National Standard Practice Manual for Energy Efficiency Cost-Effectiveness

Prepared by

The National Efficiency Screening Project

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Overview of the NSPM Process

- **NESP:** The National Efficiency Screening Project is a group of organizations and individuals working to update and improve the way that utility customer-funded energy efficiency resources are assessed for cost-effectiveness
- **NESP Members:** Over 75 organizations representing a range of perspectives. Membership is open to additional organizations interested in NESP
- **NSPM Drafting Committee:** Tim Woolf (Synapse Energy Economics), Chris Neme (Energy Futures Group), Marty Kushler (ACEEE), Steve Schiller (Schiller Consulting), and Tom Eckman (Consultant)
- **NSPM Review Committee:** Includes roughly 40 experts representing a variety of organizations from around the country
- **Project Coordination and Funding:** The NSPM is coordinated and funded by E4TheFuture. Earlier work on the NESP and NSPM was managed by the Home Performance Coalition.
- **For more information:** http://www.nationalefficiencyscreening.org/

The Need for a National Standard Practice Manual (I)

- The California Standard Practice Manual (CaSPM) has been the prevailing guidance on cost-effectiveness for decades.
- Jurisdictions have struggled with limitations of the 3 traditional tests in the CaSPM: Utility Cost test; Total Resource Cost test; Societal Cost test

Many jurisdictions have not applied the CaSPM tests properly	• Some critical utility system impacts are often ignored: e.g., avoided T&D, losses, risk, environmental compliance costs. • Some critical participant impacts are often ignored: While most states include participant costs their primary test, most of them do not account for participant benefits. • Policy impacts are not addressed. • Discount rates are not well vetted or applied. • Inputs and results are not consistent or transparent.

Jurisdictions are turning to CaSPM to define cost-effectiveness for other types of distributed energy resources	• Need to expand cost-effectiveness guidance to
	  • demand response
	  • distributed generation
	  • storage
	  • electric vehicles

The Need for a National Standard Practice Manual (II)

The NSPM builds upon the CaSPM in several ways by providing:	• A set of universal cost-effectiveness testing principles • Guidance on accounting for policy goals • Guidance on developing a primary test • Guidance on various foundational elements of cost-effectiveness testing
The time is ripe for a new manual that:	• addresses the limitations of the CaSPM; • builds off of lessons learned in the past; and • can be generally applied to other resources.

Purpose and Scope of the Manual

- **Purpose:** Provide the principles, concepts, and methodologies for sound, comprehensive, balanced assessment of energy efficiency resources.
- **Scope:** Energy efficiency resources whose acquisition is funded by, and implemented on behalf of, electricity and gas utility customers.
- **Other Utility Resources:** The principles, concepts, and methodologies in the NSPM can be applied to all types of energy utility resources, including supply-side and distributed energy resources.

Outline of the NSPM - Overview

- Executive Summary
- Introduction
- Part I – Developing Cost-effectiveness Tests Using the Resource Value Framework
- Part II – Developing Inputs for Cost-effectiveness Tests
- Appendices

Outline: Part I – Developing Cost-Effectiveness Tests

1. Principles of Cost-Effectiveness Analysis
2. The Resource Value Framework and Primary Test
3. Developing a Resource Value Test
4. Relationship to Traditional Tests
5. Secondary Cost-Effectiveness Tests

Outline: Part II – Developing Inputs

6. Energy Efficiency Costs and Benefits
7. Methodologies to Account for Costs and Benefits
8. Participant Impacts
9. Discount Rates
10. Assessment Level
11. Analysis Period and End-Effects
12. Analysis of Early Replacement
13. Free-Riders and Spillover Effects

Outline: Appendices

- Appendix A: Summary of the Traditional Cost-Effectiveness Tests
- Appendix B: Cost-Effectiveness of Other Types of DERs
- Appendix C: Accounting for Rate and Bill Impacts
- Appendix D: Glossary

Part I

Developing a Cost-Effectiveness Test Using the Resource Value Framework

Key Concepts Underlying the NSPM

- Regulators, planners, and other efficiency stakeholders typically need a primary cost-effectiveness test.
- The primary cost-effectiveness test should reflect the applicable policy goals of the jurisdiction.
- Jurisdictions do not need to be limited to the three traditional tests: Utility Cost, Total Resource Cost, or Societal Cost.
- Universal principles are critical to developing the primary cost-effectiveness test.
- The **Resource Value Framework (RVF)** can be used to develop a primary test: **The Resource Value Test (RVT)**.

NSPM Principles

1. Recognize that energy efficiency is a resource.
2. Account for applicable policy goals.
3. Account for all relevant costs and benefits, including hard-to-quantify impacts.
4. Ensure symmetry across all relevant costs and benefits.
5. Apply a forward-looking, long-term analysis that captures incremental impacts of energy efficiency.
6. Ensure transparency in presenting the analysis and the results.

Foundational Principle: Applicable Policy Goals

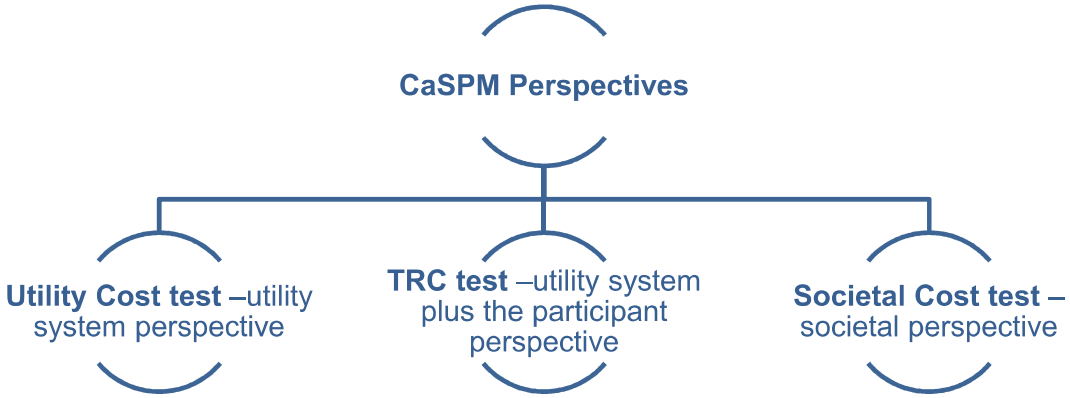
Applicable policy goals include all policy goals adopted by a jurisdiction that could have relevance to the choice of which energy resources to acquire. Examples include:

Common Overarching Goals:	Provide safe, reliable, low-cost electricity and gas services; protect low-income and vulnerable customers; maintain or improve customer equity.
Efficiency Resource Goals:	Reduce electricity and gas system costs; develop least-cost energy resources; promote customer equity; improve system reliability and resiliency; reduce system risk; promote resource diversity; increase energy independence (and reduce dollar drain from the jurisdiction); reduce price volatility.
Other Applicable Goals:	Support fair and equitable economic returns for utilities; provide reasonable energy costs for consumers; ensure stable energy markets; reduce energy burden on low-income customers; reduce environmental impact of energy consumption; promote jobs and local economic development; improve health associated with reduced air emissions and better indoor air quality.

These goals are established in many ways:

- Statutes
- Regulations
- Commission Orders
- EE Guidelines
- EE Standards
- Directives
- And Others

Cost-Effectiveness Perspectives



- These perspectives are used to define the scope of impacts to include in cost-effectiveness tests.
- There is another important perspective: the 'regulatory' perspective which is guided by the jurisdiction's energy and other applicable policy goals policy goals.
- "Regulatory" in the NSPM refers to all types of agencies that oversee efficiency investments.

Regulatory Perspective

Public utility commissions
Legislators
Municipal and coop advisory boards
Public power authorities
Other decision-makers

7-Step Resource Value Framework

Step 1	Identify and articulate the jurisdiction's applicable policy goals.
Step 2	Include all the utility system impacts in the test.
Step 3	Decide which non-utility system impacts to include in the test, based on applicable policy goals.
Step 4	Ensure that the test is symmetrical in considering both costs and benefits.
Step 5	Ensure that the analysis is forward-looking, incremental, and long-term.
Step 6	Develop methodologies and inputs to account for all impacts, including hard-to-quantify impacts.
Step 7	Ensure transparency in presenting the analysis and the results.

STEP 1

Identify and Articulate Applicable Policy Goals

Laws, Regulations, Orders:	Policy Goals Reflected in Laws, Regulations, Orders, etc.					
	Low-Cost	Fuel Diversity	Risk	Reliability	Environmental	Economic Development
PSC statutory authority	X			X		
Low-income protection						X
EE or DER law or rules	X	X	X	X	X	X
State energy plan	X	X	X	X	X	X
Integrated resource planning		X	X		X	X
Renewable portfolio standard		X	X		X	X
Environmental requirements					X	

- Each jurisdiction has a constellation of energy policy goals embedded in statutes, regulations, orders, guidelines, etc.
- This table illustrates how those laws, regulations, orders, etc. might establish applicable policy goals.

STEP 2

Include All Utility System Impacts in the Test

The term “utility system” is used to refer to:	• All elements of the electricity or gas system necessary to deliver services to the utility’s customers • Any type of utility ownership or management, including investor-owned utilities, publicly owned utilities, municipal utility systems, cooperatives, etc.
The utility system costs and benefits should provide the foundation for every cost-effectiveness test.	• Ensures that the test will, at a minimum, indicate how total utility system costs and average bills will be reduced (or increased) by the efficiency resource
Utility system avoided costs are one of the most important inputs to any cost-effectiveness analyses of EE resources:	• Avoided cost estimates should be comprehensive, up-to-date, informed by stakeholders, and ultimately reviewed and approved by regulators

STEP 3

Decide Which Non-Utility System Impacts to Include

- Ideally, applicable policy goals should be assessed and articulated with a process that is transparent and open to all relevant stakeholders.
- Stakeholder input can be achieved through a rulemaking process, a generic jurisdiction-wide docket, commission orders on specific EE plans, working groups, technical sessions, or other approaches appropriate for the jurisdiction.
- The process should address objectives based on current jurisdiction policies, and should also be flexible to address new or modified polices that are adopted over time.
- Some jurisdictions may wish to incorporate input from government agencies that do not typically make decisions regarding EE cost-effectiveness.
  - For example, a state's public utility commission may wish to incorporate input from that state's department of environmental protection or department of health and human services.

STEP 4 Ensure Symmetry Across Benefits and Costs

- Ensure that the RVT includes costs and benefits symmetrically
  - If a certain type of cost is included in the cost-effectiveness framework, then any corresponding benefits produced by those costs should be included in the framework, and vice versa.
  - If program participant costs are included in the cost-effectiveness framework, then the participant benefits should be included as well
- Emphasizes importance of avoiding bias and consequences of asymmetry:
  - If some costs are excluded, the framework will be inappropriately biased in favor of efficiency; if some benefits are excluded, the framework will be inappropriately biased against efficiency.
  - If test results in a bias either in favor of or against EE resources, the result will be a misallocation of resources, with higher than necessary costs incurred by utility customers

STEP 5

Analysis Is Forward-looking, Incremental, and Long Term

- Analysis of the impacts of efficiency investments should be forward-looking, capturing the difference between costs and benefits that would occur over the life of efficiency measures and those that would occur absent the efficiency investments.
- Sunk costs and benefits are not relevant to a cost-effectiveness analysis.

STEP 6

Identify Methodologies & Inputs for All Impacts Chosen

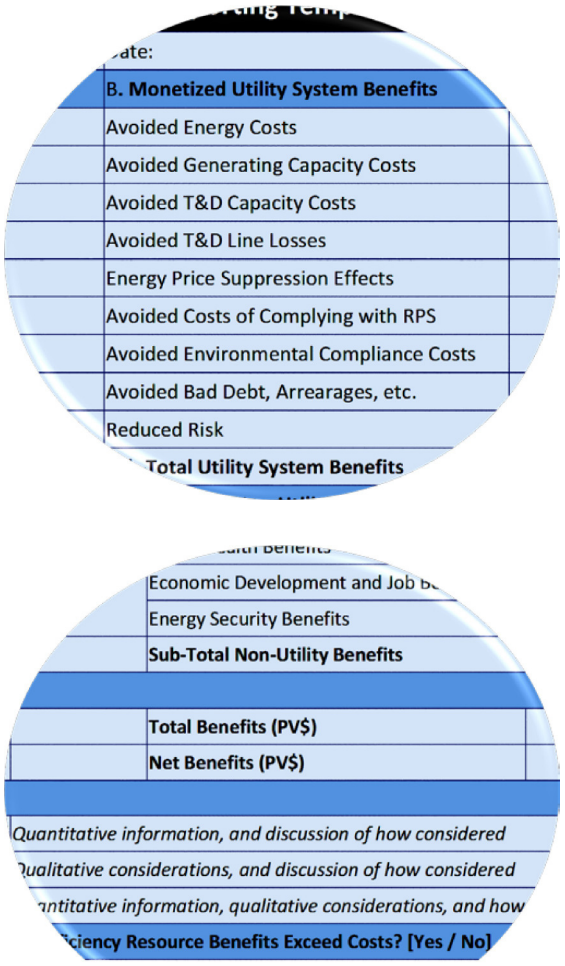
Approach	Description
Jurisdiction-specific studies	Jurisdiction-specific studies on EE costs and avoided cost offer the best approach for estimating and monetizing relevant impacts.
Studies from other jurisdictions	If jurisdiction-specific studies are not available, studies from other jurisdictions or regions, as well as national studies, can be used for estimating and monetizing relevant impacts.
Proxies	If monetized impacts are not available, well-informed and well-designed proxies can be used as a simple substitute.
Quantitative and qualitative information	Relevant quantitative and qualitative information can be used to consider impacts that cannot or should not be monetized.
Alternative thresholds	Pre-determined thresholds that are different from one (1.0) can be used as a simplistic way to account for relevant impacts that are not otherwise accounted for.

STEP 7

Ensure Transparency

Sample Template

Efficiency Cost-Effectiveness Reporting Template			
Program/Sector/Portfolio Name:		Date:	
A. Monetized Utility System Costs		**B. Monetized Utility System Benefits**	
Measure Costs (utility portion)		Avoided Energy Costs	
Other Financial or Technical Support Costs		Avoided Generating Capacity Costs	
Program Administration Costs		Avoided T&D Capacity Costs	
Evaluation, Measurement, & Verification		Avoided T&D Line Losses	
Shareholder Incentive Costs		Energy Price Suppression Effects	
		Avoided Costs of Complying with RPS	
		Avoided Environmental Compliance Costs	
		Avoided Bad Debt, Arrearages, etc.	
		Reduced Risk	
Sub-Total Utility System Costs		**Sub-Total Utility System Benefits**	
C. Monetized Non-Utility Costs		**D. Monetized Non-Utility Benefits**	
Participant Costs	*These impacts would be included to the extent that they are part of the Resource Value (primary) test.*	Participant Benefits	*These impacts would be included to the extent that they are part of the Resource Value (primary) test.*
Low-Income Customer Costs		Low-Income Customer Benefits	
Other Fuel Costs		Other Fuel Benefits	
Water and Other Resource Costs		Water and Other Resource Benefits	
Environmental Costs		Environmental Benefits	
Public Health Costs		Public Health Benefits	
Economic Development and Job Costs		Economic Development and Job Benefits	
Energy Security Costs		Energy Security Benefits	
Sub-Total Non-Utility Costs		**Sub-Total Non-Utility Benefits**	
E. Total Monetized Costs and Benefits			
Total Costs (PV$)		**Total Benefits (PV$)**	
Benefit-Cost Ratio		**Net Benefits (PV$)**	
F. Non-Monetized Considerations			
Economic Development and Job Impacts	*Quantitative information, and discussion of how considered*		
Market Transformation Impacts	*Qualitative considerations, and discussion of how considered*		
Other Non-Monetized Impacts	*Quantitative information, qualitative considerations, and how considered*		
Determination:	**Do Efficiency Resource Benefits Exceed Costs? [Yes / No]**		



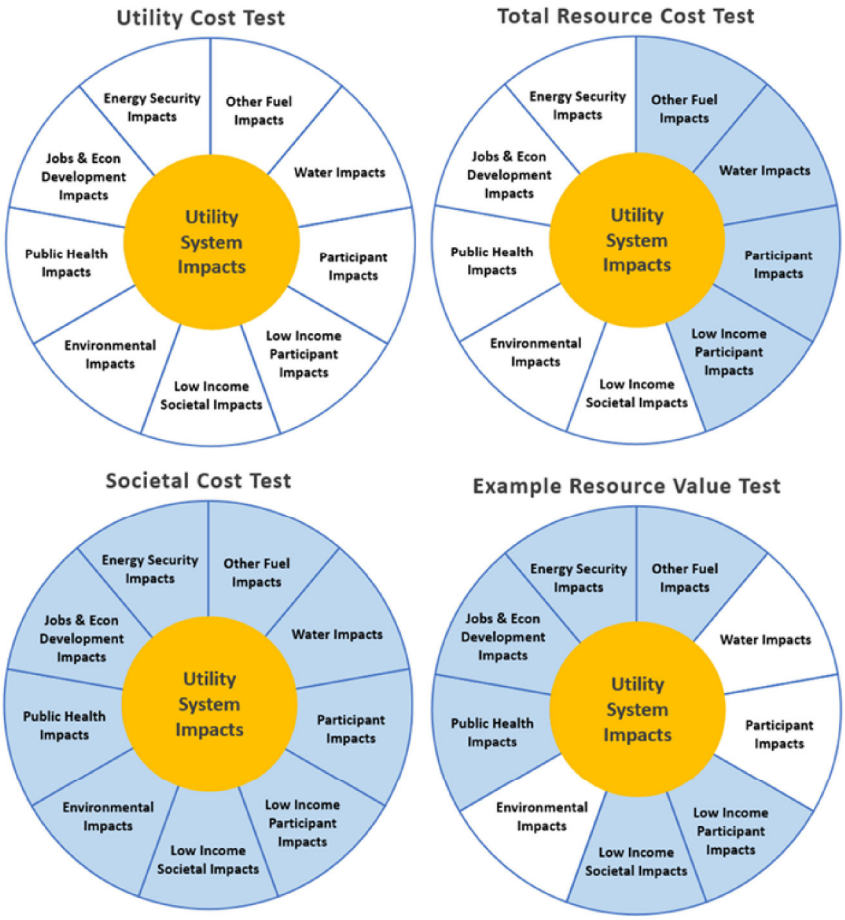
Relationship to Traditional Tests - Examples

Impacts	RVT = UCT	RVT = TRC	RVT = SCT	RVT
Utility System	✓	✓	✓	✓
Other Fuels		✓	✓	✓
Water		✓	✓	
Participants		✓	✓	
Low-Income Participants		✓	✓	✓
Low-Income Societal			✓	✓
Environmental			✓	
Public Health			✓	✓
Economic Development			✓	✓
Energy Security			✓	✓

Each of the Resource Value Tests above would be appropriate for a jurisdiction, as long as the test reflects the applicable policy goals of that jurisdiction and adheres to the NSPM principles.

Relationship to Traditional Tests - Examples

- Each cost-effectiveness test should include the utility system impacts.
- The other impacts should be based on applicable policy goals.
- In some jurisdictions, this may result in a Resource Value Test equal to one of the traditional tests.
- In other jurisdictions, the RVT may be different.



Secondary Tests

- The Resource Value Test is designed to be used as a jurisdiction's primary cost-effectiveness test, because it will best account for applicable policy goals.
- Jurisdictions, however, may want to also use other tests to provide different types of information on costs and benefits. For example:
  - To inform decisions regarding which categories of impacts to include in the test
  - To inform decisions regarding how much utility customer money could or should be invested to acquire cost-effective energy efficiency resources
  - To inform decisions regarding which efficiency programs to prioritize if not all cost-effective resources will be acquired
  - To inform efficiency program design
  - To inform public debate regarding efficiency resource acquisition

Part II

Developing Inputs for Cost-Effectiveness Tests

Utility System Impacts

	Costs	Benefits
Utility System	Measure Costs (utility portion) Other Financial or Technical Support Costs Program Administration Costs Marketing and Outreach Costs Evaluation, Measurement, and Verification Costs Shareholder Incentive Costs	Avoided Energy Costs Avoided Generating Capacity Costs Avoided T&D Capacity Costs Avoided T&D Line Losses Energy Price Suppression Effects Avoided Costs of Complying with RPS Avoided Environmental Compliance Costs Avoided Arrearages, Disconnections, etc. Reduced Risk

This table is presented for illustrative purposes, and is not meant to be an exhaustive list.

Non-Utility System Impacts

Impact	Description
Participant impacts	Impacts on program participants, includes participant portion of measure cost, other fuel savings, water savings, and participant non-energy costs and benefits
Impacts on low-income customers	Impacts on low-income program participants that are different from or incremental to non-low-income participant impacts. Includes reduced foreclosures, reduced mobility, and poverty alleviation
Other fuel impacts	Impacts on fuels that are not provided by the funding utility, for example, electricity (for a gas utility), gas (for an electric utility), oil, propane, and wood
Water impacts	Impacts on water consumption and related wastewater treatment
Environmental impacts	Impacts associated with CO2 emissions, criteria pollutant emissions, land use, etc. Includes only those impacts that are not included in the utility cost of compliance with environmental regulations
Public health impacts	Impacts on public health; includes health impacts that are not included in participant impacts or environmental impacts, and includes benefits in terms of reduced healthcare costs
Economic development and jobs	Impacts on economic development and jobs
Energy security	Reduced reliance on fuel imports from outside the jurisdiction, state, region, or country

This table is presented for illustrative purposes, and is not meant to be an exhaustive list.

Methodologies to Account for Relevant Impacts

Approach	Description
Jurisdiction-specific studies	Jurisdiction-specific studies on EE costs and avoided cost offer the best approach for estimating and monetizing relevant impacts.
Studies from other jurisdictions	If jurisdiction-specific studies are not available; studies from other jurisdictions or regions, as well as national studies, can be used for estimating and monetizing relevant impacts.
Proxies	If monetized impacts are not available; well informed and well designed proxies can be used as a simple substitute.
Quantitative and qualitative information	Relevant quantitative and qualitative information can be used to consider impacts that cannot or should not be monetized.
Alternative thresholds	Pre-determined thresholds that are different from one (1.0) can be used as a simplistic way to account for relevant impacts that are not otherwise accounted for.

Consider Participant Impacts

When considering whether to include participant impacts in the cost-effectiveness tests, it is important to consider two overarching points:

- The decision of whether to include participant impacts in the primary cost-effectiveness test is a policy decision. Regulators may choose to include participant impacts in the primary cost-effectiveness test if that would achieve the jurisdiction's policy goals.
- If regulators decide to include participant costs in any cost-effectiveness test, the test must also include participant benefits, and vice versa. This is necessary to ensure symmetrical treatment of participant impacts, consistent with the Symmetry Principle.

Including participant impacts in the cost-effectiveness test sometimes raises concerns about how this will affect non-participants. This concern can be addressed through program design:

- The incentives offered to the EE program participant could be capped at a level equal to the utility system avoided costs.
- This means that non-participants do not pay any more than the utility system benefits.

Discount Rates

- The discount rate reflects a particular “time preference,” which is the relative importance of short- versus long-term impacts.
- The choice of discount rate is a policy decision that should be informed by the jurisdiction’s applicable policies.
- The choice of discount rate should reflect the fundamental objective of efficiency cost-effectiveness analysis: *to identify resources that will best serve customers over the long term, while also achieving applicable policy goals.*
- The utility cost of capital does not necessarily reflect this objective.

Steps for Choosing a Discount Rate

Step A	Articulate the jurisdiction's applicable policy goals. These should be the same goals used in developing the RVT.
Step B	Consider the relevance of a utility's weighted average cost of capital. Is the utility investor time preference consistent with the jurisdiction's policy goals?
Step C	Consider the relevance of the average customer discount rate. Should the discount rate be based on the average utility customer time preference? Does this time preference adequately address applicable policy goals and future customers?
Step D	Consider the relevance of a societal discount rate. Is a societal time preference and use of a societal discount rate consistent with the jurisdiction's policy goals and associated regulatory perspective?
Step E	Consider an alternative discount rate. Given that the regulatory perspective may be different from the utility, customer, and societal perspective, the discount rate does not need to be tied to any one of these three perspectives.
Step F	Consider risk implications. Consider using a low-risk discount rate for EE cost-effectiveness, if the net risk benefits of EE resources are not somehow accounted for elsewhere in the cost-effectiveness analysis

Additional Foundational Information

Assessment Level	• Analysis at all levels can provide valuable insight/value • But regulators should focus only on program, sector, or portfolio level for making "yes or no" ("in or out") investment decisions • EE program costs should be included at the level at which they are truly variable
Analysis Period and End Effects	• Should be long enough to cover lifecycle costs and benefits • 2nd best alternative is to amortize/annualize costs • comparable portions of costs/benefits over shorter analysis period
Analysis of Early Replacement	• Should reflect that up-front cost is partially offset by value of deferring the next replacement (e.g. replacing now means not having to replace in 5 years) • May need to also account for shifting efficiency baseline and resulting different savings levels in different future years
Free-Riders and Spillover	• Treatment should be a function of categories of impacts included in energy policy test • Free-riders: participant rebates/incentives only a cost if test excludes participant impacts • Spillover: additional cost only if test includes participant impacts

Appendices

The Traditional Cost-Effectiveness Tests

Test	Perspective	Key Question Answered	Summary Approach
Utility Cost	The utility system	Will utility system costs be reduced?	Includes the costs and benefits experienced by the utility system
Total Resource Cost	The utility system plus participating customers	Will utility system costs plus program participants' costs be reduced?	Includes the costs and benefits experienced by the utility system, plus costs and benefits to program participants
Societal Cost	Society as a whole	Will total costs to society be reduced?	Includes the costs and benefits experienced by society as a whole
Participant Cost	Customers who participate in an efficiency program	Will program participants' costs be reduced?	Includes the costs and benefits experienced by the customers who participate in the program
Rate Impact Measure	Impact on rates paid by all customers	Will utility rates be reduced?	Includes the costs and benefits that will affect utility rates, including utility system costs and benefits plus lost revenues

Distributed Energy Resources Utility System Impacts

		Energy Efficiency	Demand Response	Distributed Generation	Distributed Storage
Costs					
Utility System	Measure costs (utility portion)	●	◑	○	○
	Other financial incentives	●	●	◑	◑
	Other program and administrative costs	●	◑	◑	◑
	Evaluation, measurement, and verification	●	●	●	●
	Performance incentives	◑	◑	◑	◑
	Interconnection costs	○	○	●	●
	Distribution system upgrades	○	○	●	●
Benefits					
Utility System	Avoided energy costs	●	◑	●	◑
	Avoided generation capacity costs	●	●	●	●
	Avoided reserves or other ancillary services	●	●	●	●
	Avoided T&D system investment	●	●	●	●
	Avoided T&D line losses	●	●	●	●
	Wholesale market price suppression	●	●	●	●
	Avoided RPS or EPS compliance costs	●	◑	●	◑
	Avoided environmental compliance costs	●	◑	●	◑
	Avoided credit and collection costs	◑	◑	◑	◑
	Reduced risk	●	●	◑	◑

Distributed Energy Resources: Non-Utility System Impacts

		Energy Efficiency	Demand Response	Distributed Generation	Distributed Storage
Costs					
Non-Utility	Measure costs (participant portion)	●	●	●	●
	Interconnection fees	○	○	◕	◕
	Annual O&M	○	○	●	●
	Participant increased resource consumption	◑	◑	◑	◑
	Non-financial (transaction) costs	◔	●	○	○
Benefits					
Non-Utility	Reduced low-income energy burden	◑	◑	◑	◑
	Public health benefits	●	◑	●	◑
	Energy security	●	◑	●	◑
	Jobs and economic development benefits	●	●	●	●
	Environmental benefits	●	◑	●	◑
	Participant health, comfort, and safety	◑	○	○	○
	Participant resource savings (fuel, water)	◑	○	○	○

Limitations of the Rate Impact Measure Test

- The RIM Test should not be used for cost-effectiveness analyses.
  - Does not provide any meaningful information about the magnitude of rate impacts, or customer equity.
  - Will not result in lowest costs to customers.
  - Is inconsistent with economic theory. The RIM test includes sunk costs, which should not be used for choosing new investments.
  - Can lead to perverse outcomes, where large benefits are rejected to avoid de minimus rate impacts.
  - Can be misleading. Results suggest that customers will be exposed to new costs, which is not true.
- Other approaches should be used to assess rate and equity issues.

Better Options for Assessing Rate Impacts

A thorough understanding of rate impacts requires a comprehensive analysis of three important factors:

- Rate impacts, to provide an indication of the extent to which rates for all customers might increase.
- Bill impacts, to provide an indication of the extent to which customer bills might be reduced for those customers that install distributed energy resources.
- Participation impacts, to provide an indication of the portion of customers that will experience bill reductions or bill increases.

  (Participating customers will generally experience bill reductions, while non-participants might see rate increases leading to bill increases.)

Taken together, these three factors indicate the extent to which customers will benefit from energy efficiency resources.

Participation impacts are also key to understanding the extent to which energy efficiency resources are being adopted over time.

The NSPM, and related materials from the NESP, are available at: nationalefficiencyscreening.org