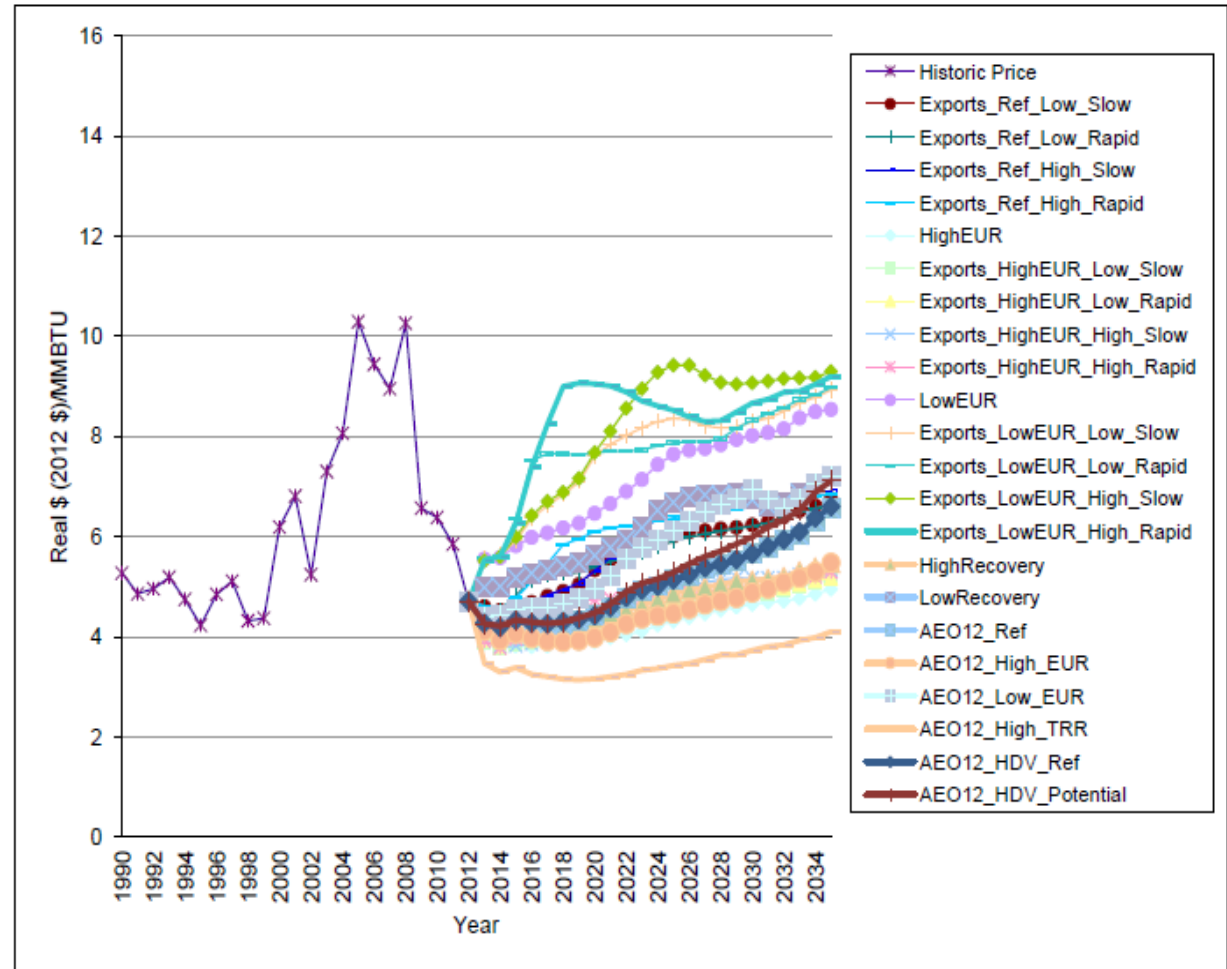
# EE's Long-Term Hedge Value

Historically, natural gas prices have been volatile. **Wide ranging long-term price projections remain.**

A range of approaches can mitigate consumer exposure to price increases, including:

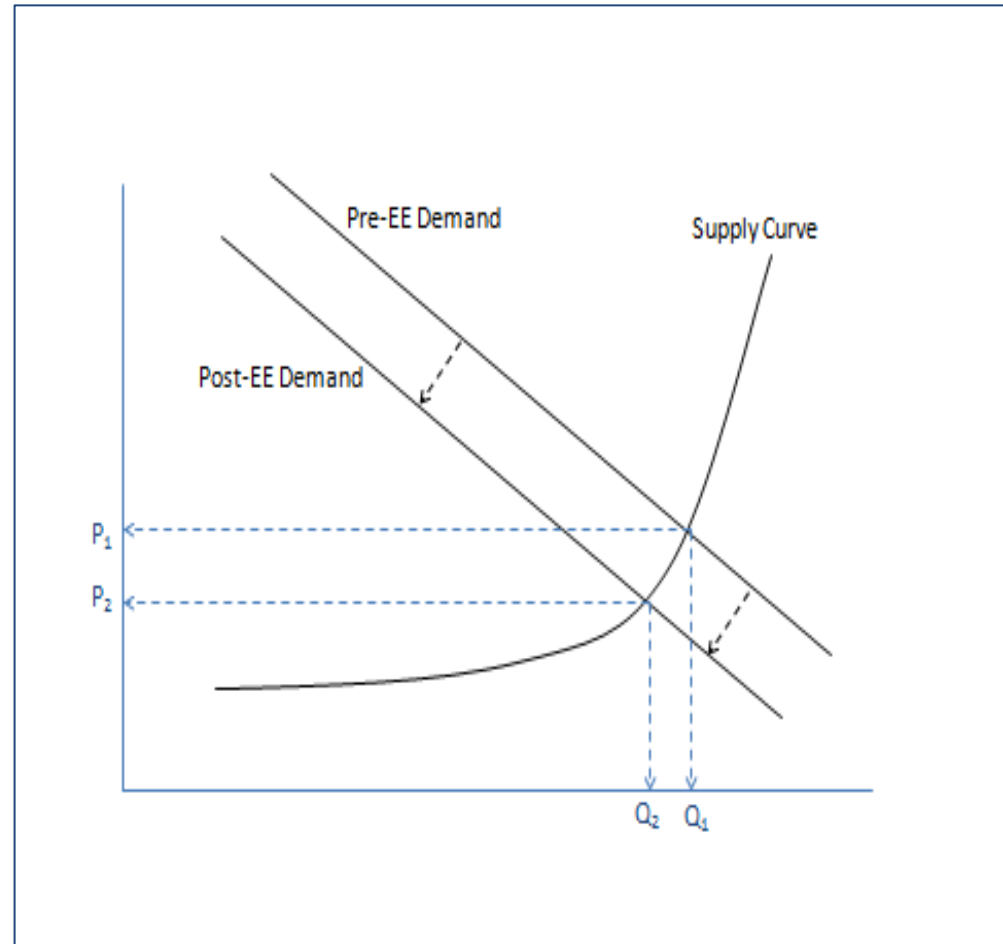
- Storage
- Financial products
- Long term contracting
- Energy efficiency

Historic Natural Gas Fuel Prices and Energy Information Administration Price Projections Through 2035.



# Demand Reduction in Price Effect (DRIPE)

- Energy efficiency reduces the quantity of energy supplied – and the price at which it is purchased
- DRIPE is credited as an electric EE benefit in California, parts of the Northeast and Pacific Northwest
- Quantification can be difficult (full market reconstruction) or relatively easy (inverse elasticity of supply)



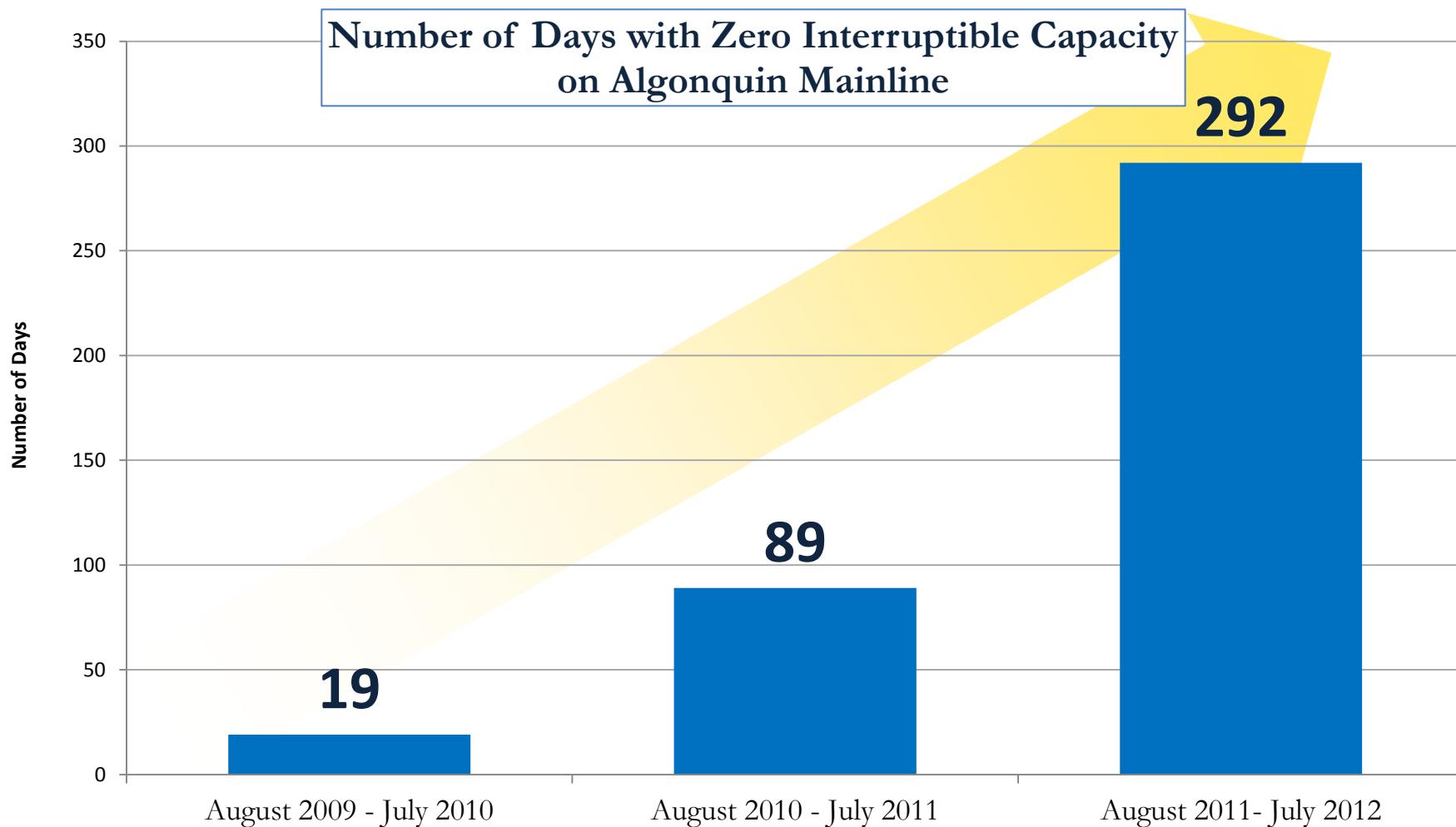
## Rise of unconventional gas exacerbating some gas T&D constraints...

- Rising demand among generators and LDCs , e.g., Mid-Atlantic, New England, Southern California/Southwest

## ...and raising reliability concerns:

- Planned pipeline additions are “inadequate to satisfy New England power sector gas demands on a winter peak (design) day over the next decade.” (ISO-NE 2012)

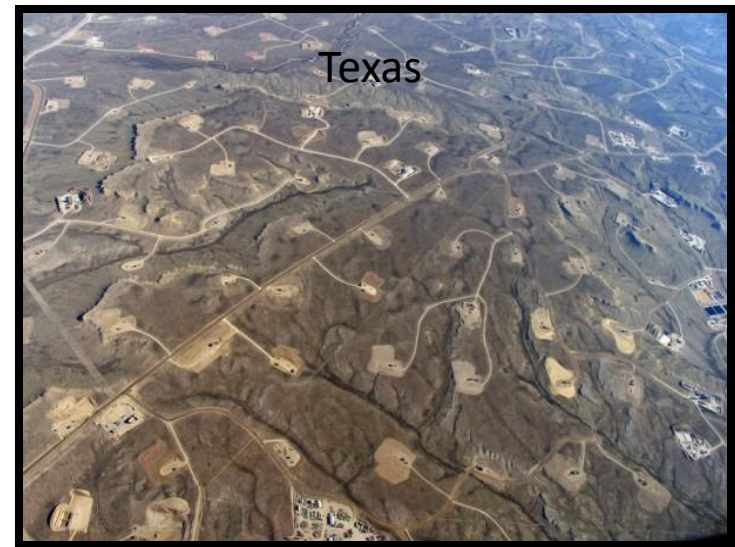
# Thinner Margins for Gas Reliability



Natural gas production has environmental impacts. The U.S. natural gas supply is expected to increasingly be met by shale gas in coming years. **Shale gas production has unique environmental risks and impacts relative to conventional gas** including:

- Uncertain GHG emissions
- Higher water use
- Greater risk of water supply contamination
- More significant air quality impacts

Gas efficiency also leads to direct savings of water through such measures as low-flow showerheads and faucet aerators





## Three Types

- **Erosion of cost effectiveness for other measures and programs**
  - Cutting measures or programs can shift costs onto other measures and programs and eliminate them, e.g., fewer measures can bear the costs of administration, savings verification or energy audits necessary to identify savings opportunities
- **Costs incurred to re-establish programs**
  - Restarting efficiency programs or portfolios at a future date would mean that utility customers would again bear the costs of hiring new staff, building networks of trade allies and customer relationships and marketing the program
- **Missed energy savings opportunities**
  - Without programs, purchases of less efficient buildings and end uses will “lock in” higher levels of consumption for the facility or measure lifetime

- Gas efficiency program benefits – as conventionally defined – have fallen due to sharp declines in current and projected wholesale natural gas prices
- Decline in benefits coincides with rising expectations of gas efficiency programs
- Several considerations are available for interested regulators and PAs
  - Changes in C/E practice, inc. shifts from program to portfolio assessment and from system to societal view
  - Assignment of value to economic, environmental and societal benefits not typically included in C/E analysis



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# Thank You!

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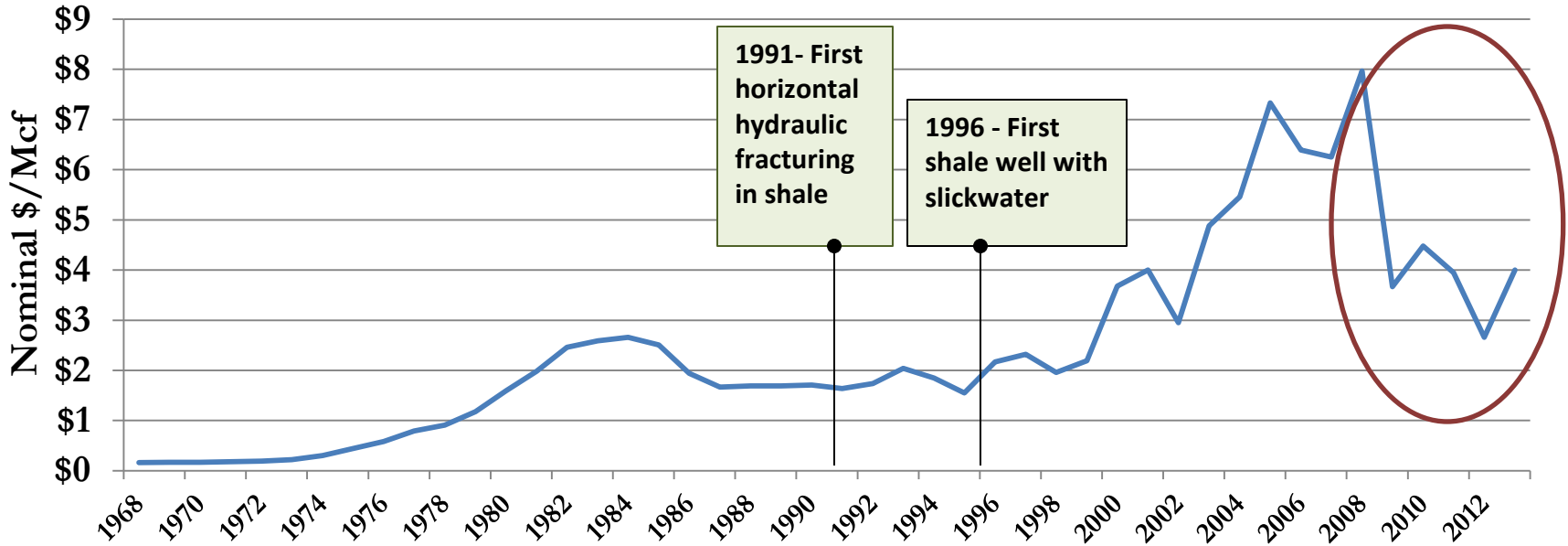
Research sponsored by Larry Mansueti  
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# Additional Slides

# Assessing the Value of these Benefits

<b>Hedge value</b>	<b>Quantitative:</b> Multiple approaches, including estimated reductions in utility hedging and storage costs
<b>Downward price pressure on gas from reduced demand</b>	<b>Quantitative:</b> Reductions in prices to consumers can be estimated from reductions in aggregate demand
<b>Easing gas transmission capacity constraints and enhancement of electricity reliability</b>	<b>Quantitative:</b> Lowering pipeline constraints can result in measurable reductions in price volatility and risk of outages or reliance on higher cost generators; avoided system capacity costs can be estimated
<b>Environmental benefits</b>	<b>Quantitative/Qualitative:</b> Releases of greenhouse gases & other air pollutants and water consumption can be monetized. Other environmental impacts and risks can be weighed qualitatively
<b>Avoided economic and programmatic costs of ending/suspending programs</b>	<b>Quantitative/Qualitative :</b> Higher costs of re-establishing program infrastructure can be estimated. Lost savings opportunities can be projected against past practice baseline.

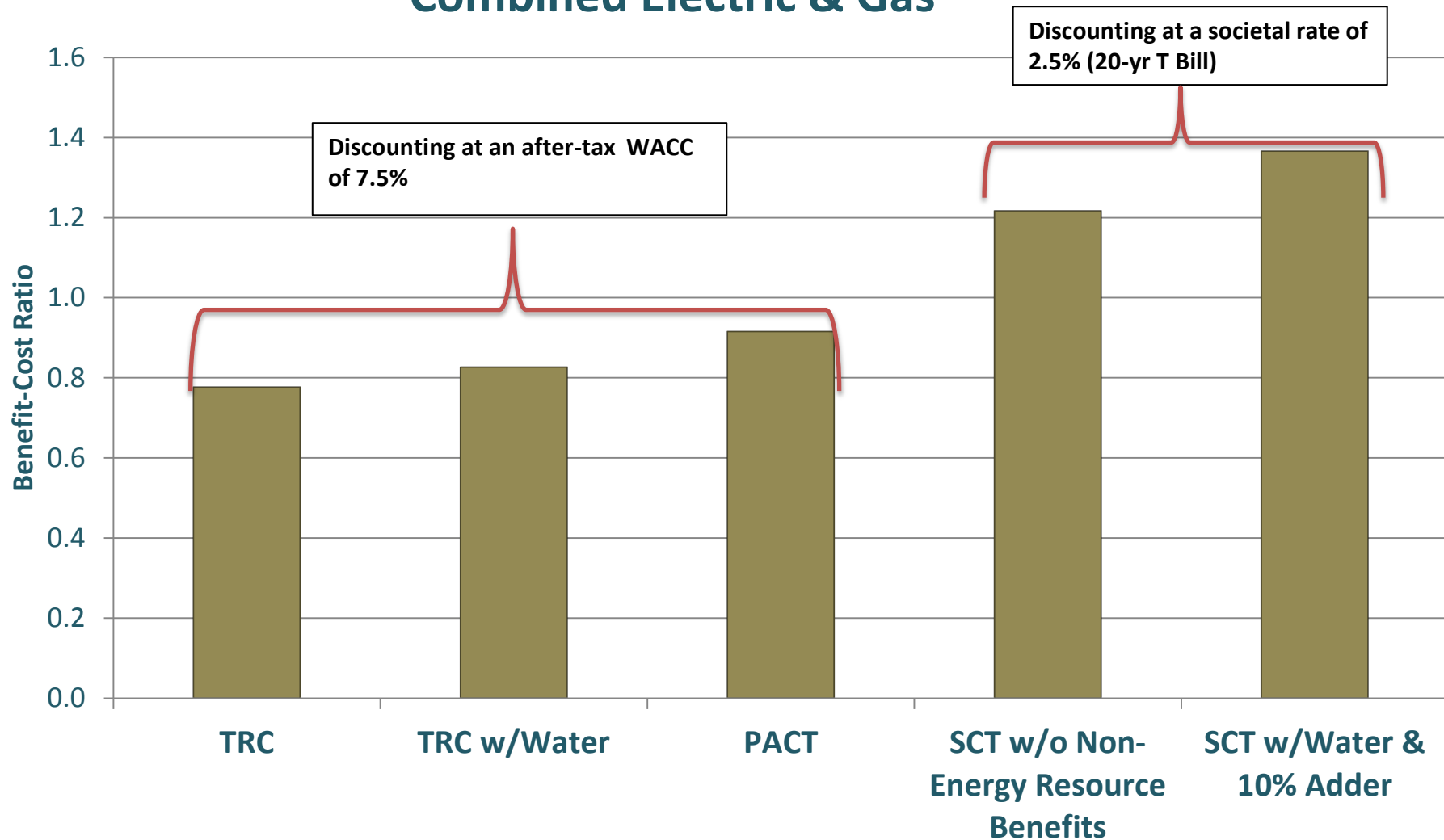
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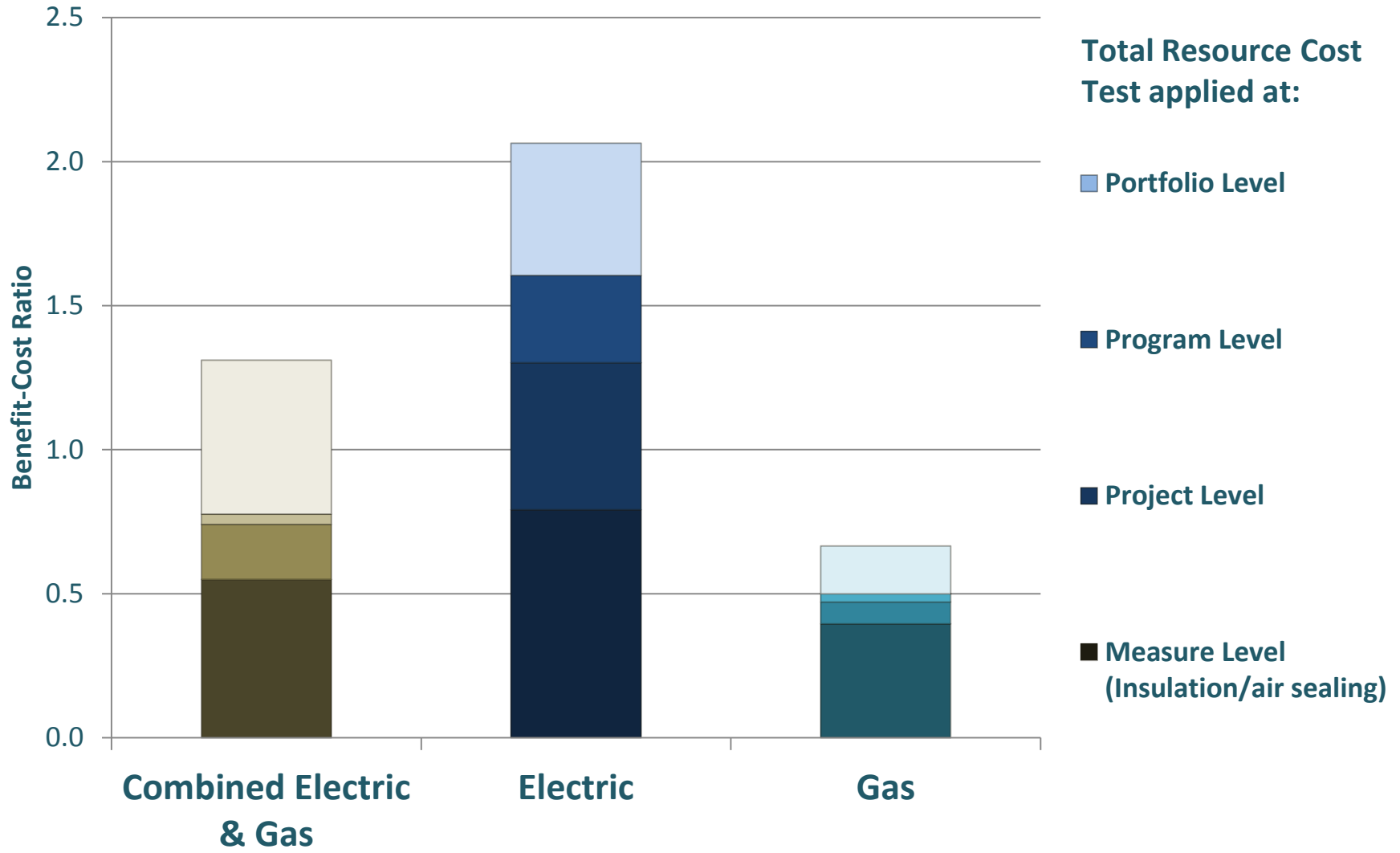
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## Combined Electric & Gas



# BCR by Screening Level & Fuel





A range of approaches can mitigate consumer exposure to price increases:

- **Storage.** Poorly suited to mitigate customer exposure to fundamental shifts in long-term gas market dynamics
- **Financial products (e.g. futures, swaps, calls).** Can introduce new risks to utilities and their customers—prudence of strategies under regulator scrutiny and often restricted to short-term hedging
- **Long term contracting.** Few contracts are truly fixed price, and those that are have often resulted in litigation and abrogation when market dynamics fundamentally shift
- **Energy efficiency.** Modest performance risk, but EE lowers overall demand so that customers are less financially exposed to short- and long-term gas price increases

