Opinion Dynamics nesp

IEPEC 2022

EVOLVING EVALUATION 202:

EVALUATION & COST-EFFECTIVENESS IN A DER WORLD

TRAINING WORKSHOP

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Workshop Agenda

Introductions & Overview (8:30 a.m. – 9:00 a.m.)

- Introductions
- EM&V Overview: Benefit-cost analyses (BCA), evaluations (impact, process, market) and program/implementation design
- **Our focus/goals for today:** BCA and impact evaluation in context of Distributed Energy Resources (DERs) and building electrification

BCA Framework & Case Study (9:00 a.m. – 10:30 a.m.)

- BCA in different regulatory contexts, overarching decision framework for DER investments
- Foundational BCA principles
- Developing a primary BCA test and application to GEBs use case
- Distributional Equity Analysis (DEA)

Break (10:30 a.m. – 10:45 a.m.)

EM&V Overview & Case Study (10:45 a.m. – 12:15 p.m.)

- Evaluation overview
- Unique considerations for DERs
- GEBs baselines
- Case Study – Building Electrification
- GHG Emissions Reduction
- Bill Impacts and Distributional Equity Analysis

Time for Q&A (12:15 p.m. – 12:30 p.m.)

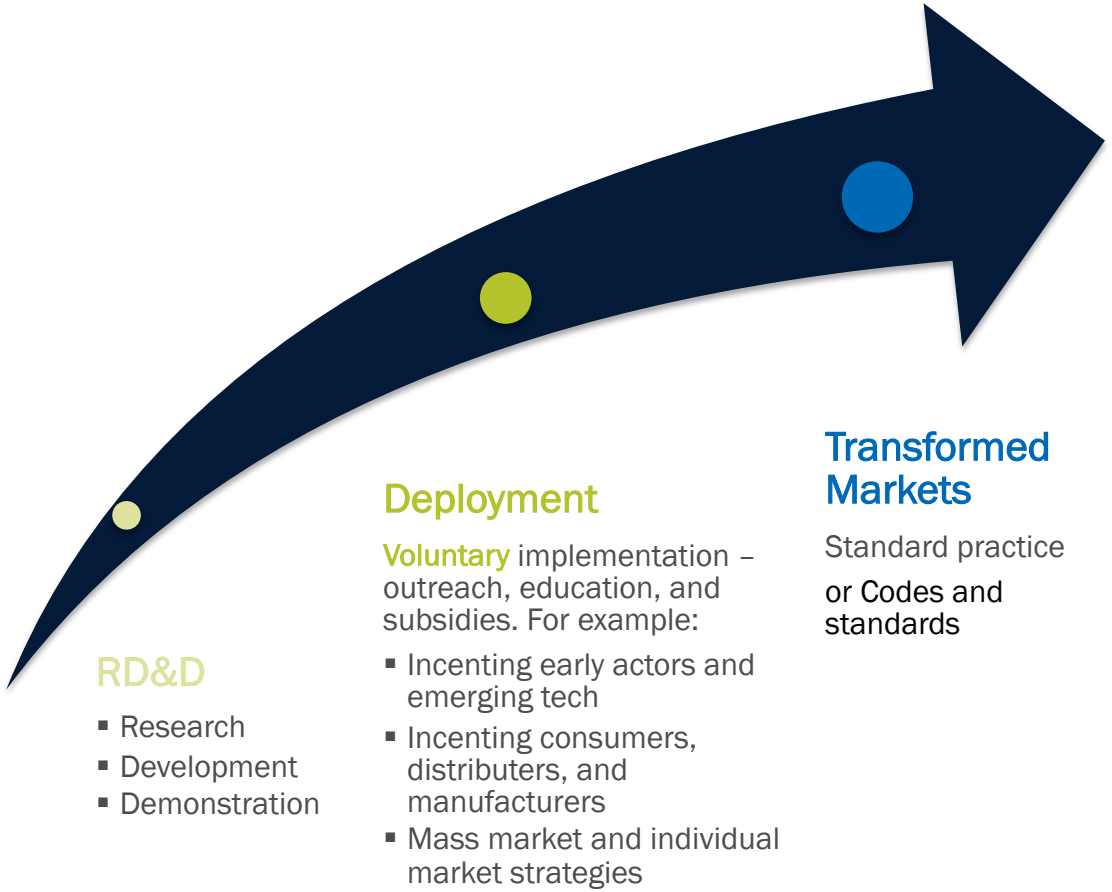
INTRODUCTIONS

TRAINING INTRODUCTION: EM&V, BCA AND DERS

Why Evaluate? - *The Generic Answer*

Evaluation provides the basis, the data, the support for our continuum of actions from RD&D, through deployment to transformed markets.

- **Document impacts:** Document impacts in order to determine how well the programs have met their goals; e.g., has there been a good use of the invested money and time?
  - Provide PROOF of the effectiveness of energy management.
- **Resource Planning:** To support energy resource planning by understanding the historical and future resource contributions of the subject resources as compared to other energy resources.
  - Provide data to support reliable, cost-effective resource mixes.
- **Understand why the effects occurred:** Identify ways to improve current and future projects and programs as well as select future projects.
  - "You can't manage what you don't measure" and "Things that are measured tend to improve."



Defining Evaluations (EM&V): Formative and Outcomes

Evaluation Category	Phase at Which Implemented (primarily)	Evaluation Type	Assessment Level
Formative	Pre-program Planning Phase	Market Assessment (includes characterization, baseline)	Market, Portfolio, Program
		Potential or feasibility	Portfolio, Program, Project
	Implementation Phase	Process	Portfolio, Program
Outcomes	Implementation Phase	– Impact –	Program, Project, Measure
		Market Effects Evaluation	Market, Portfolio
		Cost Effectiveness (Benefit-Cost Analysis)	Portfolio, Program, Project

Defining Benefit Cost Analysis– and the forms it takes in our industry

- **Benefit-Cost Analysis:** systematic approach for comparing the benefits and costs of alternative options to determine whether the benefits exceed the costs over the lifetime of the options (e.g., programs, project, technologies, tariffs) under consideration.
- In the energy efficiency (EE) and distributed energy resource (DER) world, we have two general approaches:
  - Static analyses
  - Dynamic analyses
- Both practices compare the long-run costs and benefits of different resource scenarios to identify those with benefits that exceed costs. Both should use similar inputs regarding the future costs of demand-side and supply-side resources.

Dynamic and Static BCA

Dynamic

- **No fixed alternative for comparison:** optimizing the costs, performance, and other attributes of all resource options in a dynamic fashion using optimization models, scenario analyses, and sensitivity analyses.
- **Integrated distribution planning (IDP):** assess traditional distribution resources and DERs for meeting distribution grid needs
- **Integrated grid planning (IGP):** assess all resource types (DERs and utility-scale resources) to enable optimization across generation, transmission, and distribution
- **Integrated resource planning (IRP):** assess DERs and utility-scale generation for meeting peak and energy demands
- *Primarily used for portfolio analyses of wide range of resource options*

Static

- *This is what we are covering today*
- **Single-DER analyses** involve assessing one DER type in isolation from other DER types, relative to a static set of alternative resources typically defined by avoided cost assumptions.
- **Multiple-DER analyses** involve assessing more than one DER type at the same time relative to a static set of alternative resources but with consideration of interactive effects among DERs
- Most of us EE people think of these BCAs as cost-effectiveness tests – TRC, UC, SCT, etc. and now the JST – Jurisdiction Specific Tests
- Used at a more granular level than IRPs, IGPs, etc. , typically fused or specific programs or measure

Distributed Energy Resources (DERs)

Grid-interactive Efficient Buildings and Demand Flexibility

DER	A resource sited close to customers that can provide all or some of their immediate power needs and/or can be used by the utility system to either reduce demand or provide supply to satisfy the energy, capacity, or ancillary service needs of the grid
Demand Flexibility	Capability of DERs to adjust a building's load profile across different timescales

- **Grid-interactive Efficient Building (GEB):** An energy-efficient building that uses smart technologies and on-site DERs to provide demand flexibility while co-optimizing for energy cost, grid services, and occupant needs and preferences in a continuous and integrated way
- **Smart technologies for energy management:** Advanced controls, sensors, models, and analytics used to manage DERs. GEBs are characterized by their use of these technologies.

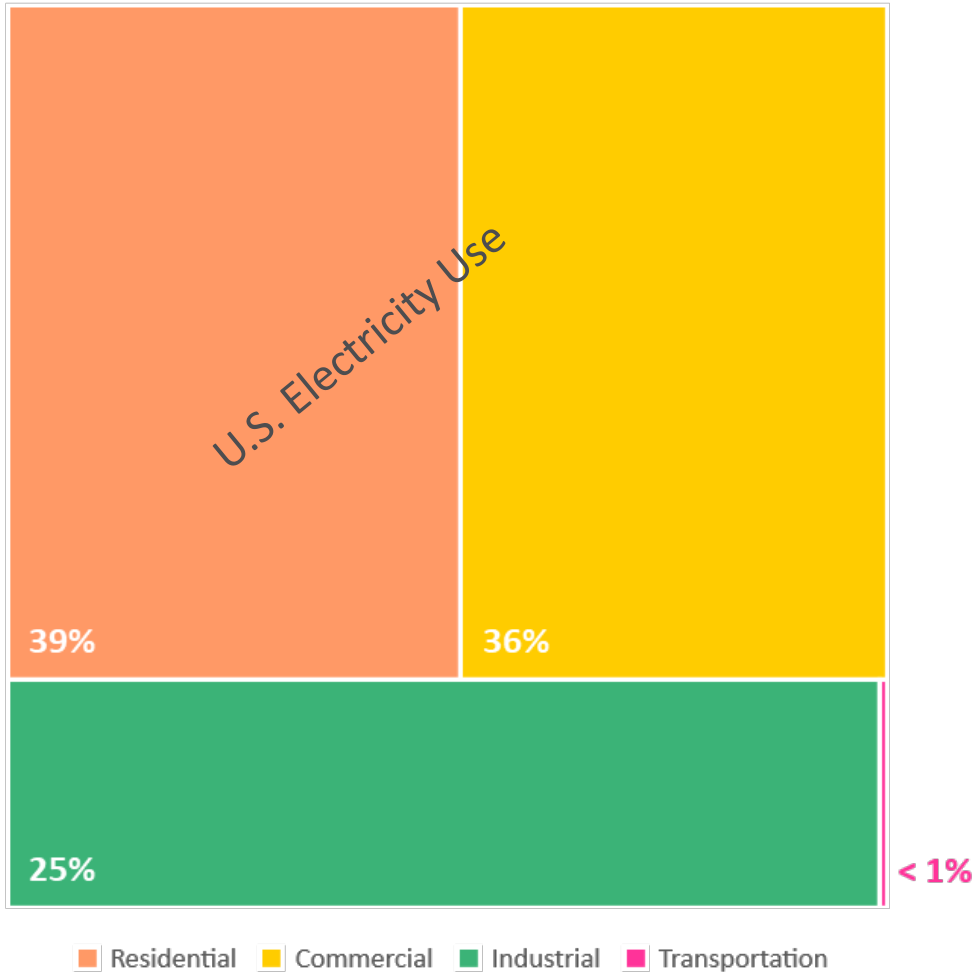
DERs, Electrification, Demand Flexibility

What's Happening:

- Increasing federal, state and local goals for GHG emission reductions
- Increasing amounts of variable renewable energy
- Growth in electric vehicles
- Buildings (residential + commercial) already account for about 75 percent of electricity consumption and in some regions up to 80 percent of peak demand – and this will increase with building electrification

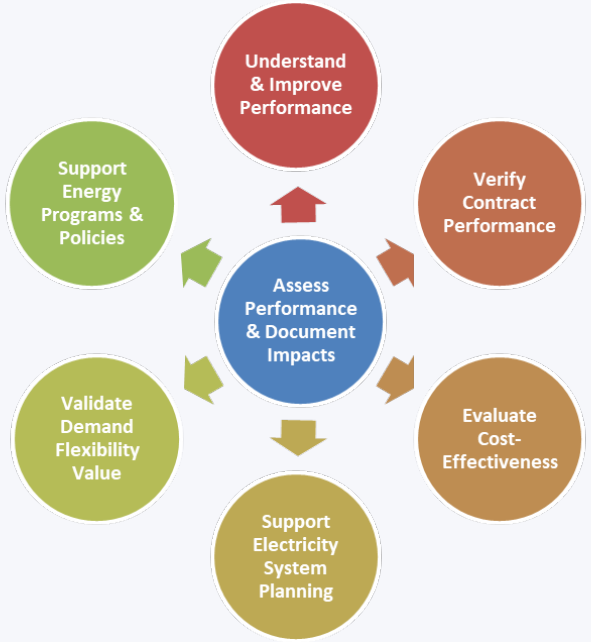
Result:

- Increased electrification combined with changes in electricity systems and grid operations requiring greater consideration of flexible loads.
- With many adjustable loads, buildings are representing a large source for demand flexibility.
- DERs provide for that flexibility and create new challenges (and opportunities) for evaluators.



Source: U.S. Energy Information Administration (EIA), Monthly Energy Review. June 2019, Table 7.6. Commercial includes street lighting.

Why Evaluate (and BCA)? The DER & Demand Flexibility Answer



Beyond serving as backbone of financial settlements:

- For utilities, regional grid operators, and utility regulators, assessments provide confirmation that buildings can be a reliable, cost-effective, and consistently grid resource.
  Critical to acceptance of DERs (and demand flexibility) as a grid resource
- For building owners, operators, and occupants, assessments optimize building performance, provide confidence in the benefits (e.g., lower energy costs), and demonstrate acceptable non-energy impacts (e.g., building maintains comfort standards).
  Critical to optimizing DER (and demand flexibility) performance
- For state and local governments, provide data needed to advance DERs in support of their broader energy goals.
  Critical to advancing demand flexibility

By any name (evaluation, M&V) assessments of actual performance are fundamental to advancing DERs and electrification as part of the cycle of planning and implementing programs.

The Big Issues of EM&V

Shhhh…Its an estimate

How good is good enough?

- Fundamental issue of EM&V
- How certain does one have to be of impact value estimates and is that certainty balanced against the amount of effort utilized to obtain that level of certainty?
- EM&V investments should consider risk management principles - balance the costs and value of information derived from EM&V (i.e., EM&V should be cost-effective).

As compared to what?

- First - Defining a baseline against which actions are compared for determining impacts and whether attribution should be considered – the counter-factual
- Second – Establishing level of performance confidence and risk for DERs relative to other options

EM&V is About Risk Management!

EM&V as problem solving: puzzle or a riddle?

- **Puzzle:** Has a single, factual answer and is solved by getting more information
- **Riddle:** Not solved by simply gathering more information; instead, solved by making sense of a massive amount of data available, using analysis, ingenuity and judgment
- **Answer Clues:**
  - How good is good enough?
  - As compared to what?

And let's remember, of course, that resource decisions are made on more than just EM&V and BCA results

Applicable Energy and Non-Energy Policy Goals

- Monetized BCA results
  - Quantitative (but not monetized) impacts
  - Qualitative impacts
- Rate, Bill and Participant Impacts ('Just and Reasonable Rates')
- Energy equity considerations
- Other policy considerations

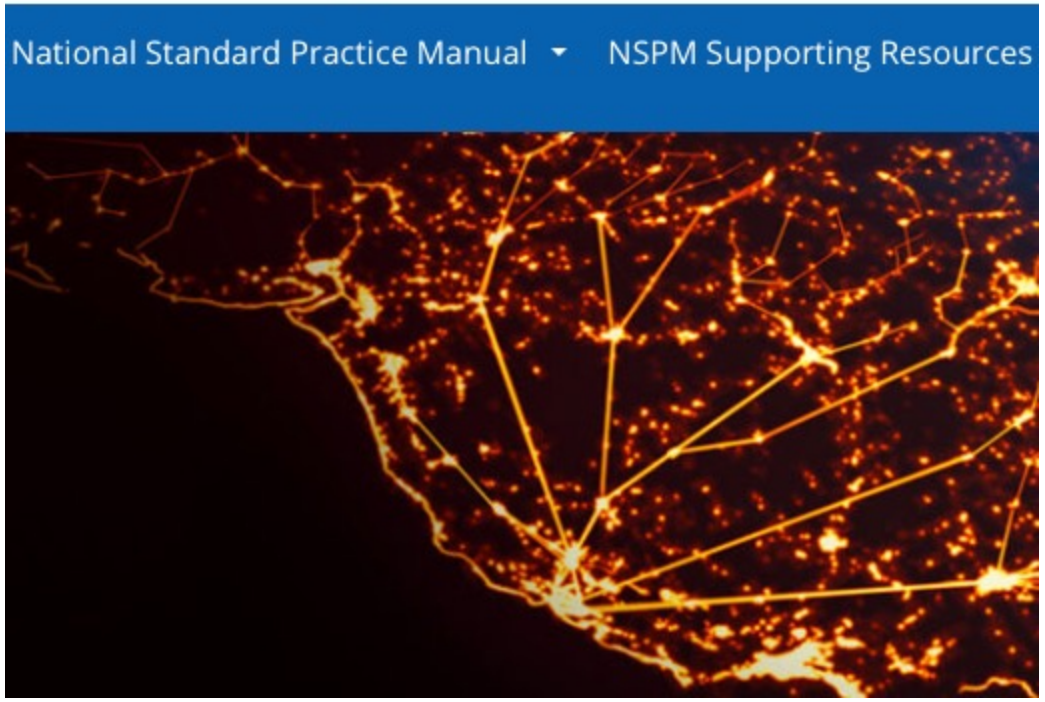
BENEFIT-COST ANALYSIS

- The National Standard Practice Manual
- Building a BCA “Jurisdiction Specific Test (JST)” - Framework and Principles
  - Benefits and Costs
  - Group exercise
- Applying a JST to a DER Program
  - Steps to calculating a BCA and some key considerations
  - Group exercise
- Distributional Equity Analysis
  - Basics
  - Group exercise

NESP Resources

National Energy Screening Project

National Standard Practice Manual for Benefit-Cost Analysis of Distributed Energy Resources (NSPM for DERs)



The New Standard for DER Benefit-Costs Analysis

The National Energy Screening Project (NESP) is a stakeholder organization that helps to improve cost-effectiveness screening practices for distributed energy resources (DERs)

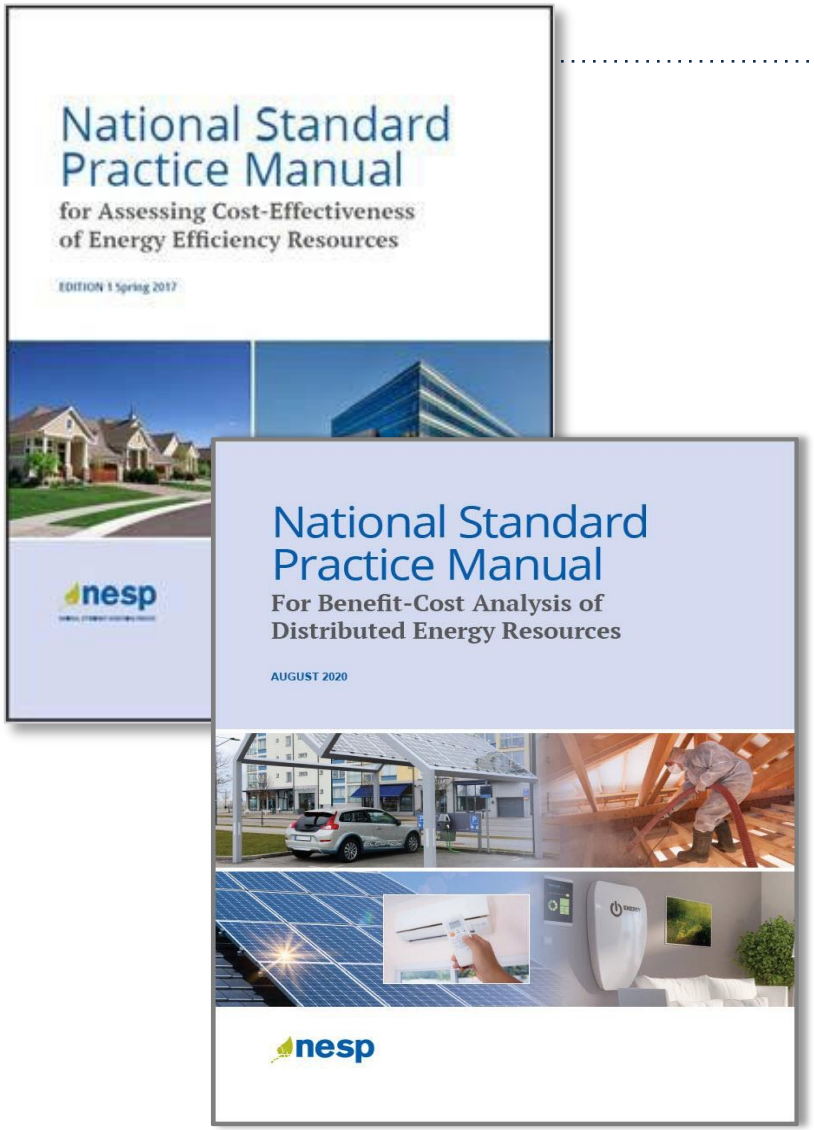
- Managed by E4TheFuture
- Funded by E4TheFuture and US DOE (via LBNL)
- Multiple co-authors
  - Extensive understanding of regulatory economics
  - Specialized expertise with different DERs
- Advisory Group
  - 45+ individuals
  - Diversity of perspectives
  - Input on Manual outline and drafts

Publications of the National Energy Screening Project (NESP)

1. National Standard Practice Manual for Benefit Cost Analysis of Distributed Energy Resources (**NSPM** – 2020) – builds on the 20-year old California Standard Practice Manual
2. NESP **BCA Case Studies** – that apply NSPM guidance for 'real' world use cases (SEPA/ICF 2022)
3. Methods, Tools & Resources **(MTR) Handbook for Quantifying DER Impacts** (2022)
4. **Database of Screening Practices** – regularly updated database of states' approaches to BCA for DERs

National Standard Practice Manual for Benefit-Cost Analysis of Distributed Energy Resources (2020) NSPM for DERs

- Comprehensive framework for cost-effectiveness assessment of DERs
- Intended for use by jurisdictions to help inform which resources to acquire to meet the jurisdiction's specific policy goals and objectives
- Set of policy-neutral, non-biased, and economically-sound principles, concepts, and methodologies to support single- and multi-DER benefit-cost analysis (BCA) for:
  - Energy efficiency (EE)
  - Demand response (DR)
  - Distributed generation (DG)
  - Distributed storage (DS)
  - Electrification (building and vehicle)



The NSPM is not a “test”, it is a process for defining a test – what we call a Jurisdiction Specific Test (JST)

NSPM ≠ Test

NSPM = Process to get a test

NSPM for DERs: Scope

Scope

Provides guidance on single and Multi-DER BCA:

- **Single-DER analysis:** where one type of DER is assessed relative to a fixed (i.e., static) set of alternative resources
- **Multiple-DER analysis:** where multiple DERs are assessed and optimized relative to a fixed set of alternative resources
- **Dynamic DER analysis:** where all electric resources, both distributed and utility-scale, are optimized

Outline

- **Part I:** Benefit-Cost Analysis Framework, including fundamental principles and guidance on development of primary and secondary BCA tests
- **Part II:** describes relevant DER benefits and costs and presents range of cross-cutting considerations
- **Part III:** guidance on single-DER analysis
- **Part IV:** guidance on multiple-DER, analysis
- **Appendices**

Why a New BCA Standard, why for DERs?

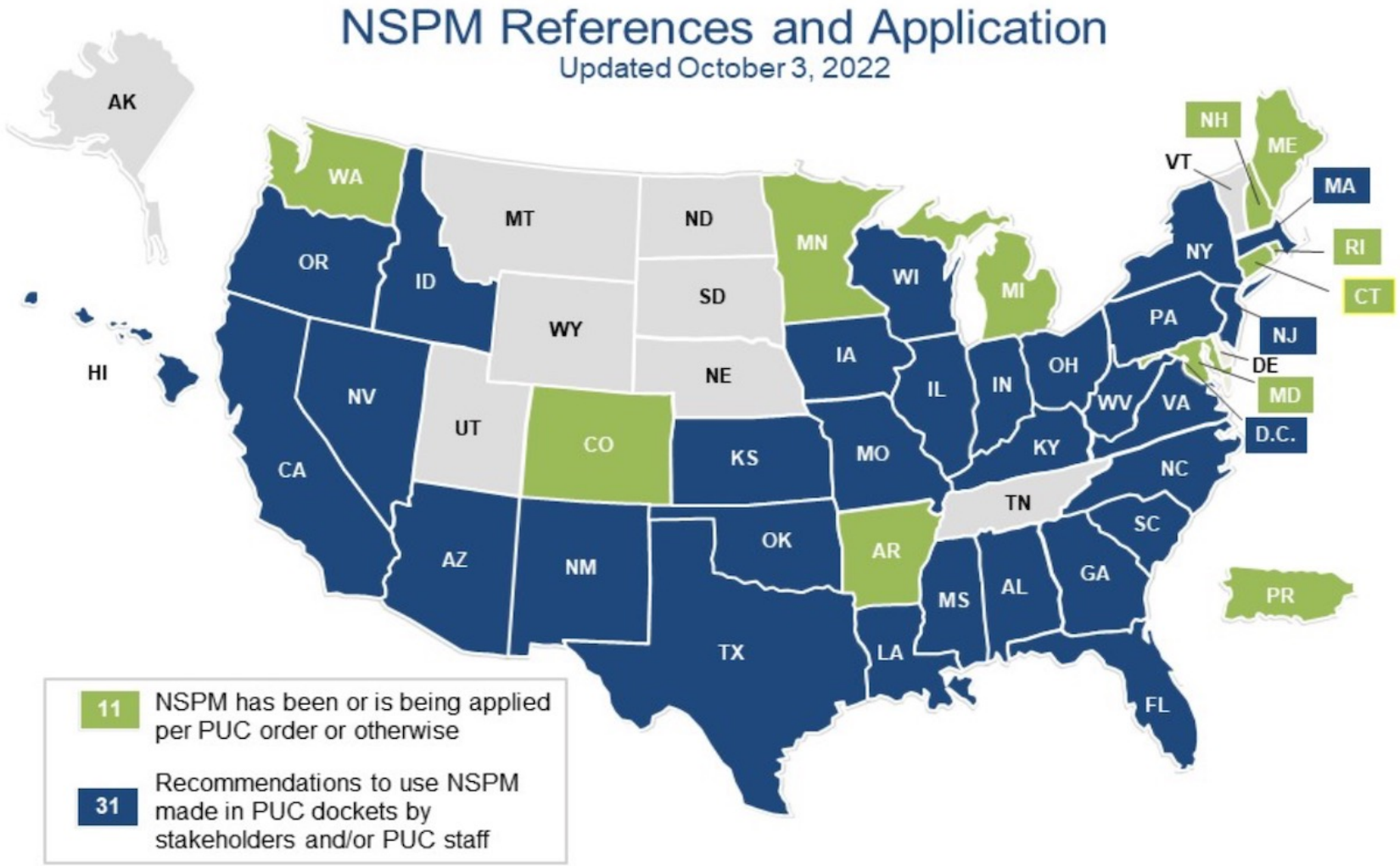
Why a new standard

- Traditional cost-effectiveness tests often do not address pertinent state policies
- Traditional tests are often modified by states in an ad-hoc manner, without clear principles or guidelines
- DERs are treated inconsistently in many BCAs
- DERs are often not accurately valued
- There is a lack of transparency on why tests are chosen and how they are applied
- The California Standard Practice Manual (the source of the traditional tests) has not been updated for about 20 years

Why for DERs

- Potential Key Differences for BCA of DERs (compared to plain vanilla EE)
- Moves outside energy efficiency policy domain (*sometimes*)
- Funding sources are different (*potentially*)
- Impacts (costs and benefits) are different (often) and their application can vary
- Audience is expanded (*most likely)*

NSPM References & Application



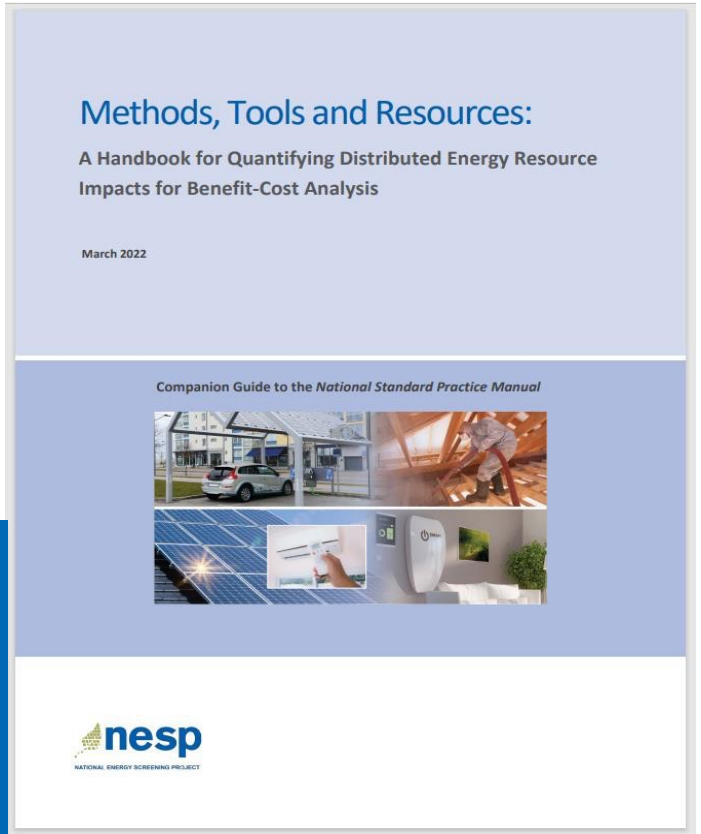
Methods, Tools and Resources for Quantifying DER Impacts (2022)

MTR Handbook

Contents:

- Key Components to Calculate BCA Impacts
- Electric Utility System Impacts
- Gas Utility System Impacts
- Other Fuel System Impacts
- Host customer Impacts
- Societal Impacts
- Reliability & Resilience
- Energy Equity
- Uncertainty & Risk
- Load Impact Profiles

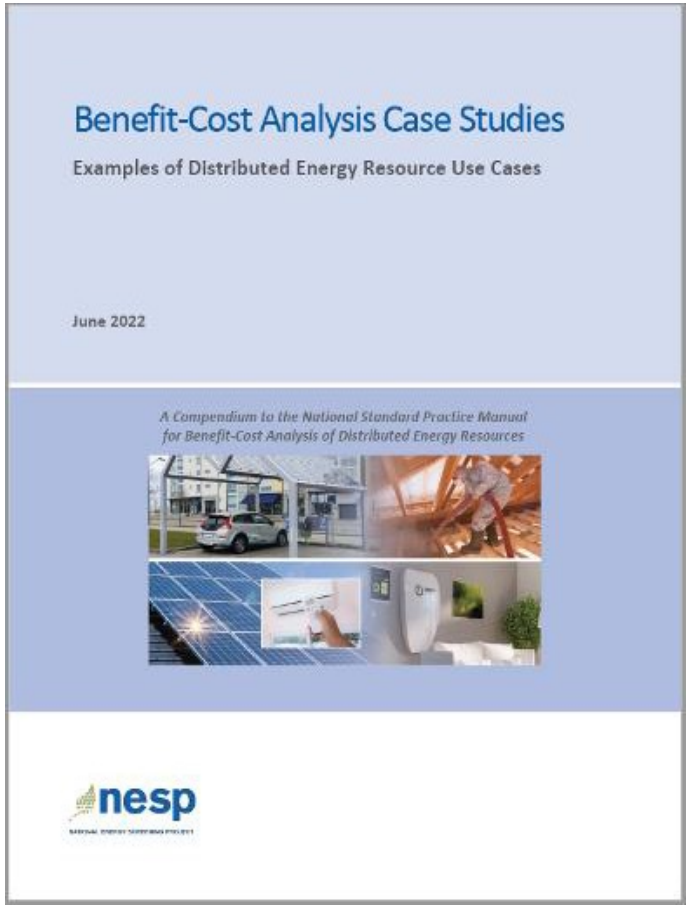
- NSPM provides guidance on *what* inputs to include in BCA tests.
- MTR Handbook provides guidance on *how* to determine those inputs to those BCA tests.



NSPM Guidance Application to Real-World Use Cases (2022)

BCA Case Studies

- NESP Benefit-Cost Analysis Case Studies: Examples of Distributed Energy Resource Use Cases
- Three Use Cases Covered:
  - Residential EV Managed Charging in the Midwest
  - Commercial Solar + Storage Controlled Dispatch in the West
- Residential Grid-interactive Efficient Building (GEB) Retrofit in the Mid-Atlantic
  - Weatherization
  - Smart thermostats
  - Heat pumps



Database of Screening Practices (DSP)

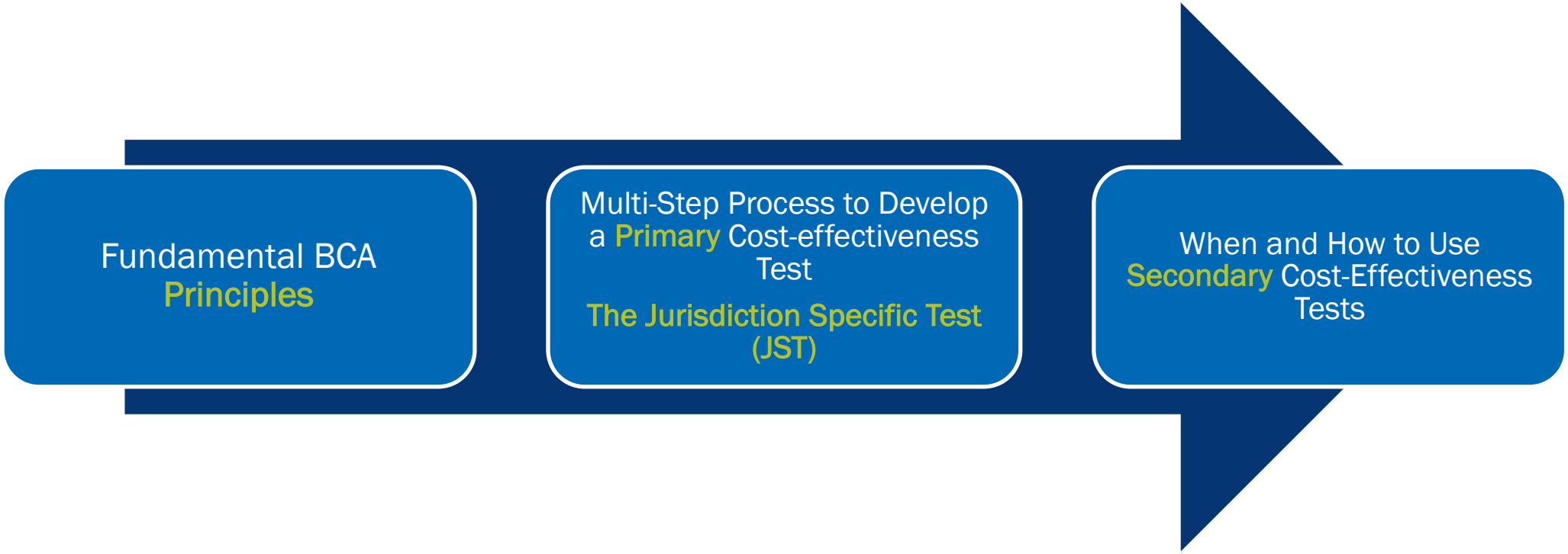
- Information regarding state cost-effectiveness screening practices for ratepayer-funded electric and natural gas energy efficiency programs
- A living document with information from 52 jurisdictions (50 states, Washington D.C., and Puerto Rico), the DSP was last updated April 1, 2021.
- DSP content is based on the best available information at the time of research, including interviews with state regulatory staff.

BCA in the Context of Different DER Applications and Regulatory Settings

Context	Application	Goal of BCA	Role of Costs & Benefits
Programs	EE, DR, DG, Storage, EVs	determine whether to implement the program	compare program benefits to costs
Procurement	DERs, NWAs, PPAs,	determine the ceiling price	ceiling price should equal the benefits of the procurement
Pricing	Rate design	estimate long-run marginal costs	long-run marginal costs should equal the benefits of modifying consumption
	DER compensation	determine the value of DER	value of DER is the sum of benefits
Planning	Optimize DERs	identify optimal DER portfolio	compare portfolio benefits to costs
	DP, IDP, IRP, IGP	identify preferred resource scenario	compare scenario benefits to costs
	GHG plans	achieve GHG goals at low cost	compare GHG plan benefits to costs
	State Energy Plans	identify resources to meet state goals	compare state plan benefits to costs
Infrastructure Investments	Grid Mod, AMI, EV infrastructure, etc.	determine whether to make the investment	compare investment benefits to investment costs
Prudence Reviews	Retrospective review	determine whether past utility decision was appropriate	compare benefits and costs using test in place at the time the decision was made
	Prospective review	determine whether proposed utility decision is appropriate	compare benefits and costs using test currently in place

LET’S BUILD SOME BCA TESTS FOR DERS!

The NSPM Defines a BCA Framework



Together, the above framework components can guide development of (or modification to) primary cost-effectiveness tests, and selection of any secondary tests.

What question does the Primary Cost-Effectiveness Test answer?

Primary test answers - Which resources have benefits that exceed costs and therefore merit potential utility acquisition or support?

While the primary test, the JST, should be used as the best indication of cost-effectiveness, and thus given the most weight, resource selection may also be supported by one or more secondary tests. For example, secondary tests can:

- Inform decisions on how to prioritize DERs (including reviewing DERs from perspectives other than the regulatory perspective, such as the host customer perspective)
- Inform decisions regarding marginally cost- effective DERs; and
- Encourage consistency in BCA analyses across different DER types.

Fundamental BCA Principles

1. Recognize that DERs can provide energy/power system needs and should be **compared with other energy resources** and treated **consistently** for BCA.
2. Align cost-effectiveness test with jurisdiction's **applicable policy goals**.
3. Ensure **symmetry** across costs and benefits.
4. Account for all **relevant, material impacts** (based on applicable policies), even if hard to quantify.
5. Conduct a **forward-looking, long-term analysis** that captures incremental impacts of DER investments.
6. Avoid **double-counting** through clearly defined impacts.
7. Ensure **transparency** in presenting the benefit-cost analysis and results.
8. Conduct **BCA separate from Rate Impact Analyses** because they answer different questions.

Principle #1: Why Consistency in BCA across DERs?

- Consistent BCA framework **reduces risk of either over or under-investing** in a resource (or combination thereof)
- **Siloed approach to valuing different DERs can be complex and overwhelming** for commissions, utilities, and stakeholders
- Allows for **comparison and prioritizing of DER investment options and strategies** to answer questions such as:
  - How cost-effective is one DER type relative to another type?
  - How to evaluate a program that includes multiple types of DERs
  - How to optimize across multiple types of DERs.
- Defining a primary test for use across all DERs **does not mean all impact factors apply to each DER(s) and/or use case.**

Principle #2: Align BCA With Policy Goals

1. Jurisdictions invest in or support energy resources to **meet a variety of goals and objectives.**
2. A BCA test should reflect the regulatory perspective to **ensure proper accounting of the jurisdiction's applicable policy goals**—as guided by statutes, regulations, organizational policies, utility resource planning principles and policies, and/or other codified forms
3. The NSPM is organized around a "**regulatory perspective**", which refers to the perspective of regulators or similar entities that oversee (utility) DER investment decisions and are responsible for enforcing or ensuring compliance with the applicable statutes, etc.

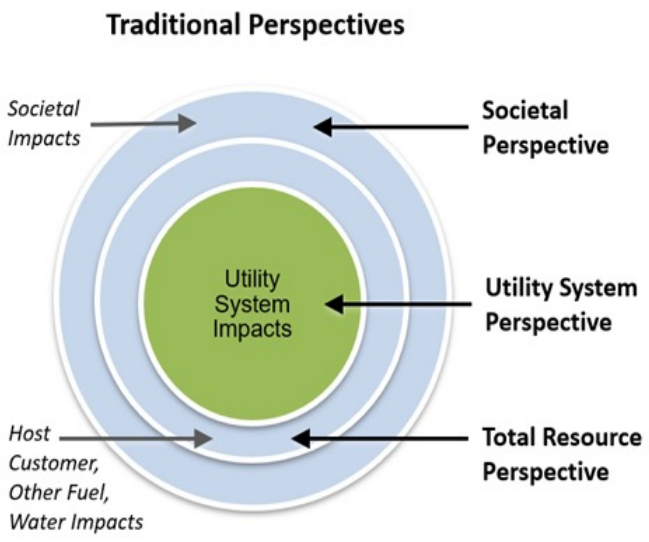
Example Goals: as articulated in statutes, regulations, decisions, etc.

Common Overarching Goals: Provide safe, reliable, reasonably priced electricity and gas services; support fair and equitable economic returns for utilities; promote customer equity; protect/reduce energy burden for low-income and vulnerable customers.

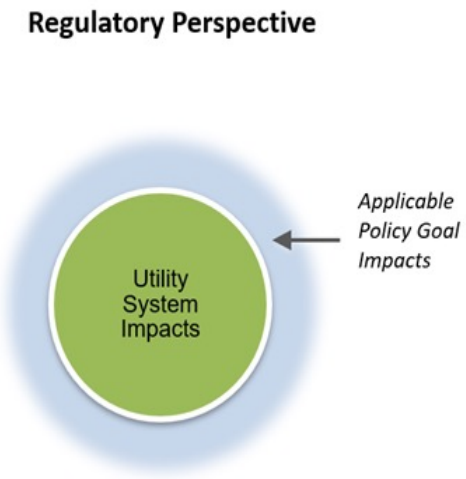
Resource Goals: Reduce electricity and gas system costs; develop least-cost energy resources; improve system reliability and resiliency; reduce system risk; promote resource diversity; increase energy independence; reduce price volatility; provide demand flexibility.

Other Applicable Goals: Ensure stable energy markets; reduce environmental impact of energy consumption; promote jobs and local economic development; improve health associated with reduced air emissions and better indoor air quality.

Traditional Cost-Effectiveness Test/Perspectives



- Three perspectives define the scope of impacts to include in the most common traditional cost-effectiveness tests.



- Perspective of public utility commissions, legislators, muni/coop boards, public power authorities, and other relevant decision-makers.
- Accounts for utility system plus impacts relevant to a jurisdiction's applicable policy goals (which may or may not include host customer impacts).
- Can align with one of the traditional test perspectives, but not necessarily.

Source: NSPM for DERs, 2020

Traditional Tests

Test	Perspective	Key Question Answered
Utility Cost	The utility system	Will utility system costs be reduced?
Total Resource Cost	The utility system plus participating customers	Will utility system costs plus program participants' costs be reduced?
Societal Cost	Society as a whole	Will total costs to society be reduced?
Participant Cost	Customers who participate in a program	Will program participants' costs be reduced?

The NSPM 'Regulatory' Perspective (Jurisdiction Specific Test)

Test	Perspective	Key Question Answered
JST	Regulators or decision-makers	Will the cost of meeting utility system needs, *while achieving applicable policy goals,* be reduced?

Source: NSPM for DERs, 2020

Principle #3: Ensure Symmetry of Benefits & Costs

Illustrative Example: Treatment of Host Customer Costs and Benefits

Costs and Benefits	Asymmetry	Symmetry	
	A. Host Customer Costs **Included,** Benefits **Excluded**	B. Host Customer Costs and Benefits **Both Included**	C. Host Customer Costs and Benefits **Both Excluded**
DER Costs			
Utility System Costs:			
- Rebate/Incentive	$1,875	$1,875	$1,875
- Administrative Costs	$1,500	$1,500	$1,500
Host Customer Costs:	$5,625	$5,625	not included
Total Costs Accounted for:	$9,000	$9,000	$3,375
DER Benefits			
Utility System Avoided Costs	$6,000	$6,000	$6,000
Host Customer Non-Energy Benefits	not included	$4,000	not included
Total Benefits Accounted for:	$6,000	$10,000	$6,000
Net Benefit/Cost	($3,000)	$1,000	$2,625
Benefit-Cost Ratio (BCR):	0.67	1.11	1.78
Treatment of Host Customer Impacts	X Asymmetrical	Symmetrical	

Principle #4: Account for All *Relevant* Impacts

Even if hard to quantify – consider range of methodological options

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.

* See NSPM Companion Guidance: *Methods, Tools & Resources - A Handbook for Quantifying DER Impacts for BCA (March 2022)*

** *See 2020 LBNL Report:* Applying Non-Energy Impacts from Other Jurisdictions in Cost-Benefit Analyses of Energy Efficiency Programs: Resources for States for Utility Customer-Funded Programs

Principle #8: Conduct BCA Separately from Rate Impact Analysis

Rate Impact (and bill impact) analyses address equity issues, and answer different questions than BCA

	Benefit-Cost Analysis	Rate Impact Analysis
Purpose	To identify which DERs utilities should invest in or otherwise support on behalf of their customers	To identify how DERs will affect rates, in order to assess equity concerns
Questions Answered	What are the future costs and benefits of DERs?	Will customer rates increase or decrease, and by how much?
Results Presented	▪ Cumulative costs (PV$) ▪ Cumulative benefits (PV$) ▪ Cumulative net benefits (PV$) ▪ Benefit-cost ratios	▪ Rate impacts (c/kWh, %) ▪ Bill impacts ($/month, %) ▪ Participation rates (#, %)

The Rate Impact Measure (RIM) Test is sometimes used for BCA purposes. However, it combines the two analyses and therefore makes it difficult to answer either question

NSPM's 5-Step Process For Defining a Primary Cost-Effectiveness Test (JST)

STEP 1 — **Articulate Applicable Policy Goals**

Articulate the jurisdiction's applicable policy goals related to DERs.

STEP 2 — **Include All Utility System Impacts**

Identify and include the full range of utility system impacts in the primary test, and all BCA tests.

STEP 3 — **Decide Which Non-Utility System Impacts to Include**

Identify those non-utility system impacts to include in the primary test based on applicable policy goals identified in Step 1:

- Determine whether to include host customer impacts, low-income impacts, other fuel and water impacts, and/or societal impacts.

STEP 4 — **Ensure that Benefits and Costs are Properly Addressed**

Ensure that the impacts identified in Steps 2 and 3 are properly addressed, where:

- Benefits and costs are treated symmetrically;
- Relevant and material impacts are included, even if hard to quantify;
- Benefits and costs are not double-counted; and
- Benefits and costs are treated consistently across DER types

STEP 5 — **Establish Comprehensive, Transparent Documentation**

Establish comprehensive, transparent documentation and reporting, whereby:

- The process used to determine the primary test is fully documented; and
- Reporting requirements and/or use of templates for presenting assumptions and results are developed.

Identify Applicable Benefits & Costs – Utility System Impacts

Utility System Impacts are foundational – Always Include

Type	Gas Utility System Impact
Energy/Supply	Fuel / Commodity
	Capacity and storage
	Environmental compliance
	Market price effects
Transportation	Pipeline capacity
	Pipeline losses
Delivery	Local delivery capacity
	Local delivery line losses
General	Financial incentives
	Program admin costs
	Performance incentives
	Credit and collection costs
	Risk, reliability, resilience

Type	Electric Utility System Impact
Generation	Energy Generation
	Capacity
	Environmental Compliance
	RPS/CES Compliance
	Market Price Effects
	Ancillary Services
Transmission	Transmission Capacity
	Transmission System Losses
Distribution	Distribution Capacity
	Distribution System Losses
	Distribution O&M
	Distribution Voltage
General	Financial Incentives
	Program Administration
	Utility Performance Incentives
	Credit and Collection
	Risk
	Reliability
	Resilience

Identify Applicable Benefits & Cost - Other Fuel Impacts

For DERs implemented by electric utilities, other fuels include:

- Gas utility system impacts
- Oil, propane, wood, gasoline, etc.

For DERs implemented by gas utilities, other fuels include:

- Electric utility system impacts
- Oil, propane, wood, gasoline, etc.

Type	Impacts
Oil, Propane, Wood, Gasoline, etc.	Fuel and O&M
	Delivery Costs
	Environmental Compliance
	Market Price Effects

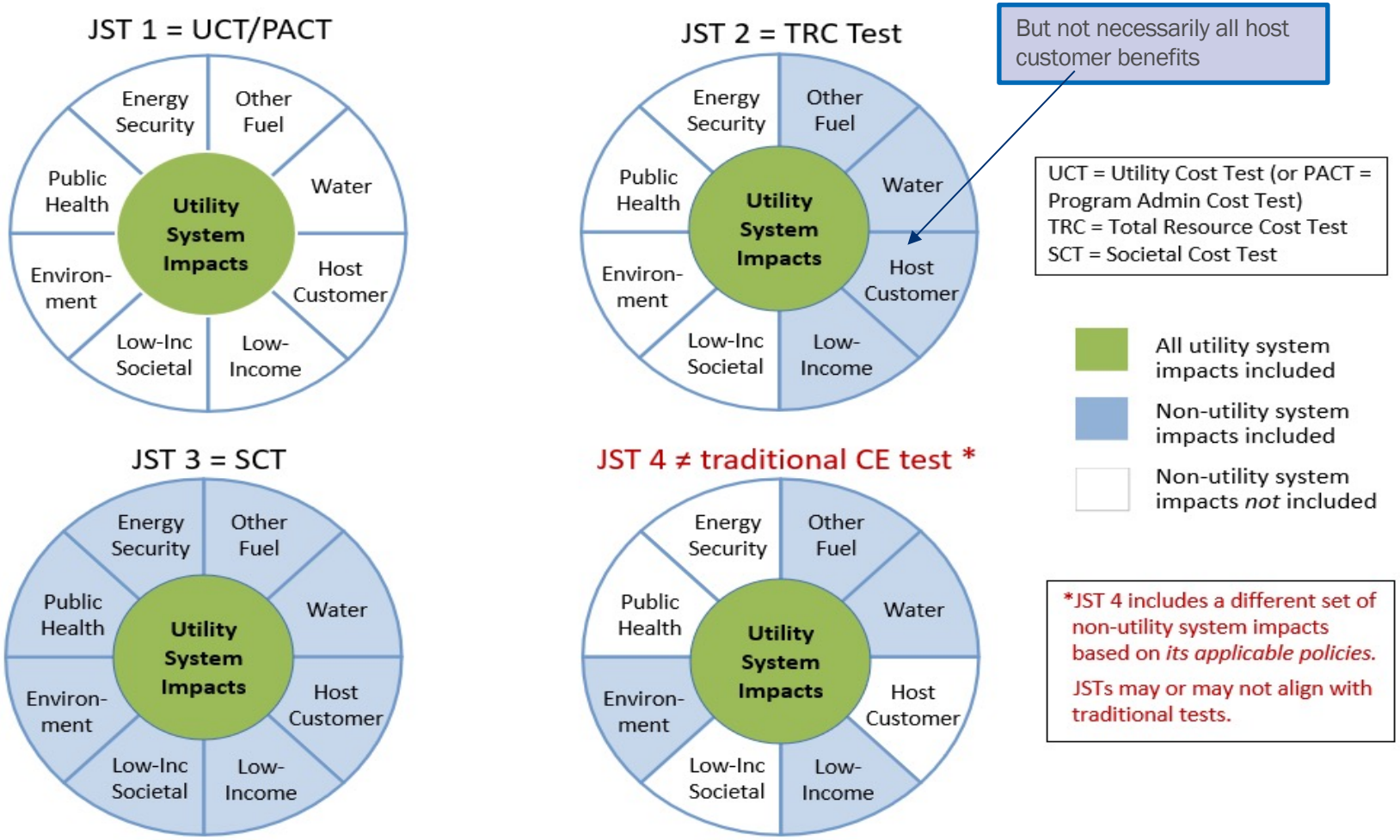
Identify Applicable Benefits & Costs – Host and Societal Costs and Benefits

Type	Host Customer Impact
Energy Related Impacts	Host portion of DER costs
	Interconnection fees/electrical upgrades
	Risk
	Reliability
	Resilience
	Tax incentives
	Transaction costs
	Asset value
	Productivity
Non-Energy Impacts (NEIs)	Economic well-being
	Comfort
	Health & safety
	Empowerment & control
	Satisfaction & pride
	Other

Societal Impacts
GHG Emissions*
Other Environmental*
Economic Development and Jobs
Public Health
Low Income/Vulnerable Populations: Society
Resilience
Energy Security

Primary Test = Jurisdiction Specific Test (JST)

Traditional tests as compared to Hypothetical JST

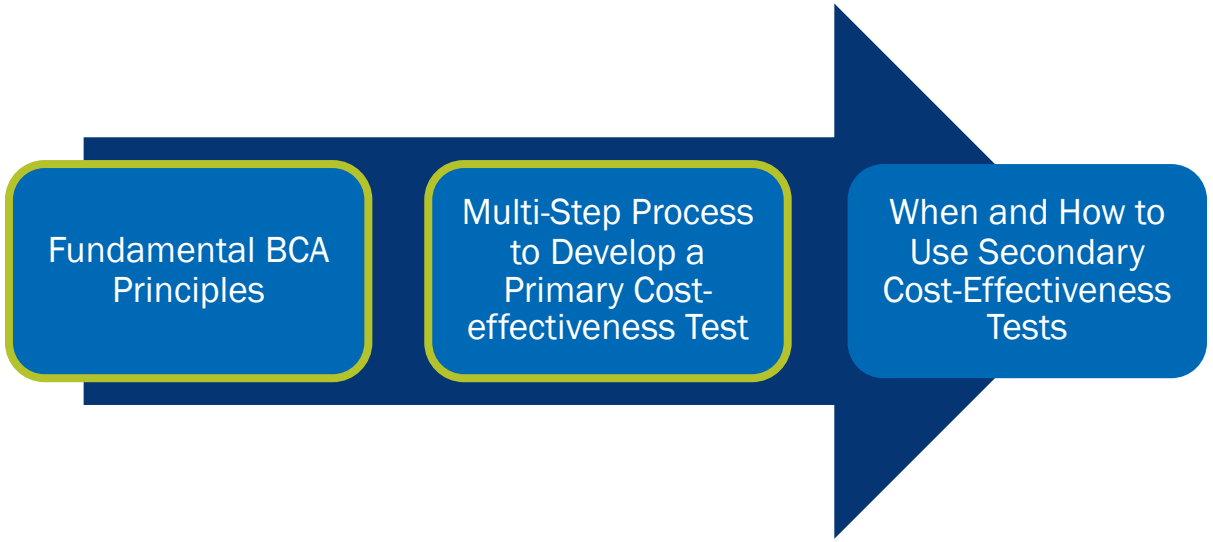


Source: NSPM for DERs, 2020

GROUP EXERCISE:
YOUR TURN TO BUILD A BCA TEST!

Breakout Groups: Develop a JST

Define a primary BCA test using NSPM principles and multi-step process



NSPM multi-step process (where BCA Principles are applied throughout)

STEP 1	Articulate Applicable Policy Goals
STEP 2	Include All Utility System Impacts
STEP 3	Decide Which Non-Utility System Impacts to Include
STEP 4	Ensure that Benefits and Costs are Properly Addressed
STEP 5	Establish Comprehensive, Transparent Documentation

Hypothetical Jurisdiction - Profile

- Electric investor-owned utility operating in the Mid-Atlantic region with a structured wholesale market (PJM) and carbon cap-and-trade market (RGGI)
- Currently uses a TRC as primary BCA test. Commission has opened docket to review and update BCA practices to ensure consistency across cost-effective assessment of all DERs
- Jurisdiction's policy goals include:
  - Energy Efficiency Statute (1992)
  - Renewable Portfolio Standard (2003)
  - Clean Energy Act (recent 2022 passage) with clear GHG emission reductions goals

See handout with information on hypothetical and forms with impact categories – for use in breakout group exercise

STEP 1

Articulate Applicable Policy Goals

Articulate the jurisdiction's applicable policy goals related to DERs.

Hypothetical jurisdiction:

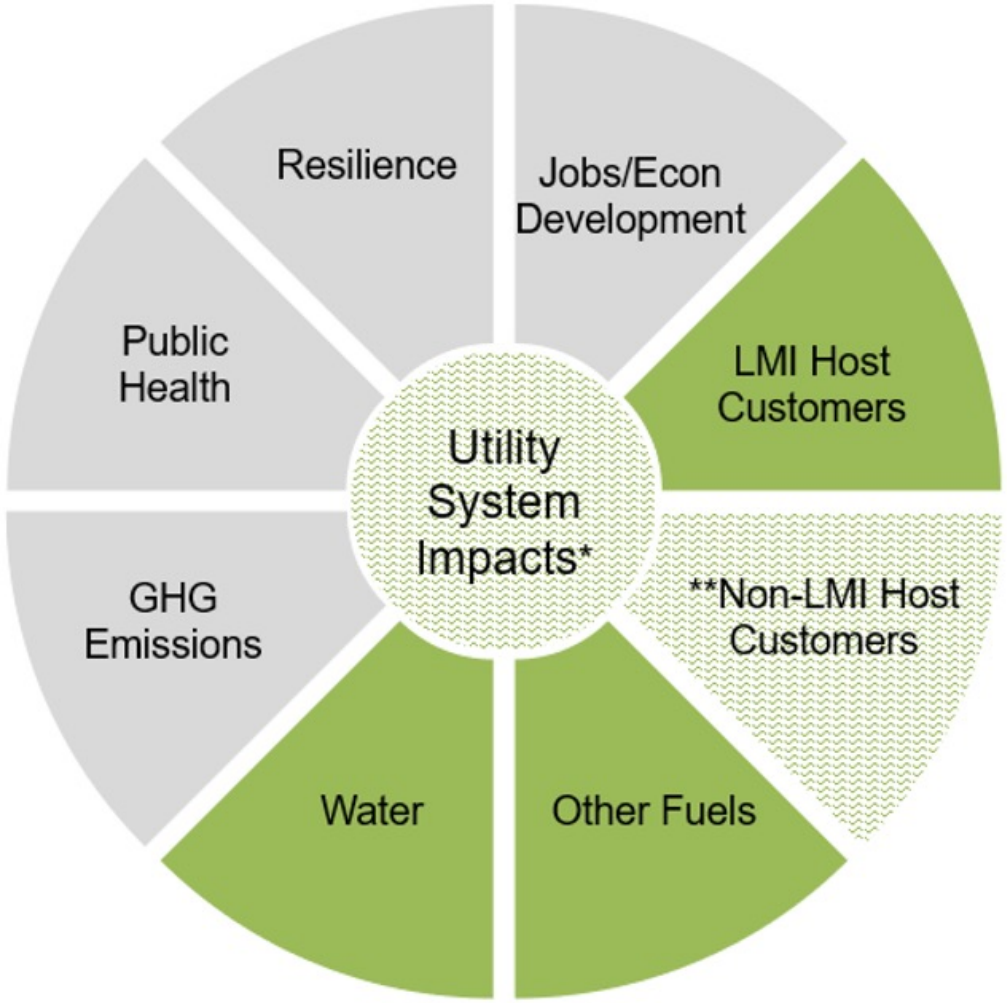
Jurisdiction's Applicable Policies Statutes, Regulations, Plans, Orders, etc.	Electric Utility System Impacts	Goals Reflected in Policies						
		Reduce Other Fuels	Reduce GHG Emissions	Resilience	Improve Public Health	Economic Develop-ment	Provide Benefits to Host Customers	Protect Low Income Customers
Energy Efficiency Statute (1992)	✓		✓				Not clear	✓
Renewable Portfolio Standard (2003)	✓		✓					
Clean Energy Act (2022)[1, 2]	✓	✓	✓	✓			Not clear	✓

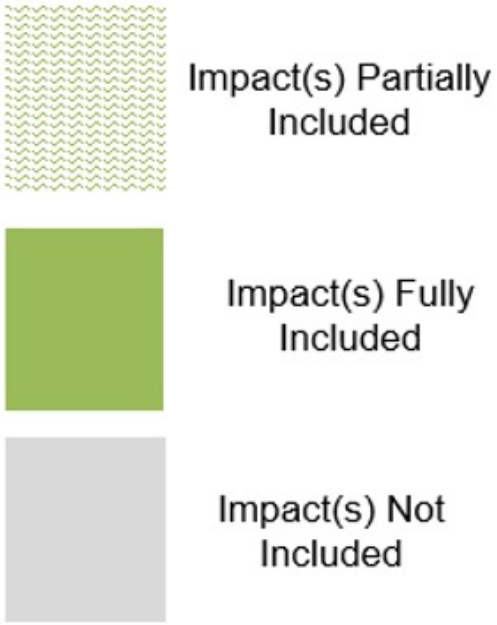
[1] Policy applies to all DERs and across all fuels. DERs include energy efficiency, demand response, distributed storage, distributed generation, transportation and building electrification

[2] Policy includes goal of providing demand flexibility to help meet GHG emission reductions. Demand flexibility impacts are captured within utility system impacts e.g., capacity, resilience impacts on system

Current Test: Total Resource Cost (TRC) Test

Question – does this test align with NSPM principles?





* Does not include wholesale price market effects, ancillary services, risk, reliability or resilience

** Includes host customer costs but no host customer benefits

STEP 2

Include Utility System Impacts

Identify and include the full range of utility system impacts in the primary test, and all BCA tests.

Electric Utility System Impacts		In current TRC test	Include in JST?
Generation	Energy Generation	✓	
	Capacity	✓	
	Environmental Compliance (RGGI Cap and Trade; CAA criteria air pollutants)	✓	
	RPS Compliance	✓	
	Market Price Effects		
	Ancillary Services		
Transmission	Transmission Capacity	✓	
	Transmission System Losses	✓	
Distribution	Distribution Capacity	✓	
	Distribution System Losses	✓	
	Distribution O&M	✓	
	Distribution Voltage		
General	Financial Incentives	✓	
	Program Administration	✓	
	Utility Performance Incentives	✓	
	Credit and Collection Savings		
	DER management system costs		
	Risk		
	Reliability		
	Resilience		

Break Out Groups:

Which impacts should be in the JST but are not currently in test?

STEPS 3 and 4

Include All Appropriate Non-utility System Impacts
Ensure That Benefits and Costs are Properly Addressed

Identify those non-utility system impacts to include in the primary test based on applicable policy goals identified in Step 1.

- **Other Fuel Impacts (e.g., oil, gas, propane, wood):** may be relevant if articulated by policy goals?
- **Host Customer Impacts (LMI and non-LMI):** Is policy clear on treatment/inclusion of these impacts for both LMI and non-LMI utility customers?
- **Societal Impacts:** Which 'societal' goals are articulated for this jurisdiction in its policies?

Non-Utility System Impacts – Host Customer

Type	Host Customer Impact	In current TRC test	Include in JST?
Energy Related Impacts	Host portion of DER costs	✓	
	Interconnection fees/electrical upgrades		
	Risk		
	Reliability		
	Resilience		
	Tax incentives	✓	
Non-Energy Impacts (NEIs)	Transaction costs		
	Asset value		
	Productivity	✓	
	Economic well-being		
	Comfort		
	Health & safety		
	Empowerment & control		
	Satisfaction & pride		
	Other		

Non-Utility System Impacts: Other Fuels and Resources

Other Fuel Impacts (includes natural gas, oil, propane, wood, and gasoline)	In current TRC test	Include in JST?
Fuel Commodity and O&M		
Environmental Compliance		
Risk /Other Fuel Resource Impacts		
Other Resources		
Water impacts		
Other		

Non-utility System Impacts – Societal

Societal Impacts	In current TRC test	Include in JST?
GHG Emissions*		
Other Environmental*		
Economic Development and Jobs		
Public Health		
Low Income/Vulnerable Populations: Society		
Resilience		
Energy Security		

Break Out Groups:

Check which impacts should (or should not) be in the JST?

* Are there impacts beyond any compliance costs captured in utility system impacts?

Things to remember, questions to ask, what more do you need to know, what are the challenges of implementing this new JST….

- Policies:
  - What are “relevant” policies, e.g., do some “non-energy” policies count?
- Double-Counting
  - What costs are already in utility impacts (e.g., in the avoided costs)?
- Does the ability to monetize a cost or benefit affect my inclusion of the impact in the JST?

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.

BREAK OUT GROUPS

COMPLETE EXERCISE TO DEVELOP JST

12.5 MINUTES (?)

Breakout Groups - use NSPM BCA framework to answer:

1. Does current TRC align with jurisdiction's policy goals? If not, what's missing or needs to change?
2. Is there symmetrical treatment of costs and benefits?
3. Are there relevant but hard to quantify impacts that you are not including? If so, why not?
4. What benefits and costs are you including in your JST?
5. What is the name of your JST

Debrief on New JST

- What's changed in the JST relative to the starting point TRC?
  - Utility System Impact
  - Other Fuels
  - Host Customer Impacts
  - Societal Impacts
- Did you 'comply' with Step 4?
  - Ensure that benefits and costs are properly addressed
    - Symmetrical treatment of costs and benefits?
    - All relevant impacts included?
    - JST is defined to ensure consistency across DERs?
- What is the name of your JST?

LET'S APPLY THE JST TO A GEB PROGRAM

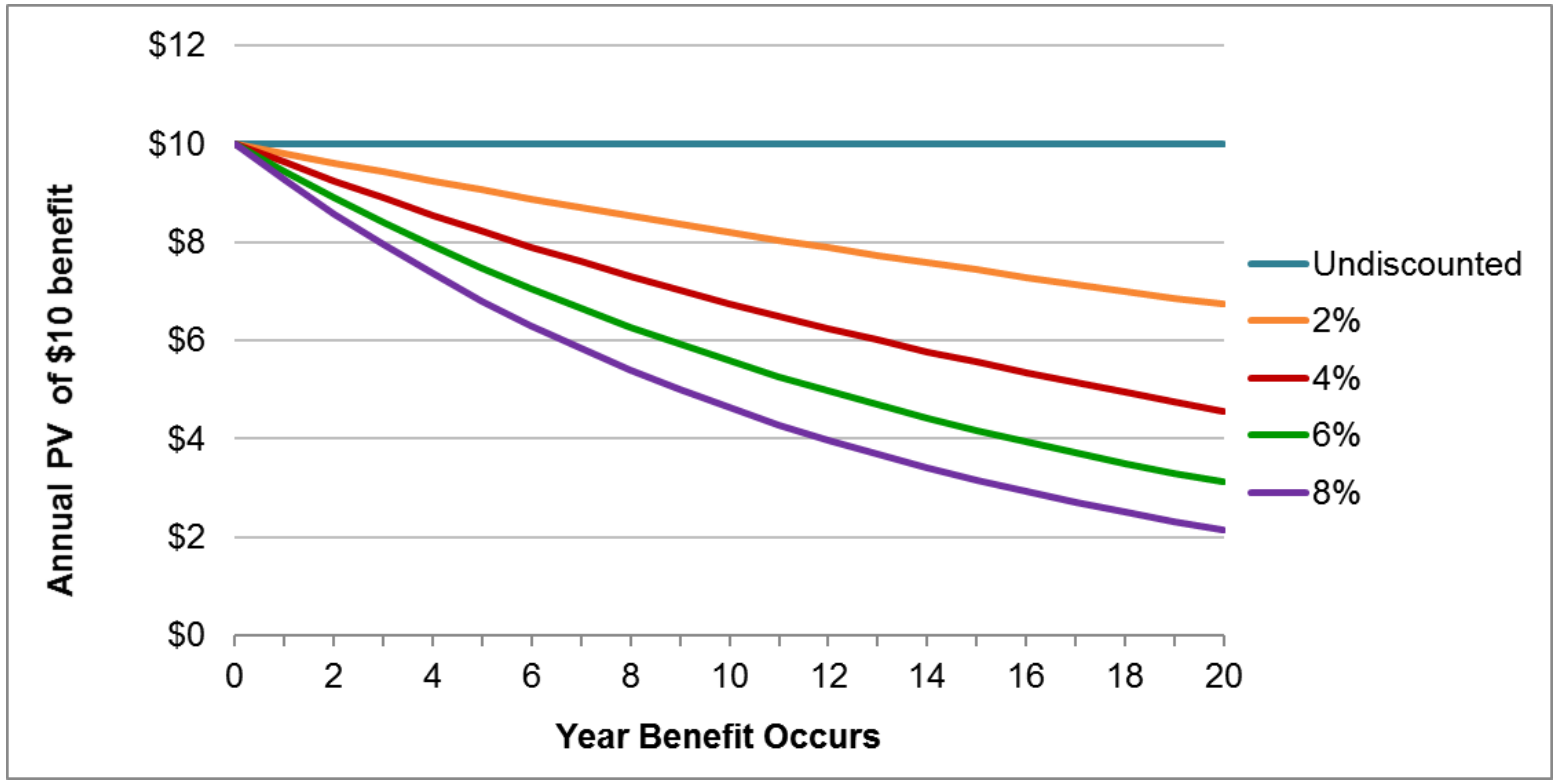
IMPACT EVALUATION FOR DETERMINING THE INPUTS FOR BCAS (AND OTHER PURPOSES) WILL BE DISCUSSED IN THE NEXT PART OF OUR COURSE ON EM&V – BUT AS A WARM-UP AND TIE-IN, LET'S TALK ABOUT HOW YOU "GET THE NUMBERS"

Key Steps For Calculating BCA Impacts

STEP 1	**Identify Impacts Metrics based on BCA Test:** Once relevant impacts for the BCA test are identified (see NSPM 2020), these impacts will define the relevant metrics to use in estimating the value of marginal impacts, e.g., MWh, kW, MMBtu, benefits/kWh, others. (See NSPM Section 2.2. and Table 4.)
STEP 2	**Identify DERs to be Evaluated:** The types of DERs to be analyzed in a BCA may include energy efficiency, demand response, distributed generation, storage, electrification, electric vehicles, or some combination of these DERs. Establish the scale of each DER to be analyzed, i.e., approximate capacity (MW) and energy (MWh or MMBTU), in each year assessed. (See MTR Section 2.3)
STEP 3	**Determine the Study Period:** The BCA study period is the number of years over which benefits and costs will be analyzed. The study period should be long enough to include the full operating life of the DERs being analyzed (See MTR Section 2.4).
STEP 4	**Determine DER Load Impact Profiles:** The DER load impact profiles can be used to estimate the energy and capacity impacts of the proposed DER, i.e., the magnitude and timing of MWh, kW, MMBtu, or other impacts. (See MTR Section 2.5.)
STEP 5	**Determine Reference and DER Use Cases** The Reference Case creates a baseline against which the DERs will be compared. (See Section 2.6.) The DER Case should include all the incremental DERs being evaluated in the BCA and should not include all the other resources avoided by those DERs. (See MTR Section 2.6.)
STEP 6	**Determine Marginal Impacts:** The marginal impact can be calculated as the difference between the value of the relevant metric(s) for the DER Case minus the value of the relevant metric(s) for the Reference Case. (See MTR Section 2.7.)
STEP 7	**Calculate Values of Marginal Impacts** The dollar value is determined by multiplying the relevant metric by the marginal impact. The marginal impacts should be “mapped onto” the DER load impact profile. (See MTR Section 2.8.)

Implementation Issue: Discount Rates

Have big impact on value of resource in the future…



There are three categories of discount rates typically considered for DER assessments: Weighted Average Cost of Capital (WACC), average customers' discount rate, and societal discount rate. A fourth option is some combination of these three categories.

See 2020 NSPM Appendix G for more information on selecting discount rates for BCA

Implementation Issue: Time Value of Savings

DERs that reduce demand during peaks produce the most value

Figure from: **Time-Sensitive Value of Efficiency:** Use Cases in Electricity Sector Planning and Programs Natalie Mims Frick and Lisa Schwartz November 2019, Lawrence Berkeley Lab

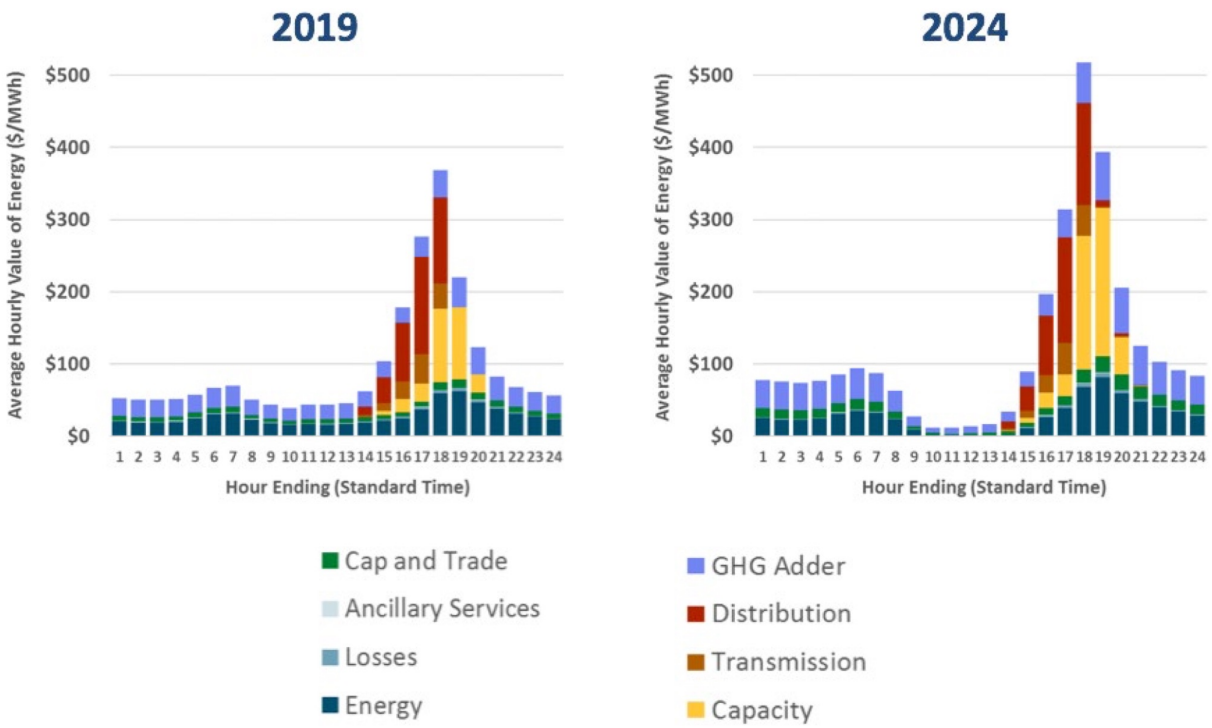
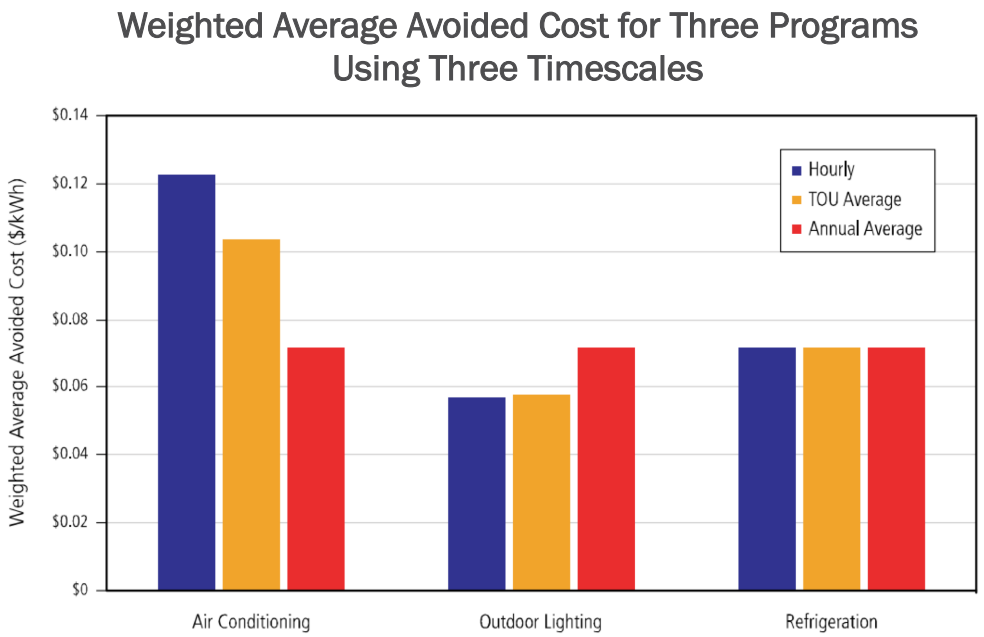


Figure 13. California Avoided Cost Model Output for Climate Zone 4 (hot and dry): 2019 and 2024



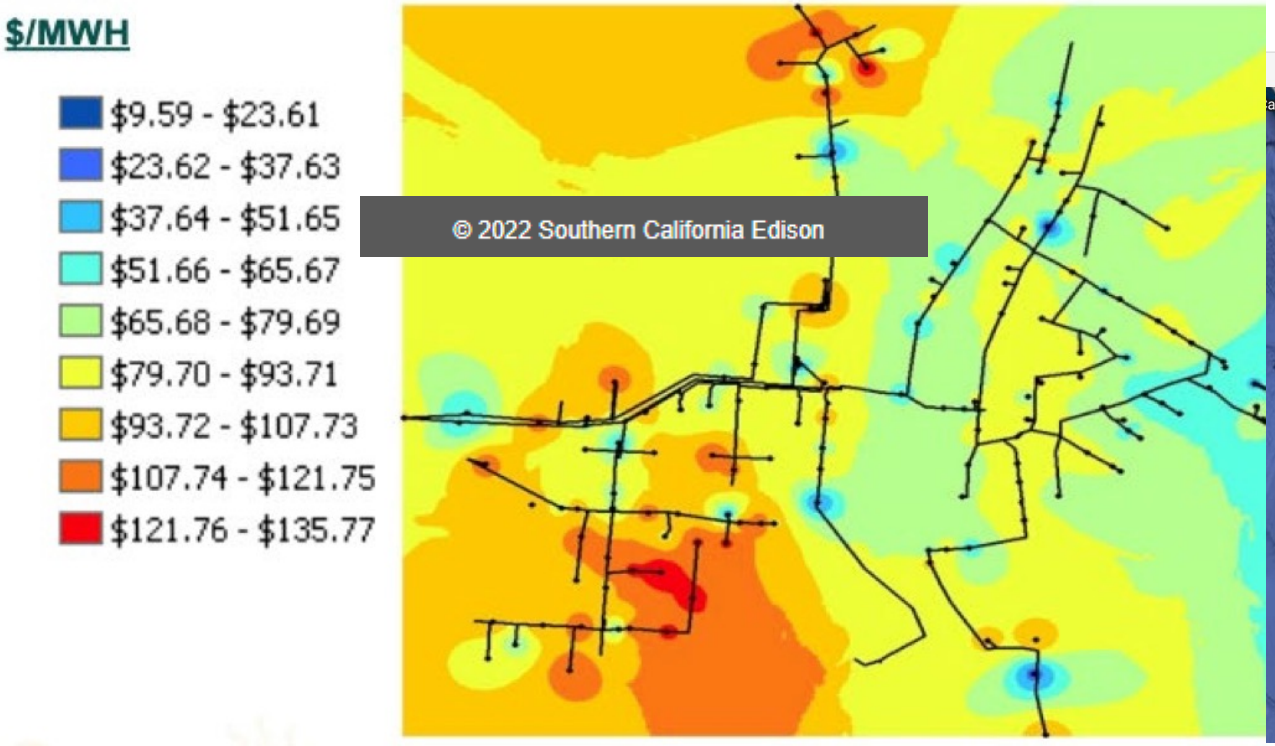
Price, S. *2018. No time to lose: Recent research on the time-sensitive value of electric energy efficiency*. Berkeley, CA: E3 presentation for Berkeley Lab webinar. *https://emp.lbl.gov/webinar/no-time- lose-recent-research-time*

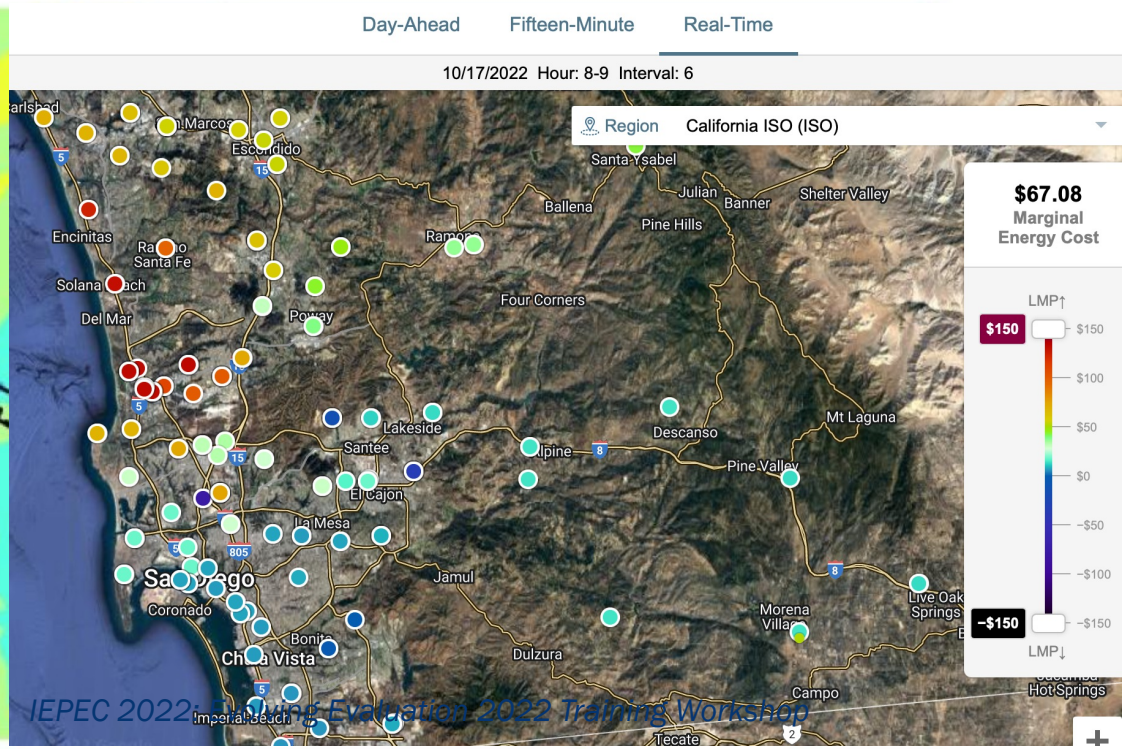
Implementation Issues: Locational Value of Energy

The figure shows an analysis of load growth for Southern California Edison, highlighting in red circuits that have very high marginal avoided cost, highlighting the most cost-effective locations for DERs.

Source: Martinez, M., K. Skinner, and E. Woychik. 2020. Integration and Optimization of Consumer Distributed Energy Resources., 2020.

And … time and location combined determine value of electricity - CAISO real time price data for San Diego region





Implementation Issue: Market Structure Influences Value of DERs

Organized Markets

- Value established by market
- Only values "products" traded in market:
  - Capacity
  - Energy
  - Reserves (spinning and balancing)
  - Volt/Var support
- Potential Gaps/Challenges – these values may not be "priced"
  - Locational value of avoided/deferred
  - T&D capacity
  - Resilience
  - Recognition of "long-term" resource value in some markets

Vertically Integrated Utilities

- Value established through regulatory/planning processes (e.g., PURPA filings, IRPs)
- Value depends on scope of state "cost-effectiveness" test(s)

Implementation Issue: Electrification BCA – Key Points

Not cost-effective if only consider utility system impacts

- Adds cost to electric utility system (relative to no electrification)
- Virtually all benefits are other fuels, consumer, and/or societal

Building Electrification

Key BCA factors:

- Avoided gas costs
- Avoided generation capacity (summer peak assumptions) and demand flexibility value
- Avoided GHG emissions (value for social cost of carbon?)
- Interactive effects (across multi-DER measures)
- Incremental cost of measures / service upgrade costs
  - Highly variable cost based on home vintage

Transportation Electrification

- Time of use can have large effect on electric system costs
- Managed charging can significantly reduce costs
- V2G capability can further mitigate costs (storage resource)
- Charging locations/options can affect electric system costs (home vs. work vs. public)
- Local T&D constraints

Implementation Issue: Electrification BCA – Key Points, continued

Not cost-effective if only consider utility system impacts

- Adds cost to electric utility system (relative to no electrification)
- Virtually all benefits are other fuels, consumer, and/or societal

Some other key points – NSPM 2020 Chapter 10 for more information:

- Electrification resources can include replacing other fuels in buildings and in the transportation sector, such as EVs.
- Electrification resources **are likely to be cost-effective only when the benefits of reducing other fuel use are included** in a jurisdiction's cost-effectiveness analyses.
- The amount of added costs to the electric grid due to electrification will **depend upon when the technologies are utilized, which in turn will be influenced by the host customer rate structure.**
- The added costs to the electric grid due to most electrification technologies may also be reduced when combined with DR, such as "managed charging" of EVs and direct load control of heat pumps.
- EVs with V2G can potentially even reduce net *electric utility* system costs, because of their ability to function as storage.
- **Electrification measures can reduce net air emission impacts as long as the marginal emissions from the electricity grid are lower than marginal emissions of the displaced fuel.**
- Electrification resources will typically create increased revenues for the electric utility. These might lead to **reduced electricity rates.**
- Electrification resources will sometimes create lost revenues for the gas utility. These might lead to **increased gas rates.**

Example:

Electrification Impacts for Electric Utility System

Benefit or Cost (or 'Depends')

Type	Utility System Impact	Benefit or Cost	Notes, or Typical Applicability
General	Energy Generation	●	A cost because electrification increases electricity generation. Cost for many measures can be reduced through economic dispatch using DR and further reduced through use of storage capabilities of V2G EVs. (See Chapters 7 and 9.)
	Generation Capacity	●	A cost because most uncontrolled electrification measures will add some demand on system peak (electric heat in summer peaking system is a possible exception). Resulting capacity cost for many measures can be reduced through DR; it can be eliminated or even made negative (i.e., a grid benefit) if storage capability of V2G EVs is utilized. (See Chapters 7 and 9.)
	Environmental Compliance	●	By adding load to the grid, electrification can increase electric costs of compliance (but reduce other fuel costs of compliance).
	RPS/CES Compliance	●	By increasing electricity load, the quantity of renewables needed to meet RPS increases.
	Market Price Response	●	Any increase in electricity consumption will increase market clearing prices where there are competitive wholesale markets.
	Ancillary Services	●	By itself, electrification could increase ancillary services costs. However, both EVs and water heaters offer the ability to provide ancillary services when enabled through DR; if that capability is utilized, this can become a benefit. (See Chapter 7.)
Transmission	Transmission Capacity	●	Most uncontrolled electrification measures will add some demand at transmission peak time (electric heat in summer peaking region a possible exception). Resulting capacity cost for many measures can be reduced through DR and eliminated or even made negative (i.e. a grid benefit) if storage capability of V2G EVs is utilized. (See Chapters 7 and 9.)
	Transmission System Losses	●	Any consumption increase will increase losses.
Distribution	Distribution Capacity	●	Most uncontrolled electrification measures will add some demand at distribution peak time (electric heat in summer peaking area is a possible exception). Resulting capacity cost for many measures can be reduced through DR and eliminated or even made negative (i.e. a grid benefit) if storage capability of V2G EVs is utilized. (See Chapters 7 and 9.)
	Distribution System Losses	●	Any consumption increase will increase losses.
	Distribution O&M	●	Any consumption increase will increase O&M.
	Distribution Voltage	●	Added loads will make distribution voltage more challenging to keep at desired levels.

● = usually a benefit

● = usually a cost

● = could be either a benefit or cost, depending upon application.

○ = not relevant

Source: NSPM for DERs, 2020

nesp

Example:

Electrification Impacts for Electric Utility System, continued

Type	Utility System Impact	Benefit or Cost	Notes, or Typical Applicability
General	Financial Incentives	●	Costs, where relevant
	Program Administration Costs	●	
	Utility Performance Incentives	●	
	Credit and Collection Costs	●	A benefit because other fuel savings may make it easier for customers with electrified end-uses to afford electricity bills.
	Risk	●	Adds risk to electric grid but may be offset by reduced risk associated with displaced fuel(s)
	Reliability	●	By adding load to the grid, electrification will decrease electric system reliability. For many measures that effect can be reduced through DR; it can be eliminated or made negative (i.e., a grid benefit) if storage capability of V2G EVs is utilized. (See Chapters 7 and 9.)
	Resilience	O	Electrified building end-uses do not affect electric system resilience; EVs functioning in V2G mode, could improve resilience by functioning as storage. (See Chapter 9.)

Example:

Electrification Impacts for Society

Type	Societal Impact	Benefit or Cost	Notes/Typical Applicability
Societal	Resilience	●	Depends upon whether reduced gas consumption affects critical customers and whether increased electricity consumption stresses the grid
	GHG Emissions	●	Depends on use case and hourly environmental profile of electricity grid relative to fossil fuel combustion emissions displaced by appliance/vehicle
	Other Environmental	●	
	Economic and Jobs	●	Potentially a net benefit or net cost depending upon fuels displace
	Public Health	●	Same as GHG emissions and other environmental
	Low Income: Society	●	Potentially a benefit depending on siting and low-income participation
	Energy Security	●	Potentially a benefit depending upon the extent that petroleum products are being displaced

● = typically a benefit for this resource type; ● = typically a cost for this resource type; ● = either a benefit or cost for this resource type, depending upon the application of the resource; O = not relevant for this resource type.

Source: NSPM for DERs, 2020

Application of JST to a GEBs (DER) Use Case – Group Discussion Exercise

Reference Case Assumption	Residential customers with a 2,500 square foot single family home with: SEER 10 central AC, 80% Annualized Fuel Utilization Efficiency (AFUE) gas furnace, and no DR program participation.
DER Case Definition	Residential customers would retrofit and install combined EE, DR, and building electrification technologies: ▪ EE: Upgrading ceiling insulation & reducing air leakage ▪ Building electrification: Installing an ASHP to replace the natural gas furnace and central AC ▪ DR: installing a smart thermostat with automatic enrollment in a DR program

Review the handouts with the prepared case study. Review the Tables (3.3 – 3.6) of inputs and sources

- What are the factors that are going to impact cost-effectiveness
- How would you account for the values in your JST for this case study, would you do anything different than what is shown in the tables? Remember the list of five approaches to getting values for inclusion in a BCA
  - Jurisdiction-specific studies
  - Studies from other jurisdictions
  - Proxies
  - Alternative thresholds
  - Other considerations

Case study from: *Methods, Tools & Resources - A Handbook for Quantifying DER Impacts for BCA (March 2022)*

Group Discussion Questions – Let's pick some…

- Are all environmental costs included in utility system impacts, are they double counted in societal impacts?
- Should avoided gas capacity (infrastructure) and O&M costs be included?
- What should the new baseline be after the end of the 6-years of remaining useful life for the replaced central AC?
- Is the right discount rate used?
- Is there a better way to address host customer NEIs other than a 5% adder
- Should have a reliability and /or resilience benefit been included?
- How many demand response events should be included in BCA?
- What did you think of the interactive impacts analysis?
- Want to talk about DRIPE (demand reduction induced price effect)?
- Does this example make you want to change the JST you developed in the last exercise?

DISTRIBUTIONAL EQUITY ANALYSIS

- What is energy equity
- Why can't BCA address energy equity?
  - Cannot account for structural or procedural equity, does not fully address distributional equity
- Conceptual distributional equity analysis (DEA) framework:
  - Conducted in addition to BCA
  - Provides insight on the distributional equity of DER programs

Let's first touch on an Energy Equity definition

- To date, there is no standard definition of "energy equity" in the electric and gas utility industries.
- Some organizations define "energy equity" and "energy justice" as the same thing. Others view them as separate, with energy justice encompassing, among other things, the remediation of historical injustices in the energy system.
- Here is one definition from one of DOE's National Labs:
  - *An equitable energy system is one where the economic, health, and social benefits of participation extend to all levels of society, regardless of ability, race, or socioeconomic status. Achieving energy equity requires intentionally designing systems, technology, procedures, and policies that lead to the fair and just distribution of benefits in the energy system.*

Source: Pacific Northwest National Laboratory, *PNNL's Visions Statement for Equity in the Power Grid*, PNNL website: https://www.pnnl.gov/projects/energyequity#:~:text=What%20is%20energy%20equity%3F,energy%2Defficient%20housing%20and%20transportation

State Energy Equity Goals

- States like CA, WA, OR, and MA are leading the way:
  - Developing clear energy equity goals for DER programs:
    - Increase program participation, trade ally diversity, community engagement, etc.
  - Identifying priority communities for energy equity purposes ("target populations"):
    - Environmental justice communities, renters, linguistically isolated communities, limited-income communities, etc.

Dimensions of Energy Equity

Structural Equity

- Decisions are made with a recognition of the historical, cultural, and institutional dynamics and structures that have led to energy inequities.
- Decision makers reform policies and programs that perpetuate disparities and work to build policy and program agendas that are fair, just, and equitable for current and future customers.

Procedural Equity

- Offer inclusive, accessible, authentic engagement and representation in the process of developing or implementing energy programs and policies.
- Community members have an active leadership role in the planning process and ensure their needs and concerns inform and drive the development and outcomes of programs, goals, and solutions.

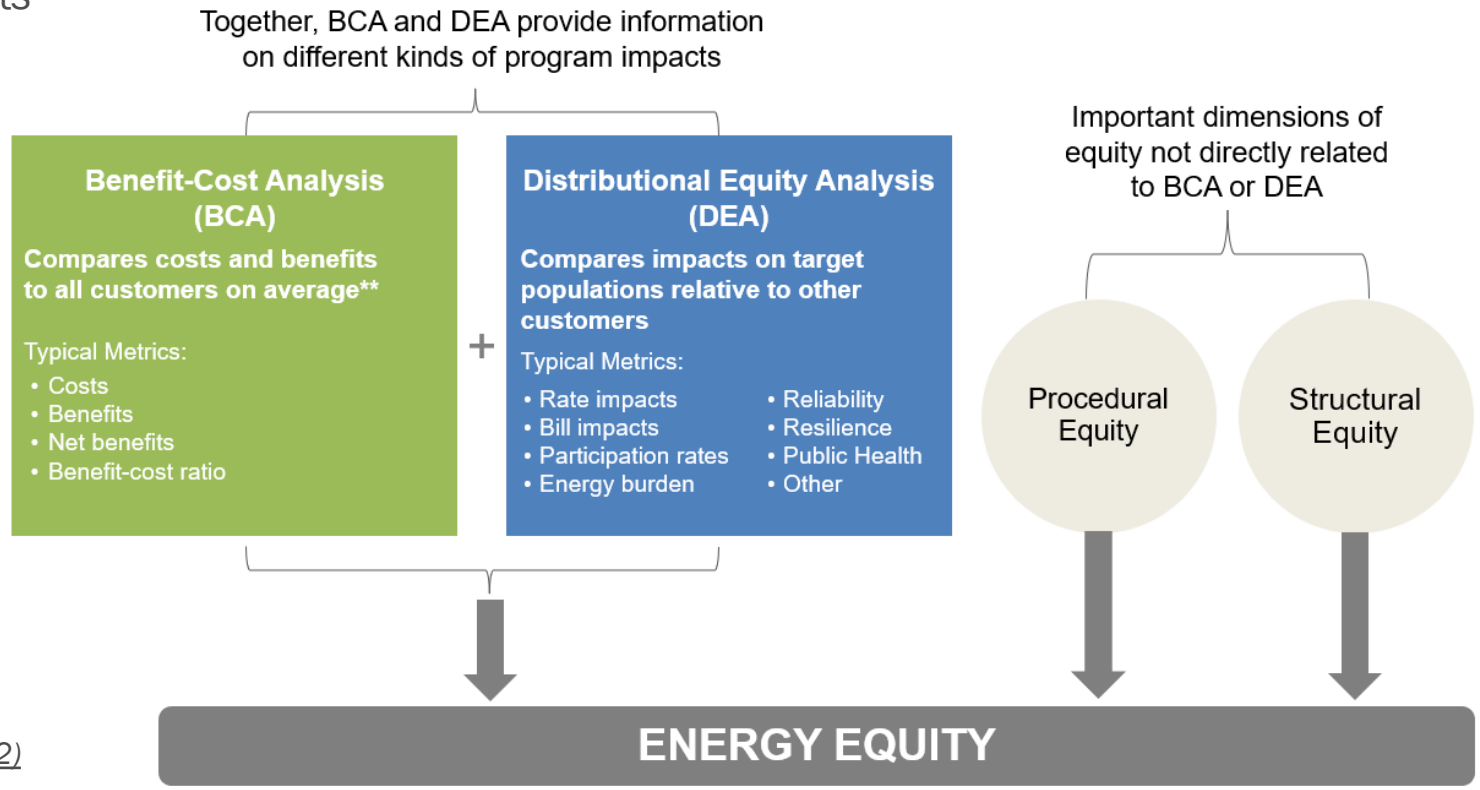
Distributional Equity

- Energy policies and programs achieve fair distribution of benefits and burdens across all segments of a community and across generations.
- Policies and programs effectively and equitably reach and benefit all current customers (e.g., lower energy bills, jobs, community wealth) and don't result in unfair burdens on future generations.

Source: NSPM MTR, adapted from the American Council for an Energy Efficient Economy (see ACEEE Energy Equity).

Accounting for Equity

- BCA and DEA are related but provide different information
- Procedural and structural equity are important but not directly related to BCA
- Distributional equity requires assessing *which customers (i.e., target populations)* experience the costs and benefits of utility programs and investments



**Non-utility system impacts can be accounted for in BCAs if consistent with the jurisdiction's policy goals, but inclusion of these impacts in BCA does not provide a measure of equity across target populations.

Methods, Tools & Resources - A Handbook for Quantifying DER Impacts for BCA (March 2022)

BCAs and Distributional Equity

Equity Considerations in BCA To Date

- Jurisdictions use several practices to partly address energy equity in BCAs, including:
  - Alternative thresholds
  - Include societal impacts
  - Discount rates
- Some jurisdictions also conduct rate, bill, and/or participation impact analyses
  - Analyzes the distribution of rates, bills, participation across participants and non-participants
  - BCAs address **transgenerational equity** is through choice of **discount rate** used to calculate present values of costs and benefits.

BCA and Energy Equity – Limitations

- BCAs do not directly address structural or procedural equity
  - Community engagement, participation, etc.
- BCAs do not and should not account for rate, bill, or participation impacts
  - Answer different questions
  - The Rate Impact Measure (RIM) Test combines the analyses – making it difficult to answer either question
- Distributional equity – *which* customers experience the costs and benefits
  - BCAs cannot distinguish impacts to target populations - exceptions: income-qualified programs, community programs

BCA vs Distribution Equity Analysis (DEA)

	Benefit Cost Analysis	Rate, Bill, Participation Analysis	Distributional Equity Analysis
Purpose	To identify which DERs utilities should invest in or support on behalf of customers on average	To identify how DERs affect host versus non-host customers	To identify how DERs affect target populations versus other customers
Questions Answered	What are the costs and benefits of DERs across customers and (if applicable) society on average? What are the costs and benefits of a DER program designed for target populations?	What is the impact of DERs on host versus non-host customers?	What is the impact of DERs on target populations versus other customers?
Example Metrics for Reporting Results	Costs (PV$) Benefits (PV$) Net benefits (PV$) Benefit-cost ratios	Rate Impacts ($/kWh) Bill Impacts ($/month) Participation rates (% of eligible customers)	**Impacts on target populations:** Rate Impacts ($/kWh) Bill Impacts ($/month) Participation rates (% of eligible) Additional Impacts: ▪ Energy burden ▪ Public health ▪ Reliability ▪ Other ▪ Resilience

Conceptual Steps to Conduct DEA

example analysis

1. Define the target population(s)
2. Identify distributional equity metrics
3. Map available data to the target population, determine data gaps and limitations
4. Analyze the equity metrics to determine program impact on the target population relative to other customers
5. Present results to allow stakeholders and regulators to compare the results of the BCA and the DEA together

Analysis	Impact of Energy Efficiency Portfolio	Results	
Benefit Cost Analysis (BCA)		All Customers on Average	
	Cumulative Costs (million PV$)	200	
	Cumulative Benefits (million PV$)	300	
	Cumulative Net Benefits (million PV$)	100	
	Benefit-Cost Ratio	1.5	
Distributional Equity Analysis (DEA)		Target Population	Other Customers
	Participation (% of eligible population)	15	28
	Rates (% change)	1.4	1.4
	Participant Bills (% change)	-5.6	-4.5
	Participant Energy Burden (% change)	-5.6	-4.5
	Non-Participant Bills (% change)	1.4	1.4
	Non-Participant Energy Burden (% change)	1.4	1.4
	Criteria Air Pollution Emissions (% change)	-9	-2
	Asthma Emergency Room Visits (% change)	-11	-2
	Reliability (% change in system average interruption frequency index (SAIFI))	-4	-8

New Project to Develop DEA Guidance

E4TheFuture and Lawrence Berkeley Laboratory (LBL) partnering to develop DEA guidance in 2023

- Project jointly funded by US DOE and E4TheFuture
- Builds on MTR Handbook conceptual DEA framework (developed by Synapse Energy Economics)

Project will:

- Research current state of equity metrics and measurement
- Develop a how-to guide for stakeholders to conduct DEA
- Present a real-world case study application of DEA
- Be guided by an advisory group being convened this year

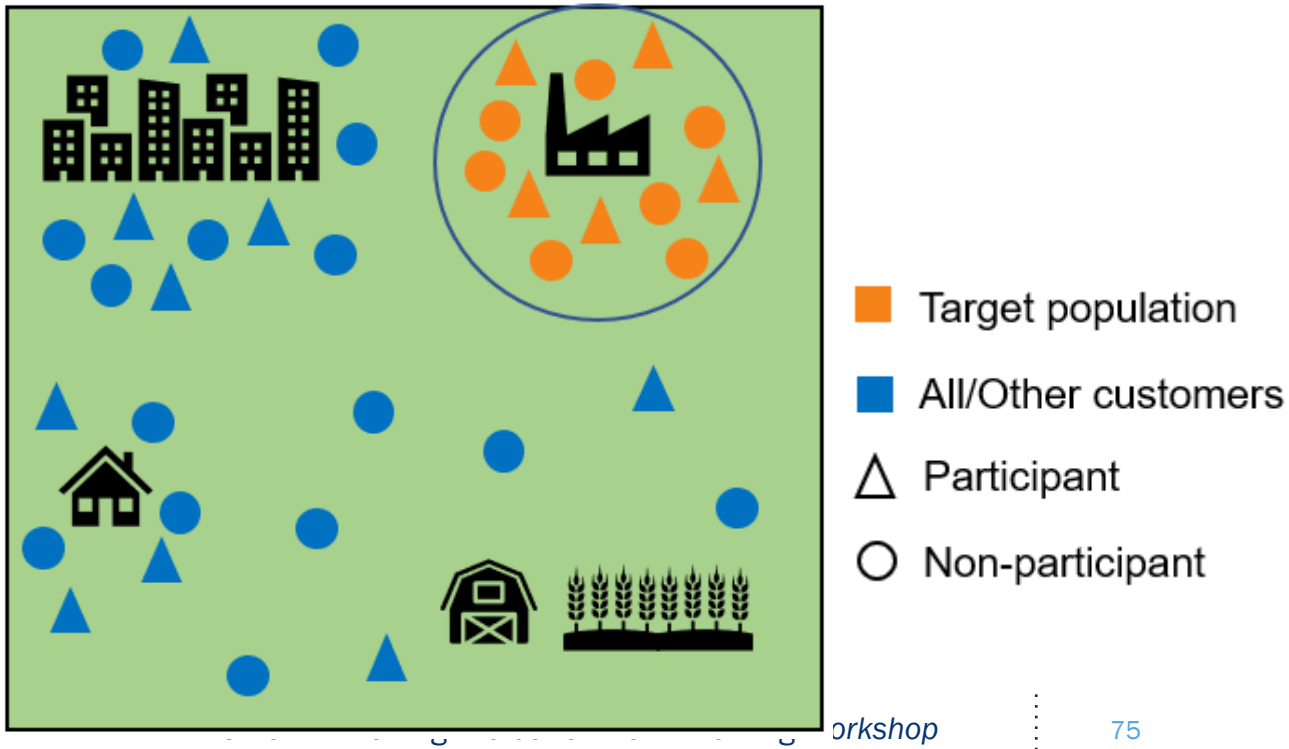
BCA vs DEA – Group Discussion Exercise

Consider a hypothetical jurisdiction with a clear policy to ensure equitable allocation of benefits from utility electrification related investments (building and transportation), with a focus on health impacts. They have defined their target population as a low-income community located next to a coal-fired power plant.

You are tasked to determine the public health impacts of a comprehensive Heat Pump program.

Discussion questions:

- How would your approach to evaluating the health impacts of this program differ if using to inform a BCA vs. a DEA?
- How might this program impact the public health outcomes for the target population vs other customers? How do you determine that?
- How might this program impact host vs. non-host customers? How do you determine that?



Thank you!

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