Cost-Effectiveness Analysis

A Tail of Two Solutions

Tom Eckman
Manager, Conservation Resources
Northwest Power and Conservation Council
NEEC Industry Lunch, Cost Effectiveness – Does It Need to Change?
July 23, 2013

It was the best of times . . .

Regional electric efficiency savings exceeded Council Plan for seventh consecutive year
It was the worst of times . . .

- Forecast spot market prices for both natural gas and electricity were lower, reducing avoided cost.

- State codes and federal standards are “bringin’ up the baseline” reducing savings from existing utility programs, especially lighting.

- Prolonged recession appeared to have eliminated load growth, reducing perceived need for new resources.

It was the age of wisdom . . .

- 40% More Efficiency Was Acquired in the Past Decade than the Prior Two Combined.
It was the age of foolishness . . .

Once again some were convinced they could predict future natural gas prices!

It was the season of light . . .

- Electric Efficiency was being acquired in ever increasing quantities across a broadening array of approaches and programs
- Federal appliance efficiency standards and state energy codes were improving significantly
- Public support for “clean” solutions continued to grow
It was the season of darkness …

- Action on climate change was no longer “on the national agenda”
- Only the cost of efficiency and renewable resources were “itemized” on customer bills
- The cost of meeting renewable resource portfolio standards was raising retail rates at the same time it was depressing wholesale market prices

It was the spring of hope …

*Lost-Opportunity Potential is Cumulative Amount Available Potential by 2030*
It was the winter of despair …

• These twin forces (transforming markets and low avoided costs) leave program administrators hamstrung to meet their saving targets. That likely will undermine energy efficiency portfolio standards in many jurisdictions. As a result, a new debate has been touched off about reforming – or replacing – the total resource cost (TRC) test, the main standard for economic valuation of ratepayer-funded energy efficiency in most jurisdictions.*


In short, the period was like the present period

So -- Are the benefits of staying the course worth the cost?
Why Limit Utility Investments in Energy Efficiency Based on Cost-Effectiveness?

- Energy Efficiency reduces system costs, but only when it is less expensive than alternative supplies
  - The bigger the difference the greater the value
  - There are no economic benefits from energy efficiency that costs the same as alternative supply options

- Energy Efficiency reduces risk relative to most generating alternatives
  - It carries no risk of fuel or climate change cost
  - It reduces variability of loads
  - It has value even when market prices are low

Surprise!

The Council Doesn’t Use A Total Resource Cost Test (and as a result) Neither Do Utilities That Must Comply with I-937.
The Council’s Definition of Resource Cost-Effectiveness Comes From the Regional Act*

- **Cost-effective,** means that a measure or resource must be forecast:
  - to be **reliable and available** within the time it is needed
  - to meet or reduce the electric power demand of the consumers **at an estimated incremental system cost no greater than that of the least-cost similarly reliable and available alternative measure or resource, or any combination thereof.**

*It’s also the cost-effectiveness definition in I-937

Under the Act the term "system cost" means:

- An estimate of **all direct costs** of a measure or resource over its effective life, including, if applicable:
  - the cost of distribution and transmission to the consumer
  - waste disposal costs
  - end-of-cycle costs
  - fuel costs (including projected increases)
  - and such **quantifiable environmental costs and benefits as are directly attributable to such measure or resource** using a methodology developed by the Council
The Act’s Definition of Cost-Effectiveness

• *Is not* the same as the Total Resource Cost test in the California SPM
  – *It considers all cost and benefits (including free rider savings)*
  – *It is a “resource” cost test, not a “program cost-effectiveness test”*\(^*\)

*Footnote 8, in 2007 SPM Clarification Memo states:

“... the SPM defines the “perspective” of this test (the TRC) as one of evaluating program cost-effectiveness, that is, looking at “the total costs of the program, including both the participants’ and the utility’s costs.”

Our Version of Total Resource Cost-Effectiveness

Captures All Costs & Benefits
Including Risks and Non-Energy Benefits

Why Council Uses “TRC”

- Avoids potential double counting of the Savings
- Directs funds toward measures that minimize total Utility and Customer investments in energy services
- Avoids promoting measures that may impose non-energy costs on others
- Expands list of conservation options by allowing consideration of quantifiable “non-energy” benefits, including quantifiable environmental costs and benefits
Why Council Uses “TRC”:
Avoids Potential Double Counting of the Savings

- Utility invest $7500 in efficient motor to acquire 5000 kWh/yr savings
  - PACT B/C Ratio = 1.0
- Customer matches $7500 utility investment to save the same 5000 kWh/yr
  - Simple payback = 10 years, motor last 20 years
- Total of all direct cost is $15,000 for 5000 kWh/yr of savings
  - TRC B/C ratio = 0.5
- If there are no non-energy benefits, these savings cost twice what it cost to generate the same amount of electricity

Why Council Uses “TRC”
Directs Funds Toward Measures That Optimize Total Utility and Customer Investments

- Utility invest $600 toward cost of $6000 solar PV system that saves 1200 kWh/yr
  - Alternatively utility and consumer could:
    - Invest $160 in 40 CFLs to save 1200 kWh, reducing cost $440
    - Invest $600 to buy 150 CFLs, saving 5000 kWh, quadrupling savings
- Especially important when budgets are limited
Why Council Uses “TRC”
Avoids promoting measures that may impose non-energy costs on others

• Act directs the Council give second priority to the use of renewable resources
• Analysis concluded that direct cost of using wood stoves to offset use of electric heat was below cost of electricity from new generating facilities
• However, Council plan’s have excluded these “fuel conversions” due to the environmental cost (air pollution) they impose on the region

Why Council Uses “TRC”
Expands list of conservation options by allowing consideration of quantifiable “non-energy” benefits

• Energy Star Clothes Washer in Homes with Gas Water Heater and Dryer
  – Present Value Capital Cost
    = $58/MWh
  – Present Value to Power System
    = $17/MWh (B/C = 0.3)
  – Value to Region/Society (includes natural gas, detergent & water savings)
    = $110/MWh (B/C = 2.0)
There Are Exceptions

• Inclusion of the TRC non-cost-effective measure(s) increases market acceptance and leads to reduced costs and program cost-effectiveness
• Where it is more expensive or impractical to exclude a few non-cost effective applications of a measure that is cost-effective in most applications
• Where inclusion increases participation in a cost-effective program
• Where a package of measures cannot be changed frequently and the measure is expected to become cost-effective during the time between program changes, or
• Where the measure is a pilot or research project

One Test Is Not Enough

• The “Total” Resource Cost (or Societal Cost Test) should be used to screen energy efficiency measures and programs.
  – These test must include reasonable estimates of non-energy benefits and costs.
  – Otherwise, the results will be WRONG
• The PAC/UCT test should be applied to the entire portfolio of efficiency programs.
  – That is, the utility system’s “willingness-to-pay” for these savings should be limited to the present value of all utility system benefits
• Use of these tests in combination ensures
  – We allocate the appropriate amount of a scarce resource ($) to the provision of energy services, compared to other societal needs
  – Utility revenue requirements are lower as a result of EE than they would be had it invested in new supplies