

# Pricing Fuel Price Risk

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# Observation: Renewables

What will it cost you to produce a megawatt of electricity 15–20 years from now?

- Solar farm owner: Would you like to buy a power purchase agreement?
- Wind farm owner: Would you like to buy a power purchase agreement?

Low price risk. Production risk engineered at inception.

## Observation: Natural Gas Power Plant

What will it cost you to produce a megawatt of electricity 15–20 years from now?

- Gas plant owner: I don't know; it depends on the price of natural gas.
- Mr. Market: Hedge with futures contracts.

# What will the prices be? Thin market.




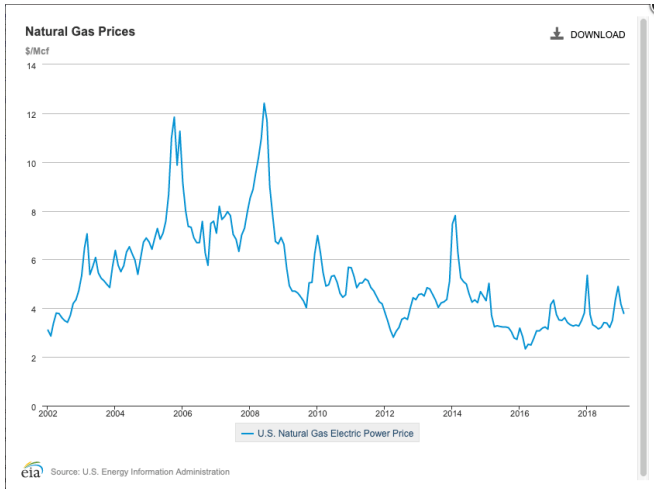
Month	Options	Charts	Last	Change	Prior Settle	Open	High	Low	Volume	HI / Low Limit	Updated
DEC 2019	OPT		2.924	+0.007	2.917	2.924	2.925	2.924	12	No Limit / No Limit	20:05:24 CT 15 May 2019
JAN 2020	OPT		3.019	+0.013	3.006	3.014	3.019	3.013	19	No Limit / No Limit	20:06:43 CT 15 May 2019
FEB 2020	OPT		-	-	2.967	-	-	-	0	No Limit / No Limit	17:55:03 CT 15 May 2019

Figure: Henry Hub futures.

Cost of rolling hedge? Huge, a non-starter.

<https://www.cmegroup.com/trading/energy/natural-gas/natural-gas.html>

# What have the prices been?



# System-Level Price Risk

- This matters at the system design level.
- Shifted to consumers, customers.
- Can we put a price or cost on that risk?
- And use that information to better optimize our systems?
- Note: Mere exposure to risk is (often) harmful.

# Four models for pricing the risk

- 1 Straddle.  
A way of hedging used for equities. Black-Scholes model-based. System perspective.
- 2 Collar.  
A way of hedging used for equities. Black-Scholes model-based. Plant perspective.
- 3 Decision analysis model.  
Broad range of applicability.
- 4 Reserve fund model.  
Insurance perspective.

# Comments

- The four models are in broad agreement, ranging from about \$0.70 to \$5.50 (or more) per MBtu.
- All risk models require a subjective decision making element. (As does every decision under risk.)
- Solution pluralism and robustness.
- Adds fuel price risk to GHG emissions and air pollution as a market failure in electricity production.
- Politics of fixing fuel price risk may be easier.
- Needed: implementation policy and strategy.  
A longer discussion. In process ...



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