

Benefit Cost Tests  
for Energy Efficiency  
Kansas Corporation Commission  
Workshop on Energy Efficiency

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# Introduction

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## Regulatory Assistance Project

RAP is a non-profit organization, formed in 1992, that provides workshops and education assistance to state government officials on electric utility regulation. RAP is funded by the Energy Foundation, US EPA & US DOE.

### RAP Mission:

***RAP is committed to fostering regulatory policies for the electric industry that encourage economic efficiency, protect environmental quality, assure system reliability, and allocate system benefits fairly to all customers.***



# Benefit-Cost Tests: Context

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- Different interests have different perspectives on costs:
  - Consumers
    - Participants
    - Non-participants
  - Utilities
  - Society
- Properly applied, all of these tests should:
  - Be based on life-cycle benefits & costs
  - Computed on a net present value basis



# California Standard Practice Manual: Economic Analysis of Demand Side Programs and Projects

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- California Standard Practice Manual is a widely accepted authority on the details of Benefit-Cost analyses for EE
- Describes each of the tests, including how to calculate them and their strengths and weaknesses



# Inputs into Cost-Benefit Tests

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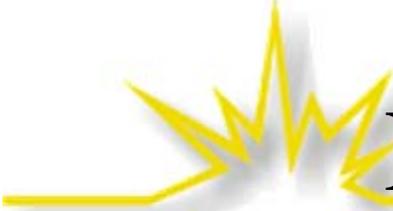
- Sources of information
  - Energy and demand savings
  - Avoided costs
  - DSM Costs
  - Retail Prices
  - Environmental Costs
- Sources are mixed and matched to compute different tests



# The Five Tests

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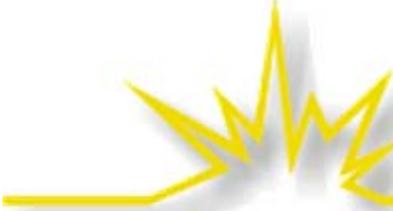
- Participant Test
- Ratepayer Impact Measure (RIM) Test
- Utility Cost (or Administrator Cost) Test
- Total Resource Cost Test
- Society Cost Test



# The Five Benefit-Cost Tests: Participant Test Components

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- Participant test: Will the participant be better off with the investment (i.e. are savings on the bill greater than the cost of the efficiency gain)?
- Benefits include reductions in utility bills, incentives paid by the utility (or third party) and any state, federal or local tax benefits received, etc.
- Costs include all out-of-pocket expenses incurred as a result of participating in a program and any increase in bills
- Ignores impact on utility, non-participants and society of making or not making the investment



# The Five Benefit-Cost Tests: Best Use of Participant Test

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- To evaluate and adapt program design
- To market the program
- To set contribution levels for participants
- Not used to determine whether or not a program is worthwhile



# The Five Benefit-Cost Tests: Rate Impact Measure Components

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- Does the investment increase average prices for non-participants over the life of the program?
- Benefits savings from avoided or deferred supply or other system costs, including fuel, generation, T&D, etc.
- Costs are program costs incurred by the utility, the incentives paid to the participants, decreased revenues for any period when load has been decreased and increased supply costs for any period when load has been increased
- Ignores related benefits to non-participants, utility and society
- Sometimes called the rate impact test, the non-participant test or the “no losers” test
- Where sales are growing, rates do not go up anyway



# The Five Benefit-Cost Tests: Use of RIM Test

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- To assess the average cost impacts to non-participants over life of program
- Serves as warning, not a litmus test
- If used (erroneously) as a program litmus test, will reject any program if non-participant prices rise, even if the program is zero cost!
- Measures average price change over life of program, not yearly price change

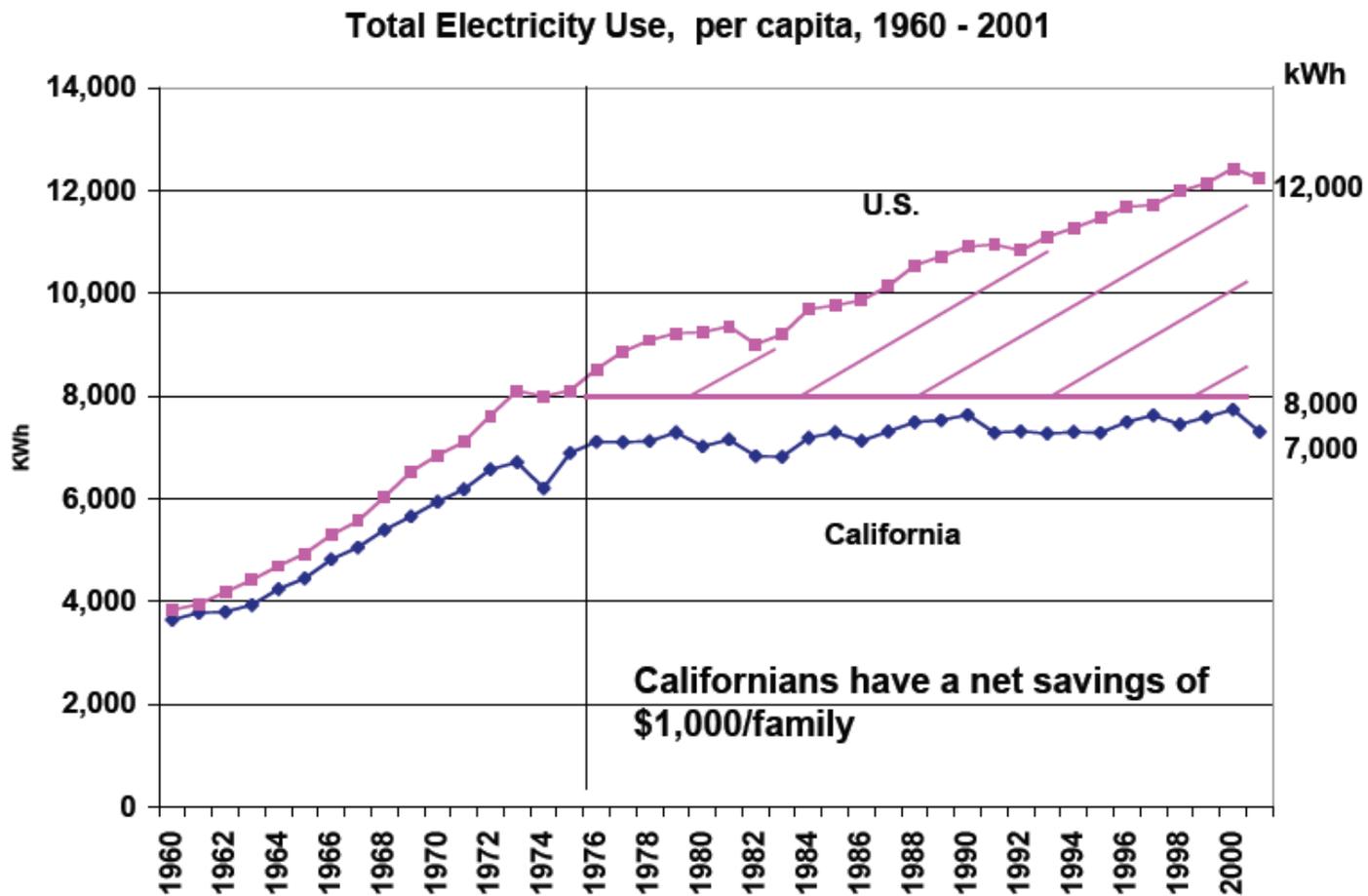


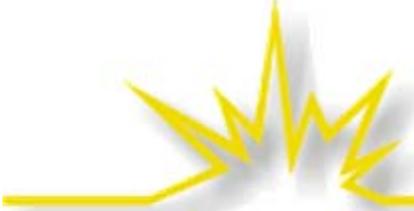
# For Advocates of RIM Test: Caveat Emptor

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- Beware: RIM test usually precludes energy efficiency investments, which leads to more supply and delivery costs (and higher prices) in the long-run
- Assumption: A utility is entitled to recovery of costs, so reduction in revenues from efficiency must be made up through price increases to non-participants
- Assumption: “Cost shifting” should be avoided
  - Assumption that *ex ante* cost allocation is superior to *ex post*
  - Ignores associated benefits to non-participants
- Not usually applied to other resource choices, such as new power plants
  - May skew answer
  - Ultimately, question should be placed in context of resource planning – that is, “As compared to what?”

# If California Used RIM Test: \$'s Left On the Table





## The Five Benefit-Cost Tests:

### Utility Cost Test a/k/a

### Program Administrator Test Components

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- Does the investment raise the utility's revenue requirement?
- Benefits are avoided supply costs of energy and demand and avoided or deferred plant investments (G,T&D, etc.)
- Costs are the net costs to utility including program costs and incentives paid, excluding participant costs
- Sometimes called the revenue requirement test



## The Five Benefit-Cost Tests: Use of Utility Cost Test

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- To identify what incentives should be paid to utility to make program attractive
- Not used to determine whether or not a program is worthwhile



# The Five Benefit-Cost Tests: Total Resource Cost Test Components

- Measures the net costs (excluding externalities) of a resource option based on the total costs of the program, including both the participants' and the utility's costs
- Benefits are avoided supply and delivery costs, including deferred or avoided investments
- Costs are the program and participant costs (including equipment costs and incentives) paid by both the utility and the participants plus the increase in supply costs for any period in which load has been increased



## The Five Benefit-Cost Tests: Use of Total Resource Cost Test

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- To determine whether a program makes sense by identifying whether it increases or decreases total direct cost of meeting energy service needs
- If program fails this test, it should not be used
- Programs that pass this test will lower total system costs



# The Five Benefit-Cost Tests: Societal Cost Test

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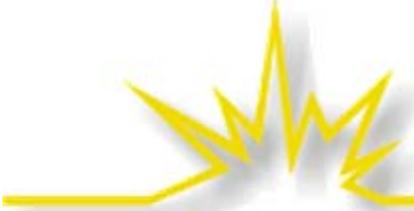
- What is the total net cost/benefit to society, including all collateral impacts?
- Measures net benefits from a viewpoint of utility, consumers and society as a whole
- Identical to the Total Resource Cost Test except:
  - Benefits include avoided externalities, including:
    - Avoided environmental or social externalities costs (e.g. reduced health care costs), and
    - “Non-price” benefits enjoyed by participants (improved comfort, aesthetic qualities, improved health, etc.).
  - Costs include environmental and other societal costs



# The Five Benefit-Cost Tests: Use of Societal Cost Test

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- Same as TRC test, but is a broader public interest inquiry
- Pass/fail implications are the same as TRC



# How Tests Are Expressed

**Table I**  
**Cost-Effectiveness Tests**

<b>Participant</b>	
<b>Primary</b>	<b>Secondary</b>
Net present value (all participants)	Discounted payback (years) Benefit-cost ratio Net present value (average participant)
<b>Ratepayer Impact Measure</b>	
Lifecycle revenue impact per Unit of energy (kWh or therm) or demand customer (kW)	Lifecycle revenue impact per unit Annual revenue impact (by year, per kWh, kW, therm, or customer) First-year revenue impact (per kWh, kW, therm, or customer) Benefit-cost ratio
Net present value	
<b>Total Resource Cost</b>	
Net present value (NPV)	Benefit-cost ratio (BCR) Levelized cost (cents or dollars per unit of energy or demand) Societal (NPV, BCR)
<b>Program Administrator Cost</b>	
Net present value	Benefit-cost ratio Levelized cost (cents or dollars per unit of energy or demand)



# How Tests Are Used

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- In most jurisdictions, all of the tests may be reviewed, but the TRC or Societal Cost Test are usually the primary test
- The Societal Cost Test is likely to emerge as an important test in the context of climate change and potential carbon regulation



# How Tests Are Used

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- If a program passes TRC or SC Test:
  - RIM test may be examined to assess impact on non-participants
  - UT indicates impact on revenues of the utility
- Programs with low Benefit-Cost ratios may still be approved, especially where targeted to low-income customers



# Adaptation Strategies

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- Modifying program design and administration
- Changing cost recovery period
- Rate design modifications to mitigate non-participant impacts
- Increased participant contribution
- Spreading programs among all customers more evenly



# Thanks for your attention

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