Realizing the Reliability and Resource Adequacy Benefits of Energy Efficiency in Power Planning

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The Resource Planner’s Problem

- Don’t have too many resources
- Don’t have too few resources
- Have “just the right amount” of resources
As A Plan’s Resource Mix Changes So Does It’s Cost and Risk

- Exposure to Market Volatility
- Exposure to Load Volatility

<table>
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<tr>
<th>Resources</th>
<th>Loads</th>
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<tbody>
<tr>
<td>Firm Contracts/Resources</td>
<td>Market Purchases</td>
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Increasing Risk
Increasing Reserve Margin
Increasing Cost
Decreasing Firm Contracts/Resources Increases Market Risk...

- **Resources**
  - Firm Contracts/Resources
  - Market Purchases

- **Loads**
  - Exposure to Market Volatility
  - Exposure to Load Volatility

Increasing Risk

Increasing Reserve Margin

Increasing Cost
Increasing Firm Contracts/Resources Increases Load Volatility Risk

- **Exposure to Market Volatility**
- **Exposure to Load Volatility**

Increasing Risk

Increasing Reserve Margin

- **Firm Contracts/Resources**
- **Market Purchases**

GWH/yr

Resources

Loads

Increasing Cost
Energy Efficiency Is an Inexpensive Source of Reserve Margin Which Reduces Market Exposure Risk & May Moderate Wholesale Price Swings

- Efficiency’s value stems from “being there” when a shortage hits (high prices)

- Higher levels of efficiency (lower demands) provide price moderation
Why Is EE A Lower Risk Resource Option?

Reason 1: EE is the **Lowest Cost** and Lowest **Cost Risk** Resource
Why Is EE A Lower Cost Way of Providing Reserves?  
Reason 2: EE Has A Non-Linear Supply Curve

- EE Supply Curve Exhibits “Diminishing Returns”
- Acquiring EE *At A Premium* over Short Term Market Prices
  - Builds more EE when market prices are low
  - Does not overbuild EE when market prices are high
Why Is EE A Lower Cost Way of Providing Reserves? 
Reason 3: EE Has Value Even In Low Market Price Conditions

$Net Benefit per $Expense

Benefits/Cost = 1.0

Frequency

SCCT discretionary conservation lost opportunity conservation

Ratio ($Net Benefit$/Expense)
A Bit More Explanation . . .

SCCT and Energy Efficiency Resources Serving As Reserves:

- **Operate under circumstances of relatively lower electricity market prices and volatility**
  - This is a direct consequence of having the additional resources that give us protection against uncertainty (i.e., “we are never short”)

- **Do not pay for themselves!**
  - If we want to reduce risk, we have to pay the insurance premium of extra capacity that may not be used frequently enough to cover its costs.
Take Home

- The quality of reserves provided by EE is superior to conventional resources, because:
  - EE has value under low market prices
  - EE is not subject to forced outages
  - EE is not subject to fuel price risk
  - EE is not subject to carbon control risk

- Implication - For low-risk plans, the cost-effectiveness limit for energy efficiency resources is higher than long-term view of the average wholesale market price for electricity
Setting A Cost-Effectiveness Limit Above Short-Term Market Prices, Acquires More Efficiency (Increases Reserves) and Reduces Both System Cost and Risk.