



National Action Plan for Energy Efficiency

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Cost-effectiveness Tests 'Current Practice'

Snuller Price, E3



Definition of Cost Tests

Cost Test	Acronym	Key Question Answered	Summary Approach
Participant Cost Test	PCT	Will the participants benefit over the measure life?	<ul style="list-style-type: none"> Comparison of costs and benefits of the customer installing the measure
Utility/Program Administrator Cost Test	UCT/PAC	Will utility bills increase?	<ul style="list-style-type: none"> Comparison of program administrator costs to supply side resource costs
Ratepayer Impact Measure	RIM	Will utility rates increase?	<ul style="list-style-type: none"> Comparison of administrator costs and utility bill reductions to supply side resource costs
Total Resource Cost	TRC	Will the total costs of energy in the utility service territory decrease?	<ul style="list-style-type: none"> Comparison of program administrator and customer costs to utility resource savings
Societal Cost Test	SCT	Is the utility, state, or nation better off as a whole?	<ul style="list-style-type: none"> Comparison of society's costs of energy efficiency to resource savings and non-cash costs and benefits



Summary of Costs and Benefits

- High level summary of costs and benefits included in each cost test
- Each state adjusts these definitions depending on circumstances
- Details can significantly affect the type of energy efficiency implemented

Component	PCT	PAC	RIM	TRC	SCT
Energy and capacity related avoided costs.	-	Benefit	Benefit	Benefit	Benefit
Additional resource savings	-	-	-	Benefit	Benefit
Non-monetized benefits	-	-	-	-	Benefit
Incremental equipment and install costs	Cost	-	-	Cost	Cost
Program overhead costs	-	Cost	Cost	Cost	Cost
Incentive payments	Benefit	Cost	Cost	-	-
Bill Savings	Benefit		Cost	-	-



Key Cost-effectiveness Issues

- Definition of cost-effectiveness tests
- Cost-effectiveness tests to use
- Point of cost-effectiveness measurement
- Calculation of avoided costs
- Discount rate
- Net to gross ratio and free-riders
- Emissions savings and RPS impact
- Non-energy benefits



Example Cost Test Results

- Benefit / Cost ratio results from three programs
- Energy efficiency is widely cost-effective
- RIM test results are often less than one

Test	So. Cal. Edison Residential Program	AVISTA Regular Income	Puget Sound Energy Com/Ind Retrofit
PCT	7.14	3.47	1.72
PAC	9.91	4.18	4.19
RIM	0.63	0.85	1.15
TRC	4.21	2.26	1.90
SCT	4.21	2.26	1.90

* Examples based on information gathered in 2008



RAP Analysis: Cost Test by State

Primary Cost Test Used by Different States					
PCT	UCT/PAC	RIM	TRC	SCT	Unspecified
	CT, UT, TX	FL	CA, MA, MO, NH, NM,	AZ, ME, MN, VT, WI	AR, CO, DC, DE, GA, HI, IA, ID, IL, IN, Ks, KY, MD, MT, NC, ND, NJ, NV, OK, OR, PA, RI, SC, VA WA WY
Secondary Cost Test Used by Different States					
PCT	UCT/PAC	RIM	TRC	SCT	
AR, FL, GA, HI, IA, IN, MN, VA	AT, CA, CT, HI, IA, IN, MN, NO, NV, OR, UT, VA, TX	AR, DC, FL, GA, HI, IA, IN, KS, MN, NH, VA	AR, CA, CO, CT, DE, FL, GA, HI, IL, IN, KS, MA, ME, MN, MO, MT, NH, NM, NY, UT, VA	AZ, CO, GA, HI, IA, IN, MW, MN, MT, NV, OR, VA, VT, WI	



Electric Avoided Cost Components

- Each state selects their own elements and methods for quantification
- Based on coal or natural gas generation and market prices

Electricity Energy Efficiency	
Energy Savings	Capacity Savings
Market purchases <i>or</i> fuel and O&M costs	Capacity purchases <i>or</i> generator construction
System Losses	System losses (Peak load)
Ancillary services related to energy	Transmission facilities
Energy market price reductions	Distribution facilities
Co-benefits of water, natural gas, fuel oil savings (if applicable)	Ancillary services related to capacity
Air emissions	Capacity market price reductions
Hedging costs	Land use



Methodology of Avoided Costs

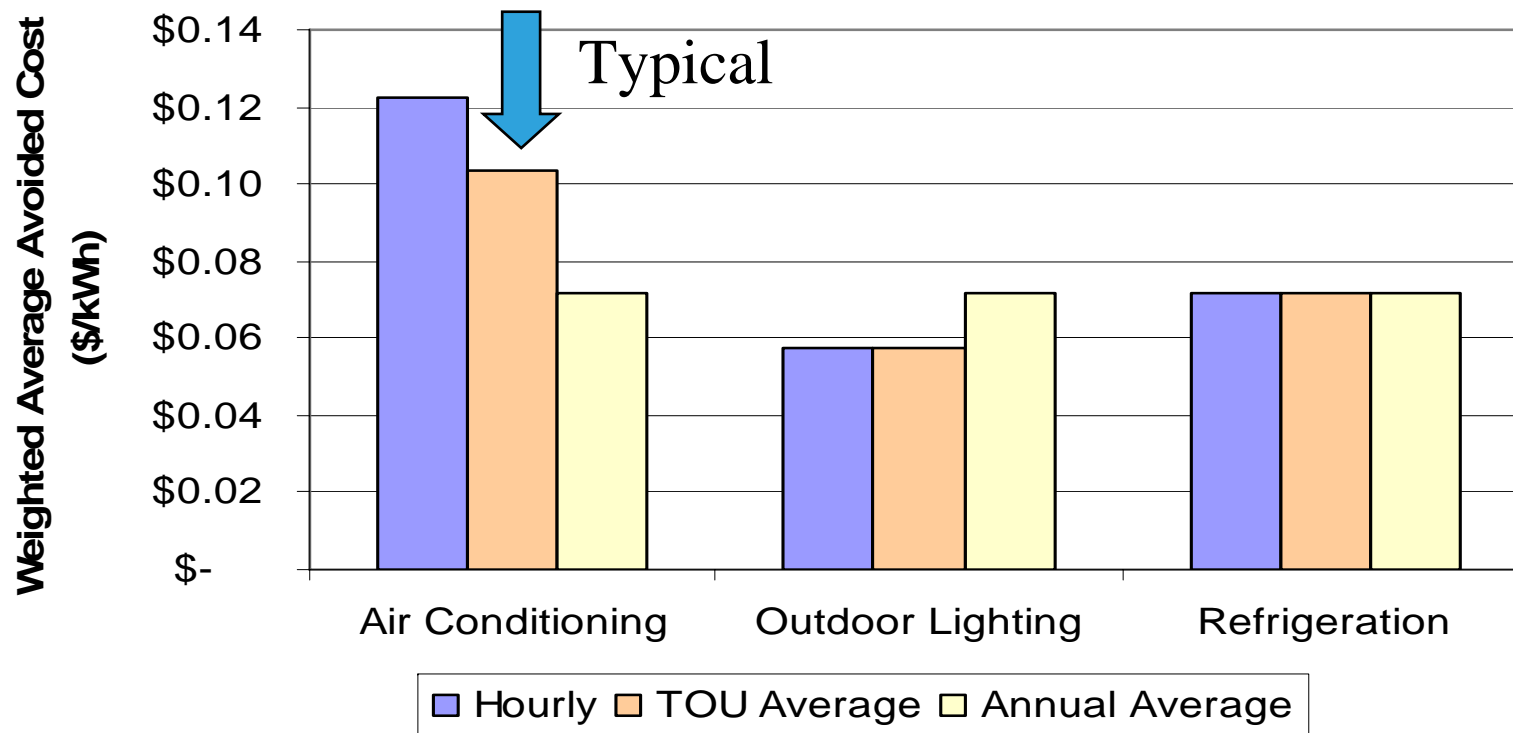
- Methodology depends on market structure
- Lots of variation across states

Approaches to Value Energy and Capacity		
	Near Term (Market data is available)	Long Term (No market data available)
Distribution electric or natural gas utility	Current forward market prices of energy and capacity	Long-term forecast of market prices of energy and capacity
Electric vertically-integrated utility	Current forward market prices of energy and capacity <i>or</i> Expected production cost of electricity and value of deferring generation projects	Long-term forecast of market prices of energy and capacity <i>or</i> Expected production cost of electricity and value of deferring generation projects



Differences in Level of Decomposition of Time and Area Avoided Costs

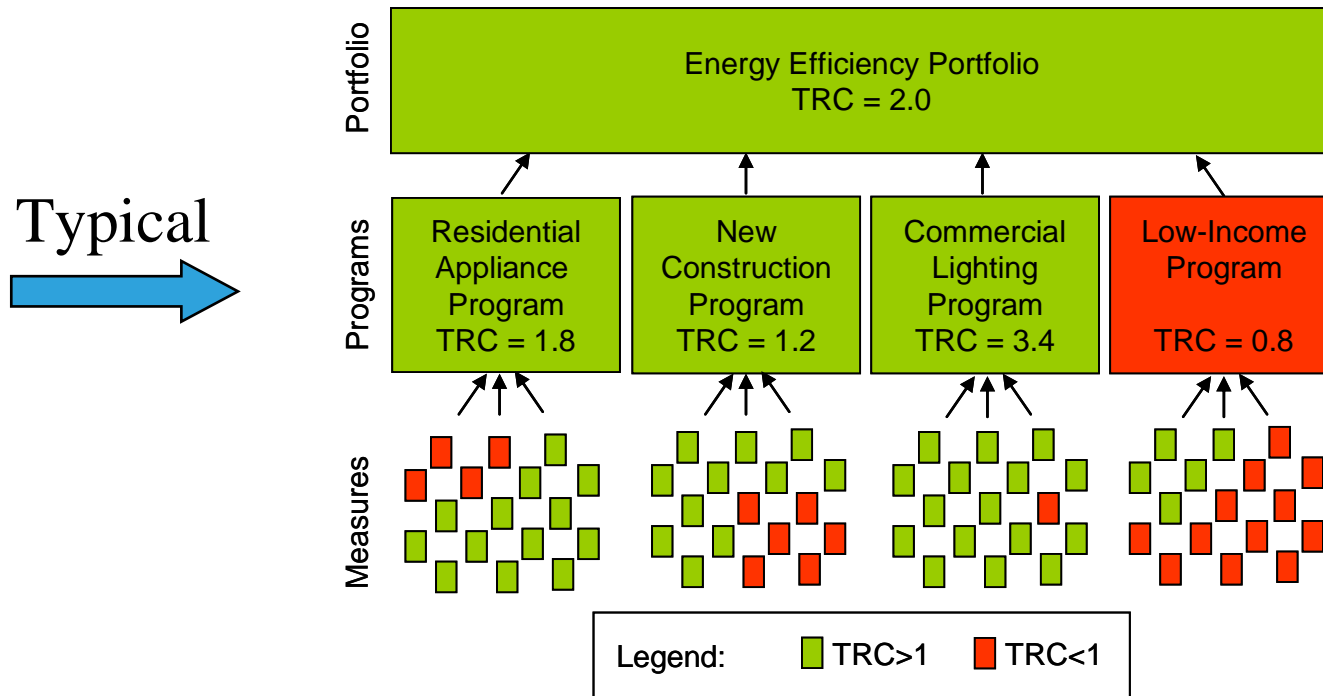
Implication of Time-of-Use on Avoided Costs



Example from California Avoided Cost Analysis for Fresno, CA



Point of Cost-Effectiveness Measurement



- Application at portfolio level allows for inclusion of individual programs or measures that do not pass cost test
 - Low Income, emerging technologies, market transformation



Discount Rates for each cost test

Tests and Perspective	Discount Rate Used	Illustrative Value	Present Value of \$1/yr for 20 years	Today's value of the \$1 received in Year 20
Participant Cost Test (PCT))	Participant's discount rate	10%	\$8.51	\$0.15
Ratepayer Impact Measure (RIM)	Utility WACC	8.5%	\$9.46	\$0.20
Utility Cost Test (UCT/PAC)	Utility WACC	8.5%	\$9.46	\$0.20
Total Resources Cost Test (TRC)	Utility WACC	8.5%	\$9.46	\$0.20
Societal Cost Test	Social discount rate	5%	\$12.46	\$0.38

 Typical Values



Net To Gross (NTG) Ratio

- Net to gross ratio may derate the program impacts and significantly affects the results of the TRC, SCT, PAC, and RIM tests
- Difficult to estimate the NTG with confidence
- Key factors addressed through the net-to-gross ratio are:
 - Free Riders
 - Installation Rate
 - Persistence/Failure
 - Rebound Effect
 - Take Back Effect
 - Spillover



Any Questions?

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