Update on Benefit Cost Analysis for Distributed Energy Resources

Conversation with E4TheFuture's Julie Michals and SEPA's Kate Strickland

A new report important to those in the energy regulatory world, is titled, Benefit-Cost Analysis Case Studies: Examples of Distributed Energy Resource Use Cases. For as the clean-energy journey continues, evaluating DERs becomes even more imperative.

This report builds on a significant document, the 2020 National Standard Practice Manual for Benefit-Cost Analysis of Distributed Energy Resources. That gave regulators and others a starting point with a set of central principles to guide decision making when conducting BCA and which cost tests to use.

The purpose of the new report is to illustrate BCAs for various DER technologies and use cases that are of growing interest in the electric industry. To unpack what this vital resource means for the energy and utilities industry, PUF brought together two of the experts behind the report, E4TheFuture's Julie Michals and SEPA's Kate Strickland.

PUF's Lori Burkhart: Why did you see the need for this report on benefit cost analysis on distributed energy resources?

Julie Michals: The National Energy Screening Project, otherwise known as NESP, has been rolling out a series of publications over the past few years to improve and provide resources for stakeholders, primarily the regulatory audience, to improve cost-effectiveness analysis of distributed energy resources. The benefit cost analysis, or BCA, case studies that you refer to, are part of this series of publications. But let me give you some context on two key publications that preceded the technical BCA case studies.

The first major publication was the National Standard Practice Manual for conducting cost effectiveness analysis of efficiency, which NESP expanded more broadly to the full range of distributed energy resources in 2020. The NSPM provides a conceptual framework for how regulators and key stakeholders can develop or modify existing cost effectiveness practices centered around a set of core principles.

When states began to apply the NSPM framework, it became clear there was a need for further guidance on its application – moving from the theoretical to practical. While the NSPM helps a jurisdiction identify its cost effectiveness test and the various impacts to include in its test, the harder questions are often: "How do you quantify those impacts?" And, "what do real world BCA use-case examples look like?"

To respond to the question around, how to quantify impacts, we published a companion document to the NSPM called, the Methods, Tools & Resources Handbook, in early 2022. Developed by Synapse Energy Economics with contributions from multiple authors, the MTR Handbook describes how to account for utility system impacts and nonutility system impacts and gets into the nitty gritty of methodological options for quantifying impacts, including links to useful resources and modeling tools.

The third resource we published, also earlier this year, involved working with SEPA and ICF to select DER use cases, apply the NSPM framework, and offer details of what a BCA would look like. This includes presenting modeling inputs and results. Kate can provide details on the specific BCA case studies.

PUF: Kate, can you share an overview of the case studies?

Kate Strickland: We developed a publicly available set of three benefit cost analysis case studies that demonstrate the application of the NSPM, as well as the Methods, Tools, and Resources handbook guidance.

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The case studies are based on cost effectiveness tests that align with policy goals and objectives for the three hypothetical jurisdictions. Each case study illustrates key benefit cost analysis considerations for either single or multi distributed energy resource use cases and is demonstrating different approaches to account for those impacts, especially in the cases where certain data may be unavailable.

For the case studies, different regions of the U.S. were used to highlight how different policy and grid contexts can influence a benefit cost analysis. The case study set includes three use cases, the first focused on residential electric vehicle managed charging in the midwest. The second is commercial solar plus storage-controlled dispatch in the west, and the third is a residential grid-interactive efficient building retrofit in the mid-Atlantic.

PUF: Dig into the three case studies and three geographic areas.

Kate Strickland: Let me provide a high-level overview. First, is the residential electric vehicle managed charging case study, which considered a hypothetical incentive for level two EV chargers coupled with a time-of-use rate.

The program is assumed to be provided by an investor-owned utility located in the midwest. It was developed to demonstrate

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key factors and challenges with conducting benefit cost analysis for a managed charging program offered to existing EV owners.

For this case study, the jurisdiction specific test – or JST – is the cost-effectiveness test used by the hypothetical jurisdiction based on its specific applicable policies. The benefit cost analysis impacts encompass electric utility system and societal impacts, including greenhouse gas emission impacts. The analysis did not include host customer impacts because they're not applicable given the jurisdiction's policies.

Each case study includes a summary of impacts which illustrate the approach in terms of key factors and results. For the EV case study, the key value streams that drove the benefit cost analysis results were avoided energy costs, avoided generation capacity costs, and program financial incentive costs.

PUF: This is a residential use case, did you cover any commercial DER use cases?

Kate Strickland: Yes, for the second use case we looked at a commercial solar plus storage case study focused on a hypothetical commercial behind-the-meter solar plus storage program that provided an incentive for a battery energy storage system when paired with a solar PV system, as well as enrollment in a time-of-use rate.

This case study was assumed to be provided by an investor-owned utility in the western U.S. and was developed to demonstrate key factors and challenges around benefit cost analysis, both for distributed generation, as well as distributed storage resources in a multiple onsite DER use case. The key value streams that drove the benefit cost analysis included host customer reliability benefits, the value of state incentives, federal investment tax credits, depreciation tax write-offs, and avoided generation capacity and energy costs.

Finally, the third case study profiled a residential grid-interactive efficient building or GEB retrofit in the mid-Atlantic, illustrating a hypothetical retrofit program that included weatherization measures, such as ceiling insulation upgrades.

The GEBs example included switching from a natural gas furnace and central air conditioning to an air source heat pump and included a smart thermostat, which was automatically enrolled in a demand response program.

This program was assumed to be provided by a municipal utility in the mid-Atlantic and was developed to demonstrate key factors and challenges for a combined weatherization energy efficiency demand response and building electrification program.

Some of the key factors for the GEBs case study are the importance of accounting for interactive effects between DERs within the program, which is important because historically DERs have been analyzed in isolation.

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PUF: What advice would you give to regulators who are considering BCAs for DERs?

Julie Michals: I encourage using the NSPM framework

to help ensure a jurisdiction's primary cost effectiveness test is aligned with the goals and objectives articulated in energy policies. This is where NSPM guidance differs from the California Standard Practice Manual. The NSPM does not present any one standard test, such as a societal test or total resource cost test. Rather, you can develop a test that's specific to your jurisdiction, hence it's referred to as a jurisdiction specific test.

The EV managed charging case study, for example, includes the full range of utility system impacts and GHG emission societal impacts, but does not include host customer impacts. This is a unique test to that jurisdiction and doesn't align with any of the traditional tests in the California manual. It's what the NSPM refers to as the regulatory perspective, which ensures that the jurisdiction can meet its goals by aligning its test with its goals.

Another key consideration for regulators is the NSPM's core principle of symmetry, which is to ensure that if you're going to include the costs of a DER investment, you should include the benefits, and the other way around, for any particular impact. This is often a challenge, especially with certain host or participant customer impacts.

We often see in practice that the host customer costs are included, but the benefits are not. The NSPM would say, if you are going to include the participant costs, ensure that you include the benefits. Even if they're hard to quantify, it doesn't mean the value is zero.

There are methodologies for accounting for those impacts, such as using a proxy adder or some qualitative representation. And the MTR handbook provides ways to account for all impacts, even those that are hard to quantify.

Another key point for regulators to consider is the NSPM principle of transparency. ICF and SEPA did a great job demonstrating this, where each case study clearly presents the input assumptions that went into calculating each of the impacts.

It explains why and how an impact, whether it's resilience or reliability or avoided risk, is included or not. Perhaps in some cases it's not included because, for the particular use case, it's not deemed material. Or perhaps it's already embedded in the avoided energy cost or capacity cost, and this is clearly explained.

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PUF: What about equity, which is increasingly important to regulatory commissions?

Julie Michals: As we've been working in states to apply the NSPM, increasingly we're being asked this question, "what about equity?" We first addressed this topic in the MTR Handbook, where we published a chapter on energy equity to explain the fundamental difference between conducting benefit cost analyses versus distributional equity analyses.

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Benefit cost analyses answer questions about the cost effectiveness of DER investments on average across the system generally. The results tend to be absolute numbers in terms of net present value of the benefit cost value streams over a certain amount of time and a BCA ratio.

Whereas addressing distributional equity and the way many states are addressing equity is understanding, as we transition to a clean-energy economy where many states have aggressive goals, how do we ensure that everyone benefits?

While NESP developed a conceptual framework for distributional equity analysis earlier this year, E4TheFuture is co-funding a new project with U.S. DOE via Lawrence Berkeley National Laboratory to develop guidance on distributional equity analysis.

We held a kickoff meeting in late November with a stakeholder advisory group. The goal of the project is to provide guidance on how regulators and decision makers can look at BCA results alongside distributional equity analysis results, so that they have a full picture of how DER investments will impact different populations, in particular those identified as marginalized or disadvantaged communities.

There are many different types of distributional equity metrics, and we will consider a broad range of them, such as energy burden, program participation rates, rate impacts, and health impacts. In the case of health impacts, for example, we aim to provide guidance on determining how a community that lives by the coal-fired generation plant will be impacted by electrification of buildings or transportation. That's the distributional question that needs to be addressed. This isn't going to be easy.

Julie Michals: It requires a lot of data that isn't readily available, but that's the next big effort we are undertaking in 2023 to develop that guidance to complement the BCA guidance. PUF