Aligning the non-energy benefits of utility programs with health outcomes

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EQUITY IN A CLEAN ENERGY ECONOMY

E Source
POWERING WHAT'S NEXT

Wednesday, March 8, 2023

E Source: Affordability and equity

ECEE background and challenge statement

The Equity in a Clean Energy Economy (ECEE) Collaborative is a unique group of more than 500 stakeholders focused on energy equity. Members work for utilities (municipal and investor-owned); state regulatory agencies; social service agencies; research institutes; consumer organizations; national associations and other nonprofit organizations; and creative, analytical, and software businesses.

Created in 2021, the ECEE adopted this challenge statement:

> ***Utilities have an obligation to provide safe, affordable, reliable energy to all. We believe the time has come to expand the traditional compact in the utility sector to include clean energy and new perspectives on equity. We must consider the impacts on the grid, the traditional utility business model, and customers, especially around affordability and access. Particular attention is needed to ensure that at-risk customers share the benefits of the transition to a clean energy economy. It is critically important that we get the right balance.***

ECEE mission

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Bring together different stakeholders to create new approaches and tools that ensure equity in a clean energy economy for at-risk customers and communities

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Background

On June 9, 2022, ECEE hosted a panel discussion on the intersection of health equity and the energy sector.

We wanted to examine more closely the ways to link the idea of clean energy communities being healthy communities.

To that end, we delved into the topic of non-energy benefits (NEBs) and current research on how best to measure them.

In this webinar, you'll learn:

- The basics of NEBs
- Numerous ways to measure these benefits
- How to realign energy goals with societal goals

We'll provide a few real-life examples of NEBs and specific measurements for them.

Challenge statement

Equity metrics have proved tricky for many to wrap their arms around. The most fruitful opportunity to measure for equity in the utility space comes from NEBs.

The challenge is in capturing and incentivizing NEBs as part of traditional cost-effectiveness tests, program design, and measurement and verification of a utility's demand-side management portfolio.

Linking NEBs to health benefits seems to be the simplest path forward, but it comes with its own set of challenges in sifting through a mountain of variables.

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Energy and health

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Social determinants of health

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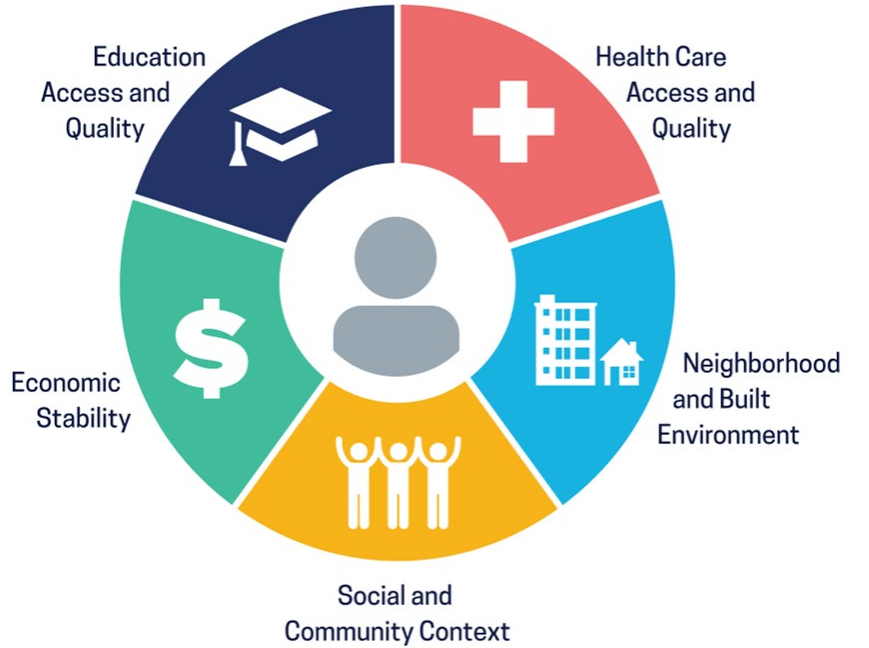
The Centers for Disease Control and Prevention lists five categories of social determinants of health (SDOH).

Each category has numerous factors under them. Some examples include:

- Safe housing, transportation, and neighborhoods
- Racism/discrimination
- Education
- Job opportunities/income
- Polluted air and water



Source: Social Determinants of Health, Centers for Disease Control and Prevention (2022)

Health disparities by income

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Overall, low-income families tend to have higher rates of health issues than higher-income families.

Income tends to be the best predictor of health issues.

Income has a cascading effect on people's health, based on:

- Access to healthcare (paying bills and transportation)
- Ability to buy nutritious foods
- Neighborhood and built environment they live in

Disease or illness	Annual family income				
	Less than $35,000	$35,000–$49,999	$50,000–$74,999	$75,000–$99,999	$100,000 or more
Coronary heart disease	8.1%	6.5%	6.3%	5.3%	4.9%
Stroke	3.9%	2.5%	2.3%	1.8%	1.6%
Emphysema	3.2%	2.5%	1.4%	1%	0.8%
Chronic bronchitis	6.3%	4%	4.4%	2.2%	2.4%
Diabetes	11%	10.4%	8.3%	5.6%	5.9%

Source: How Are Income and Wealth Linked to Health and Longevity? (PDF), Urban (2015)

Five sectors contribute to over 100,000 US deaths due to emissions

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Industrial and commercial	Transportation	Food and agriculture	Residential	Electricity
Industrial boiler and combustion engine use	Passenger car use	Livestock rearing	Heating and cooking	Generation

Source: “Reducing mortality from air pollution in the United States by targeting specific emission sources,” *Environmental Science & Technology Letters* 7, no. 9 (2020): 639-645

Exposure to pollution by race and ethnicity

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> Nationwide, Black people are exposed to greater-than-average concentrations of a dangerous form of pollution known as $PM_{2.5}$. People of color face more exposure from almost every type of source, while white people are less exposed."

—People of Color Breathe More Hazardous Air. The Sources Are Everywhere, *New York Times* (2021)

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NEB basics

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What are non-energy benefits?

Looking at NEBs is a way to understand the total contribution of energy efficiency investments that goes beyond the simple energy and demand savings.

Positive or negative, these can take the form of economic, social, or personal impacts.

They can be called many things—non-energy impacts (NEIs), NEBs, co-benefits, etc.—but they all mean the same thing.

NEBs are at the vital intersection of energy and equity. They're a central part of the metrics of equity.

Three beneficiary types of NEBs

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Utility benefits

- Peak load reduction
- Transmission and distribution savings
- Reduced arrearages
- Reduced carrying costs
- Less debt written off
- Lower collection costs
- Fewer customer calls

Participant benefits

- Operation and maintenance cost savings
- Health benefits
- Increased comfort
- Increased employee productivity
- Increased property values
- Benefits to low-income customers

Societal benefits

- Public health and welfare
- Improved air quality
- Water quality and quantity
- Fewer coal ash ponds and coal combustion residuals
- Economic development
- Increased employment
- Energy security
- Benefits to low-income families

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Measuring NEBs

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Three ways to quantify NEBs

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Adder: “Standardized dollar or percentage value added to the benefits of an energy efficiency program.”

Quantification/monetization: “Inclusion of certain specified NEBs or all NEBs that can be quantified or monetized.”

Hybrid: “Use of an adder to represent certain NEBs, while also allowing for the inclusion of other NEBs based on quantification.”

Source: Non-Energy Benefits of Energy Efficiency (PDF), Midwest Energy Efficiency Alliance

The six cost-effectiveness tests

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Test	Impacts measured
Ratepayer Impact Measure	Includes all program administrator costs and benefits, plus changes in revenue
Utility Cost Test	Includes program administrator costs and benefits
Participant Cost Test	Includes participant costs and benefits
Total Resource Cost	Includes utility's and participant's costs and benefits
Societal Cost Test	Includes societal costs and benefits including environmental impacts, and tends to include long-term impacts instead of short-term
Resource Value Test	Includes the utility's, participant's, and society's costs and benefits, and uses jurisdictional policies to inform the test.

Traditional cost-effectiveness tests

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Test	Key question answered	Summary approach
Participant Cost Test (PCT)	Will participants benefit over the measure life?	Comparison of costs and benefits of the customer installing the measure
Program Administrator Cost Test (PACT)	Will utility bills increase?	Comparison of program administrator costs to supply-side resource costs
Ratepayer Impact Measure (RIM)	Will utility rates increase?	Comparison of administrator costs and utility bill reductions to supply-side resource costs
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

Challenges of measuring

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Uncertainty caused by testing methods

One example is a study by Skumatz in 2014, which found a large range for participants in saved water utility costs. The range was $3 to $54.

> "Ranges of this magnitude can be the result [of] the methods and assumptions used, or the differences in the households, housing stock, climate, and measures under study."

Deciding which to measure

There could be dozens of impacts for each beneficiary.

Determining which of these impacts to measure can be tricky.

One way to navigate this is to apply the Resource Value Framework (RVF) by examining which impacts are most relevant to the stated policy goals of the energy efficiency program.

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NEBs in action

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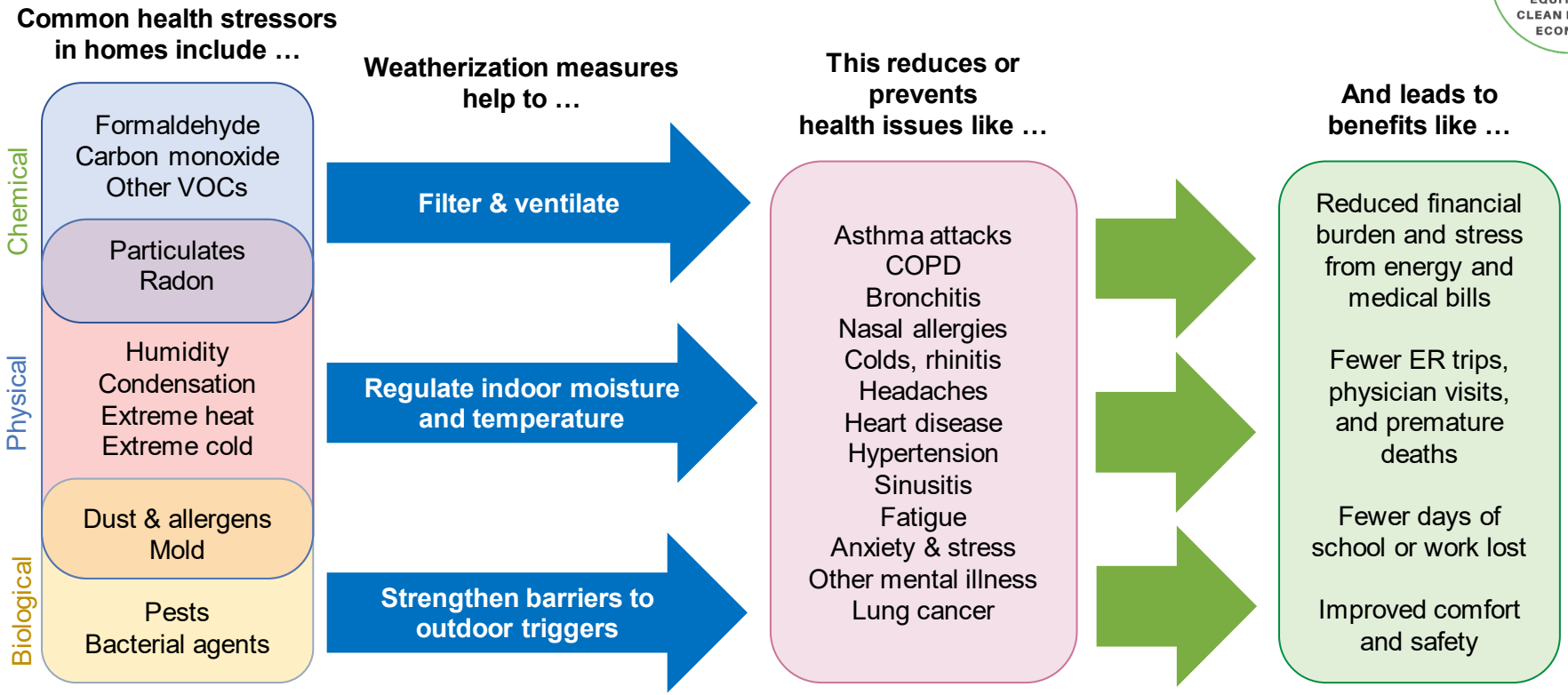
How can weatherization improve health?



Source: Making Health Count: Monetizing the Health Benefits of In-Home Services Delivered by Energy Efficiency Programs, American Council for an Energy-Efficient Economy (2020)

Weatherization and NEBs

Researchers from Oak Ridge National Laboratory explored several topics around the question of quantification as it relates to how the US Department of Energy (DOE) can approach weatherization efforts.

They describe two major ways to measure this: monetization and a savings-to-investment ratio (SIR) calculator.

The paper recognizes three monetization measurement methods (shown here from most to least rigorous):

- Measured changes in incidence and valuation
- National data extrapolation to determine incidence
- Participant surveys to directly value NEBs

Savings-to-investment ratio calculation

Since the focus of this paper was on the DOE's acceptance of certain NEBs in its weatherization efforts, the SIR calculation could be used to help select measures for individual weatherization jobs.

The paper identifies two key sub-issues for this: individual weatherization measures and occupant and house characteristics.

This section of the paper revealed the sheer number of factors and variables at play when finding the link between energy efficiency measures and their NEBs, including:

- Age, income, race/ethnicity, and education
- Geographic location
- Housing characteristics
- Climate and weather

EPA and health savings

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The US Environmental Protection Agency (EPA) estimates the health savings of energy efficiency and renewable energy investments.

This estimate is expressed as cents/kilowatt-hour (kWh) and can vary depending on program type, region, and other factors.

In California, the low estimate for “uniform energy efficiency” investments is 0.67¢/kWh (note that this 2/3 of one penny, not 67 cents)

The US Energy Information Administration estimates that the average household uses 11,000 kWh annually.

11,000 x 0.67 = 7,370¢ = $73.70 annual health savings/household

Cascading effects

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Assigning a dollar amount to NEBs can be a useful tool in approximating NEBs.

But it's important to see NEBs as having a whole host of effects on people's jobs, schooling, spending, and overall quality of life.

This table from a 2016 report on Massachusetts NEBs shows avoided doctor visits as a result of energy investments.

Table E.3. Number of Avoided Deaths, Hospitalizations, ED Visits, and Physician Office Visits Annually for Each Health-Related NEI, Per 1000 Units Weatherized

NEI	Deaths	Hospitalizations	ED Visits	Physician Office Visits
Asthma	-	9.9 (adult) 4.2 (child)	54.6	-
Cold-related Thermal Stress	0.05	1.9	7.6	9.5
Heat-related Thermal Stress	0.01	1.1	23.6	3.2
CO Poisoning	0.004	0.07	0.47	-
Fire Injury	0.0087	0.013	0.4	0.25

Source: Massachusetts Special and Cross-Cutting Research Area: Low-Income Single-Family Health- and Safety-Related Non-Energy Impacts (NEIs) Study (PDF), Three[3] and NMR Group for Massachusetts Program Administrators (2016)

Challenges of linking NEBs and health

- The paper notes the complexity of determining the extent of NEBs, especially with something as intricate as health.
- Some of the challenges surrounding this include:
  - Difficulty isolating which energy efficiency measures lead to which NEBs since most measures are implemented en masse
    - Exceptions to this include the removal of lead paint and some water-saving measures
  - Numerous factors involving occupants, housing, and climate obscure causal links
- SIR calculations may only work in some specific cases because there are so many factors at play

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Regulatory strategies for NEBs

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1. Incorporate NEBs into your **current analysis**
2. Use a **different benefit-cost test**
3. Try a **performance-based** approach

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Incorporating NEBs into your benefit-cost testing

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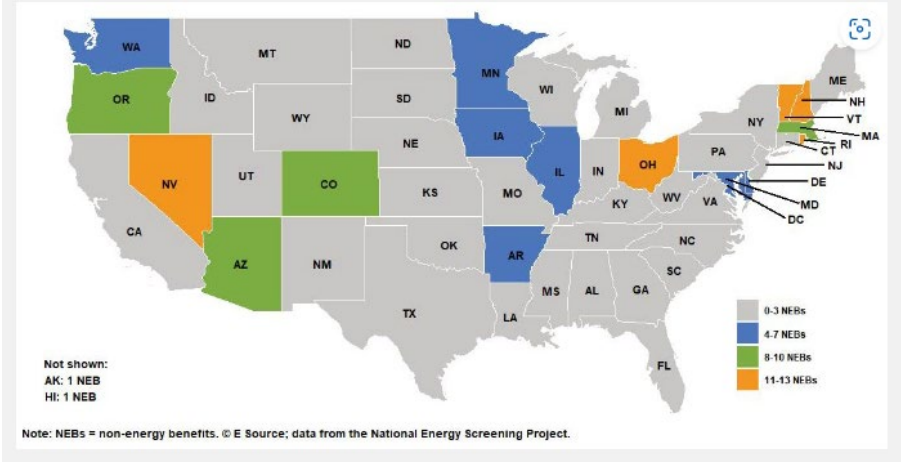
Twenty-one states consider NEBs in their benefit-cost analysis.

Most use NEBs with demonstrated consistent value for low-income customers, like:

- Reduced energy costs
- Improved health
- Water conservation

NEBs need a tangible and quantifiable value to be monetized.

Most states consider fewer than three NEBs in their cost-effectiveness testing. Nevada, New Hampshire, Ohio, Rhode Island, and Vermont consider the most NEBs.



How non-energy benefits help make programs cost-effective, E Source (2020)

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Incorporating NEBs into your benefit-cost testing

Method	Non-energy benefit category and beneficiary/perspective
Arrearage studies, directly or derived	Utility: Arrearages, bad debt, shutoffs/reconnects, notices, calls/collections Participant: Calls, connections/disconnections, notices
Incidence change times value	Utility: Emergency/safety, transmission and distribution savings Participant: Water bill savings Societal: Tax effects
Engineering/third-party models	Societal: Economic, emissions
Surveys	Participant: Moving, maintenance, equipment lifetimes, equipment function, comfort, noise, light quality, sick days, satisfaction, ability to pay bills, property value/aesthetics in home
Not currently estimated or few studies, or multiple methods being tested	Utility: Substations/infrastructure, power quality/reliability Societal: Health, social welfare, infrastructure, wildlife, national security Participant: Deeper health benefits, indoor air quality

Source: Northeast Energy Efficiency Partnerships

Vermont's weatherization NEBs

- Lessons from the Field: Practical Applications for Incorporating Non-Energy Benefits into Cost-Effectiveness Screening (PDF) includes a case study of the NEBs associated with the Vermont Weatherization Assistance Program
  - Reduced arrearages and collection costs
  - Fewer fires
  - Water savings
  - Fewer lost work or school days due to illness
- The study found that the value of the NEBs was **$11,391 per participant**
- The program cost $2,259 per participant to implement

Incorporating NEBs in your benefit-cost testing

- In 2019, National Grid adjusted its technical reference manual (TRM) to assign monetary values to measures included in energy efficiency programs
- These amounts accounted for both the direct energy benefits and the NEBs
- The weatherization measure delivers NEBs worth $558.21 per year

Use a different benefit-cost test

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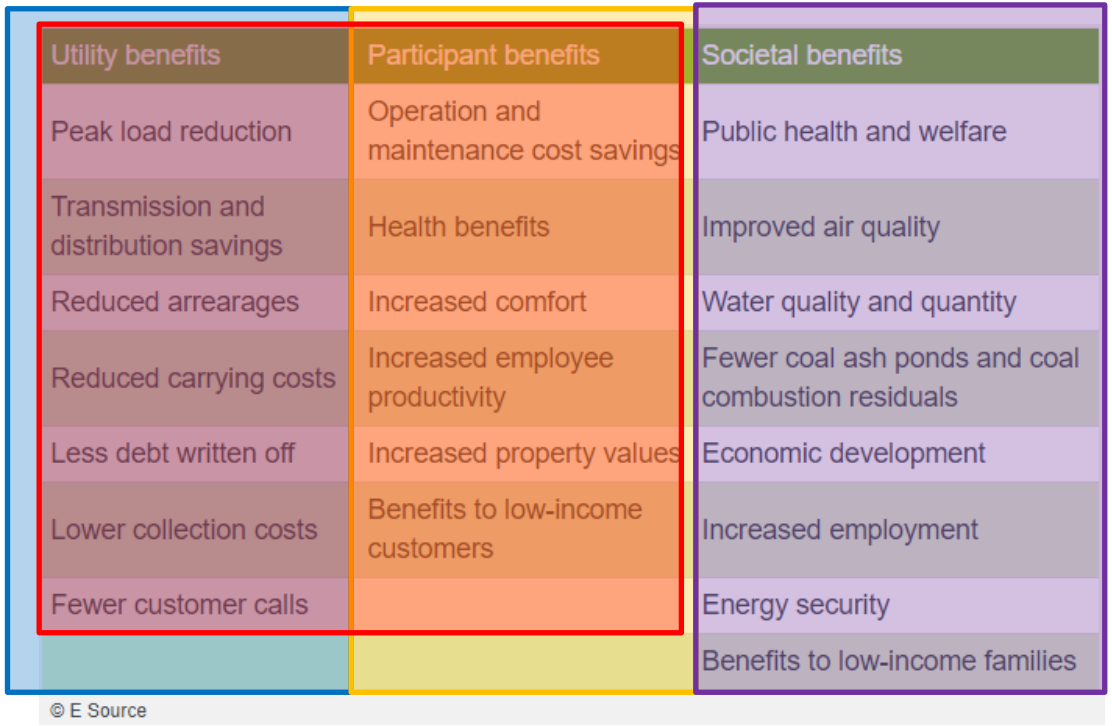
Utility Cost Test (UCT)

Total Resource Cost (TRC) test

Participant Cost Test (PCT)

Societal Cost Test (SCT)



Methods, Tools and Resources Handbook, National Energy Screening Project (chapters 3.2 and 7.1)

Use a different benefit-cost test (it doesn't have to be the SCT!)

The National Energy Screening Project's Database of Screening Practices tracks six states that use SCT as the primary test.

But 12 states include health and safety as a non-utility impact

- Only 5 of these use SCT as primary or secondary test
- Adders (5% to 15% of utility benefits) or monetized $ per home (established with regulator or in TRM), or a combination of the two
- Adder can vary based on the type of program (low-income programs use a higher adder, for example)
- Make programs with substantial NEBs exempt from passing TRC test

Use a different benefit-cost test

- The National Standard Practice Manual (NSPM) Jurisdiction-specific test (JST): A test that incorporates symmetrical utility system impacts and costs/benefits that align with a jurisdiction's specific policy goals
  1. Articulate policy goals
  2. Include all utility system impacts (symmetrically)
  3. Decide which non-utility system impacts to include based on #1

- Maryland JST (MJST)
  - Maryland first applied a JST to a specific resource (EVs) and then expanded to a unified JST
  - The Shirley Nathan-Pulliam Health Equity Act of 2021 (PDF)

Use a different benefit-cost test

- While there was some overlap with the existing TRC and SCT, the JST broadened to include two new health and safety impacts.
- “Two proxy adders are included in the primary MJST to account for nonenergy impacts that are difficult to quantify: a **10% Health and Safety adder** to be applied to certain residential retrofits and HVAC upgrades in addition to the existing comfort benefit, and a **20% Limited Income adder** capturing the health and safety and other economic benefits specific to limited income customers. The MJST also adds federal tax credits as benefits.” (National Standard Practice Manual Case Study: Maryland [PDF], National Energy Screening Project [2022])

National Standard Practice Manual Case Study: Maryland (PDF), National Energy Screening Project (2022)

Use a different benefit-cost test

What NEBs you include in a JST will depend on your specific policy goals. Examples of possible impacts are summarized in this table and discussed in more detail in the National Standard Practice Manual for Energy Efficiency (NSPM for EE).

Note: The National Standard Practice Manual for Benefit-Cost Analysis of Distributed Energy Resources (NSPM for DERs) incorporates and expands upon the 2017 NSPM for EE: "Jurisdictions and interested stakeholders are encouraged to refer to the NSPM for DERs to guide BCA efforts in their jurisdiction, whether for a single DER type (including EE) or multiple DER types."

Performance metrics and performance-based regulation (PBR)

PBR rethinks utility compensation and ties shareholder returns to performance on key metrics (called performance incentive mechanisms or PIMs).

In Illinois, state legislation on performance-based ratemaking directed the commission to approve tracking metrics to inform future PIMs:

> "Minimize emissions of greenhouse gases and other air pollutants that **harm human health**, **particularly in environmental justice and equity investment eligible communities**, through minimizing total emissions by accelerating electrification of transportation, buildings and industries."

E Source resources: Performance metrics and PBR

- A performance puzzle: Untangling performance incentives and performance-based regulation
- Does energy equity fit into benefit-cost analyses?
- Performance-based regulatory strategies to accelerate beneficial electrification
- Is performance-based regulation the future of the utility business model?
- The evolution of utility performance incentives (for members of the E Source Distributed Energy Resource Strategy Service)

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Lessons learned and next steps

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Lessons learned

- It's possible to include NEBs regardless of your current benefit-cost processes or regulatory environment
- Numerous challenges exist in linking health and NEBs, especially at a granular level
- Testing for specific links requires fewer energy efficiency measures being implemented at once
- Designing a custom test that best suits your particular area is ideal, but including NEBs in existing tests can work if a total overhaul is not possible
- Be skeptical of dollar values of NEBs because they could be imprecise
- Aligning energy goals with societal goals goes a long way toward improving equitable outcomes

Questions?

Next steps

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- You'll get access to this presentation and recording
- Upcoming events:
  - Strategies for income-qualified program enrollment and customer eligibility (March 13, 2:00–3:00 p.m. ET)
  - Exploring energy equity frameworks and definitions (April 11, 2:00–3:00 p.m. ET)
  - Payment assistance pilots (April 17, 2:00–3:00 p.m. ET)

Further reading and resources

- How non-energy benefits help make programs cost-effective, E Source (2020)*
- Include non-energy benefits in cost-effectiveness tests to improve energy equity, E Source (2021)*
- Strategies to improve low-income program cost-effectiveness, E Source (2019)*
- Panel Discussion: Health Impacts, Clean Energy and Equity, DEFG (now an E Source company) (2022)
- Performance-based regulatory strategies to accelerate beneficial electrification, E Source (2022)

Others:

- Non-Energy Impacts Approaches and Values: an Examination of the Northeast, Mid-Atlantic, and Beyond (PDF), NEEP (2017)
- Non-Energy Benefits of Energy Efficiency (PDF), MEEA
- Addressing Non-Energy Impacts of Weatherization (PDF), ORNL (2021)
- Non-Energy Benefits / Non-Energy Impacts (NEBs/NEIs) and Their Role & Values in Cost-Effectiveness Tests: State of Maryland (PDF), SERA (2014)
- National Standard Practice Manual for Assessing Cost-Effectiveness of Energy Efficiency Resources (PDF), NESP (2017)
- Cost-Effectiveness Tests: Overview of State Approaches to Account for Health (PDF), ACEEE (2018)
- Understanding Cost-Effectiveness of Energy Efficiency Programs (PDF) EPA (2008)
- Rhode Island Technical Reference Manual (PDF), National Grid (2019)
- Massachusetts Special and Cross-Cutting Research Area: Low-Income Single-Family Health- and Safety-Related Non-Energy Impacts (NEIs) Study (PDF), Three[3] and NRM Group (2016)

** Available to members of certain E Source services*

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