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WEBINAR SERIES

National Standard Practice Manual

A New Lens for Cost-Effective Testing

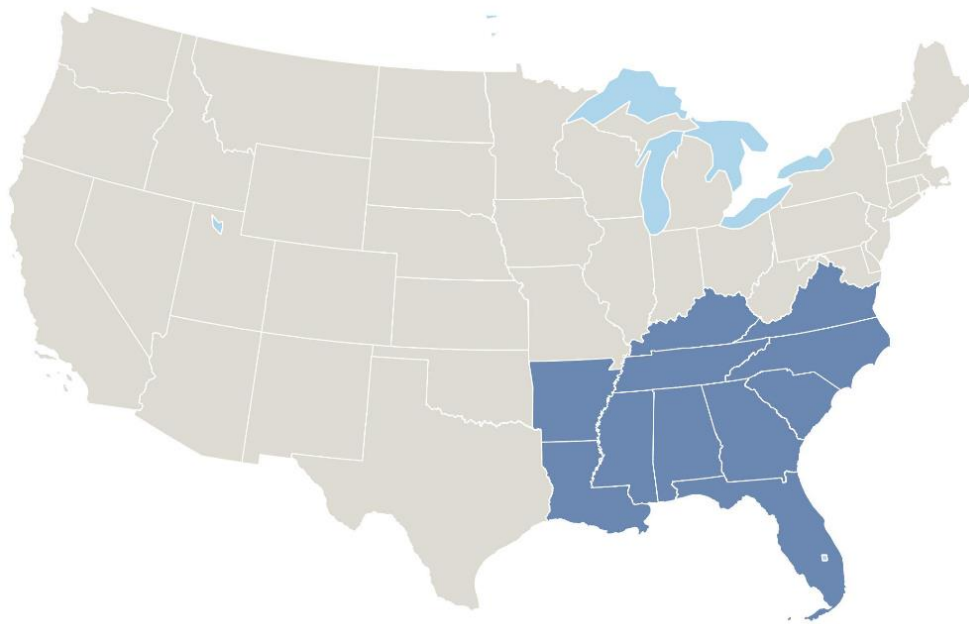
SEEA Serves the Southeast

Mission

The **Southeast Energy Efficiency Alliance (SEEA)** works to ensure people in the Southeast have the knowledge, resources, and opportunities to optimize energy use.

Vision

Energy efficiency is a primary driver of a prosperous, healthy and sustainable Southeast.



Work Areas:

Built Environment

State, Local & Utility Policy

Energy Equity

Innovative Finance



National Standard Practice Manual for Energy Efficiency Cost-Effectiveness

Chris Neme, Energy Futures Group

Southeast Energy Efficiency Alliance

November 16, 2017

Overview of the NSPM Process

NESP:

- Group working to improve cost-effectiveness analyses
- Over 75 organizations representing a range of perspectives.

NSPM Drafting Committee:

- Tim Woolf, Synapse Energy Economics
- Chris Neme, Energy Futures Group,
- Marty Kushler, ACEEE
- Steve Schiller, Schiller Consulting
- Tom Eckman (Consultant)
- Julie Michals, E4TheFuture

NSPM Review Committee:

- ~40 experts representing a variety of organizations from around the country
- Provided several rounds of review/feedback on draft manual

Project Coordination and Funding:

- Coordinated and funded by E4TheFuture
- Managed by Julie Michals, 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 an NSPM (1)

Test Selection

- Traditional tests (UCT, TRC, SCT) not meeting states' needs
 - No underlying principles
 - Don't directly address policy goals/needs
 - Lack of clarity on their conceptual constructs
 - Only 3 options, despite much greater variability in state needs
 - Many states modified the tests
 - A good thing if done well, but that has only sometimes been the case...
- Efficiency is significantly under-valued in many states
 - Including participant costs, but not participant benefits under TRC/SCT
 - Not accounting for impacts on all key energy policy objectives
- Lack of transparency on why/how tests were chosen/developed

Developing the right test is critical to ensuring utility investments are economic.

The Need for an NSPM (2)

Test Use

- Absence of standard guidance on proper application of tests
- Inputs to tests are often problematic
- Most of the common problems lead to under-valuing efficiency:
 - Not accounting for full range of utility system impacts
 - Not valuing hard-to-quantify impacts (utility, participant or societal)
 - Defaulting to WACC for discount rate
 - Use of average instead of marginal line loss rates
 - Improperly counting free rider “costs” under TRC/SCT
 - Etc.

Regardless of which test is used, big improvement could be made in many states by just more comprehensively and accurately developing inputs to the test.

Purpose and Scope of NSPM

Purpose

- Fundamental principles – both test selection & application
- Framework for primary test selection/development
- Guidance on key test inputs/application issues

Scope

- Focus on efficiency resources
 - Principles and framework apply to all other resources (incl. other DERs)
 - But only addresses details and nuances of efficiency
- Focus on utility rate-payer funded efficiency acquisition
- Focus on static cost-effectiveness analysis
 - Not dynamic IRP modelling...
 - Though principles and key elements should theoretically be applied to IRP too
- Addresses 1st order question: “which EE resources merit acquisition?”

NSPM Outline

Executive Summary

Introduction

Part 1: Developing Your Test

1. Principles
2. Resource Value Framework
3. Developing Resource Value Test
4. Relationship to Traditional Tests
5. Secondary Tests

Part 2: Developing Test Inputs

6. Efficiency Costs & Benefits
7. Methods to Account for Costs & Benefits

8. Participant Impacts

9. Discount Rates

10. Assessment Level

11. Analysis Period & End Effects

12. Analysis of Early Retirement

13. Free Rider & Spillover Effects

Appendices

A. Summary of Traditional Tests

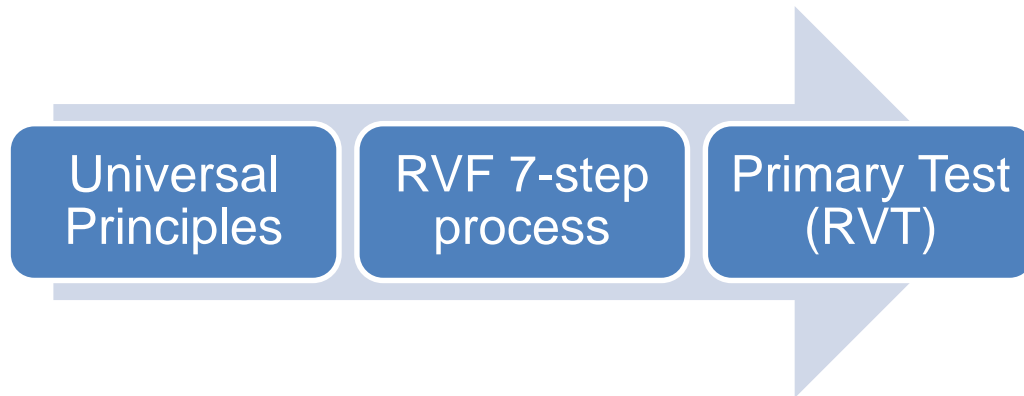
B. Cost-Effectiveness of Other DERs

C. Accounting for Rate & Bill Impacts

D. Glossary

Part I

Developing a Cost-Effectiveness Test Using the Resource Value Framework



NSPM Principles

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

7-Step Resource Value Framework

Step 1	Identify and articulate the jurisdiction's applicable policy goals.
Step 2	Include all utility system impacts in the test.
Step 3	Decide which additional <i>non-utility</i> system impacts to include in the test, based on applicable policy goals.
Step 4	Ensure the test is symmetrical in considering both costs and benefits.
Step 5	Ensure 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.

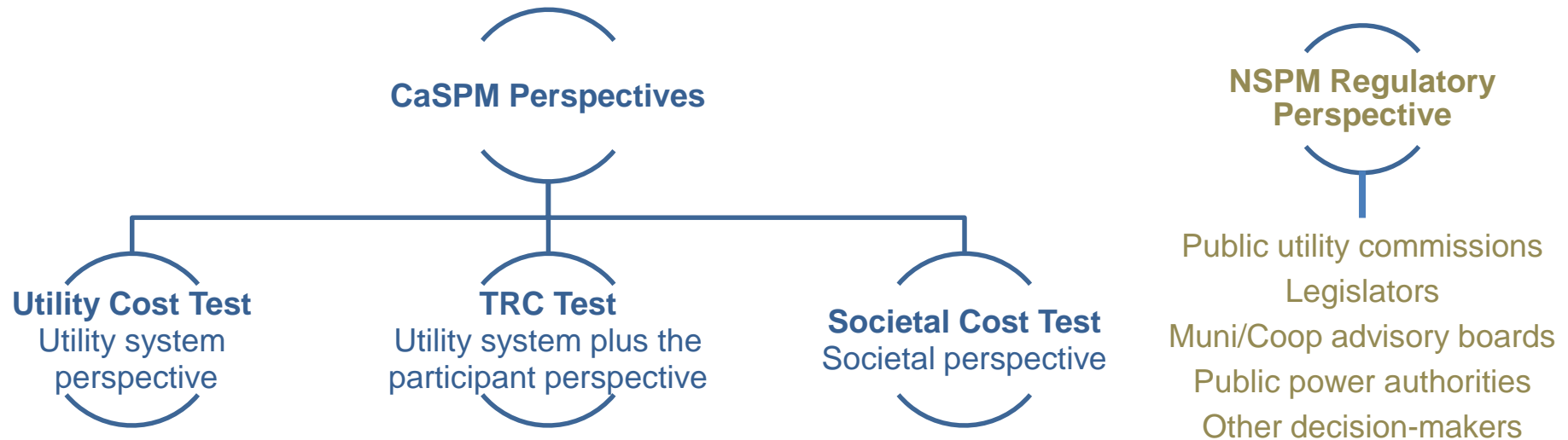
STEP 1

Identify and Articulate Applicable Policy Goals

Laws, Regs, 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.

Cost-Effectiveness Perspectives



- California Standard Practice Manual (CaSPM) – test perspectives are used to define the scope of impacts to include in the ‘traditional’ cost-effectiveness tests
- NPSM introduces the ‘regulatory’ perspective, which is guided by the jurisdiction’s energy and other applicable policy goals

STEP 2

Include All Utility System Impacts in the Test

- The foundation of every test
 - Central to principle of treating efficiency as a resource
 - Should be comprehensive
- “Utility system” = all that’s necessary to deliver electric or gas service
 - See discussion later for lists of costs, benefits

STEP 3

Decide Which Non-Utility System Impacts to Include

- Determine thru transparent process open to all stakeholders.
- Stakeholder input can be achieved through a variety of means:
 - rulemaking process,
 - generic jurisdiction-wide docket,
 - working groups or technical sessions,
- Address objectives based on current jurisdiction policies
 - be flexible to address new or modified policies adopted over time.
- May wish to incorporate input from other government agencies
 - department of environmental protection
 - department of health and human services

STEP 3

Illustrative 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.

STEP 3

Include Participant Impacts?

- A policy decision
- Should be based on jurisdiction's policy goals
- If participant costs included, participant benefits must be too

Category	Costs	Benefits
Utility System	\$XXX	\$XXX
Participant	\$XXX	\$XXX
Total	\$XXX	\$XXX

This number can't be ignored or assumed to be zero...

...if this number is included

Otherwise you get the
*"Total Resource Cost,
 Partial Resource
 Benefits Test"*

STEP 3

Participant Non-Resource Benefits



	Examples
Asset value	<ul style="list-style-type: none"> • Equipment functionality/performance improvement • Equipment life extension • Increased building value • Increased ease of selling building
Productivity	<ul style="list-style-type: none"> • Reduced labor costs • Improved labor productivity • Reduced waste streams • Reduced spoilage/defects • Impact of improved aesthetics, comfort, etc. on product sales
Economic well-being	<ul style="list-style-type: none"> • Fewer bill-related calls to utility • Fewer utility intrusions & related transactions costs (e.g., shut-offs, reconnects) • Reduced foreclosures • Fewer moves • Sense of greater “control” over economic situation • Other manifestations of improved economic stability
Comfort	<ul style="list-style-type: none"> • Thermal comfort • Noise reduction • Improved light quality
Health & safety	<ul style="list-style-type: none"> • Improved “well-being” due to reduced incidence of illness—chronic (e.g., asthma) or episodic (e.g., hypothermia or hyperthermia) • Reduced medical costs (emergency room visits, drug prescriptions) • Fewer sick days (work and school) • Reduced deaths • Reduced insurance costs (e.g., for reduced fire, other risks)
Satisfaction/pride	<ul style="list-style-type: none"> • Improved sense of self-sufficiency • Contribution to addressing environmental/other societal concerns

STEP 4

Ensure Symmetry Across Benefits and Costs

- Ensure that the RVT includes costs and benefits symmetrically
 - If category of cost is included, corresponding benefits should be too
 - e.g., if participant costs included, participant benefits should also be included
- Necessary to avoid bias:
 - If some costs excluded, the framework will be biased in favor of EE;
 - if some benefits excluded, the framework will be biased against EE.
 - Bias in either direction results hurts ratepayers
 - misallocation of resources
 - higher than necessary costs to meet energy needs

STEP 5

Analysis Is Forward-looking, Incremental, and Long Term

- What matters is difference in costs/benefits relative to baseline
 - What would have occurred absent EE investment w/o EE
 - Sunk costs and benefits are not relevant to a cost-effectiveness analysis
- Analysis also needs to capture full lifecycle costs

STEP 5

RIM Test Is Not a Cost-Effectiveness Test

- It is not solely forward-looking or incremental
 - It includes already-incurred or “sunk” costs
 - Inconsistent with the way supply-side resources are assessed
- Really more of a test of equity...
 - between EE participants and non-participants
- Also has significant limitations as a test of equity
 - Measures only magnitude of impact on non-participants
 - Ignores both (1) magnitude of impact on participants and (2) portion of customers likely to be participants over time
 - Can lead to perverse outcomes where large benefits that will be spread across most customers are rejected because of very small rate impacts for a minority of customers

STEP 6

Identify Methodologies & Inputs for Considering All Impacts Included in RVT

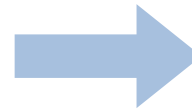
Approach	Application
Jurisdiction-specific studies	Best approach for estimating and monetizing relevant impacts.
Studies from other jurisdictions	Often reasonable to extrapolate from other jurisdiction studies when local studies not available.
Proxies	If no relevant studies of monetized impacts, proxies can be used
Alternative thresholds	Benefit-cost thresholds different from 1.0 can be used to account for relevant impacts that are not monetized.
Other considerations	Relevant quantitative and qualitative information can be used to consider impacts that cannot or should not be monetized.

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		Participant Benefits	
Low-Income Customer Costs	These impacts would be included to the extent that they are part of the Resource Value (primary) test.	Low-Income Customer Benefits	These impacts would be included to the extent that they are part of the Resource Value (primary) test.
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]		



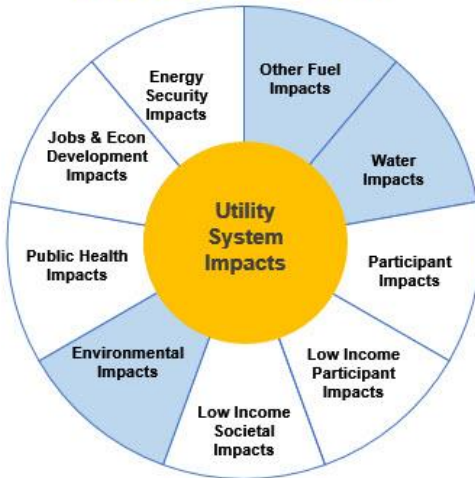
Date:	
B. Monetized Utility System Benefits	
Avoided Energy Costs	
Avoided Generating Capacity Costs	
Avoided T&D Capacity Costs	
Avoided T&D Line Losses	
Energy Price Suppression Effects	
Avoided Costs of Complying with RPS	
Avoided Environmental Compliance Costs	
Avoided Bad Debt, Arrearages, etc.	
Reduced Risk	
Total Utility System Benefits	



Economic Development and Job Benefits	
Energy Security Benefits	
Sub-Total Non-Utility Benefits	
Total Benefits (PV\$)	
Net Benefits (PV\$)	
Quantitative information, and discussion of how considered	
Qualitative considerations, and discussion of how considered	
Quantitative information, qualitative considerations, and how considered	
Do Efficiency Resource Benefits Exceed Costs? [Yes / No]	

Relationship to Traditional Tests - Examples

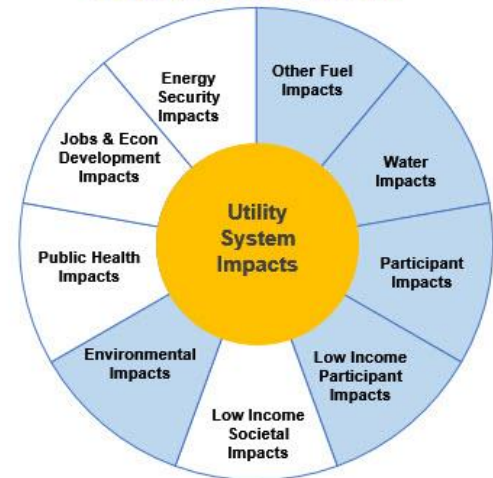
JURISDICTION 1: RVT



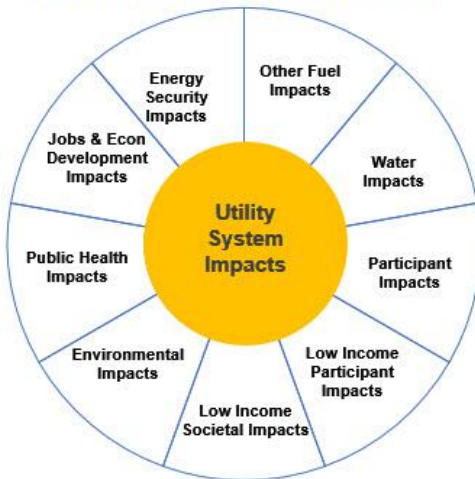
JURISDICTION 2: RVT



JURISDICTION 3: RVT



JURISDICTION 4: RVT = UCT



JURISDICTION 5: RVT = TRC



JURISDICTION 6: RVT = SCT



Part II

Developing Inputs for Cost-Effectiveness Tests

Capture All Utility System Impacts

Utility System Costs	Utility System Benefits
• EE Measure Costs (utility portion – e.g. rebates)	• Avoided Energy Costs
• EE Program Technical Support	• Avoided Generating Capacity Costs
• EE Program Marketing/Outreach	• Avoided T&D Upgrade Costs
• EE Program Administration	• Avoided T&D Line Losses
• EE Program EM&V	• Avoided Ancillary Services
• Utility Shareholder Performance Incentives	• Wholesale Price Suppression Effects
	• Avoided Costs of RPS Compliance
	• Avoided Costs of Environmental Compliance
	• Avoided Credit and Collection Costs
	• Reduced Risk
	• Increased Reliability

- *This table is presented for illustrative purposes, and is not meant to be an exhaustive list.*
- *Some categories of benefits are potentially overlapping; care must be taken to ensure no double-counting of benefits.*

Non-Utility System Impacts to Consider Including

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.

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.

Additional Foundational Information

Assessment Level	<ul style="list-style-type: none">• 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 & End Effects	<ul style="list-style-type: none">• 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	<ul style="list-style-type: none">• 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 & Spillover	<ul style="list-style-type: none">• 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

2017 NSPM Webinars/Presentations

NEEA Conference	May 9-10	Portland OR
Better Buildings Summit	May 15-17	DC
NASEO Northeast Meeting	May 22-23	Woodstock VT
CEE Summer Meeting	May 31 - June 1	Boston MA
NEEP EM&V Workshop	June 15	Hartford CT
MEEA Cost-effectiveness Workshop	June 15	Rosemont IL
LBNL EM&V webinar series	June 29	Webinar
NASEO Midwest Meeting	June 20	Chicago IL
MACRUC Meeting (joint with NASEO)	June 26-27	Hershey PA
AESP Brown Bag webinar	July 13	Webinar
NARUC Summer Policy Summit	July 16-19	San Diego CA
IEPEC Cost-Effectiveness Workshop	Aug 8-10	Baltimore MD
NASEO Annual Meeting	Sept 17-20	New Orleans LA
Institute of Public Utilities (MSU) Training	Oct 2	E. Lansing MI
NARUC ERE Subcommittee	Oct 16	Webinar
ACEEE EE as a Resource	Nov 1	Litchfield Park AZ
SEEA Webinar	Nov 16	Webinar
NARUC Annual Meeting OUTREACH	Nov 12-15	Baltimore MD
US DOE HPwES Webinar	Dec 5	Webinar
NARUC Winter Meeting - ERE subcomm	February 2018	Washington DC

← upcoming

NSPM Next Steps

- Continued outreach
 - More conferences and trainings in 2018
 - Website/social media
 - Regulatory comments (federal and state proceedings)
 - State-specific outreach
- Case Studies
 - Rhode Island: in final stages
 - Washington: underway, expected write-up early 2018
 - Others in discussion
- Project work
 - ACEEE policy database, maybe state energy efficiency scorecard
 - Health NEBs calculation tools/guidance for states
 - Jobs NEBs quantification guidance for states
 - Others being considered

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

Extra Slides for Reference

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

Relationship to Traditional Tests - Examples

Impacts	Jurisdiction					
	1	2	3	4	5	6
	RVTs Differ from Any Traditional Test			RVT = UCT	RVT = TRC	RVT = SCT
Utility System	✓	✓	✓	✓	✓	✓
Other Fuels	✓	✓	✓		✓	✓
Water	✓		✓		✓	✓
Participants			✓		✓	✓
Low-Income Participants		✓	✓		✓	✓
Low-Income Societal		✓				✓
Environmental	✓		✓			✓
Public Health		✓				✓
Economic Development		✓				✓
Energy Security		✓				✓

- Each cost-effectiveness test should include the utility system impacts.
- The other impacts included 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.

Steps for Choosing a Discount Rate

Step A	<u>Articulate the jurisdiction's applicable policy goals.</u> These should be the same goals used in developing the RVT.
Step B	<u>Consider the relevance of a utility's weighted average cost of capital.</u> Is the utility investor time preference consistent with the jurisdiction's policy goals?
Step C	<u>Consider the relevance of the average customer discount rate.</u> 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	<u>Consider the relevance of a societal discount rate.</u> 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	<u>Consider an alternative discount rate.</u> 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	<u>Consider risk implications.</u> 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

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

Conceptual Constructs of Traditional Cost-Effectiveness Tests

	UCT	TRC	SCT
Benefits			
Primary Fuel Avoided Supply Costs	✓	✓	✓
Secondary Fuel Avoided Supply Costs		✓	✓
Water Savings		✓	✓
Participant Non-Energy Benefits		✓	✓
Low Income Societal Benefits			✓
Environmental Benefits			✓
Public Health Benefits			✓
Jobs/Economic Development Benefits			✓
Other Societal Benefits			✓
Costs			
Efficiency Measure Rebates	✓	✓	✓
Participant Contributions to Efficiency Measure Costs		✓	✓
Other Program Costs (admin, marketing, training, etc.)	✓	✓	✓
Utility Shareholder Incentives	✓	✓	✓
Other Societal Costs			✓

Conceptually should be included in both TRC and SCT, but often are not.

Conceptually, all of these should be included in the SCT, but often only environmental benefits are

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)	●	○	○	○



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