Distributional Equity Analysis for Energy Efficiency and Other Distributed Energy Resouces

Midwest Energy Solutions Conference

Extra Credit: How Broader Metrics Illuminate the Value of Efficiency

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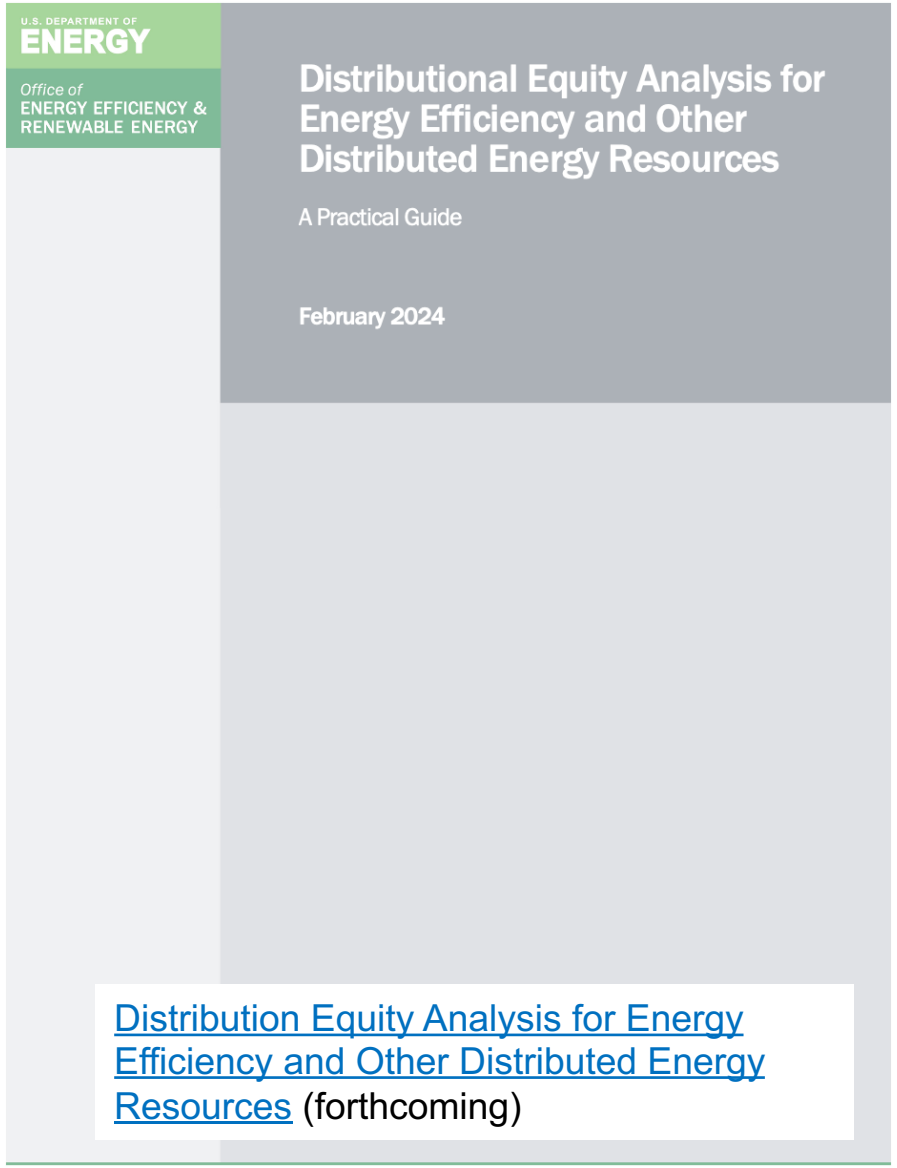
Purpose

- Customers in a given jurisdiction do not share the burdens of the energy system equally.
- There is a need for a different type of analysis beyond benefit-cost analysis to help decision-makers understand whether their distributed energy resource investments are equitable.
- The primary purpose of the distributional equity analysis guide is to answer two key questions:
  - What are the distributional equity impacts from utility distributed energy resource investments?
  - How can jurisdictions incorporate those distributional equity impacts into their decision-making framework alongside benefit-cost analysis?

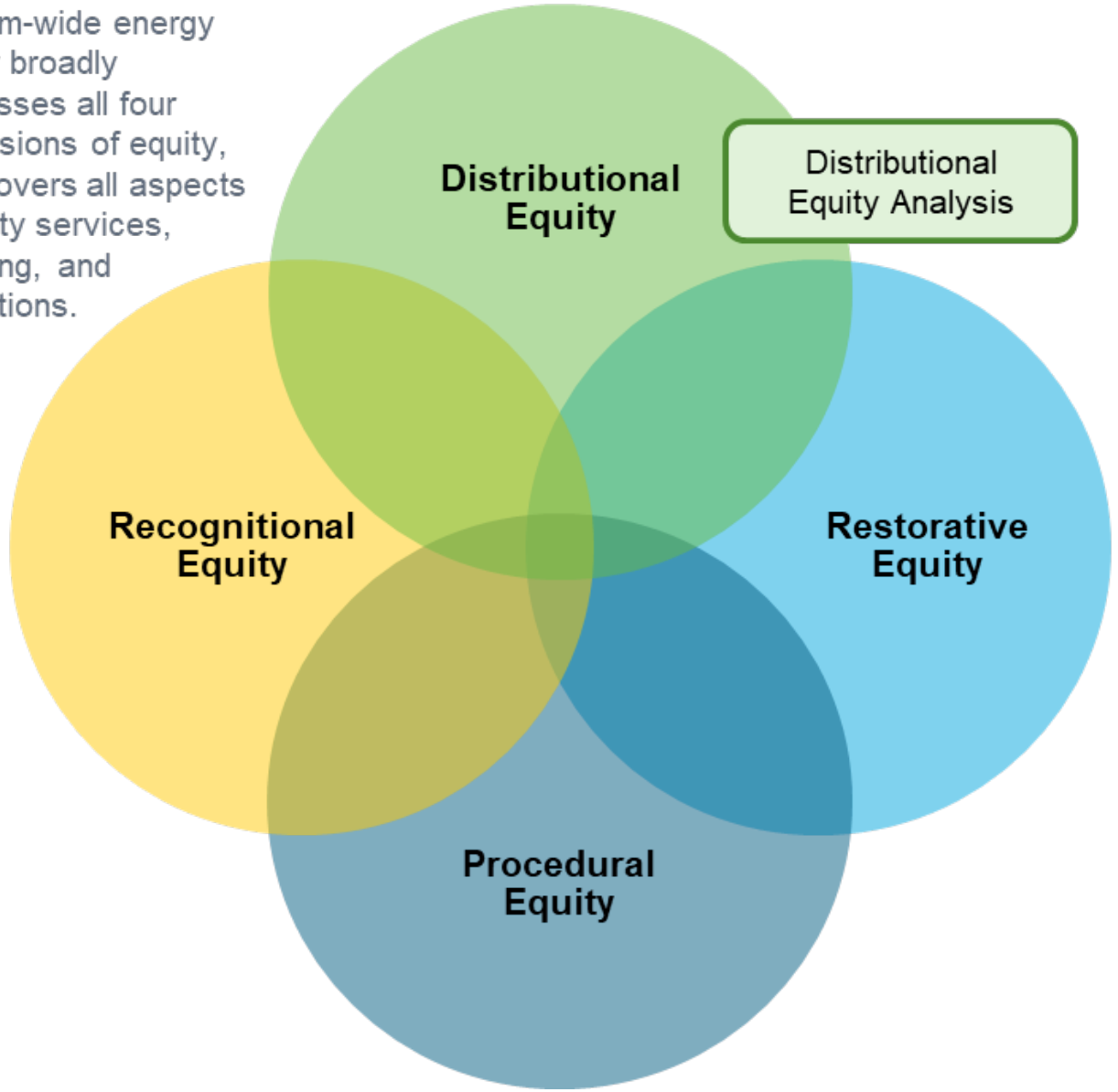


Distribution Equity Analysis for Energy Efficiency and Other Distributed Energy Resources (forthcoming)

Scope

- Utility distributed energy resource investments
- Focused on distributional equity

System-wide energy equity broadly addresses all four dimensions of equity, and covers all aspects of utility services, planning, and operations.



Distributional Equity Analysis + Benefit Cost Analysis

DEA addresses one aspect of distributional equity:

What are the distributional equity impacts of utility resource investments?

Source: Distribution Equity Analysis for Energy Efficiency and Other Distributed Energy Resources (forthcoming)

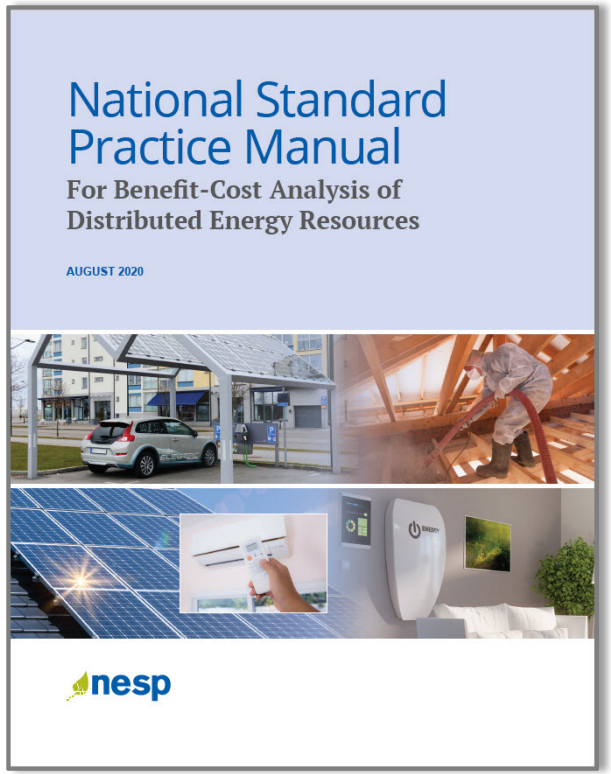
Benefit-Cost Analysis and Distributional Equity Analysis

Benefit-Cost Analysis

- Compares the total costs and benefits
- Includes costs and benefits that align with the perspective of the cost-effectiveness test (e.g., a societal cost test would include the costs and benefits from the perspective of society)
- Results do not show how costs and benefits are distributed

Distributional Equity Analysis

- Compares impacts on distinct populations
- Includes metrics that are selected because relate to equity
- Metrics can be in incongruous units (e.g., % participation, change in bills ($), reduction in emergency room visits for asthma (#))

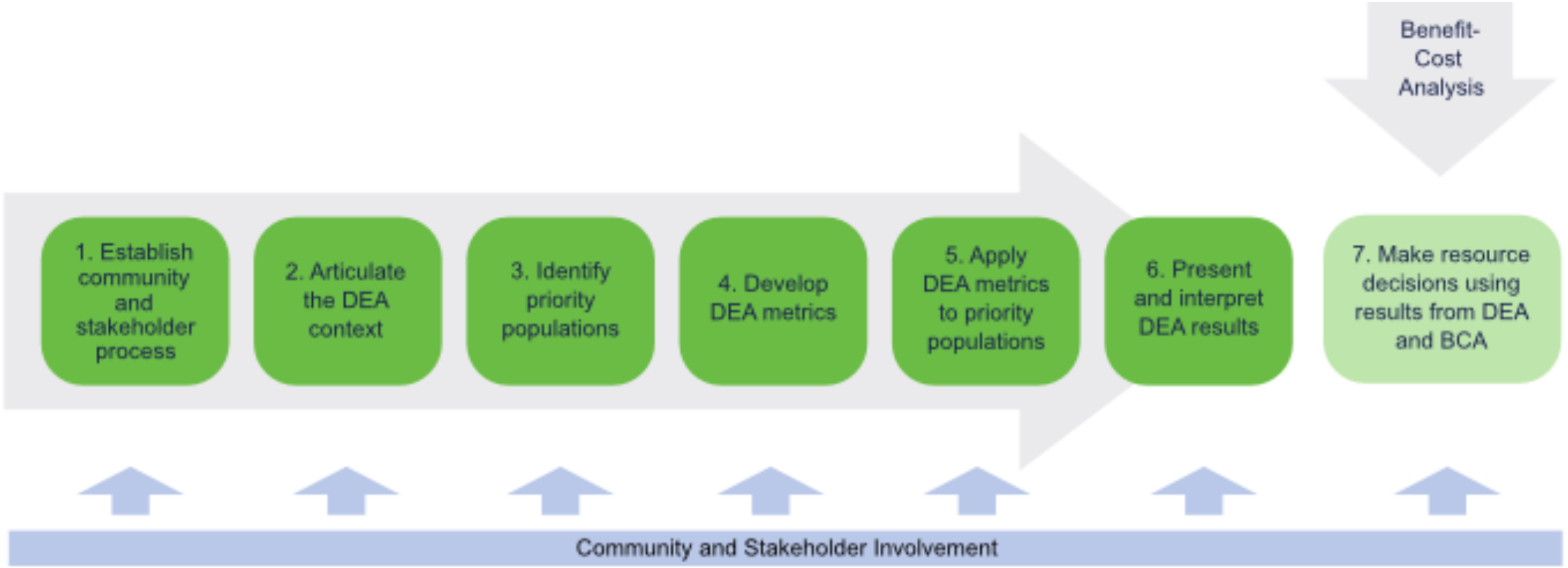


National Standard Practice Manual for Benefit-Cost Analysis of Distributed Energy Resources

Together the two analyses can inform decisions about whether and to what extent utilities should invest in distributed energy resources.

Source: Alice Napoleon, Synapse Energy Economics,
Sharing the Benefits and Costs - Distributional Equity Analysis of Utility Investments, SEEA/E4TheFuture webinar, December 13, 2023

DEA Guidance Document Overview



Distributional Equity Analysis – DEA; Benefit Cost Analysis - BCA

Source: Distribution Equity Analysis for Energy Efficiency and Other Distributed Energy Resources (forthcoming)

Example Applications

Applications	Examples
Assess a single DER program serving priority populations	Low-income energy efficiency program, low-income community solar program, low-income microgrid program
Assess a single DER program serving all types of customers	Residential retrofit energy efficiency program, distributed generation net-billing program, distributed storage program
Compare across DER programs	• *Compare same type of DERs*: one energy efficiency program vs. other energy efficiency programs, one distributed generation net-billing program vs. other distributed generation net-billing programs • *Compare different types of DERs*: energy efficiency versus distributed generation; distributed generation versus storage program; demand response versus storage program
Assess a portfolio including programs of the same type of DERs	Portfolio of energy efficiency programs, portfolio of multiple distributed generation programs, portfolio of multiple storage programs
Optimize a portfolio including programs of multiple types of DERs	Portfolio including all types of DER programs (energy efficiency, demand response, distributed generation, batteries, electric vehicles)

Distributed Energy Resources - DERs

Source: Distribution Equity Analysis for Energy Efficiency and Other Distributed Energy Resources (forthcoming)

Select Additional Resources

- Distributional Equity Analysis for Energy Efficieny and Other Distributed Energy Resources (forthcoming report). Additional resources from Berkeley Lab are available on our Energy Equity page, e4TheFuture's Energy Equity and BCA page and Synapse Energy Economic's Energy Justice page.
- Methods, Tools, and Resources: A Handbook for Quantifying DER Impacts for Benefit-Cost Analysis
- Sharing the Benefits and Costs – Distributional Equity Analysis of Utility Investments
- Distributional Equity Analysis: Beyond the Average Customer
- Distributional Equity Analysis for Energy Efficiency and Other Distributed Energy Resources – presentation at the National Association of State Utility Consumer Advocates
- National Association of Regulatory Utility Commissioners Regulatory Training Intiative – Conducting Distributional Equity Analysis 2023 (fee)
- Benefit-Cost Analysis: What it Can and Cannot Tell us About Distributional Equity of DERs (paper) and presentation

ENERGY MARKETS & POLICY

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Extra Slides

Source of all Extra Slides: Alice Napoleon, Synapse Energy Economics.
Sharing the Benefits and Costs - Distributional Equity Analysis of Utility Investments, SEEA/E4TheFuture webinar, December 13, 2023

Articulate DEA Context

- Articulating **DEA goals**, **applications**, and **timeframe** up front is key to ensuring transparency and managing the scope of analysis
- What is the purpose of your DEA?
- Are you looking at the impact of a single program, or are you comparing one portfolio to another to determine the best choice?
- Analyses can be prospective (for planning purposes) or retrospective (for evaluation purposes)

Example: A utility wants to analyze whether its planned electric energy efficiency portfolio will serve a Justice40-defined population equitably compared to other customers. A stakeholder group refined the scope to look at a portfolio of electric energy efficiency programs serving residential customers.

- See Link for more applications and examples

Identify Priority Populations

Steps to identify priority populations

1. Review any existing state definitions already in use (e.g., for environmental justice)
2. Review existing state energy equity goals
3. Review indicators that other jurisdictions have used for priority populations
4. Solicit input from stakeholder representatives
5. Choose a set of indicators based on the previous four steps
6. Conduct "cumulative impact analyses" to identify the most highly impacted customers
7. Consider refinements for the purpose of conducting the DEA

Other terms for priority populations.

- Disadvantaged
- Overburdened
- Marginalized
- Underserved
- Vulnerable
- Environmental justice communities
- Frontline communities
- Highly impacted communities
- Target populations

Develop DEA Metrics

- "**System-wide equity metric**" refers to a broad range of metrics that can be used to address the full range of equity issues.
- "**DEA metric**" refers to a narrower subset of metrics used to determine if costs and benefits of a utility program or investment are equitably distributed between priority populations and other customers.
- DEA Metrics should meet standards for good utility performance metrics:
  - Distributional
  - Discrete
  - Tied to equity goals
  - Impactful

Develop DEA Metrics - Examples

- Utility system impacts
  - Reliability: Change in number/duration of outages
  - Shutoffs: Change in number or frequency of shutoffs
- Host customer impacts
  - Change in lost workdays
  - Change in health, safety, or comfort non-energy impacts
- Societal
  - Workforce development/job training participation
- Rates, bill, participation
  - Change in bills
  - Participation rates

Apply DEA Metrics to Priority Populations

Steps

1. Assess existing data and tools
2. Review data type and resolution
3. Investigate useful tools (mapping tools, screening tools, dashboards, models)
4. Ensure data privacy and equitable data practices
5. Calculate metrics for priority populations and other customers

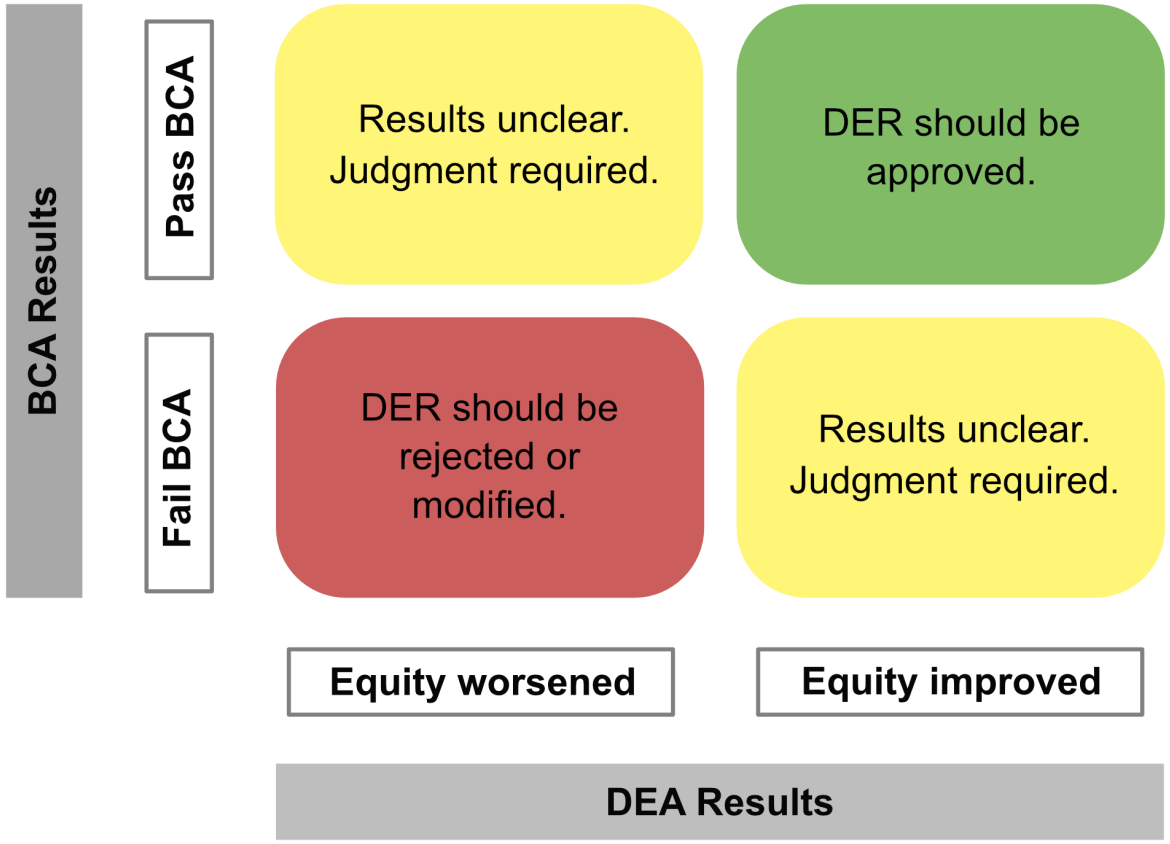
Present and Interpret DEA Results

- **Simple results** - Includes unadjusted results for each DEA metric separately for priority population and other customers.
- **Benchmarked results** - Includes simple results for each metric alongside metric-specific benchmarks.
- **Weighted DEA scores** - Applies multi-attribute analysis (MAA) to benchmarked metrics to calculate DEA scores. Weighted scores for each DEA metric can aggregated to present net scores for priority population and other customers.

Benchmarks are a set of standards or goals by which success can be measured and can be used to draw more informed conclusions. Examples include:

- Targets for participation
- Targets for reducing energy burden
- Caps for reasonable rate impacts

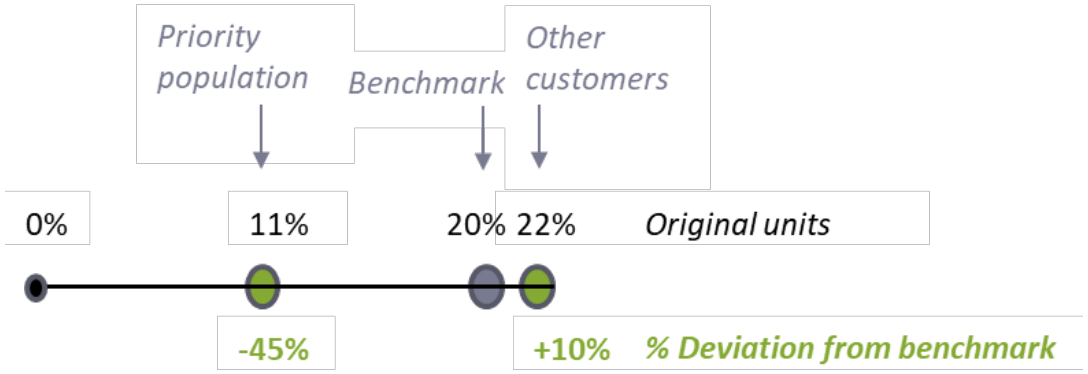
Make Resource Decisions



Establish community & stakeholder process | Articulate DEA context | Identify priority populations | Develop DEA metrics | Apply DEA metrics | Present and interpret results | **Make decisions**

Benchmarked results example

- This example translates the simple results for participation rates into unweighted DEA scores.
- The utility uses a benchmark of 20% participation.
- For this metric, scoring higher than the benchmark is a desired outcome.
- The projected priority population participation rate is 11%.
- The other customers' projected participation rate is 22%.
- Applying the formulas on the previous slide, the priority population falls short of the benchmark, resulting in a deviation of negative 45 percent, whereas the other customers exceed the benchmark, resulting in a deviation of +10 percent.

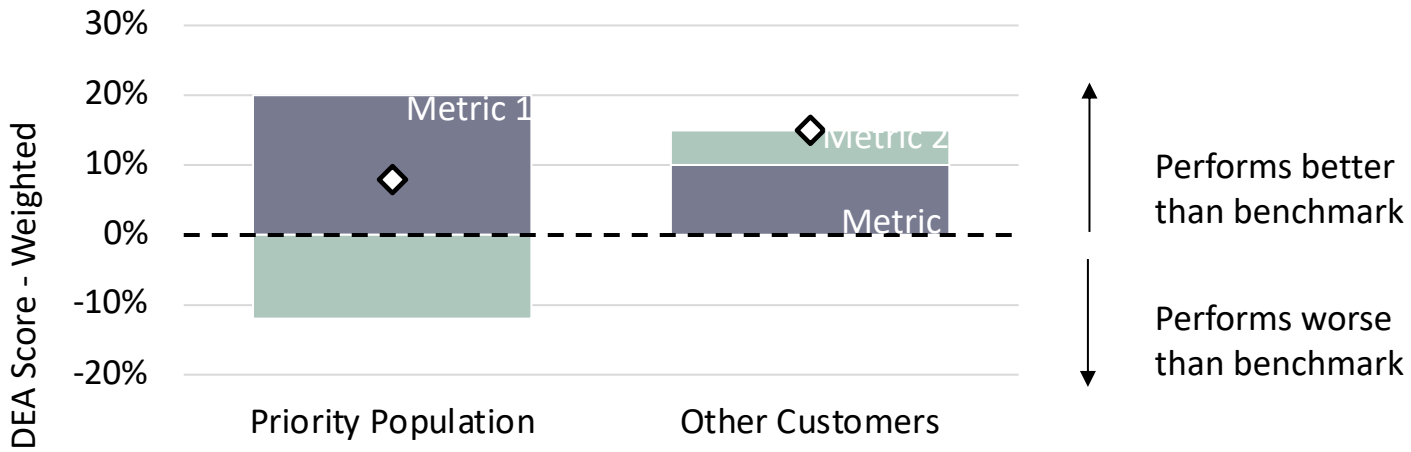


Present and Interpret DEA Results

Assign importance weights and calculate weighted DEA scores

Metric examples	+/- from benchmark		Importance weight		Weighted DEA score	Implication
Metric 1	+50%	X	40%	=	+20%	Metric improved
					+	
Metric 2	-20%	X	60%	=	-12%	Metric worsened
					=	
			Net score		+8%	Net improvement

Present scores for both populations



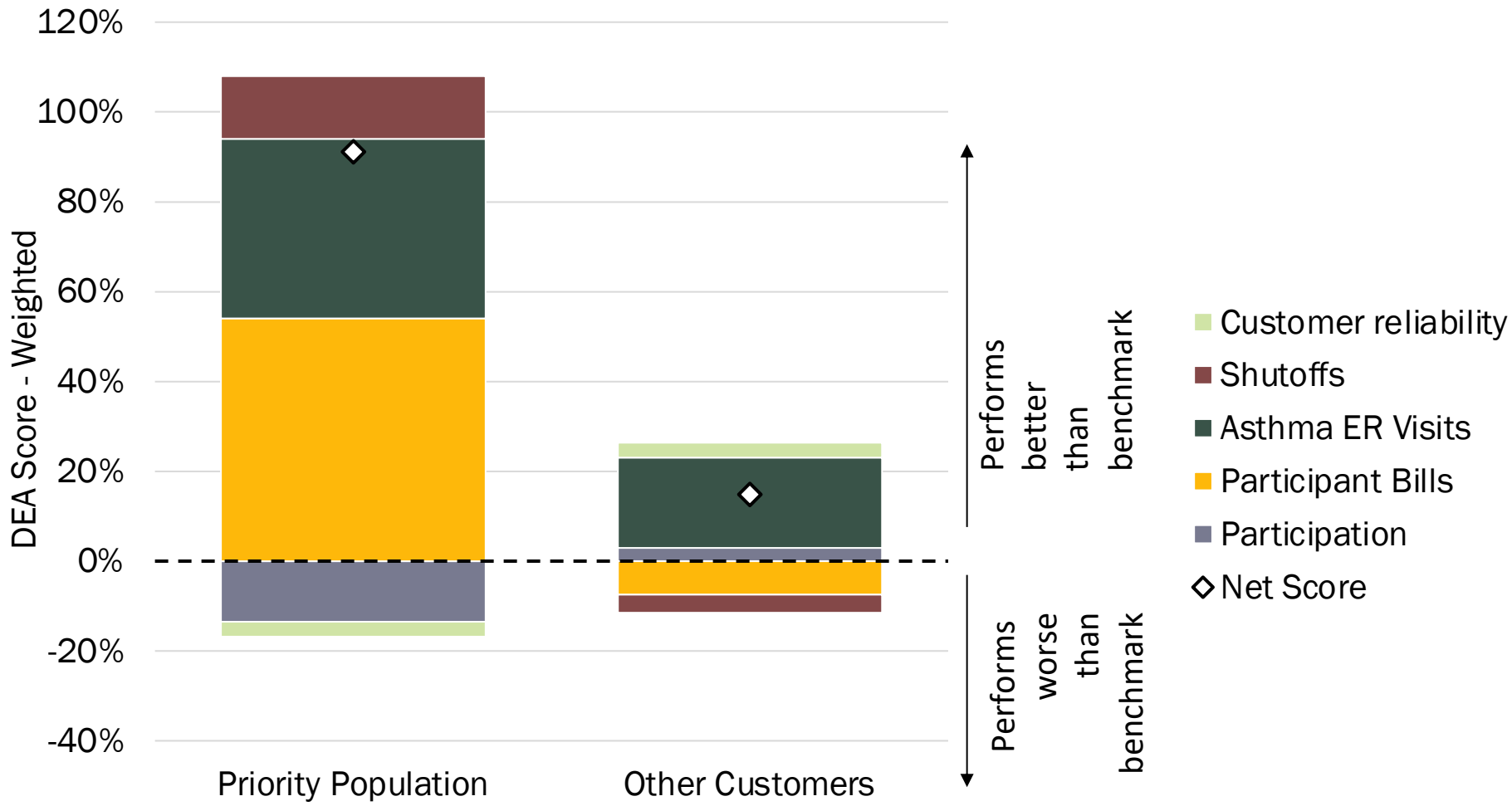
Establish community & stakeholder proces | Articulate DEA context | Identify priority populations | Develop DEA metrics | Apply DEA metrics | **Present and interpret results** | Make decisions

Illustrative Example

- Examine whether a hypothetical utility's planned electric energy efficiency portfolio will serve a pre-defined priority population equitably compared to other customers.
- At the direction of a stakeholder group, the utility selects and scores the following metrics.

Metric	Unit	Simple results		Benchmarked results			Importance Weight
		Priority Population	Other Customers	Benchmark	Priority Population	Other Customers	
Participation	% population	11%	22%	20%	-45%	10%	30%
Participant Bills	% change	-5.6%	-1.5%	-3%	-80%	-80%	30%
Frequency of asthma ER Visits	% change	-6%	-4%	-2%	180%	-25%	20%
Frequency of shutoffs	# change	-12	-3	-5	0%	-75%	10%
Customer reliability (CEMI)	% change	-2%	-4%	-3%	-40%	-40%	10%

Illustrative Example



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