



**ROCKY  
MOUNTAIN  
INSTITUTE®**

# **HOW UTILITY-SCALE WIND CAN BENEFIT FROM NATURAL GAS VOLATILITY PRICING**

**DAN SEIF, [DSEIF@RMI.ORG](mailto:DSEIF@RMI.ORG)**

**RENEWABLE ENERGY MARKETS, WASHINGTON, D.C.**

**SEPTEMBER 24, 2012**

*“My number one fear is that we will be pushed to build natural gas at the expense of solar and wind. Ben Franklin said there are two certainties in life: death and taxes. To that, I would add the price volatility of natural gas”*

**Jim Rogers**, CEO Duke Energy, June 13, 2012

*“...just as a financial portfolio manager balances yield and risk across different asset types, it's important not to lose sight of the stable Treasuries [efficiency and renewables] in our energy portfolio.”*

**Amory Lovins**, RMI, Sept. 6, 2012

# OUTLINE

## **Context: Why we should care about natural gas volatility**

- PUC and utilities decision-making based on assumed lowest cost power (LCOE). Today, natural gas CCGT beats wind without RECs and/or PTC without fuel volatility pricing.
- With natural gas volatility pricing, [wind is often the lowest cost new generation option.](#)

## **Question: How do we put a price tag on volatility?**

- Straddle
- Utility Short-Term Hedging Budgets
- Actual Long-Term Contracts

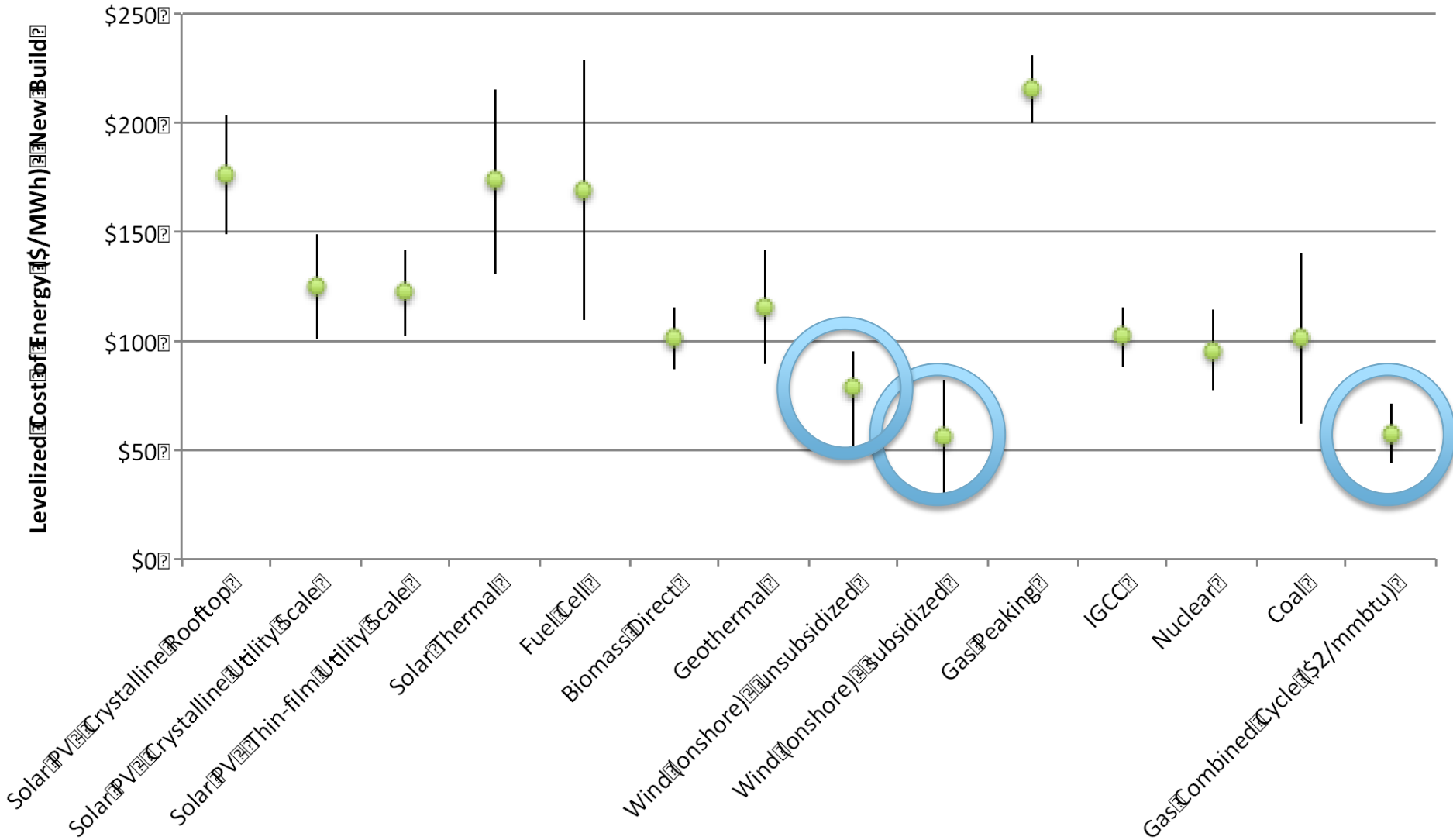
## **Answer: Wind works as a viable hedging strategy**

- Accounting for fuel price volatility changes how Nat Gas cost and Wind LCOEs compare

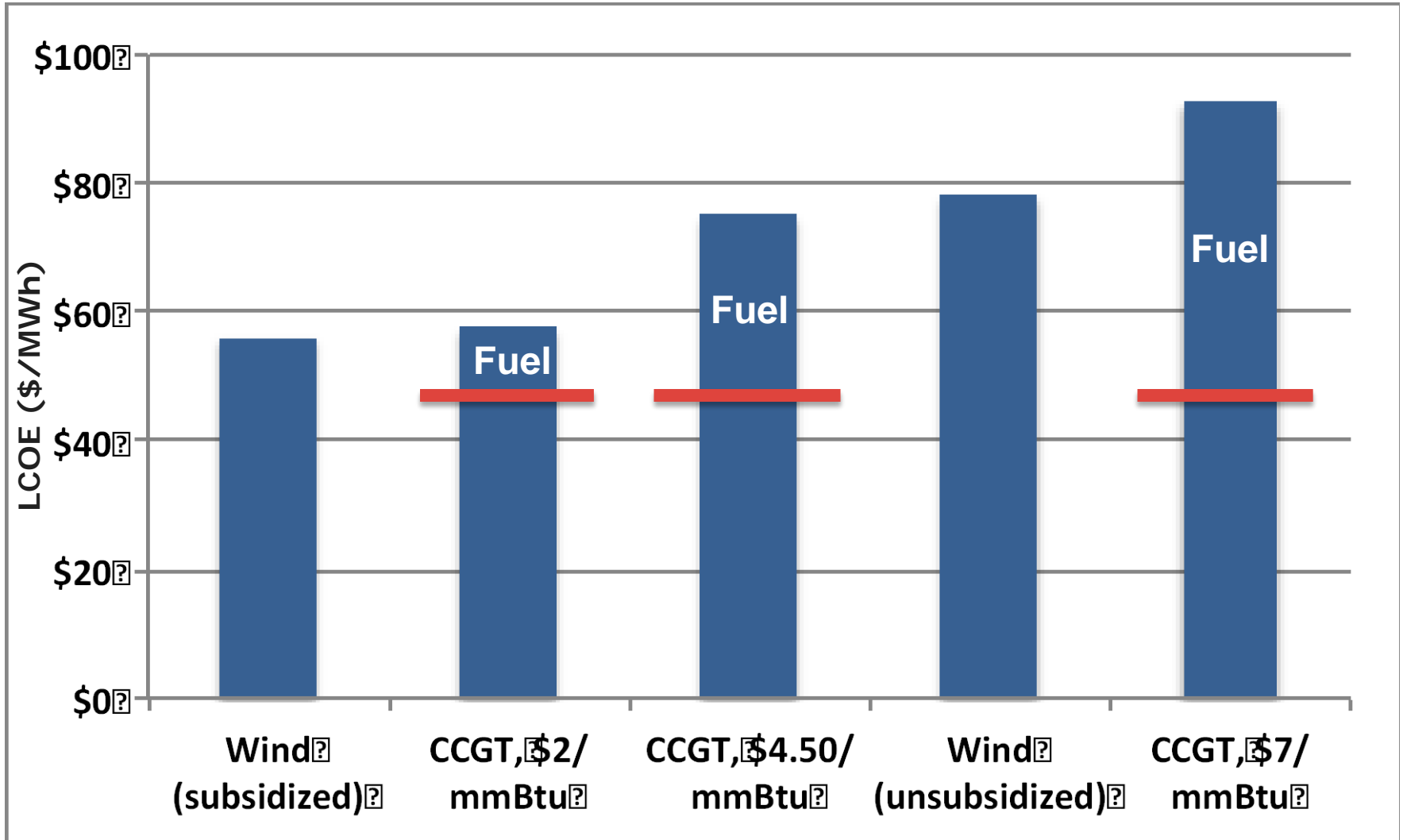
## **Solutions: How to implement wind as a hedge**

- Regulated Markets: Utilities
- Deregulated Markets:
  - Large Customers Solutions
  - Residential Solutions

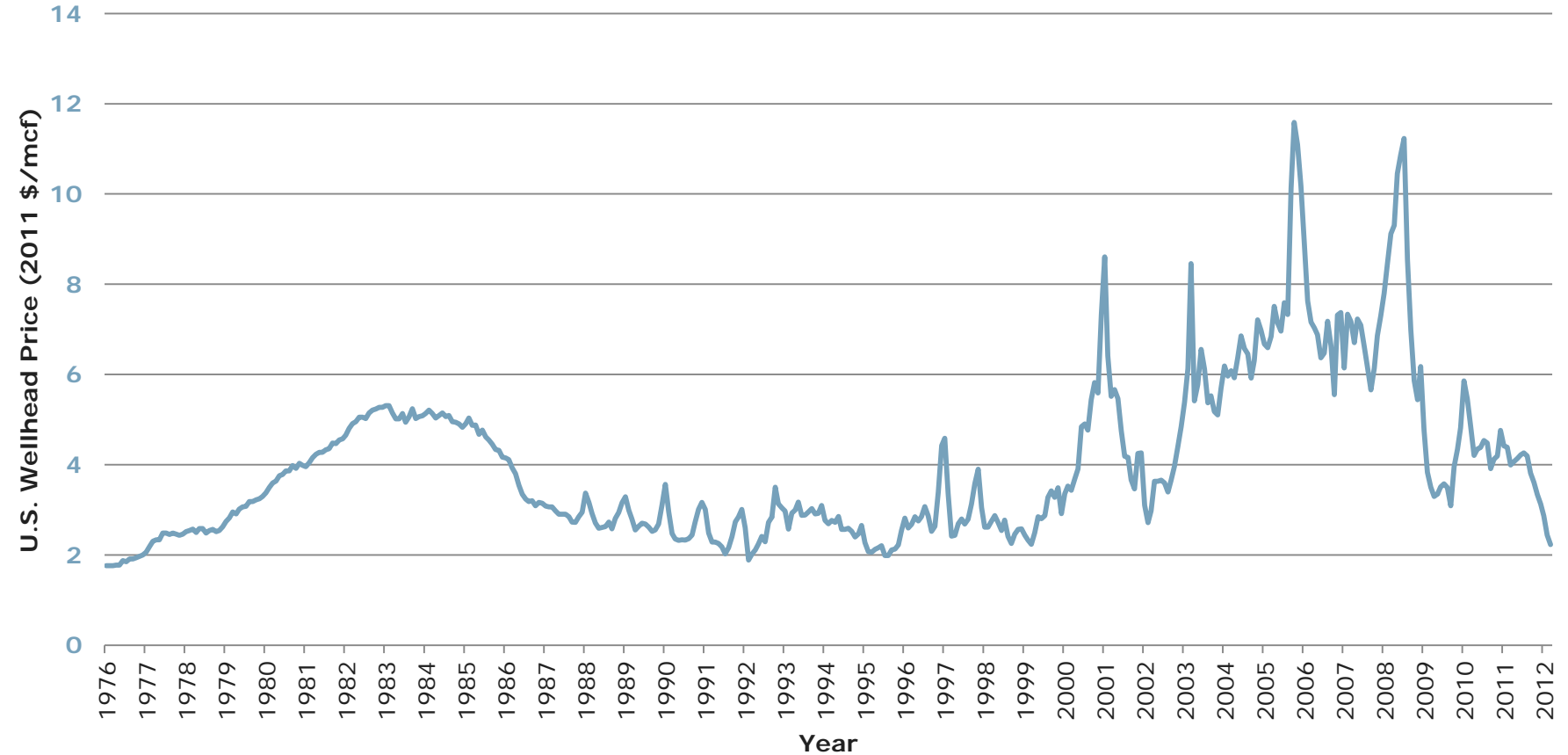
# DECISIONS BASED ON LCOE



# DECISIONS BASED ON LCOE IGNORING VOLATILITY

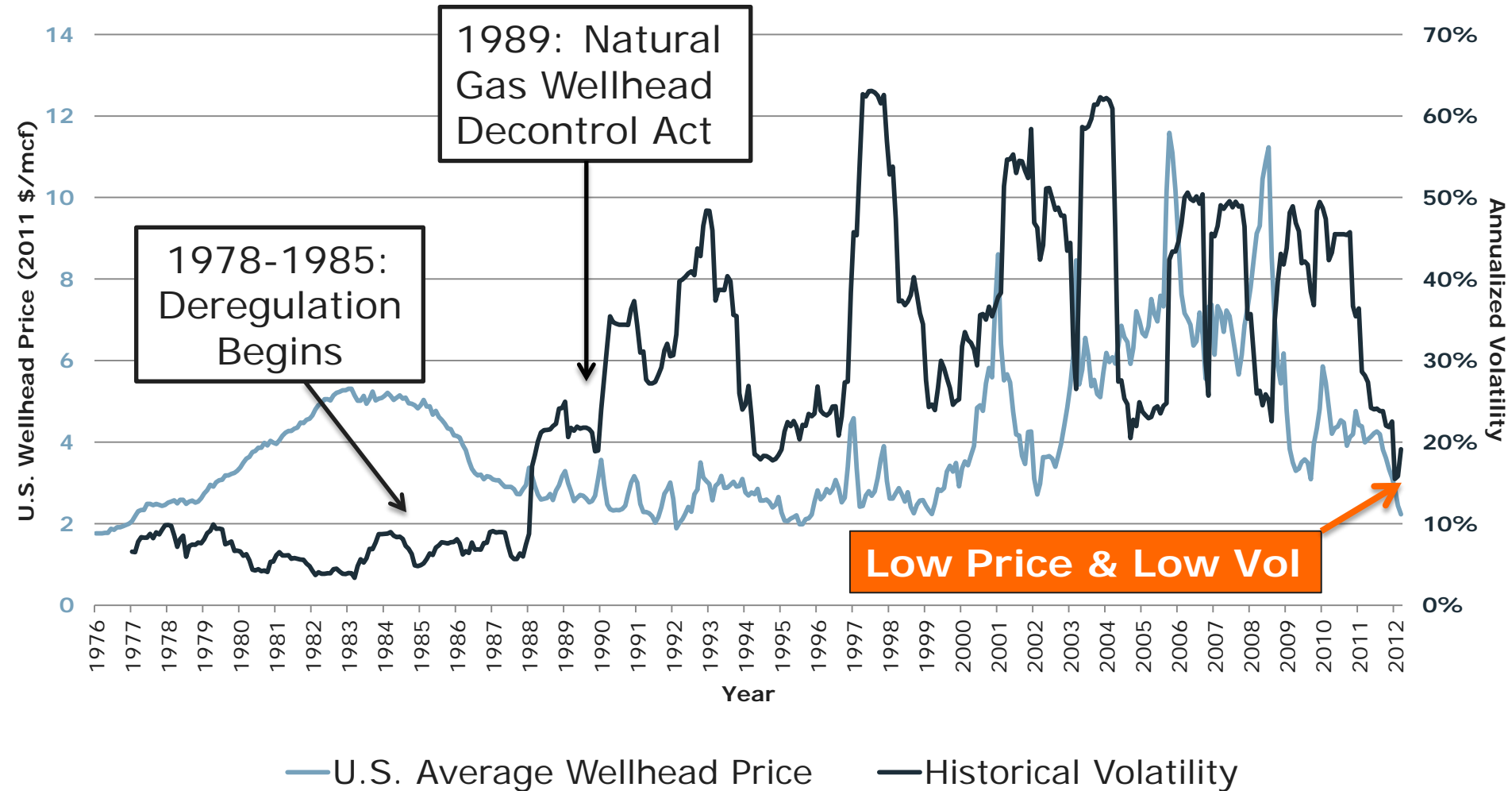


# HISTORICAL PRICES & VOLATILITY

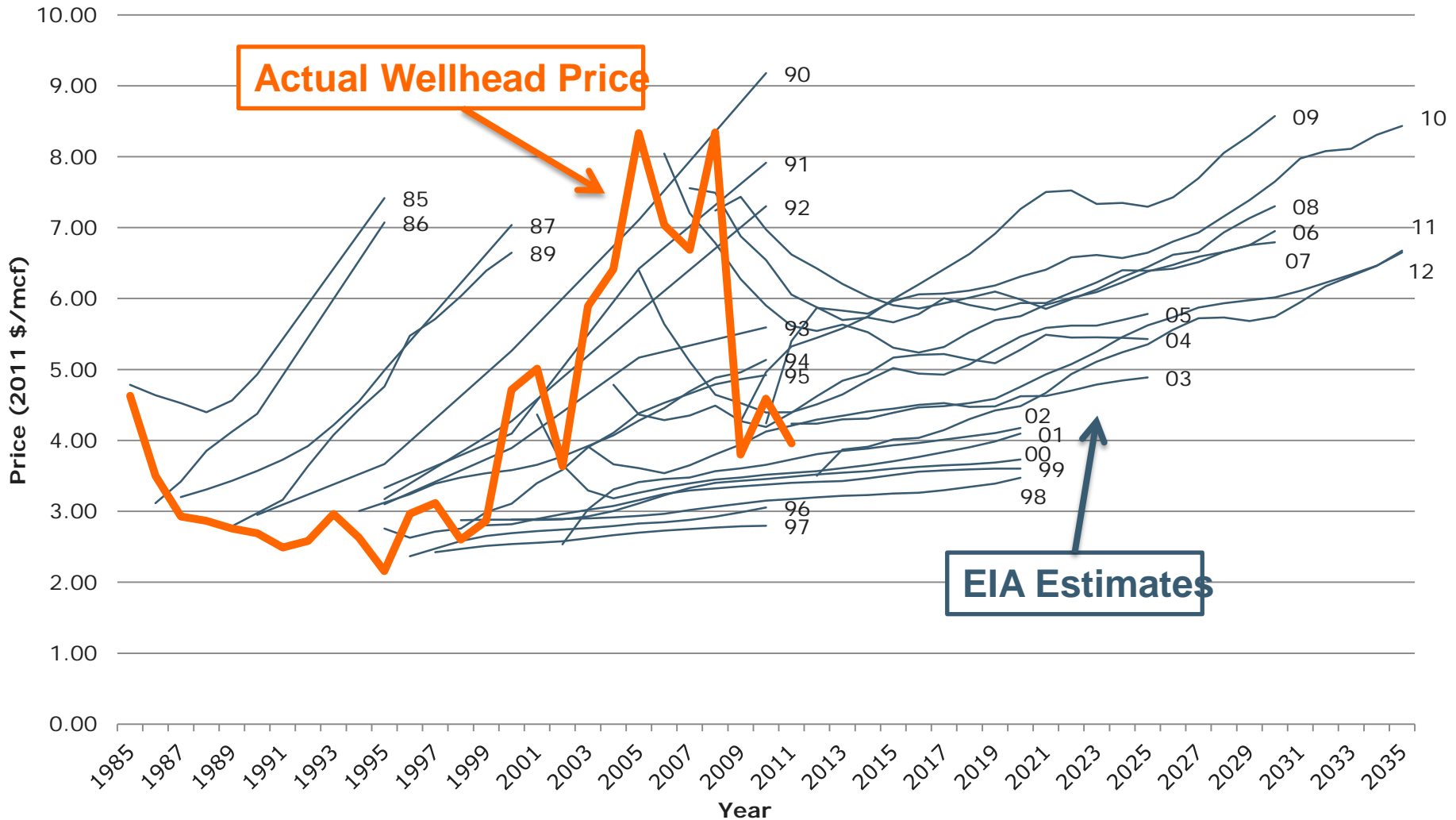


— U.S. Average Wellhead Price

# HISTORICAL PRICES & VOLATILITY

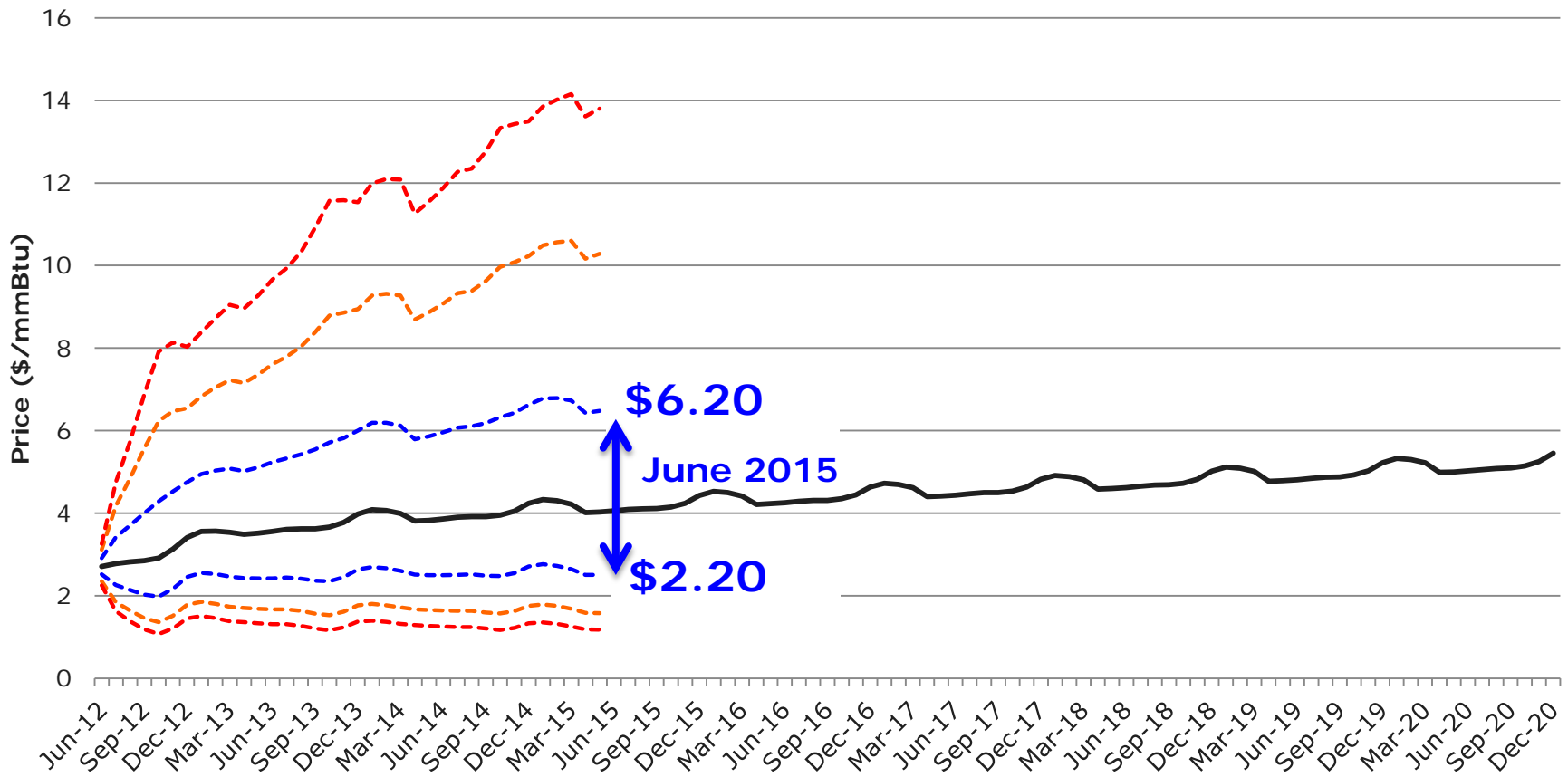


# NATURAL GAS PROJECTIONS: LONG-TERM





# IMPLIED VOLATILITY & FUTURE PRICES



— NYMEX Henry Hub Futures
 Date
- - - 68% CI
- - - 95% CI
- - - 99% CI

1 standard deviation

2 standard deviations

3 standard deviations

# VOLATILITY PRICING METHODS

## 1. Straddle

- Theoretical
- Protection against VOLATILITY, not RISK
- Typically used by speculative traders

## 2. Utility Short-Term Hedging Budgets

- Clearly defined budgets (\$/mmBtu)
- Protection against short-term upward price movements

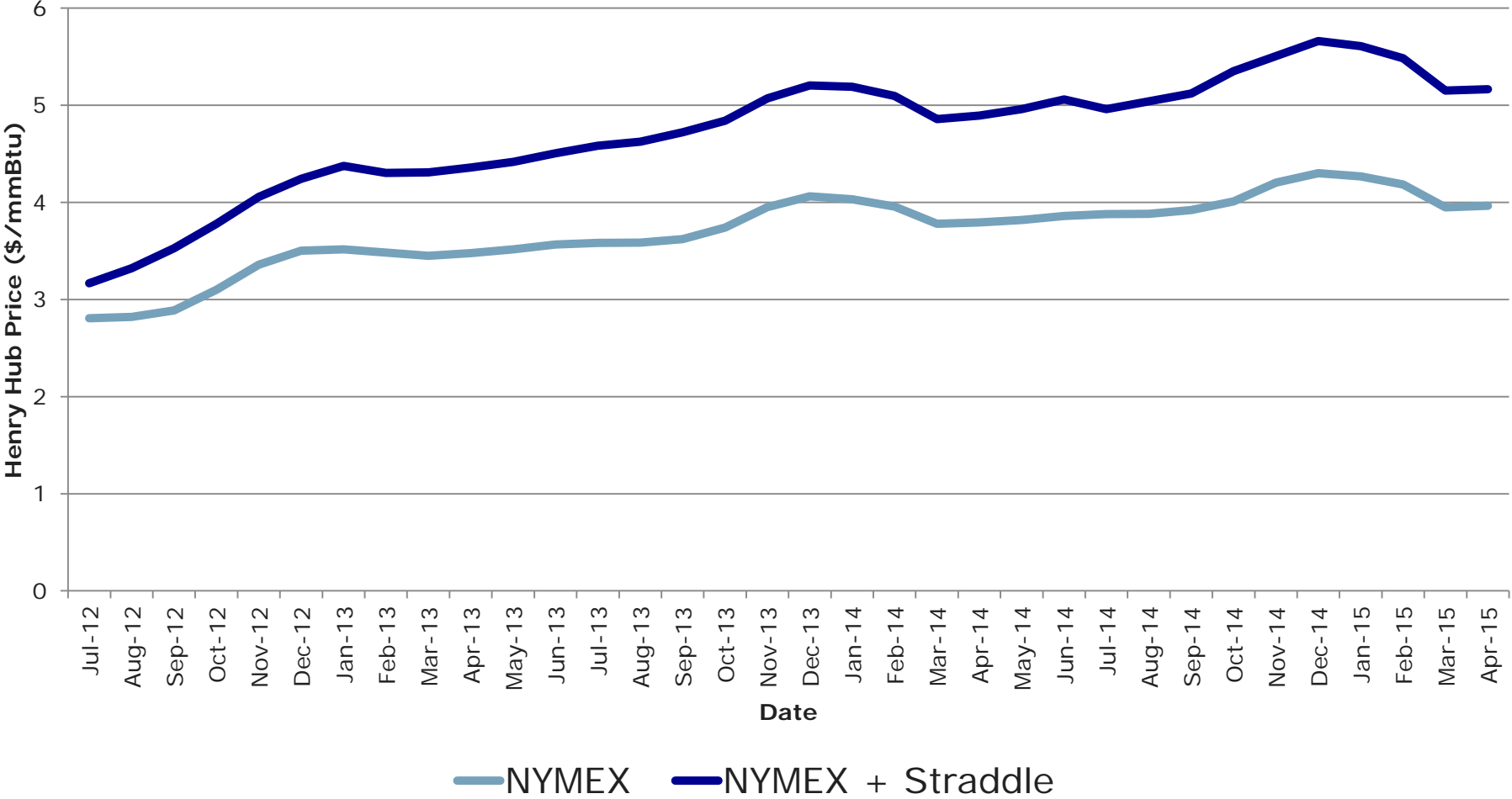
## 3. Long-Term Contracts

- Rare, but clear data points
- Long-term protection – best comparison to power purchase agreements (PPA)

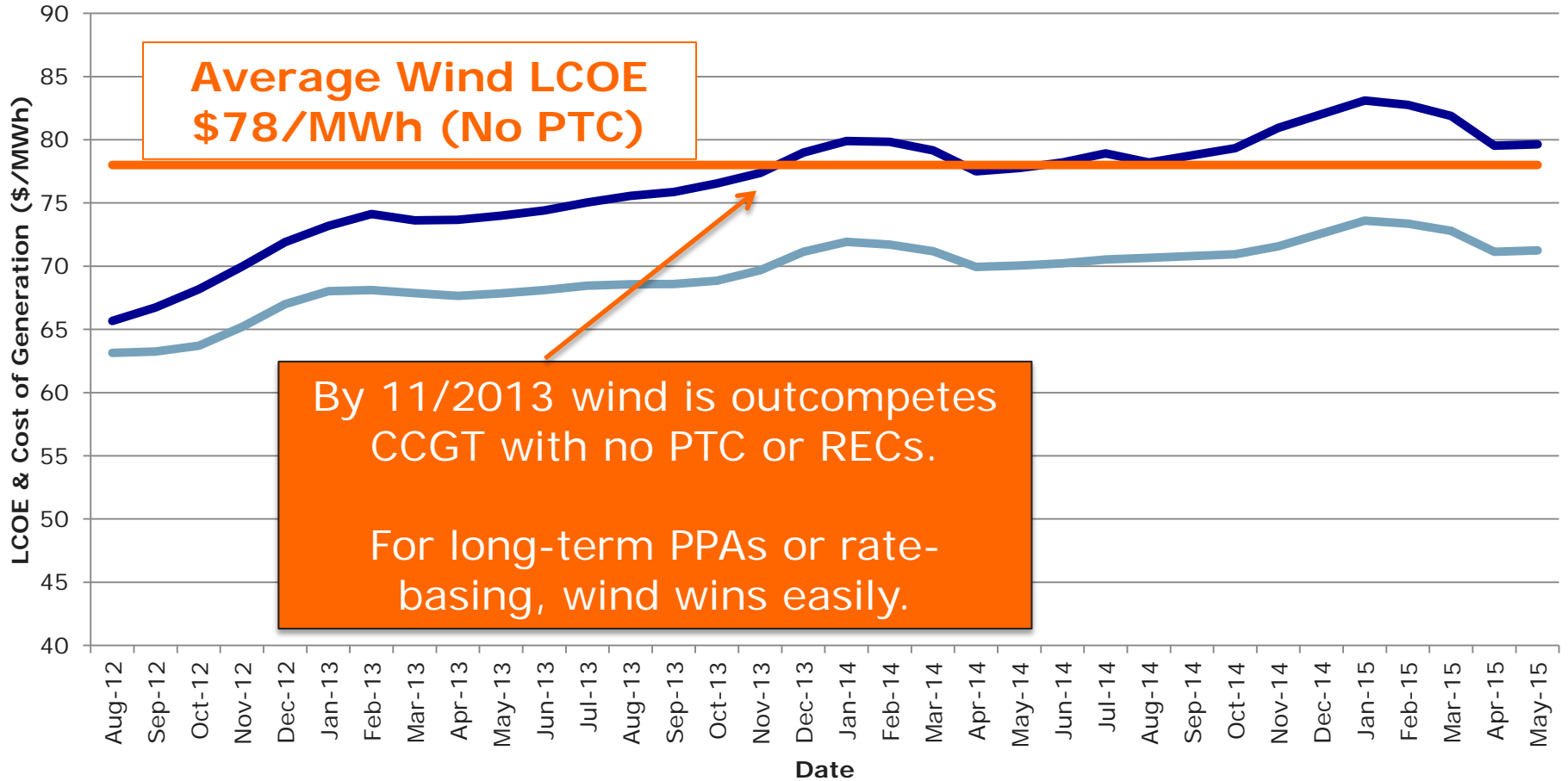
# 1. STRADDLE

- **Call Option**
  - Right to BUY at given strike price
  - Protects against UPWARD price movements
- **Put Option**
  - Right to SELL at given strike price
  - Protects against DOWNWARD price movements
- **Straddle**
  - Combination of Call and Put
  - Protects against price movements in either direction to effectively “lock-in” price

# 1. STRADDLE



# 1. STRADDLE



— CCGT New Build - No Price of Volatility

— CCGT New Build - Accounting for Volatility

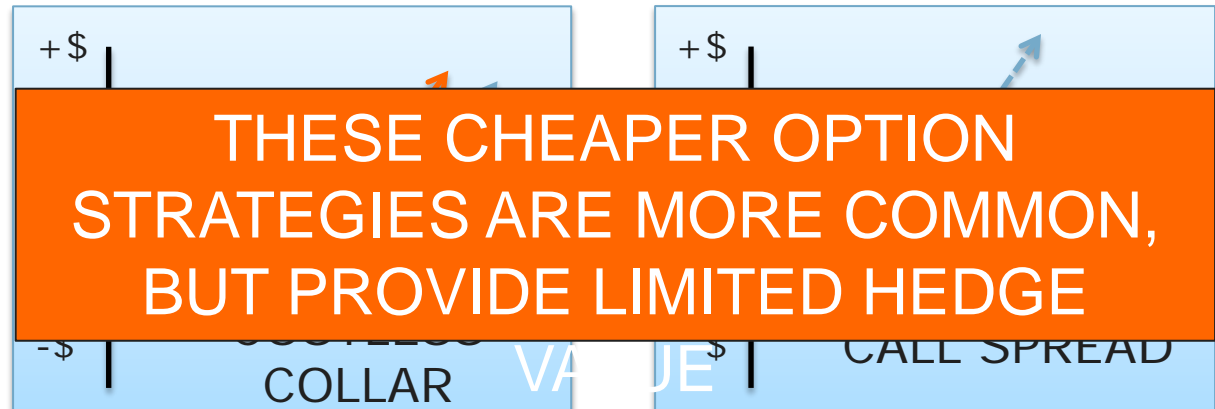
## 2. UTILITY SHORT-TERM HEDGING BUDGETS

### ACTUAL PREMIUMS BEING PAID

- Not a reflection of true price of volatility. Always an incomplete risk mitigation.
- Demonstration of utility willingness-to-pay and/or negotiated appropriate rate controls.
- A potential capital source for wind projects (i.e. within hedging budgets?)

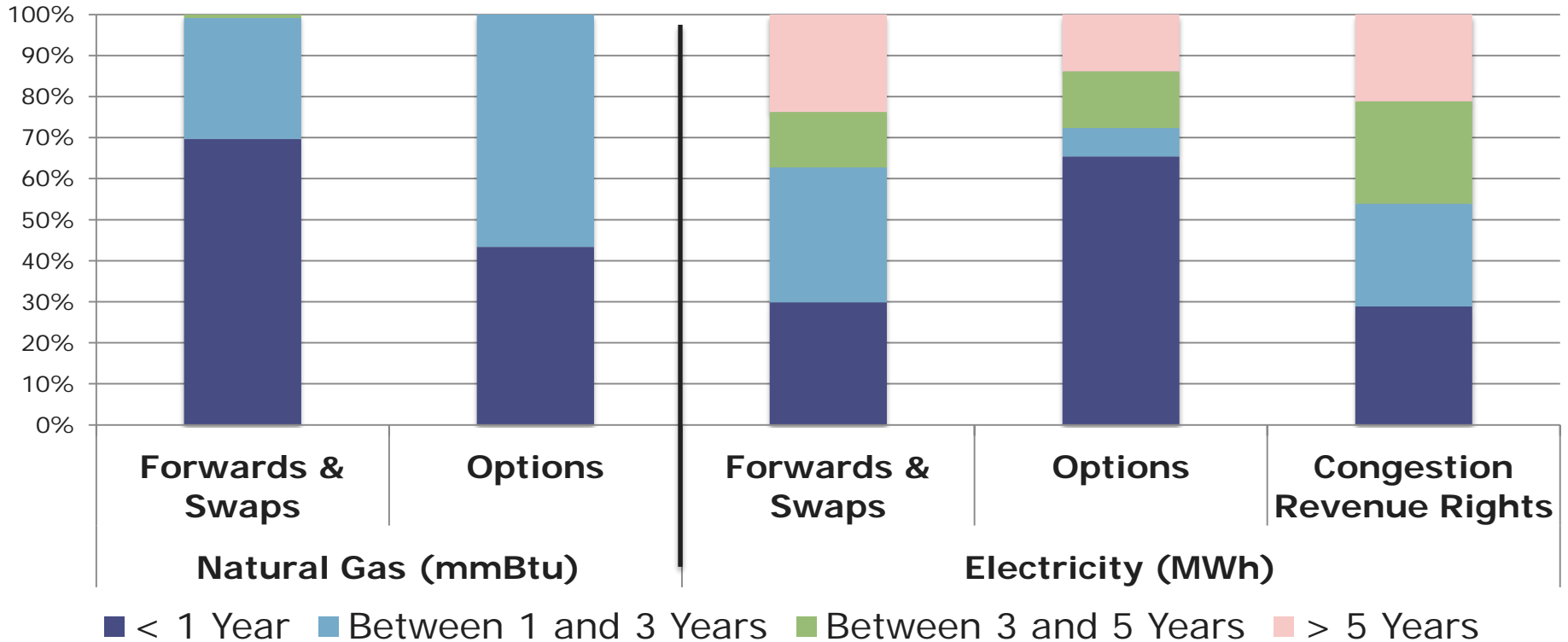
# 2. UTILITY SHORT-TERM HEDGING BUDGETS

Utility Name	State	\$/mmBtu Hedge Budget for Natural Gas
PSCo/Xcel	Colorado	\$0.55 - \$1.82
CenterPoint Energy	Minnesota	\$0.25
Portland General Electric	Oregon	½ bid/ask spread on forward contracts
Duke Energy Carolinas	North Carolina	\$0



# 2. UTILITY SHORT-TERM HEDGING BUDGETS

PG&E: Derivative Contracts Outstanding By Volume

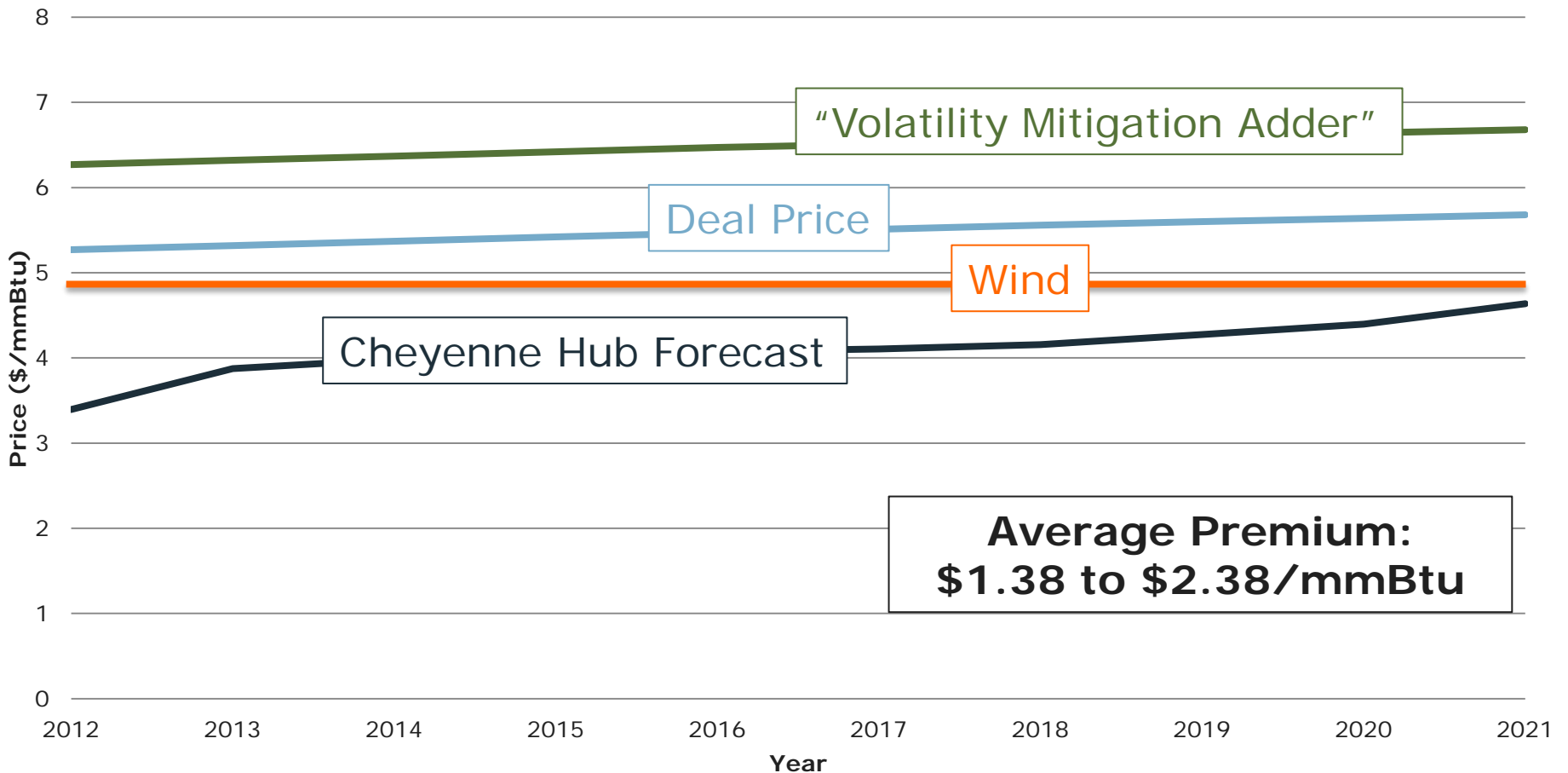


**UTILITIES HEDGE NATURAL GAS  
OVER SHORT TIME HORIZONS**

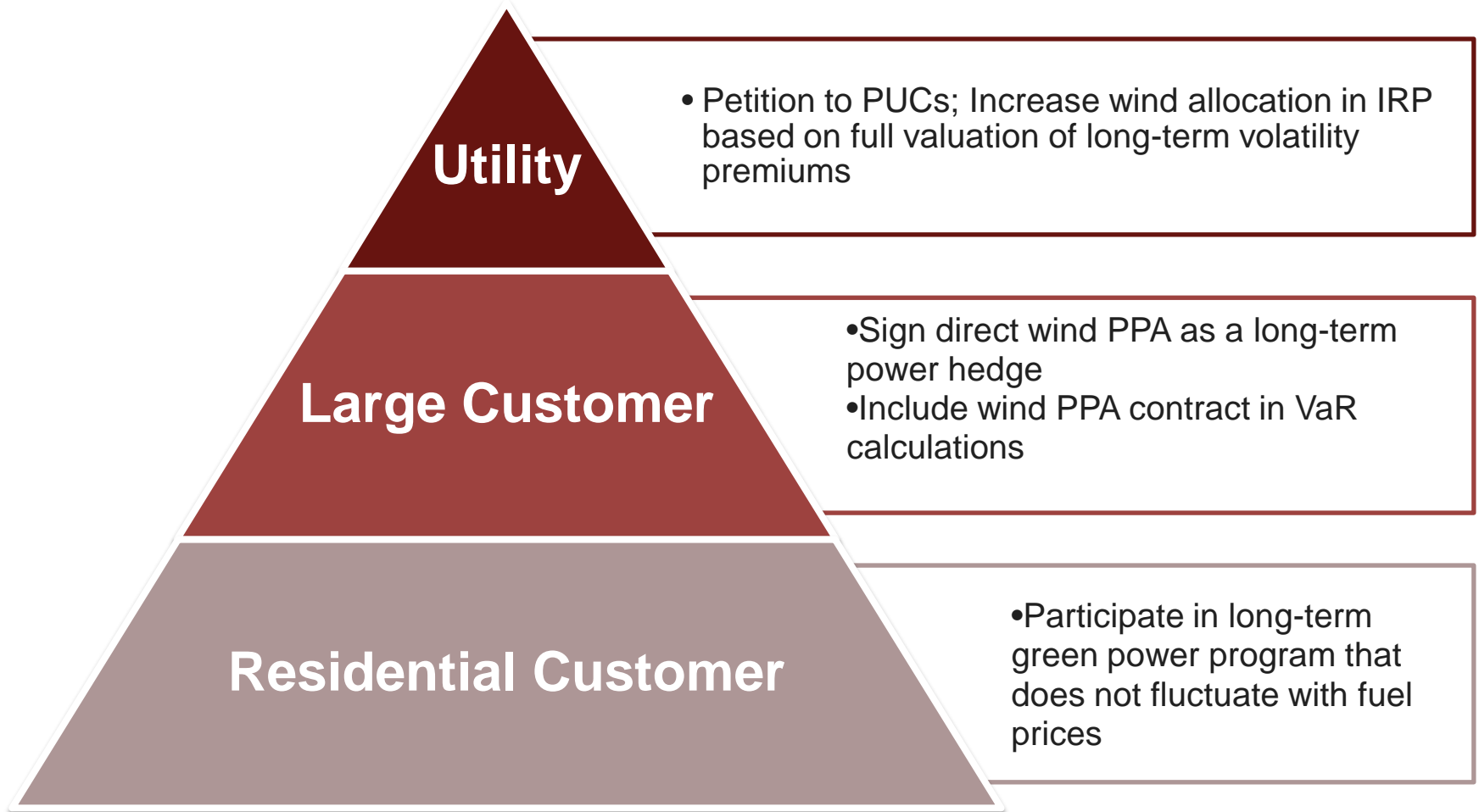


# 3. LONG-TERM CONTRACTS

## PSCo/Anadarko 10-year Contract



# SOLUTIONS

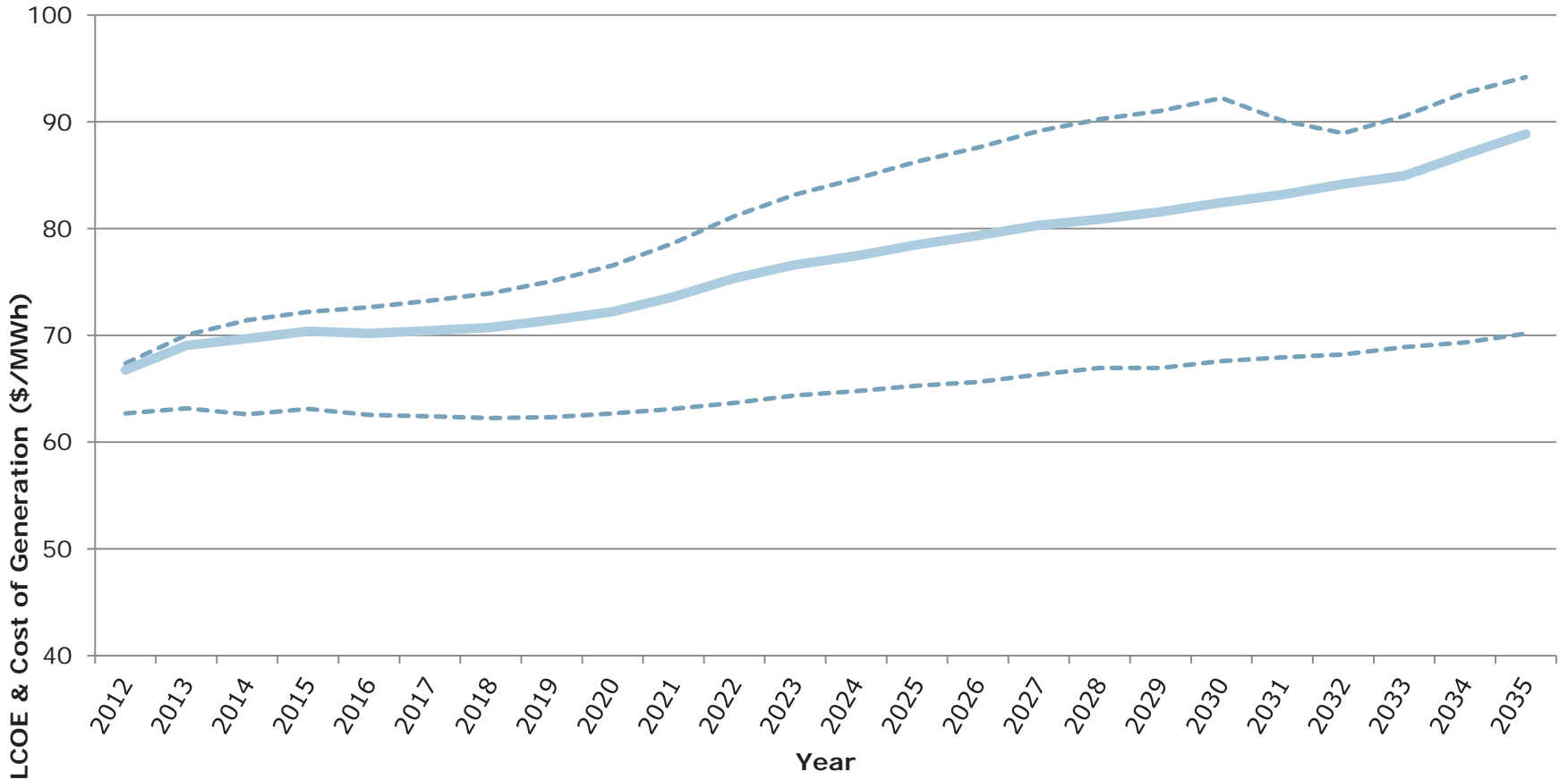


# SOLUTIONS: UTILITY

## EXAMPLE: PSCo BUDGET

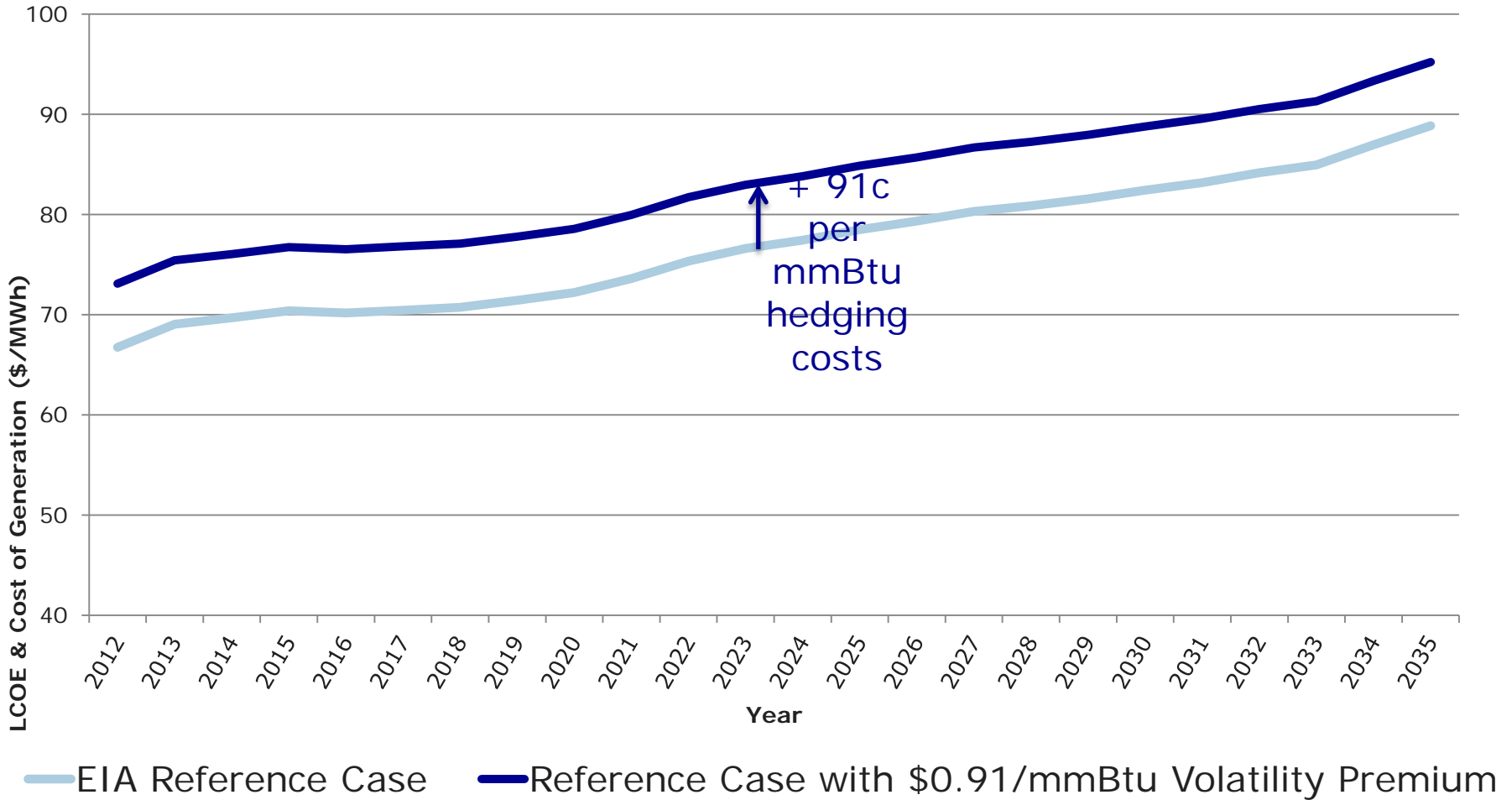
- 2011-2012 Gas Purchase Year
- \$0.91/mmBtu Budget (Total \$30mm)
- Swaps & Option Strategies

# SOLUTIONS: UTILITY

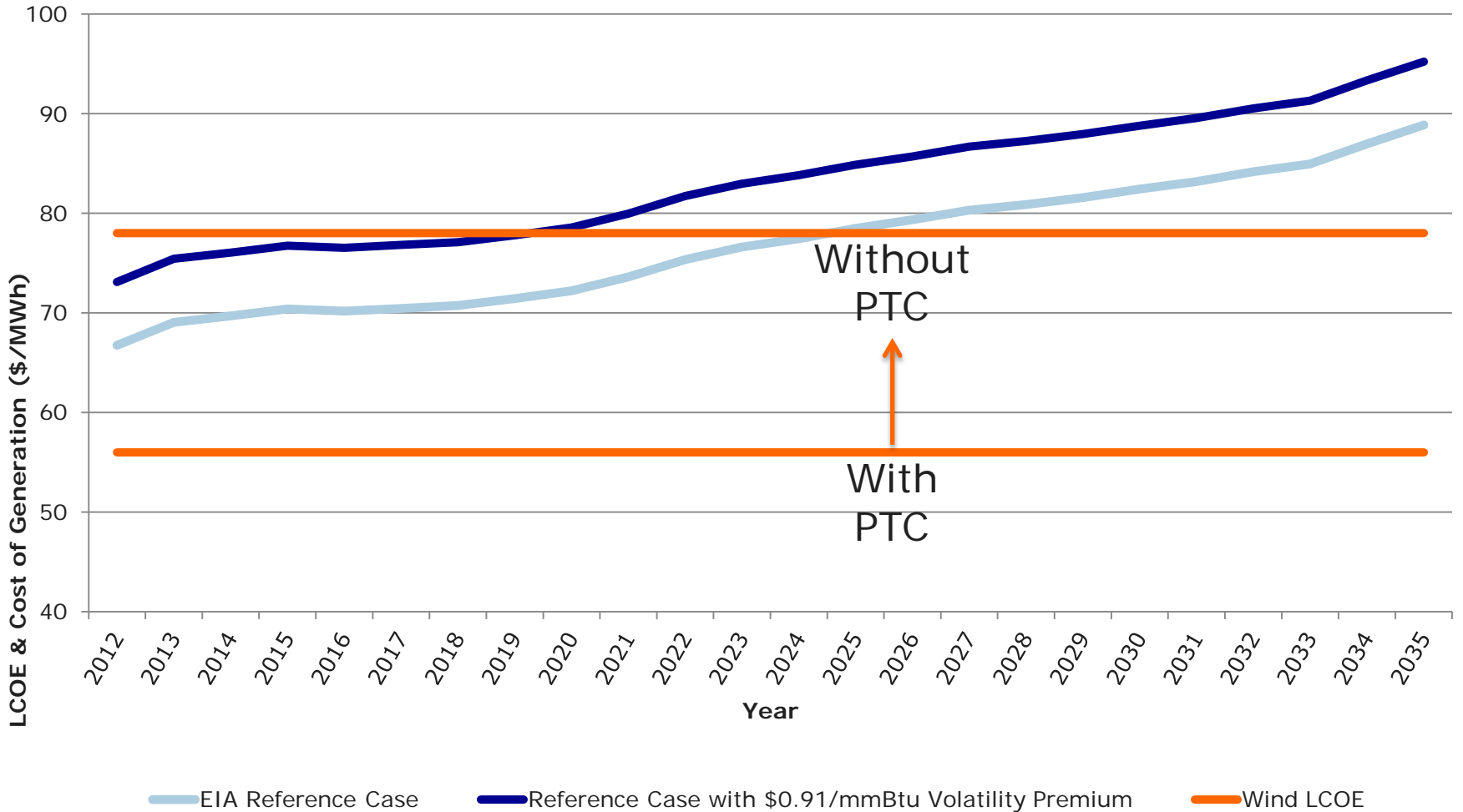


— EIA Reference Case

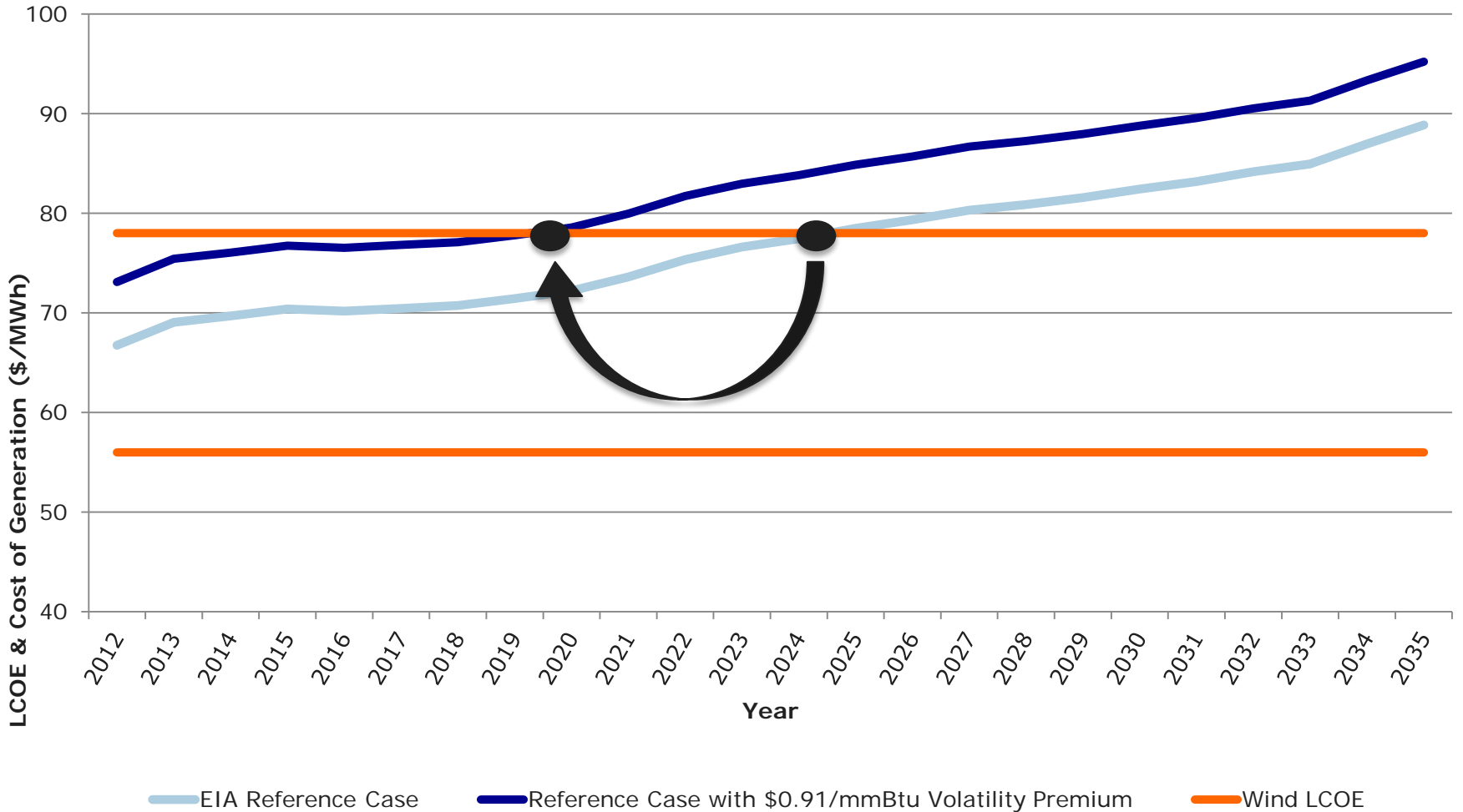
# SOLUTIONS: UTILITY



# SOLUTIONS: UTILITY

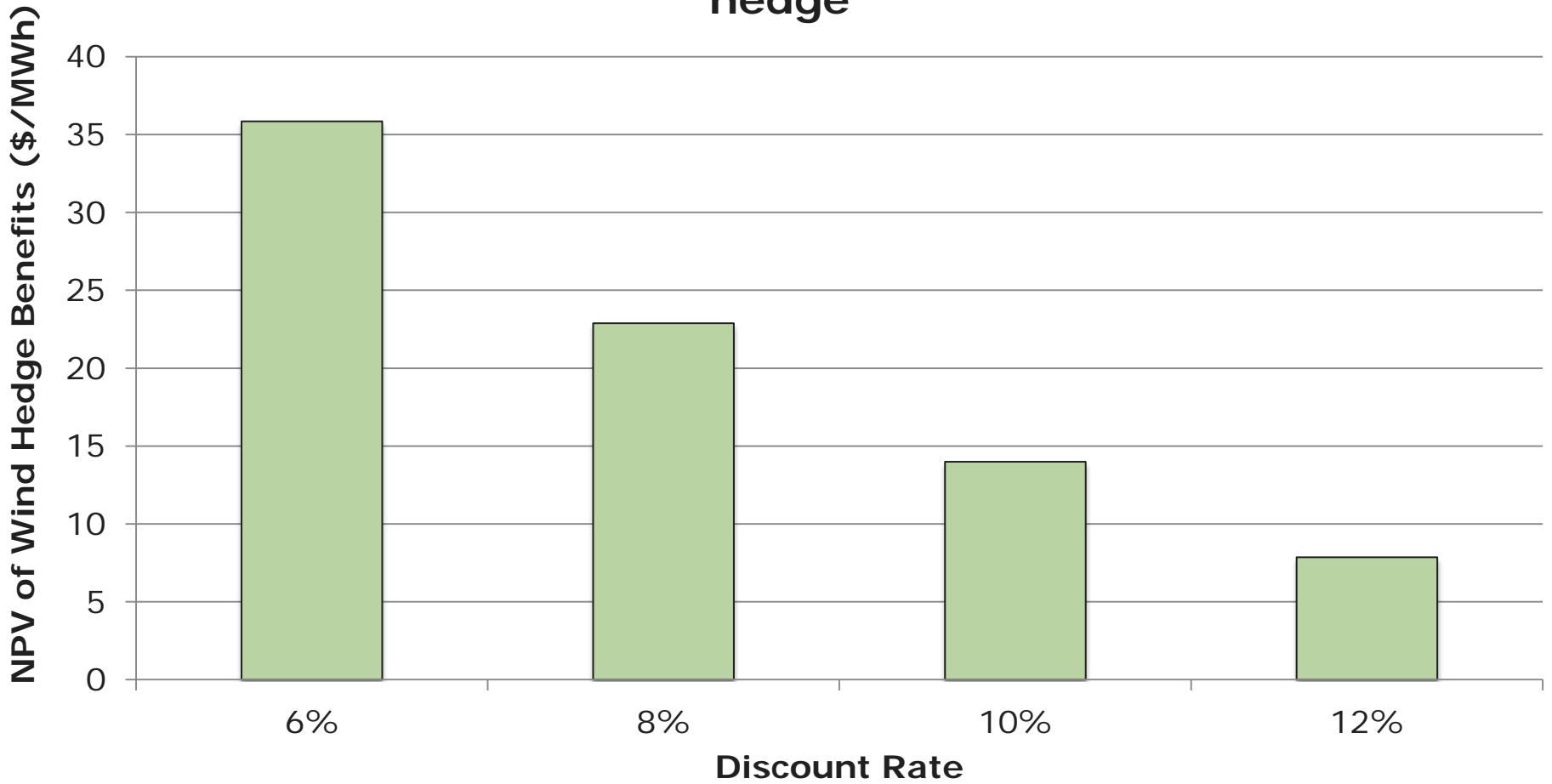


# SOLUTIONS: UTILITY



# SOLUTIONS: UTILITY

NPV of Wind vs. CCGT + \$0.91/MMBTU volatility hedge





# SOLUTIONS: LARGE CUSTOMER

## Large Industrial Natural Gas Customer

- Chemical Company
- Fertilizer Company

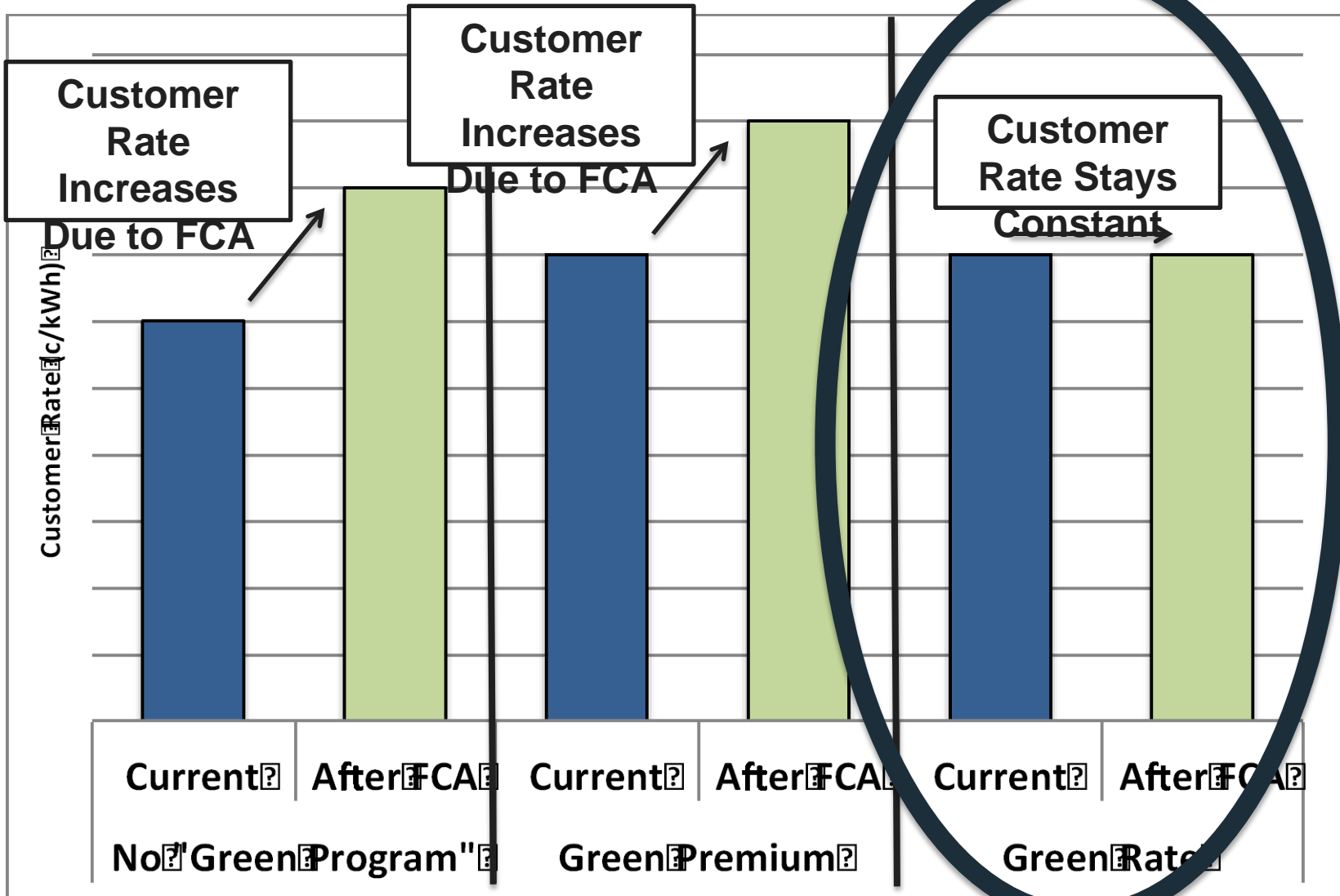
## Large Electricity Customer

- IT Data Centers
- Refrigeration Facilities

## Intermediaries

- Altenex Model

# SOLUTIONS: RESIDENTIAL CUSTOMER



# AUSTIN ENERGY GREENCHOICE PROGRAM

“A batch 1 customer paying 1.7 cents per kWh and averaging 1,000 kWh per month will have saved about \$1,300 when their subscription ends”

– Austin Energy

- Previous batches:

- 1: 1.7c/kWh – Expired 3/11: net in the money over term
- 2: 2.85c/kWh – Expired 3/11: net in the money over term
- 3: 3.3c/kWh – currently in the money
- 4: 3.5c/kWh – currently in the money
- 5: 5.5c/kWh
- 6: 5.7c/kWh

# CONCLUSIONS

- Volatility protection is ALREADY being paid for short-term via options trading. Why not use wind?
- Long-term wind makes sense as a hedge, even with “cheap & low vol” gas, **no PTC, and no RECs.**
- Solutions using wind as hedge (separate from RPS commitments) exist at ratepayer and large industrial levels, why not utilities?

# THANK YOU!

7/2012 RMI discussion paper by Lisa Huber

***Utility-Scale Wind and Natural Gas Volatility:  
Uncovering the Hedge Value of Wind for Utilities  
and Their Customers.***

Available for download at [www.RMI.org](http://www.RMI.org)