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Assessing the Cost-Effectiveness of Energy Efficiency Portfolios

June 29, 2017

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National Association of State Energy Officials

Introduction

- LBNL is supported by the U.S. Department of Energy to conduct non-classified research, operated by the University of California

- Provides technical assistance to states—primarily state energy offices and utility regulatory commissions

The presentation was funded by the U.S. Department of Energy's Office of Electricity Delivery and Energy Reliability-National Electricity Delivery Division under Lawrence Berkeley National Laboratory Contract No. DE-AC02-05CH11231.

Technical Assistance

- LBNL's provides technical assistance to state utility regulatory commissions, state energy offices, tribes and regional entities in these areas:
  - Energy efficiency (e.g., EM&V, utility programs, behavior-based approaches, cost-effectiveness, program rules, planning, cost recovery, financing)
  - Renewable energy resources
  - Smart grid and grid modernization
  - Utility regulation and business models (e.g., financial impacts)
  - Transmission and reliability
  - Resource planning
  - Fossil fuel generation
- Assistance is independent and unbiased
- LBNL Tech Assistance website: https://emp.lbl.gov/projects/technical-assistance-states
- US DOE Tech Assistance gateway: http://energy.gov/ta/state-local-and-tribal-technical-assistance-gateway

Webinar Series

- Webinars designed to support EM&V activities for documenting energy savings and other impacts of energy efficiency programs
- Funded by U.S. DOE in coordination with EPA, NARUC and NASEO
- Audience:
  - Utility commissions, state energy offices, state environment departments, and non-profits involved in operating EE portfolios
  - Particular value for state officials starting or expanding their EM&V
  - Evaluation consultants, utilities, consumer organizations and other stakeholders also are welcome to participate
- For more information (upcoming and recorded webinars, EM&V resources) see:
  - https://emp.lbl.gov/emv-webinar-series
  - General Contact: EMVwebinars@lbl.gov

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Next Webinar

- More webinars coming for 2017 and beyond…

Possible Next Webinar:

Guidance on Establishing and Maintaining Technical Reference Manuals for Energy Efficiency Measures

– information from a new SEE Action Guide -
https://www4.eere.energy.gov/seeaction/publication/see-action-guide-states-guidance-establishing-and-maintaining-technical-reference

Todays Webinar – Assessing Cost Effectiveness

- Cost-effectiveness evaluations = comparing benefits and costs for assessing efficiency measures, projects and programs and portfolios
  - Judging whether to expand, retain, revise, or eliminate efficiency programs or specific measures
  - Providing feedback on whether efficiency is an effective investment, compared with other resource options.
- How assessed:
  - Integrated resource planning processes
  - Standard tests using assumptions about avoided cost values
- Covering today:
  - Standard tests –California Standard Practice Manual and National Standard Practice Manual (NSPM)
  - The basics and some key issues
  - Two states' experience with using the standardized tests

Today's Speakers

- **Overview of cost effectiveness assessments and new National Standard Practice Manual**
  - Snuller Price, Senior Partner, Energy and Environmental Economics
  - Tom Eckman, Consultant and Former Power Division Director, Northwest Power and Conservation Council
- **State experience with cost effectiveness assessments**
  - Deborah Reynolds, Assistant Director, Conservation and Energy Planning, Washington Utilities and Transportation Commission
  - Jamie Barber, Energy Efficiency and Renewable Energy Manager, Georgia Public Service Commission

Energy+Environmental Economics

Overview: Energy Efficiency Cost-effectiveness Methods

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June 2017

Topics

- **Cost-effectiveness basics and perspectives**
  - Origins of Cost-effectiveness
  - Definitions in the Standard Practice Manual
  - Primary and secondary tests
- **Key concerns and commonly asked questions**
  - What is the right test?
  - Important inputs and methodology issues (screening level, discount rate, etc...)
  - Cross-subsidies, impacts on non-participants, Opt-outs
  - Equity

Cost-effectiveness basics, current practice and perspectives

Why analyze cost effectiveness?

Origins are in integrated- resource planning: efficiency is compared against supply-side options

+ **Traditional analysis yields a preferred supply plan**
+ **Integrated supply and demand planning ("IRP") can also yield a preferred supply plan**
+ **No 'benefits' calculation is needed in this framework, just complete characterization of all costs required to meet the planning objectives**

Once you have a plan – how do develop a portfolio with a mix of programs to maximize cost effectiveness ?

Answer: Conduct CE analyses

Plus:

+ **These tests tend to be required by EE policy rules**
+ **Compared to the macro level IRP:**
  - Less complex
  - Relatively transparent
  - Unbundle the efficiency resource for comparison of EE options

Cost-effectiveness Framework

Testing whether an alternative plan is lower cost is the basic building block of CE analysis

Step 1 Evaluate the costs of the EE program

Step 2 Evaluate the change in costs of your preferred supply plan. These are the ("avoided costs") of efficiency.

Step 3 Compute the difference (or ratio)

More formally, net present value difference of benefits and costs…

Net Benefits (difference)	Net Benefits$_a$ (dollars)	= NPV $\sum$ benefits$_a$ (dollars) -NPV $\sum$ costs $_a$ (dollars)
Benefit-Cost Ratio	Benefit-Cost Ratio$_a$	$= \frac{\text{NPV} \sum \text{benefits}_a \text{ (dollars)}}{\text{NPV} \sum \text{costs}_a \text{ (dollars)}}$

Cost-effectiveness Process

- **Step 1: Overall cost-effectiveness. Is EE lower cost overall for everybody?**
  - Measured by the Total Resource Cost test (TRC)
- **Step 2: If the program is cost-effective, are there winners and losers?**
  - Measured by the distribution tests (RIM, PCT, PAC)
  - PCT – Will the customer save money?
  - PAC – Will the utility revenue requirement decrease?
  - RIM – Will utility rates have to increase as a result?

Definition of cost tests

Cost Test		Key Question	Summary Approach
Participant Cost Test	PCT	Will the participants benefit over the measure life?	Compare costs and benefits of consumer installing the measure; important for incentive design
Utility/ Program Administrator Cost Test	UCT/ PAC	Will utility bills decrease?	Comparison of program administrator costs to supply side resource costs; values EE on a similar basis as IRP
Ratepayer Impact Measure	RIM	Will utility rates decrease?	Comparison of administrator costs and utility bill reductions to supply side resource costs; Only looks at impacts to non-participants
Total Resource Cost	TRC	Will the total costs of energy in the utility service territory decrease?	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?	Comparison of society's costs of energy efficiency to resource savings and non-cash costs and benefits

Summary of costs and benefits components

- 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
Other energy resource savings	-	-	-	Benefit	Benefit
Societal non-energy benefits (non-ratepayer benefit)	-	-	-	-	Benefit
Incremental equipment & install costs paid for by customer	Cost	-	-	Cost	Cost
Program administration overhead costs	-	Cost	Cost	Cost	Cost
Incentive payments paid by utility/program admin.	Benefit	Cost	Cost	-	-
Bill Savings	Benefit	-	Cost	-	-

Primary and Secondary Tests

- **TRC test is the primary test used by most commissions**
- **RIM, PCT, UCT/PAC typically secondary tests**
  - If the TRC is positive, what can we say about the distribution of costs and benefits?
  - PCT (cost-effectiveness for participants)
  - UCT / PAC (cost-effectiveness from a utility perspective)
  - RIM (economics for non-participants)
- **Some states use SCT in place of/ in addition to TRC**
  - Value water savings, air quality benefits, GHG reductions etc.

Non-participant Impacts (RIM)

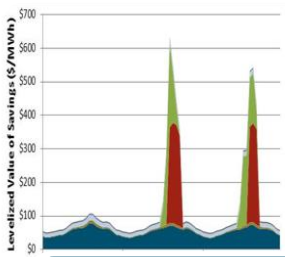
- **Impacts on non-participants are a concern, should we use the RIM test and only approve EE that passes?**
  - Essentially eliminates conventional EE programs
  - Only focuses on costs to non-participants regardless of how large the benefits are to other customers or the state overall
- **Pay attention to the magnitude of cost-shifting**
- **There are other ways to mitigate non-participant impacts through program design**
  - Increase access to programs
  - Increase equity by providing programs for all customers
  - Don’t pay larger incentives than necessary
  - Get the most value from efficiency by coordinating with supply planning

Which Cost Test to Use?

- **Conventional Process for Many States**
  - Use TRC as the primary test for overall portfolio cost-effectiveness. Indicates that the direct financial savings from programs outweigh the program costs.
  - Use secondary tests to support program design
    - Eg. Participant and utility cost test to balance incentive levels
  - Most states ignore ratepayer impact measure (RIM) as too restrictive and address non-participants in other ways by making sure there are broadly accessible programs and the overall impact on non-participants is small
- **High GHG Policy States**
  - Planning and procurement process is adding significant resources and cost to reduce GHG emissions (CA, OR, WA, NY, MA, others)
  - Northwest has, and California is considering integrated resource planning (IRP) to capture value of energy efficiency in the portfolio for GHGs
  - Complete overhaul of EE cost-effectiveness is not required, TRC can still work. However, avoided costs should be adjusted to capture displaced renewable generation and other GHG measures that can be avoided.

DOE Better Building Cost-effectiveness Spreadsheet Tool

- **Established cost-effectiveness methodology**
- **Transparent analysis of costs and benefits with a flexible input format for avoided cost data**
- **Download with documentation at DOE Better Buildings Residential Program website**



Avoided Cost

Nominal Dollars

Adjusted Avoided Cost Values	2012
Monthly Generation Capacity Allocation	
Monthly T&D Capacity Allocation	
Adjusted Generation Capacity Value ($/kW-Yr)	$167.56
Adjusted T&D Capacity Value ($/kW-Yr.)	$77.59
Adjusted On-Peak Avoided Energy Cost ($/MWh)	$82.99
Adjusted GHG Value ($/MWh)	$9.21
Impacts	

Program Impacts

	BIP
Benefit/Cost Ratio	
TRC	3.15
PAC	2.40
RIM	2.39
PCT	1.33
Load Impacts (MW)	222

Cost-effectiveness Results

Link: https://energy.gov/eere/better-buildings-residential-network/downloads/better-buildings-residential-program-energy

Key Drivers and Inputs

Key Drivers of Cost-effectiveness Results

+ **Benefits**
  - Avoided costs (ratepayer & utility benefits)
    - Energy and capacity value, time-specific estimates
+ **Costs**
  - Equipment incremental equipment and installation costs (impacts TRC, participant)
  - Incentives (cost to ratepayers & utility)
  - Program administrative costs (cost in all tests but for participant test)
+ **Methodology issues**
  - Test application level: portfolio, program, or measure level
  - Time frame of analysis
  - Effective useful life of measures/programs
  - Discount rates
  - Use of gross versus net savings
  - Net to gross ratio

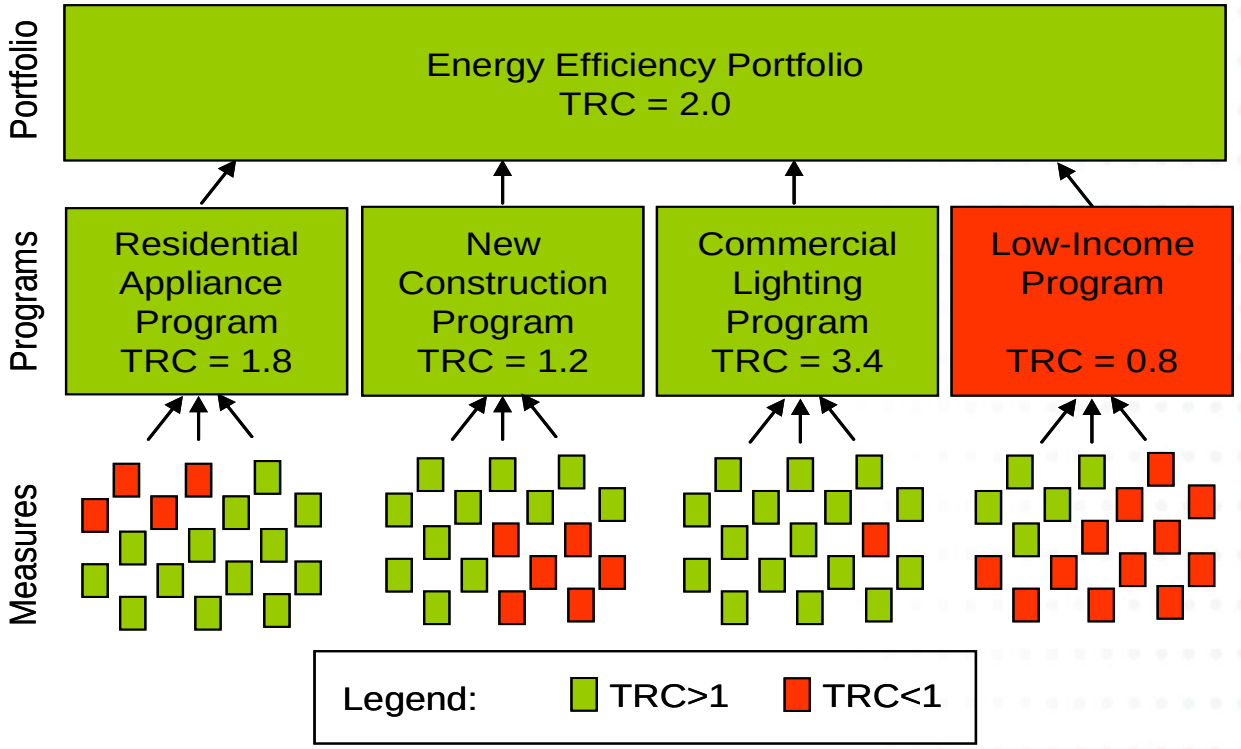
Avoided Costs are Falling

- **Across the country, the wholesale value of natural gas and electricity is low for a number of reasons**
  - Energy: the fuel and O&M costs of power generation
  - Capacity: the cost of new powerplants, or pipelines
- **Energy prices / costs are low primarily because of low natural gas prices, renewables also driving down wholesale energy prices in some markets**
- **Capacity prices / costs are low because growth is sluggish and there is excess generation capacity in many areas of the country**

Incremental Measure Costs

- **Main driver of costs for TRC test**
- **Incremental cost** = difference in cost between "baseline" (standard) and energy efficient measure
  - Difference in capital, O&M and, when appropriate, labor costs
- Two kinds of measures:
  - Replace on burnout: standard practice, replace equipment when existing equipment fails
    - Here, the baseline is a new inefficient equipment
  - Early replacement: replace equipment before the end of the useful life of existing equipment
    - Here, use the *full* cost of the energy efficient measure
    - "double baseline": remaining useful lifetime of early replacement equip. matters for calculating EE savings

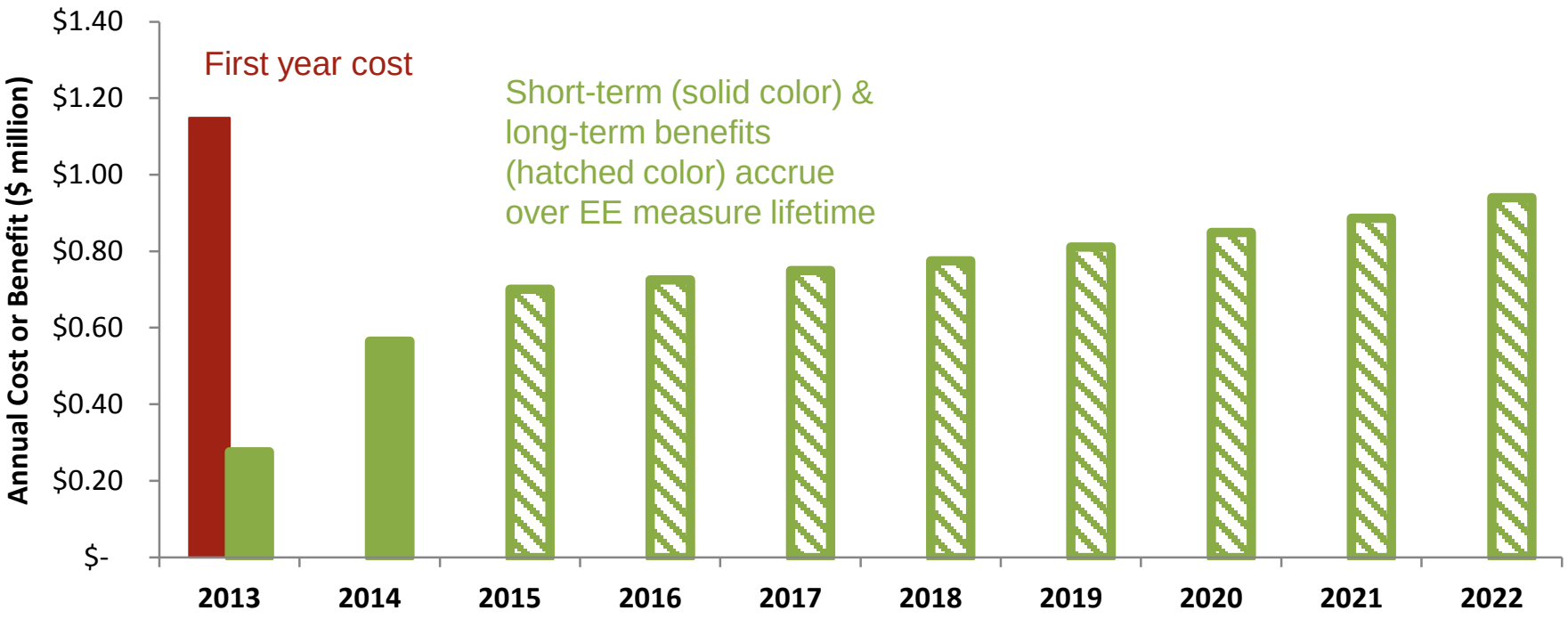
Where to Screen for Cost Effectiveness



- **Screening EE C/E at portfolio level allows for inclusion of individual programs or measures that do not pass cost-effectiveness test, such as low income, emerging technologies, market transformation**

Time Frame of Analysis

- **Analysis time frame accounts for full lifetime of energy efficiency measures**



Timeframe of Analysis – Measure Life

- **Effective useful life (EUL):** an estimate of the duration of savings from a measure. *Savings can live as long as the behavior that enables the efficiency is continued.*
- **EUL is an important input to CE analyses**
- It is estimated through various means:
  - Historical and documented persistence
  - Laboratory and field testing
  - Field inspections, over multiple visits
  - Non-site methods such as telephone surveys and interviewS
- It is also sometimes defined as the date at which 50% of installed units are still in place and operational
- The EUL (i.e. How long to "count savings") can be affected by baseline assumptions, particularly for early replacement programs

Discount rates are a key input

The discount rate used should be appropriate to the perspective in 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	9%	$9.13	$0.18
Ratepayer Impact Measure (RIM)	Utility WACC	7.5%	$10.19	$0.24
Utility Cost Test (UCT/PAC)	Utility WACC	7.5%	$10.19	$0.24
Total Resources Cost Test (TRC)	Utility WACC	7.5%	$10.19	$0.24
Societal Cost Test	Social discount rate	3%	$14.88	$0.55

Net and Gross Savings

- **Estimates of gross (energy and/or demand) savings**
  - Changes in energy consumption and/or demand that result directly from program-related actions taken by participants in an efficiency program, *regardless of reasons why the customers participated*
- **Estimates of net (energy and/or demand) savings**
  - Changes in energy consumption or demand that are attributable to an energy efficiency program (exclude 'free-riders', participant & non-participant spillover effects & market effects)
- **Net to gross ratio**
  - Net to gross ratio de-rates EE program impacts and can significantly affect the results of all cost tests (except for the PCT, where gross savings are used)

Contact Information

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National Standard Practice Manual for Energy Efficiency Cost-Effectiveness

Tom Eckman

Assessing the Cost-Effectiveness of Energy Efficiency Portfolios

LBNL Webinar Series on Evaluation, Measurement and Verification (EM&V) for Energy Efficiency

July 29, 2017

Why Create Another Cost-Effectiveness Manual?

- Traditional tests (UCT, TRC, SCT, PCT)
  - Not explicitly connected to state energy and environmental policy goals
  - Many states have adopted modified versions of the traditional tests
    - A good thing if done well
- Provide guidance on application of tests so that efficiency is accurately valued by:
  - Accounting for full range of utility system benefits (capacity, T&D, use of average versus marginal line losses)
  - Aligning scope of cost-effectiveness test and state energy and environmental policy goals (e.g., treatment of GHG emissions)
  - Including participant benefits when participant costs are considered
  - Valuing hard-to-quantify impacts (utility, participant or societal)
  - Selecting the appropriate discount rate
  - Properly accounting for free rider “costs”

The “right test” should ensure that utility investments are economic and that other state goals and energy policies are explicitly considered.

Overview of the NSPM Development Process

Who is behind the NSPM?

- National Efficiency Screening Project (NESP) – national group working to improve cost-effectiveness analyses
- Over 75 organizations representing a range of perspectives

Who drafted the NSPM?

- Tim Woolf, Synapse Energy Economics
- Chris Neme, Energy Futures Group,
- Marty Kushler, ACEEE
- Steve Schiller, Schiller Consulting
- Tom Eckman (Consultant and former Director of Power Planning, Northwest Power and Conservation Council)

Who reviewed the NSPM?

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

Who Coordinated and Funded the NPSM Project?

- 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/

Purpose and Scope of NSPM

Purpose

- Set forth policy nuetral principles for test selection & application
- Establish framework for primary test selection/development
- Provide 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
- Addresses 1st order question: "which EE resources merit acquisition?"

NSPM provides a foundation on which jurisdictions can develop and administer a cost-effectiveness test, but does not prescribe "the answer."

What's Covered -- 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

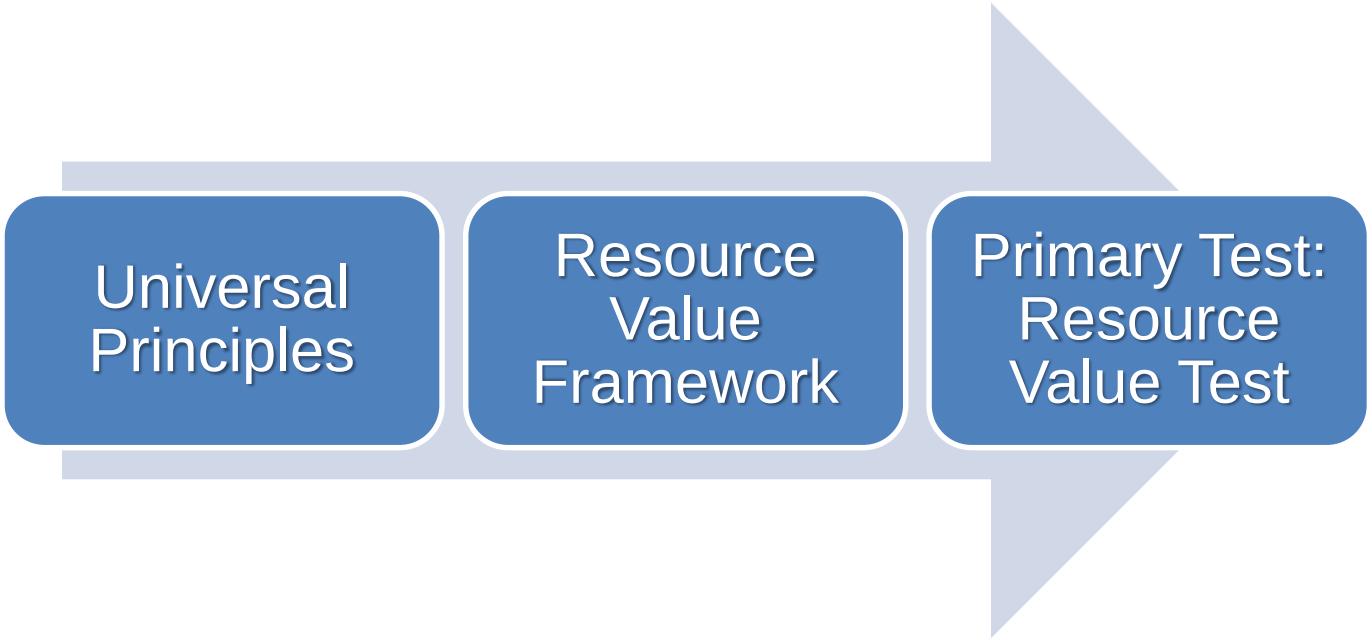
Part 2: Developing Test Inputs

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

Developing the Primary 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.

Implementing the Resource Value Framework Involves Seven Steps

Step 1	Identify and articulate the jurisdiction's applicable policy goals.
Step 2	Include all utility system costs and benefits.
Step 3	Decide which additional *non-utility* system costs and benefits 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, Regulations, Orders:	Policy Goals Reflected in Laws, Regulations, Orders, etc.					
	Low-Cost	Fuel Diversity	Risk	Reliability	Environ-mental	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 Costs and Benefits in the Test

Illustrative Utility System Costs	Illustrative 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

The principle of treating energy efficiency as a resource dictates that utility system costs and benefits serve as the foundation for all tests

STEP 3

Include Non-Utility System Impacts Based on Jurisdiction's 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

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 4 Ensure Symmetry Across Benefits and Costs

- Ensure that the test 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)
- Symmetry is 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 can result in misallocation of resources (over or under investment)
    - higher than necessary costs to meet energy needs
    - too little or too much investment in actions to achieve jurisdiction's energy related policies goals

Conduct Incremental, Forward Looking and Long Term Analysis

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

STEP 6

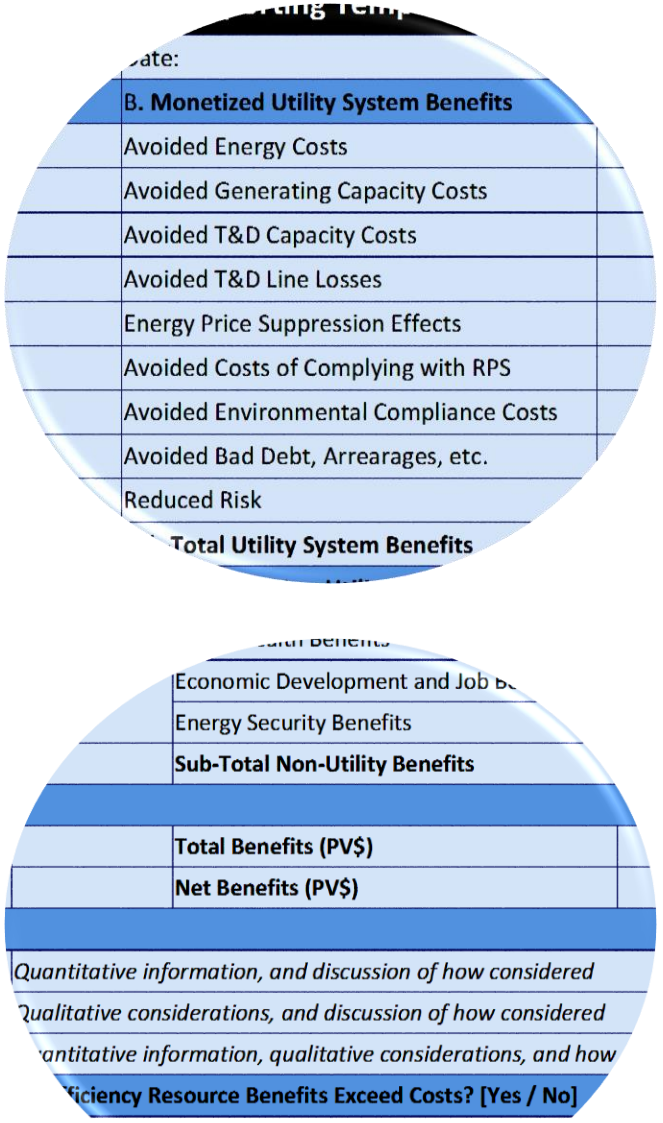
Develop Methodologies and Inputs to Account for All Impacts, Including Hard-to-Quantify Impacts

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 in Reporting

Sample Template

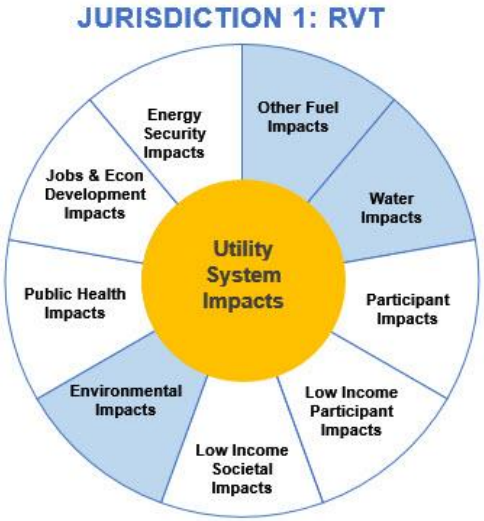
Efficiency Cost-Effectiveness Reporting Template			
Program/Sector/Portfolio Name:		Date:	
A. Monetized Utility System Costs		**B. Monetized Utility System Benefits**	
Measure Costs (utility portion)		Avoided Energy Costs	
Other Financial or Technical Support Costs		Avoided Generating Capacity Costs	
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]**		

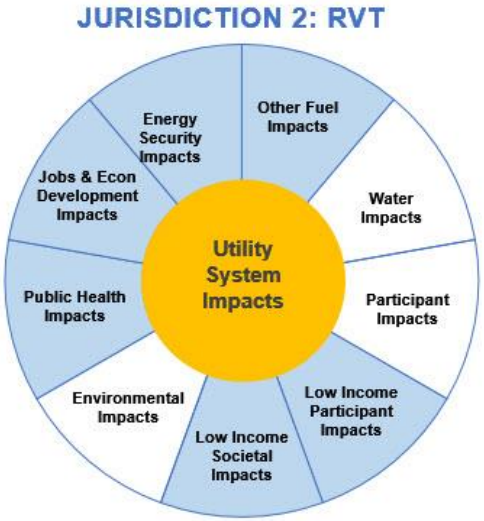


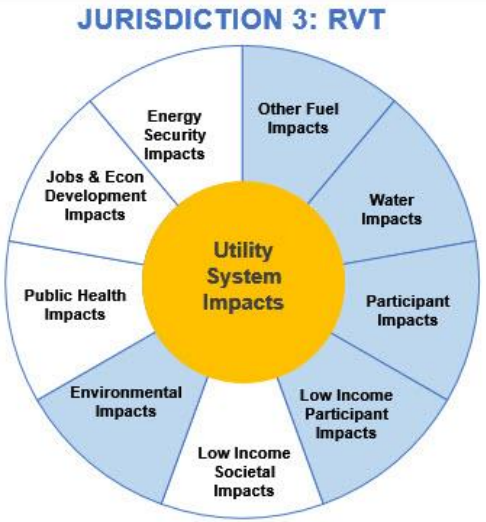
STEP 7 Ensure Transparency in Decisions on Which Non-Utility System Impacts To Include

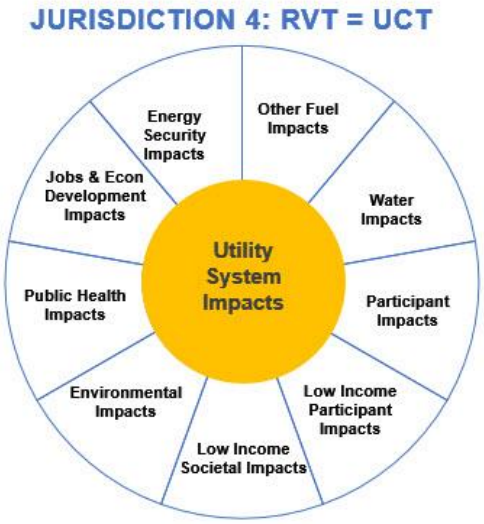
- Process should be open to all stakeholders.
- Stakeholder input can be achieved through a variety of means:
  - rulemaking process,
  - generic jurisdiction-wide docket,
  - working groups or technical sessions,
- Address objectives based on current jurisdiction policies
  - However, be flexible to incorporate evolution of policies through time.
- Policy goals may require consulation with other government agencies
  - Environmental protection
  - Health and human services
  - Economic development

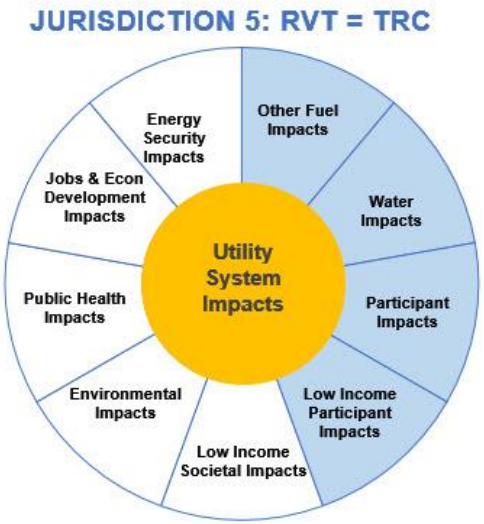
Relationship of Resource Value Test to Traditional Tests – Your Results May Differ

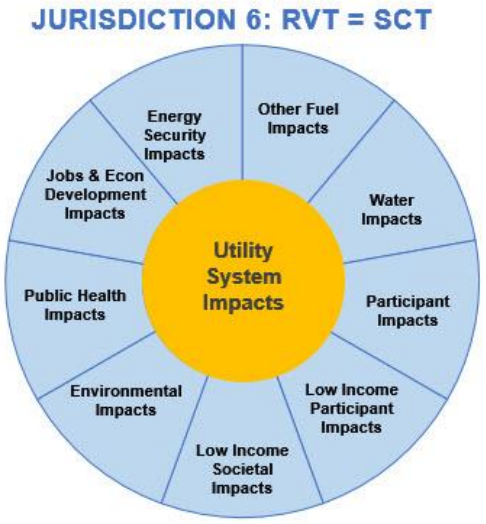













two
Just one
more things

Determining Whether to Include Participant Impacts

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

To avoid double counting energy costs and benefits only those participant costs that exceed the value of utility system benefits, should be treated as the incremental investment required to secure participant 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 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.
  - A private utility’s cost of capital reflects the time preference of its investors, not customers
  - Many resource costs, (e.g., fuel, operation and maintenance, most energy efficiency program costs), are not “capitalized”

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

Tom Eckman (TEckman49@gmail.com)

WASHINGTON UTC UTILITIES AND TRANSPORTATION COMMISSION

Cost-effectiveness Webinar

Lessons from a Regulatory Perspective

Deborah Reynolds, Assistant Director

June 29, 2017

WASHINGTON UTC UTILITIES AND TRANSPORTATION COMMISSION

Regulatory Context

- 63 Electric utilities of various flavors in WA
  - *Only 3 are investor-owned*
  - *45 percent of revenue*
  - *45 percent of customers*
  - *35 percent of retail Megawatt-hour sales*
- National Standard Practice Manual
  - Efficiency is a resource
  - Policy goals
  - Forward-looking analysis
  - Symmetry and transparency
- Integrated Resource Planning
  - *Lowest-reasonable-cost resource mix of conservation and generation*
- 2006 Energy Independence Act
  - *15 percent RPS by 2020*
  - *All cost-effective EERS*
- Northwest Power Act of 1980
  - *All quantifiable costs and benefits*

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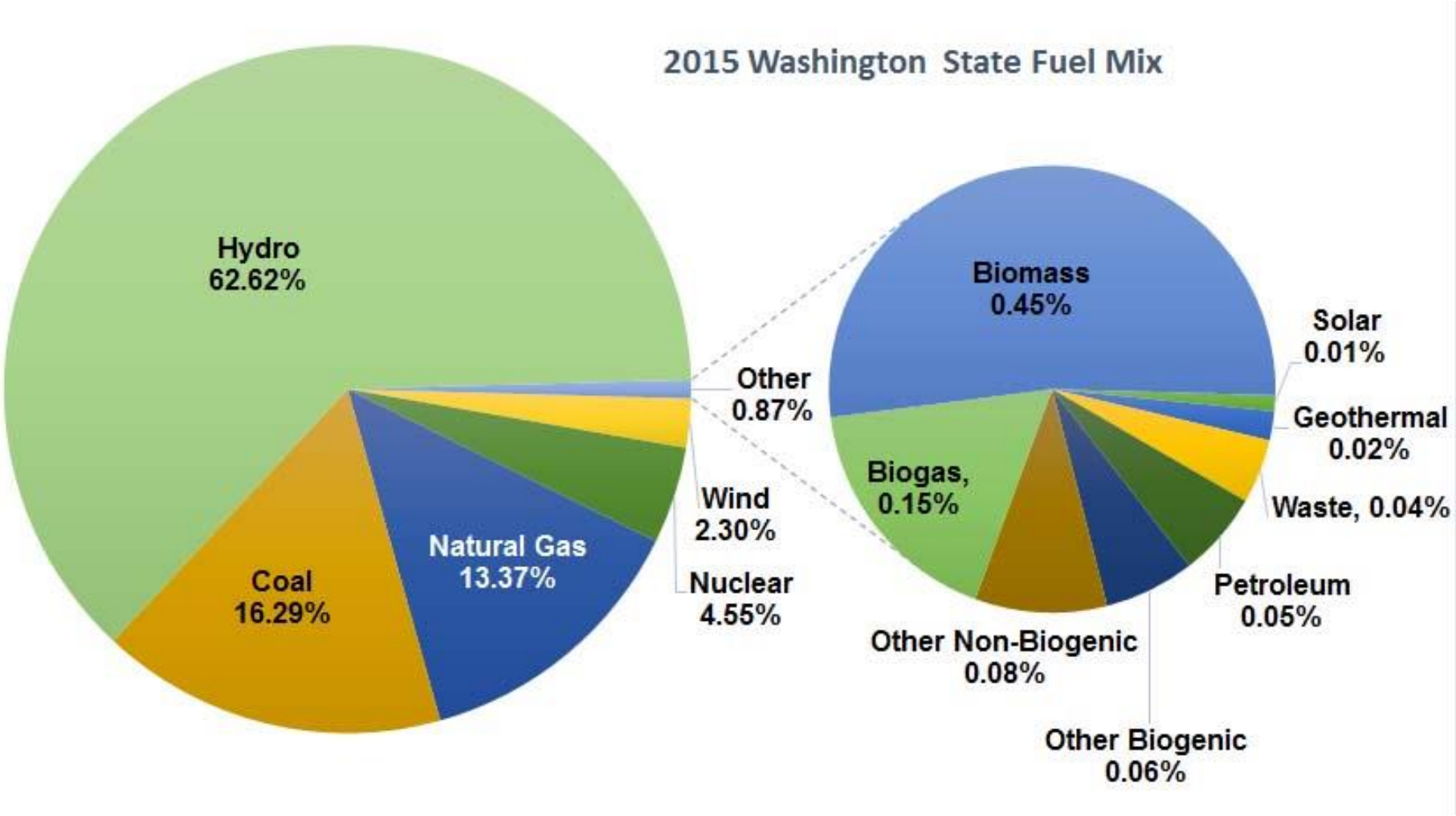
Regulatory Context



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Planning and Reporting Cycle:

WAC 480-109

Plans and reports

Quarterly advisory group meetings

Commissioner briefings

Open meeting Presentations

Commission orders

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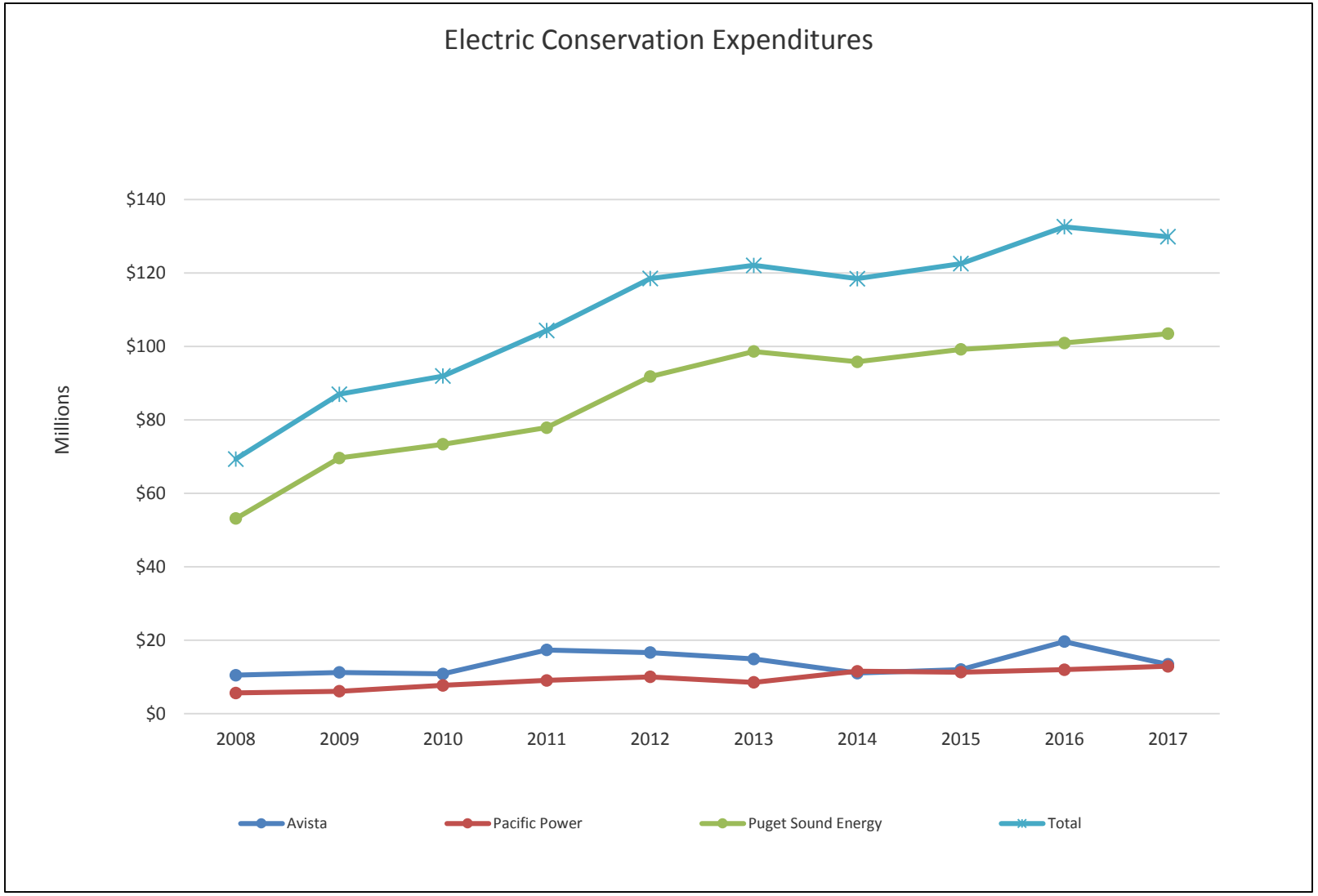
Conservation spending:



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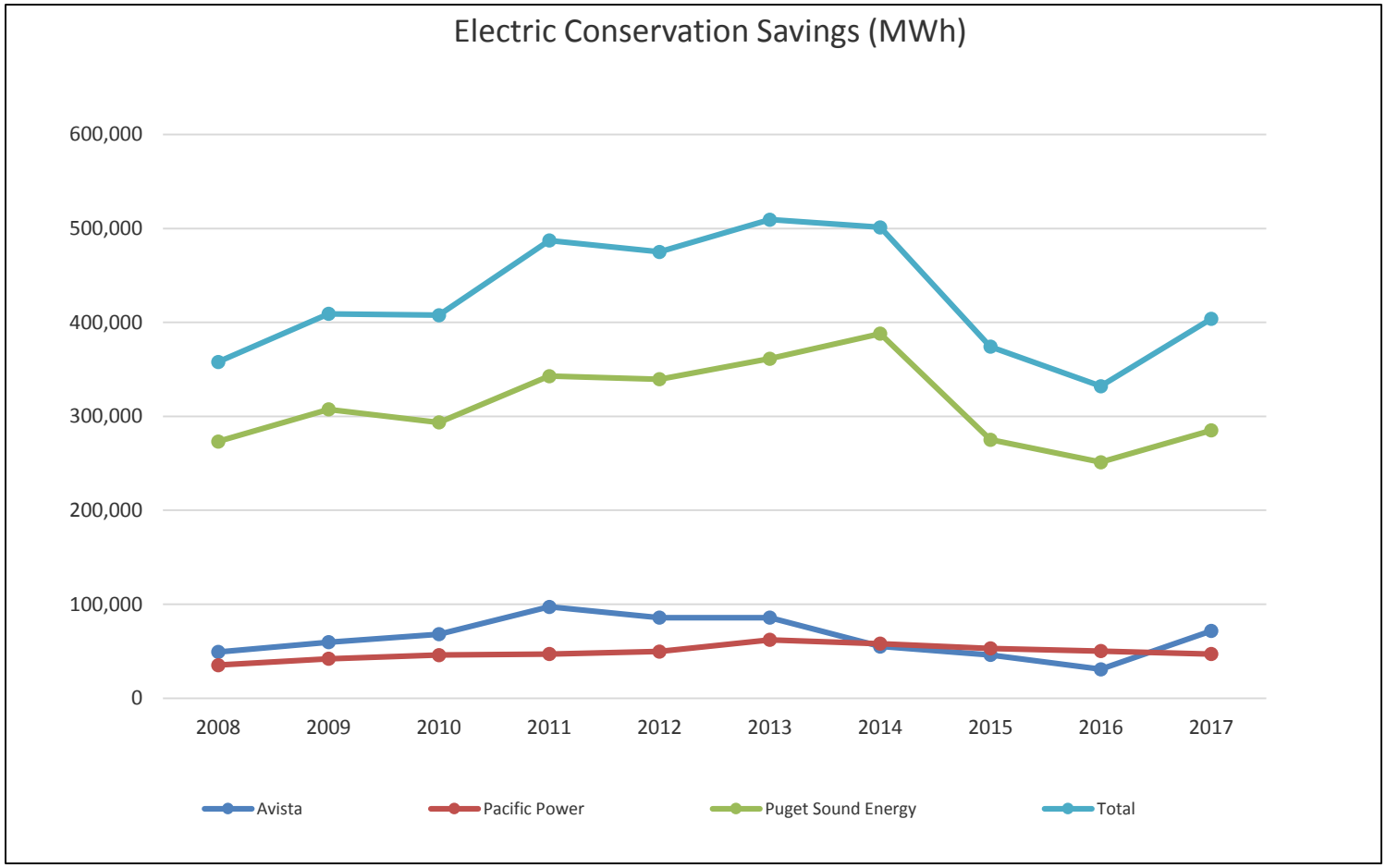
Conservation achievement:



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Current cost-benefit test includes:

- Utility Costs
  - Incentive costs
  - Program costs
  - Program Administration costs
  - Evaluation, Measurement & Verification costs
- Utility Benefits
  - Avoided energy costs
  - Avoided generating capacity costs
  - Avoided transmission and distribution line losses
  - Reduced risk

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Current cost-benefit test includes:

- Non-Utility Costs
  - Water and Other Resource Costs
  - Low-Income Customer Costs
  - Participant Costs
- Non-Utility Benefits
  - Water and Other Resource Benefits
  - Low-income Customer Benefits

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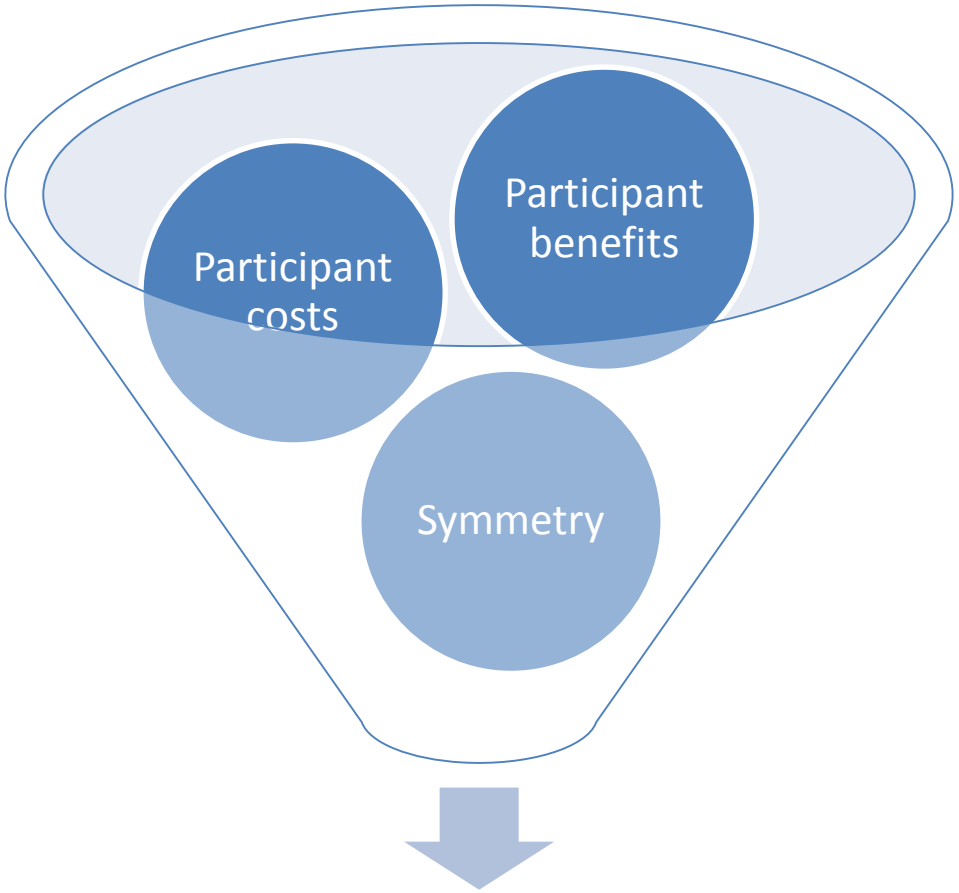
What are we thinking about?



Resource Value Test

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Conclusion

- **Questions?**

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GEORGIA PUBLIC SERVICE COMMISSION

Use of Cost Effectiveness Tests for DSM Program Planning

Jamie Barber

Energy Efficiency and Renewable Energy Manager

Economic Screening for DSM Programs

- Integrated Resource Plan (IRP) is filed by utility every three years (next filing Jan 2019)
- Georgia PSC rules require the calculation of four tests for screening:
  - Rate Impact Measure (RIM)Test
  - Total Resource Cost (TRC) Test
  - Participant Cost Test (PCT)
  - Societal Cost Test (SCT)
  - After programs are designed, program administrative costs are estimated and included in subsequent screening of demand-side programs
  - The utility shall perform a final screening of demand-side programs based on current Commission policy.
- DSM Programs are required to pass the TRC Test
  - This language is contained in the GPSC Rules
  - Based on Net Present Value
  - Per Commission Order, the RIM test is not a test of economic efficiency
- IRP filing includes modeling of alternative DSM cases
  - Aggressive Case (higher incentive)
  - Additional programs
  - Larger budgets
  - Higher incentives
  - All 4 cost tests results are shown for all cases

2017 – 2019 GPC Programs and Budgets Approved in the 2016 IRP/DSM Certification

2017-2019	# of Programs	Cumulative MWh savings	Budget (2017-19)
Residential	6	241,243	$72 Million
Commercial	4	856,345	$103 Million
Total	10	1,097,588	$175 Million

Note: Budget does not include associated DSM activities or Additional Sum

Residential Programs	Commercial Programs
Behavioral	Midstream HVAC
HVAC Servicing	Small Commercial Direct Install
New Home	Prescriptive
Home Energy Improvement	Custom
Refrigerator Recycling	
Lighting	

2016 IRP/DSM Timeline

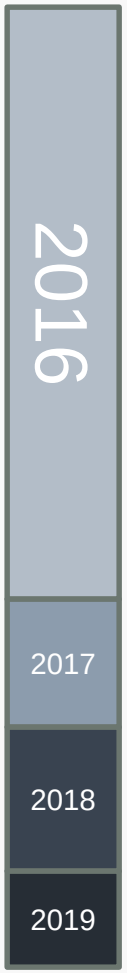
2016 Integrated Resource Plan (filed 1-31-16)

- The utilities DSM Application included economic modeling
  - Measures are individually screened using the TRC Test
  - Measure level data is rolled up to program level results
  - RIM, PA, Program Administrator Cost (PAC), TRC and SCT all included as $ benefits and ratios
  - PAC is used for the calculation of utility incentive (Commission Order)
- Final 2016 IRP/DSM Stipulation Order was signed on August 2nd, 2016
  - Included changes that were made to the DSM Program plans/budgets
  - DSM Program Plan modeling is updated

EM&V of Certified DSM Programs

- Required by Commission Order
- By the end of 2016, an Independent EM&V Contractor is selected by Georgia Power
- Draft EM&V Plan provided to Commission Staff in early 2017 for review
  - EM&V Plan agreement mid 2017 (almost complete)
  - EM&V activities have begun
- EM&V Results Report to be filed in July 2018
- Updated data from EM&V will inform 2019 IRP/DSM planning and modeling
- EM&V Results filed/Staff review

2019 IRP will be filed on or before Jan 31, 2019



EM&V

- 2018 EM&V Report will provide updated benefit/cost test results
  - Sample from 2015 Commercial EM&V Report
  - Measure level data is aggregated to program and portfolio levels
- Economic data from EM&V Report will be used in the planning for the next IRP
- The 2018 EM&V results will not affect current programs
  - Updated TRC value below 1.0 does not result in immediate elimination of current program or measures
  - Cost test comparison between IRP and EM&V can help identify issues

Table 9-2: GPC 2014 Commercial Sector Cost Effectiveness Summary

Cost Effectiveness	Commercial
Program Administrator Cost (PAC)	
PAC Costs	($16,482,619)
PAC Benefits	$238,801,401
PAC Net Benefits ($)	$222,318,782
PAC Net Benefit (Ratio)	14.5
Ratepayer Impact Measure (RIM)	
RIM Costs	($288,624,333)
RIM Benefits	$238,801,401
RIM Net Benefits ($)	($49,822,932)
RIM Net Benefit (Ratio)	0.8
Total Resource Cost (TRC)	
TRC Costs	($70,964,828)
TRC Benefits	$211,490,214
TRC Net Benefits ($)	$140,525,386
TRC Net Benefit (Ratio)	3.0
Levelized Delivery Cost	
$/MWh	$12.60

Source: Evaluation of Georgia Power Company's 2014 Commercial DSM Programs Report , Docket No. 36499, filed on July 31, 2015

Planning for the next IRP Cycle

The Demand Side Management Working Group (DSMWG) meets throughout 2017-2018 (prior to IRP Filing)

- DSMWG reviews the technical, economic, achievable potential study results
- Review of "new" Technical Reference Manual
- DSMWG allows members to provide feedback on current programs and propose new programs and delivery pathways
- DSMWG members can propose alternative program plans that can include additional programs (Residential and/or Commercial) and more aggressive goals
- Before IRP filing, preliminary modeling is shared with Staff and DSMWG members
- Feedback from interested parties is encouraged
- Programs must pass the TRC test
  - Potential programs that do not pass the TRC test are eliminated

Georgia Public Service Commission

Thank You

Jamie Barber
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Discussion/Questions

For more EM&V information see:

- Webinars: https://emp.lbl.gov/emv-webinar-series
- For technical assistance to state regulatory commissions, state energy offices, tribes and regional entities, and other public entities see: https://emp.lbl.gov/projects/technical-assistance-states
- Energy efficiency publications and presentations – financing, performance contracting, documenting performance, etc. see: https://emp.lbl.gov/research-areas/energy-efficiency
- The State and Local Energy Efficiency Action Network (SEE Action) Evaluation, Measurement, and Verification (EM&V) Resource Portal: https://www4.eere.energy.gov/seeaction/evaluation-measurement-and-verification-resource-portal

From Albert Einstein:

"Everything should be as simple as it is, but not simpler"

"Everything that can be counted does not necessarily count; everything that counts cannot necessarily be counted"