

Energy Efficiency as a Financial Hedge: An Alternative Valuation Methodology and Analytic Context for Energy Efficiency Programs

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Introduction

Electric competition has exposed utilities (and their customers) to price volatility. Recent years have seen spot prices ranging by several orders of magnitude in a single day. The lack of liquidity and transparency in wholesale markets has made it difficult to adequately hedge price risk with financial instruments.

Regulators are mandating that utilities hedge (or insure) against such price risk. Hedges, if available, add to the cost of electricity supply, but mitigate the risk of much higher prices in the future. While energy efficiency investments have long been justified based on energy savings and utilities' direct avoided costs, the hedge value represents an additional benefit of energy efficiency. Energy efficiency can cost-effectively reduce price risk by (1) reducing the volumes that need to be purchased, and (2) reducing the volatility of the purchase price.

Analysis

The analysis approach consists of the following steps.

1. Estimate the relationship between the energy supply curve and price volatility. This relationship is determined from historical data on hourly loads and wholesale clearing prices in the region.
2. Estimate the cost of hedging price volatility. Since the electricity derivative markets are immature, this estimate cannot be based directly on the costs of options, but must be derived based on analysis of the value at risk.
3. Estimate the change in the cost of hedging for a reduction in price volatility. That is, building on the analysis in Step 2, determine how much the cost of hedging is reduced by a reduction in volatility.
4. Determine the demand impact of energy efficiency programs. This step uses established tools to estimate the market potential of regional programs at various levels of investment.
5. Translate the demand reduction for a given level of energy efficiency investment into an equivalent hedge value by calculating (a) the reduction in volatility via step one, and (b) the reduced cost of hedging via step 4.
6. Determine the economics of the proposition by comparing the cost of energy efficiency with the hedge value.

The preliminary analysis conducted shows that energy efficiency can provide a significant hedge against price volatility in California's wholesale power markets. It appears that the value of the energy efficiency hedge could be up to 30 percent of wholesale power prices on an annual basis.

