Cost Effectiveness in the Next Generation of Energy Efficiency

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Getting the Right Value…

Improving Cost-Effectiveness Testing

NEEP EM&V Forum Spring Meeting

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What is Cost-Effectiveness Testing?

A set of tests designed to determine if the benefits of an energy efficiency program outweigh the costs

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Current Cost Effectiveness Testing

- The California Standard Practice Manual (CA SPM) has been the prevailing source of guidance on cost-effectiveness for many years (since 1983).
- The CA SPM does not serve current needs well:
  - No guidance on how to select a primary test or the limitations of the tests;
  - No guidance on how to account for policy goals.
- In recent years, many stakeholders have been turning to the CA SPM to help define cost-effectiveness for other types of DERs: demand response, distributed generation, etc.

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National Efficiency Screening Project

- **NESP:** 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 Review Committee:** Includes roughly 40 experts representing a variety of organizations from around the country.
- **Drafting Committee:** Includes Tim Woolf, Chris Neme, Marty Kushler, Steve Schiller, and Tom Eckman.
- **National Standard Practice Manual**: new cost-effectiveness manual forthcoming May 2017

More information. http://www.nationalefficiencyscreening.org/

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What Does a Better System Look Like?

The Resource Value Framework (RVF)

- A new approach to cost-effectiveness screening
- A framework – not a single test that replaces the widely-used California screening tests
- Provides a method to ***"test your test"***

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Key Elements of the RVF

Step 1	Identify and articulate the **jurisdiction's policy goals** that are relevant to decisions on whether to invest in energy efficiency resources.
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 policy goals.
Step 4	Develop methodologies and inputs to account for all impacts, including **hard-to-monetize impacts**.
Step 5	Ensure that the test is **symmetrical** in considering both costs and benefits.
Step 6	Ensure that the analysis is **forward-looking, incremental, and long-term.**
Step 7	Ensure **transparency** in presenting the analysis and the results.

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National Standard Practice Manual (NSPM)

- The purpose of the ***National Standard Practice Manual*** (NSPM) is to be a handbook for regulators, utilities, efficiency program administrators, efficiency planners, consumer advocates, and other efficiency stakeholders to replace the CA SPM
- The NSPM advances the principles, concepts, and methodologies of the RVF for sound, unbiased assessment of energy efficiency resources
- The NSPM introduces a framework for each state to develop a test that reflects its energy policy goals
- It introduces a new test: The Resource Value Test

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Key Concepts Underlying the NSPM

Regulators, planners, and other efficiency stakeholders should develop a **primary** cost-effectiveness test

Applicable policy goals and needs should be accounted for in designing the primary cost-effectiveness test.

- the primary test reflects mix of various perspectives affected by the jurisdiction's **relevant policies**

NSPM introduces concept of **'regulatory' perspective**

- 'regulator/agent' refers to all types of **entities that oversee EE investments:** PUCs, legislatures, municipal and coop advisory boards, public power authorities, etc.

- includes consideration of **full scope of issues** for which regulators/agents are responsible: 1) overall objective of requiring utilities to provide safe, reliable, low-cost services to customers; and 2) meeting applicable jurisdiction policy goals

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Key Concepts Underlying the NSPM

Regulators/agents **don't need to be limited to traditional tests**: UTC, TRC or SCT

NSPM introduces **the Resource Value Framework (RVF):** 7-step process that embodies key principles and concepts

NSPM provides guidance for how to develop a jurisdiction's primary **Resource Value Test (RVT)** using the RVF

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Thank You!

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National Standard Practice Manual for Cost-Effectiveness Analyses

Supplementary Slides

Why a National Standard Practice Manual?

- California Standard Practice Manual (CaSPM) → prevailing guidance on cost-effectiveness for energy efficiency since 1983 – currently updating
- CaSPM limitations:
  - No framework with principles to guide developing primary CE test
  - No guidance on accounting for policy goals
  - Jurisdictions are limited to set of pre-defined tests e.g., Utility Cost Test (UCT), Total Resource Cost (TRC), Societal Cost test (SCT) – that may not reflect the mix of perspectives reflected in relevant policies
  - No guidance on developing critical inputs to CE tests

Why a National Standard Practice Manual? (2)

- Challenges in applying the CaSPM tests
  - Some critical utility system impacts often ignored, e.g., avoided T&D, losses, risk, environmental compliance costs
  - Participant impacts often ignored - 65% of states include participant costs, where 69% don't account for participant benefits (ACEEE)
  - Relevant policy goals and associated impacts not addressed
  - Inputs and results not consistent or transparent
- With increased focus on integrated distributed energy resources (DERs), new CE framework needed
- The time is ripe for a new manual that:
  - Builds on the CaSPM and lessons learned over years
  - Can be applied to all types of DERs

Purpose and Scope of the NSPM

- **Purpose:** Provide principles, concepts, and methodologies for sound, comprehensive, balanced assessment of DERs, with detailed guidance on energy efficiency (EE)
- **Scope:** EE resources whose acquisition is funded by, and implemented on behalf of, electricity and gas utility customers
- **Distributed Energy Resources:** Principles and framework in NSPM can be applied to all types of DERs, but with important caveats - the applicability and magnitude of some impacts vary by type of DER

Relationship to the Traditional Tests

- Use of the NSPM Resource Value Framework *could* result in a jurisdiction adopting one of the traditional tests as its primary test:
  - UTC, TRC, or SCT tests… if the jurisdiction's goals are aligned with these tests
- For many jurisdictions the RVF will likely produce a different test
  - RVF provides regulators the ability to design a test that best reflects their unique applicable policy goals

NSPM – Preview of Topics Covered (DRAFT)

Part/Chapter	Topic
Part I	Developing CE Tests Using the Resource Value Framework
Chapter 1	Principles
Chapter 2	The Resource Value Framework (RVF)
Chapter 3	Developing the Resource Value Test (RVT)
Chapter 4	RVT Examples (and Relationship with Traditional Tests)
Chapter 5	Use of Multiple Tests
Part II	Developing Inputs for CE Tests
Chapter 6	Energy Efficiency Impacts
Chapter 7	Methods to Account for Relevant Impacts
Chapter 8	Participant Impacts
Chapter 9	Discount Rates
Chapter 10	Assessment Level
Chapter 11	Analysis Period
Chapter 12	Early Replacement
Chapter 13	Free-Riders / Spillover
Appendices	
Appendix A	Cost Effectiveness of Other DERs
Appendix B	Traditional CE Tests
Appendix C	Rate and Bill Impacts
Appendix D	Glossary of Terms

Cost-Effectiveness for EE and DERs

Northeast Energy Efficiency Partnerships

EM&V Forum Spring Public Meeting

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Tim Woolf

Synapse Energy Economics

Lead technical consultant for the NSPM

CA SPM Often Applied to DERs

- Demand response
- Distributed PV
- Some of the limitations/challenges of the CA SPM are perpetuated or exacerbated in these analyses
  - Frequent use of the RIM test for distributed PV.
  - Analyses confined to the traditional tests:
    - Utility Cost test
    - Total Resource Cost test
    - Societal Cost test
  - Inconsistent recognition of policy goals.
- Many states are seeking consistency

Key Elements of the NSPM Applied to DERs

- Principles
  - The NSPM principles apply to all resources: energy efficiency, other DERs, supply-side.
- The Resource Value Framework
  - Can be used develop a resource value test for DERs.
- The Resource Value Test
  - The primary test used to determine DER cost-effectiveness
  - Secondary DER tests can be applied as warranted
  - States could use different tests for different DERs – or one test
- Several key differences…

Different Costs and Benefits for Different DERs

		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	●	●	◑	◑

Different Cost-Shifting Implications

Energy Efficiency

- Do not use the Rate Impact Measure test
- Conduct a rate, bill, participant analysis instead
- Expand EE services to ensure that the vast majority of customers participate in the programs.

Distributed PV

- Do not use the Rate Impact Measure test
- Conduct a rate, bill, participant analysis instead
- Modify distributed PV policies as warranted
- Coordinate with other DERs

The Future of Rhode Island Cost-Effectiveness Practice

NEEP EM&V Forum Spring Public Meeting

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Danny Musher, RI Office of Energy Resources

RI has used a robust cost-effectiveness standard to date

	Utility Test	TRC Test	Societal Cost Test
Energy Efficiency Program Benefits:			
Avoided Energy Costs	Yes	Yes	Yes
Avoided Capacity Costs	Yes	Yes	Yes
Avoided Transmission and Distribution Costs	Yes	Yes	Yes
Wholesale Market Price Suppression Effects	Yes	Yes	Yes
Avoided Cost of Environmental Compliance	Yes	Yes	Yes
Utility Non-Energy Benefits	Yes	Yes	Yes
Participant Non-Energy Benefits	---	Yes	Yes
Societal Benefits (e.g., environment, jobs)	---	---	Yes
Energy Efficiency Program Costs:			
Program Administrator Costs	Yes	Yes	Yes
EE Measure Cost: Program Financial Incentive	Yes	Yes	Yes
EE Measure Cost: Participant Contribution	---	Yes	Yes
Societal Costs	---	---	Yes

For Most EE **For CHP**

- Participant non-energy benefits include:
  - Improved comfort
  - Improved sense of environ-mental responsibility
  - Reduced noise
  - Lighting quality
  - Improved health and safety
  - Property value increase
  - … and more

RI will account for diverse energy policy goals in future cost-effectiveness screening

- New **"Rhode Island Test"** builds on Total Resource Cost test to ***"more fully reflect the policy objectives of the state with regard to energy, its costs, benefits, and environmental and societal impacts"***

Summary Table	Reliability / Resiliency	Economic develop-ment / Growth	Job creation	Price stability / Cost reduction	Environ-mental quality	Air quality / Health risks	GHG reductions	Fuel diversity
Rhode Island Utility Restructuring Act (1996)								
Renewable Energy Standard (2004)								
Least-Cost Procurement (2006)								
Net Metering (2011)								
Renewable Energy Growth Program (2014)								
Affordable Clean Energy Security Act (2014)								
Resilient Rhode Island Act (2014)								
Energy 2035: Rhode Island State Energy Plan (2015)								

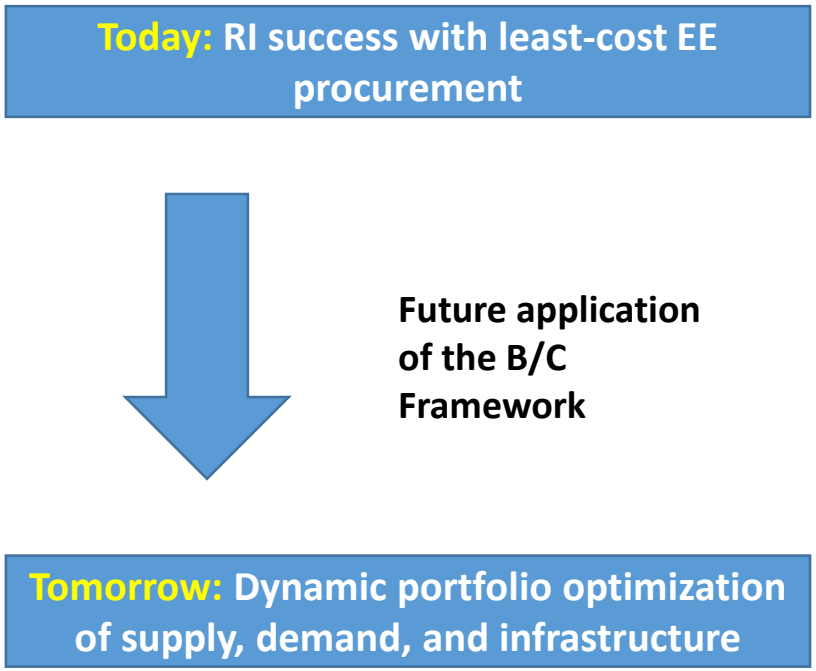
RIPUC Docket 4600 created a Benefit/Cost Framework that builds further on the RI Test

- The Framework is intended to capture all benefits and costs of interest in Rhode Island energy policy

Level	Example Cost / Benefit Category	System Attribute / Cost Driver	How to Measure / Monetize?	Visibility Requirements?
Power System	Distribution Costs	Locational Constraints, Losses, Marginal Prices…	Dynamic, Multi-Layered Forecasts	Interval or AMI Meters, Modeling, Planning
Customer	Low-Income Participant Benefits	Improved Health, Comfort, Property Value…	Current Values in EE Program	Interval or AMI Meters?
Societal	Economic Development	Impacts on GSP, Employment…	Economic Modeling	Detailed Economic Modeling

Illustrative

The B/C Framework will allow "apples-to-apples" comparison of diverse resources



- Energy Efficiency
- Demand Response
- Distributed Generation
- All DER
- Alternative Rate Designs
- Distribution Infrastructure
- Advanced Metering
- Dynamic Portfolio Optimization

DER BENEFIT-COST ANALYSIS
New York Handbook

Northeast Energy Efficiency Partnerships, Inc. (NEEP)
EM&V Forum Spring Public Meeting | Washington, D.C.

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Background – NY Benefit-Cost Analysis (BCA) Handbook

- BCA Handbook provides techniques for quantifying the benefits and costs identified in the *BCA Order [Benefit Cost Analysis (BCA) Handbook Version 1.1]*[1]
- Responding to: NY PSC Case 14-M-0101 – Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision, Order Establishing the Benefit-Cost Analysis *[January 21, 2016 — Order Establishing the BCA Framework]*
- Foundational Principles from PSC Order:
  1) Based on transparent assumptions and methodologies; list all benefits and costs including those that are localized and more granular;
  2) Avoid combining or conflating different benefits and costs;
  3) Assess portfolios rather than individual measures or investments (allowing for consideration of potential synergies and economies among measures);
  4) Address the full lifetime of the investment while reflecting sensitivities on key assumptions; and,
  5) Compare benefits and costs to traditional alternatives instead of valuing them in isolation.
- PSC – This is an initial step in forming a robust and long-lasting BCA Framework; and, the development of the BCA Framework, however, is best understood in the broader context of the overall REV effort.

[1] *Navigant Consulting, Inc. (Navigant) facilitated the development of a standard BCA template at the request of the NY Joint Utilities.*

NY PSC Order

- The PSC *BCA Order* requires that benefit-cost analysis be applied to the following four categories of utility expenditure:
  1) Investments in distributed system platform (DSP) capabilities
  2) Procurement of distributed energy resources (DER)
  3) Procurement of DER through tariffs
  4) Energy efficiency programs
- The BCA Order specified 16 categories of benefits and 7 categories of costs -- while reasonably prescriptive, many practical issues still need to be resolved.
- Practical DER Complexities:
  - Portfolios of projects: Each defined investment option or set of investments will provide one or more functions with each producing benefits and costs.
  - Investments may be made in technologies that enable or facilitate the realization of benefits from additional measures or technologies.
  - Determination of impacts and benefits may depend on how and/or in what order the elements are implemented.

BCA Handbook Challenges: First-cut assessment for DER investments

- BASELINE: One of the most significant challenges is establishing baseline data that illustrates the performance of the system without the DER investment.
- ANALYSIS TIME HORIZON: The duration over which the impact and benefits of new grid and DER investments accrue varies significantly.
- UNCERTAINTY AND SENSITIVITY: PSC states that the BCA Handbook shall include sensitivity analysis that will be applied to key assumptions.
- GRANULARITY: Develop approaches that leverages appropriate location or temporal information
- EXAMPLE: How to value grid resiliency types of benefits:
  - What can be measured and what data do we have now?
  - Do we need better information?
  - If yes, how do we get better information?
  - How much to spend to get better information?
  - Do you use formal value-of-information (VOI) analyses?
  - How important is the sequencing of DER investments and how is this time-dimension synergy addressed?

CONTACTS – DER Cost-Effectiveness Analyses

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