National Standard Practice Manual

For Benefit-Cost Analysis of Distributed Energy Resources

2026

SUMMARY



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National Association of State Energy Officials

National Energy Screening Project

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The *National Standard Practice Manual for Benefit-Cost Analysis of Distributed Energy Resources* (NSPM or the Manual) 2026 Edition is a publication of the National Association of State Energy Officials (NASEO), developed by NASEO's National Energy Screening Project (NESP). The Manual incorporates and expands upon guidance from the 2020 edition of the NSPM.[1]

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The views and opinions of authors expressed herein do not necessarily state or reflect those of NASEO's members.

The full version of the NSPM 2026 Edition and supporting resources and tools are available at: www.naseo.org/topics/nesp



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[1] This is an updated version of the 2026 NSPM. It corrects errors identified after the original release of the 2026 edition. A full list of corrections (errata) is available on NASEO's NSPM webpage at www.naseo.org/nesp/nspm.

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NSPM SUMMARY

S.1 Introduction

The National Association of State Energy Officials (NASEO) created this 2026 Summary Edition of the *National Standard Practice Manual for Benefit-Cost Analysis of Distributed Energy Resources* (NSPM) as a part of its National Energy Screening Project (NESP)[2]. The Manual is intended to help State Energy Offices, Public Utility Commissions, boards and leadership of consumer-owned utilities, and others apply a comprehensive and consistent benefit-cost analysis (BCA) framework to analyze the benefits and costs of distributed energy resources (DERs), to inform optimal levels of DER investments, and to avoid uneconomic investment decisions that can lead to unintended increases in electric and natural gas utility costs for consumers and businesses. The NSPM covers a broad range of distributed energy resource (DER), including electrification-related DER programs and strategies.[3]

BCAs involve a systematic approach for assessing the cost-effectiveness of investments by consistently and comprehensively comparing the benefits and costs of individual or multiple types of DERs with each other and with/or alternative energy resources.

The NSPM introduces a BCA framework that jurisdictions (e.g., states, local municipalities) can use to guide BCA of DER investments. The framework includes a set of core principles that serve as the foundation for developing and applying cost-effectiveness tests. It further defines the steps a jurisdiction can use to develop its primary cost-effectiveness test—the Jurisdiction-Specific Test (JST)—and provides guidance on developing secondary BCA tests, where applicable.

Distributed Energy Resources (DERs) are resources located on an electric or natural gas distribution system that are generally sited close to or at customers' facilities. The DER types covered in the Manual are energy efficiency (EE), demand response (DR), distributed generation (DG), and distributed storage (DS).

The Manual also provides guidance on **electrification-related DERs** (ELEC-DER) in residential and commercial buildings (e.g., heat pumps), industrial facilities, and the transportation sector (e.g., related to electric vehicle charging).

The NSPM provides objective, policy- and technology-neutral, and economically sound guidance for developing jurisdiction-specific approaches to benefit-cost analyses of distributed energy resources.

The NSPM provides policy-neutral guidance in that it does not recommend any specific BCA tests or policies but rather supports BCA practices that align with a jurisdiction's policy goals and objectives. The Manual thus serves as an objective, technology-neutral and economically sound guidance document for those interested in comprehensively assessing the impacts of DERs.

The NSPM BCA Framework also distinguishes between conducting BCAs and other complementary analyses to inform DER investment decisions. Such complementary analyses can include analyzing the rate and bill impacts to customers associated with the DER investment(s) or strategies being considered, relative to alternative options, to address energy affordability concerns and goals.

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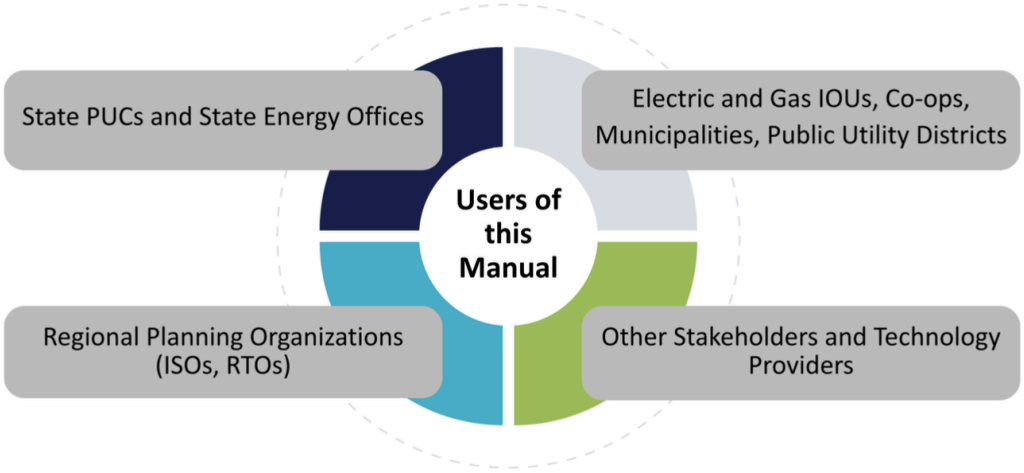
[2] The NESP was funded and managed by E4TheFuture from 2016-2025. It became a project of NASEO in 2026, including its full range of products and services. See *National Energy Screening Project* (NESP).

[3] Electrification of energy loads – the conversion of energy use from non-electric fuels to electricity – is not in and of itself a DER but rather can include DER technologies that replace other fuels to meet a jurisdiction's policy goals and objectives.

The NSPM is intended to be relevant to State Energy Offices, Public Utility Commissions and the electric and gas utilities they regulate, municipal and cooperative utilities and their boards, consumer advocates, and other stakeholders that have a role guiding or reviewing DER investment decision-making, as shown in Figure S-1.

Figure S-1. Intended NSPM Users



This Manual focuses on assessing DER benefits and costs in the context of regulatory oversight of electric and natural gas DER investments and strategies, with an emphasis on electricity DERs because these are the most common types of DERs. The principles and concepts also apply broadly to resource investments in non-regulatory contexts (e.g., state policy, legislative, planning, program development, municipal authorities), as well as to utility-scale resource investments.

The NSPM includes information for conducting BCAs of single and multiple types of DERs and provides examples that illustrate BCAs under different combinations and applications of DERs. Whether in the form of programs, procurement, planning, or other contexts, DER investments have multiple purposes. DERs can meet a range of utility system, host customer, and societal needs and jurisdictional policy objectives. These needs and objectives can include reducing utility system costs, meeting increased energy consumption needs, deferring capacity, providing demand flexibility, increasing reliability, reducing energy burdens for customers, managing grid power quality, enabling integration of variable-generation renewable energy resources, and reducing emissions or other environmental impacts.

The Manual, and companion tools and resources identified herein, are products of NASEO's NESP. This 2026 edition of the Manual builds upon and replaces the 2020 NSPM version, and its update was guided by an advisory group represented by a range of experts with varying perspectives and backgrounds.

S.1 Terminology and Applicability of the NSPM

This NSPM uses terms that are commonly used within the electricity and natural gas industries. Key terms are defined in the Glossary and in relevant sections of the Manual. Some of the terms used in the NSPM are more broadly defined than in other applications, as noted below.

Benefit-cost analysis (also commonly referred to as 'cost-effectiveness analysis') is a systematic approach for assessing the cost-effectiveness of investments by comparing the benefits and costs of alternative options. The Manual uses the term benefit-cost analysis or BCA throughout.

Jurisdiction refers to a state, territory, province, city, town, or some other jurisdiction covered by policy makers, regulators or other authorities that oversee DER initiatives.

'Utility' refers broadly to an entity that funds, implements, or supports DERs using customer or public funds that are overseen by regulators or other decision-makers. This typically includes investor-owned utilities (IOUs) and consumer-owned utilities (i.e., publicly owned utilities; municipal or cooperative utilities), and non-IOU DER program administrators (e.g., energy efficiency utilities, community choice aggregators).

Regulator (***and other decision-makers)*** refers broadly to any entity that oversees and guides DER analyses and associated investment decisions. This includes Public Utility Commissions, State Energy Offices, and boards of public power authorities and municipal or cooperative utilities.

Regulatory perspective refers to the perspective of regulators or other decision-makers that oversee resource investment choices, including energy generation and T&D infrastructure. This perspective is guided by the jurisdiction's applicable energy policy goals—whether in laws, regulations, organizational policies, or other codified forms—under which it operates.

Host customer refers to any customer that has a DER installed and/or operated on their site. In some cases, these are program participants (such as in a DR or EE program) while in other cases there is no program (such as with EV owners).

Third party refers to the broad range of independent providers such as aggregators, or implementation, service and technology providers.

The principles and concepts presented in the NSPM are relevant to:

- DER programs, procurements, or pricing mechanisms and other contexts associated with expenditures on behalf of the public consumers or utility customers, whether by utilities or others.
- Any jurisdiction where DERs are funded, acquired, or otherwise supported by electric or gas utilities or others on behalf of their customers or consumers.
- All types of utilities, including utilities that are vertically integrated, transmission and distribution (T&D), or distribution-only utilities, or those serving as a distribution platform for host customers to access a variety of energy services and DERs from third parties (e.g., aggregators).
- Single DER analyses involving *one DER type* in isolation from other DER types, relative to a static set of alternative resources.
- Multiple-DER *analyses* involving assessing more than one DER type at the same time, including multiple on-site DERs, non-infrastructure DER solutions (e.g., non-wires), virtual power plants (VPPs), and microgrids (as defined further below).
- Investments in the full range of energy resources, where consistency in terms of methods and underlying assumptions used to value resources can help to promote efficient and economic decision-making in resource investments.

S.2 Manual Contents

The NSPM includes six parts:

- **Part I** presents the *NSPM BCA Decision Framework*, including foundational principles and guidance on the development of primary BCA tests (and any secondary tests) and key considerations.
- **Part II** describes the full range of potential DER benefits and costs (i.e., impacts) that may be included in a jurisdiction's BCA test(s) and presents a range of cross-cutting factors and DER attributes that can affect the valuation and materiality of impacts.
- **Part III** provides guidance on single-DER analysis for various types of DER technologies and discusses key factors that affect BCAs for each type of DER, identifies BCA challenges, and provides guidance on key issues.
- **Part IV** provides guidance on multiple-DER analysis, focusing on specific scenarios: multiple DERs on a customer site; non-infrastructure solutions; virtual power plants (VPPs); and microgrids.
- **Part V** describes approaches to accounting for DER benefits and costs, including developing monetary values and consideration of quantitative and qualitative values.
- **Appendices** provide further guidance on topics that warrant additional explanation on key concepts or to support guidance application.

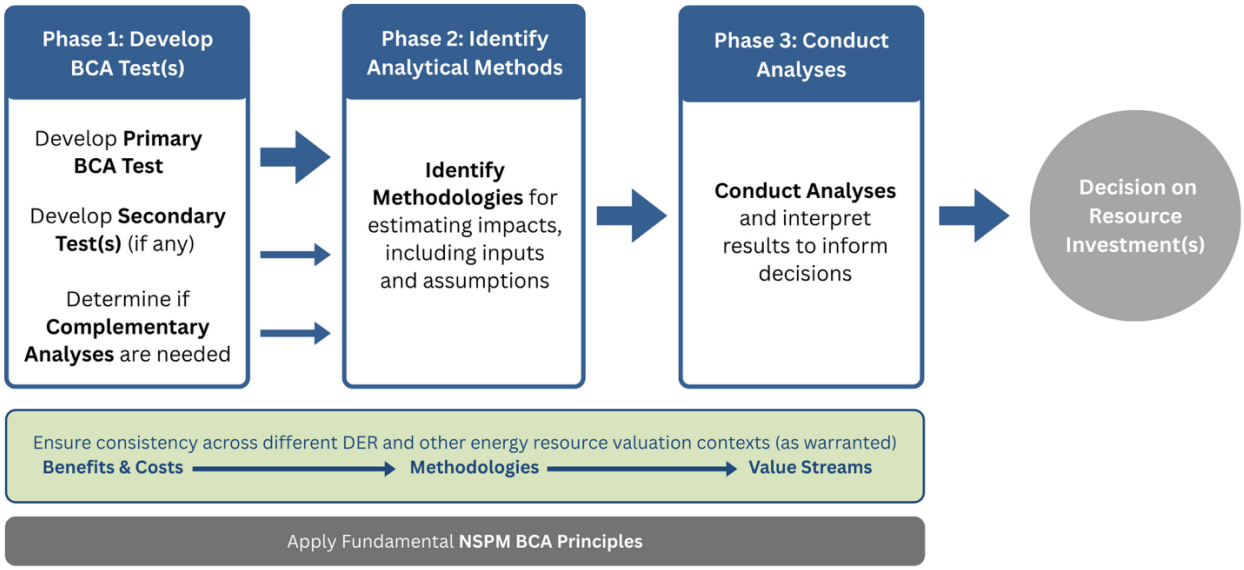
S.3 PART I: The NSPM BCA Framework

The material in the NSPM is based on supporting a decision framework for conducting BCAs ('BCA Decision Framework' or 'framework'). This framework consists of applying eight foundational principles across three phases of the framework shown in Figure S-2.

- **Phase 1**: Develop a jurisdiction's primary BCA test, known as the Jurisdiction-Specific Test (JST). The NSPM is focused on providing guidance for this phase.
- **Phase 2**: Identify the methodologies for use in developing numeric inputs and calculating value streams for the costs and benefits included in BCA tests.
- **Phase 3**: Conduct the analyses and interpret the results to inform investment decisions.

The NSPM focuses on Phase 1 of the framework which is supported by Parts I-IV of the Manual. Phases 2-3 of the framework are addressed in Part V, which describes supporting NESP tools and resources.

Figure S-2. BCA Decision Framework and Process



S.3.1 Phase 1 of the Decision Framework

This phase involves:

- Developing a **primary BCA test** that is most applicable to a jurisdiction—a jurisdiction-specific test (JST)—given its energy goals and objectives.
- Developing **any secondary tests** that may help to inform DER investment decisions by answering different questions than the primary test.
- Establishing **key analytical parameters** for the BCA test(s) such as geographic boundaries to apply in quantifying different costs and benefits, the discount rate(s) to use, and the assessment level of impacts that will inform investment decisions.
- Identifying **any complementary analyses** (based on jurisdictional policy goals) that may be useful to undertake in parallel with BCAs to inform DER investment decisions, such as assessing rate impacts, economic development impacts, and/or the distribution of impacts to different populations.

The Manual includes an eight-step process that jurisdictions can use to systematically apply the NSPM principles to accomplish the four outcomes above. The principles are summarized below in Section S.3.4 and the eight-step process is summarized in Section S.3.5.

S.3.2 Phase 2 of the Decision Framework

This phase involves selecting methodologies and data sources for quantifying the value streams of impacts included in the BCA (such as calculation formulas and input values). Guidance on BCA methodologies at a general level is provided in the NSPM and is further covered in other companion NESP resources, including *Methods, Tools and Resources for Quantifying DER Impacts (MTR Handbook)* (NESP 2022). In addition, resources on methodologies for conducting parallel complementary analyses to BCAs are identified in various appendices of the Manual.

S.3.3 Phase 3 of the Decision Framework

This phase involves conducting the BCA itself (i.e., using calculations and data to generate benefit and cost value streams) and presenting BCA results to inform decision-making in DER investments.

Program administrators and evaluation practitioners use a range of internal or external models to conduct BCAs. The NSPM-based *OpenBCA* tool is designed to analyze BCAs for single- and multi-DER investments using an open-source platform that is publicly available to all users and jurisdictions.

S.3.4 The Fundamental BCA Principles

The NSPM principles serve as a foundation for conducting DER BCAs, where the principles:

- Are policy-neutral[4] (in that they do not prescribe specific BCA tests), are technology-neutral, and are in line with sound economic practices.
- Provide guidance on how to select relevant categories of benefits and costs for a jurisdiction to include in its primary (and any secondary) BCA test.
- Can guide the selection and application of analytical methods used to quantify BCA impacts, as well as any complementary analyses (such as rate and bill impact analyses).
- Help to increase consistency in valuing DERs across a broad range of contexts.

The NSPM principles in and of themselves do not determine a jurisdiction's appropriate cost-effectiveness test for DERs. The principles are policy-neutral in that they do not prescribe specific BCA tests. Rather, the principles provide guidance on how to select relevant categories of benefits and costs for a jurisdiction to include in its primary (and any secondary) BCA test.

Table S-1 summarizes the NSPM principles. While the Manual recommends adherence to all the principles, it is up to the users of the NSPM to decide if they will apply the principles in all situations.

[4] The NSPM is policy-neutral in that it can be used by any jurisdiction, regardless of what policies it has adopted. The manual does not advocate or reject any specific policies but rather sets forth that a jurisdiction's BCA practices should align with the jurisdiction's policy goals and objectives.

Table S-1. NSPM BCA Principles

Principle 1	**Align with Applicable Energy Policy Goals** Jurisdictions invest in DERs to meet a variety of energy goals and objectives. Accounting for the associated benefits and costs in a jurisdiction's primary BCA test helps to ensure that least-cost investments are used to achieve the goals and objectives.
Principle 2	**Treat DERS as a Utility System Resource** DERs are energy resources that can help meet utility system needs. Using consistent BCA tests, valuation methods, and assumptions when comparing DERs to traditional resources, or to other DERs, avoids bias across resource investment decisions.
Principle 3	**Account for All Relevant and Material Impacts** The relevance and materiality of impacts can vary depending on the DER type or use case. Accounting for all relevant and material impacts, even when difficult to quantify or monetize, ensures DERs are appropriately valued and avoids biased investments.
Principle 4	**Ensure Symmetry in the Treatment of Benefits and Costs** DER investments produce benefits to the utility system and to customers. Treating benefits and costs symmetrically in BCA tests, such that benefits and costs are both either included or excluded, avoids biased results and uneconomic investments.
Principle 5	**Conduct Forward-Looking, Long-Term, Incremental Analyses** BCAs address how benefits and costs will differ in the future because of a specific resource investment relative to what would have occurred absent the investment. This ensures that sunk costs do not influence investment decisions.
Principle 6	**Avoid Double-Counting Impacts** Some BCA benefits and costs can potentially be captured in more than one impact category. Clearly documenting the way in which a BCA accounts for each impact helps to avoid double-counting and either over- or under-estimating the value of DERs.
Principle 7	**Conduct BCAs Separately from Other Complementary Analyses** BCAs inform whether total benefits exceed total costs of a resource investment. Depending on a jurisdiction's policy goals, separate analyses may be warranted to inform investment decisions that address different questions than BCAs, such as rate- and bill-impact analyses.
Principle 8	**Ensure Transparency** Clear documentation of the rationale for decisions on BCA tests, complementary analyses, and associated methods, inputs, and results supports transparency. Transparency enables engagement and instills confidence in resource decision-making processes.

S.3.5 Developing a Primary Jurisdiction-Specific Test (JST)

The NSPM presents a step-by-step process for developing a primary cost-effectiveness test, the JST. The JST is based on the 'regulatory' perspective, which refers to the perspective of regulators or similar entities that oversee utility (or other publicly funded) DER investment decisions. **This perspective factors in the jurisdiction's applicable**

A primary BCA test answers the critical question: *Will the cost of meeting utility system needs, while achieving applicable policy goals, increase or decrease?*

policy goals and objectives, whether in laws, regulations, organizational policies, or other codified forms in which utilities operate.

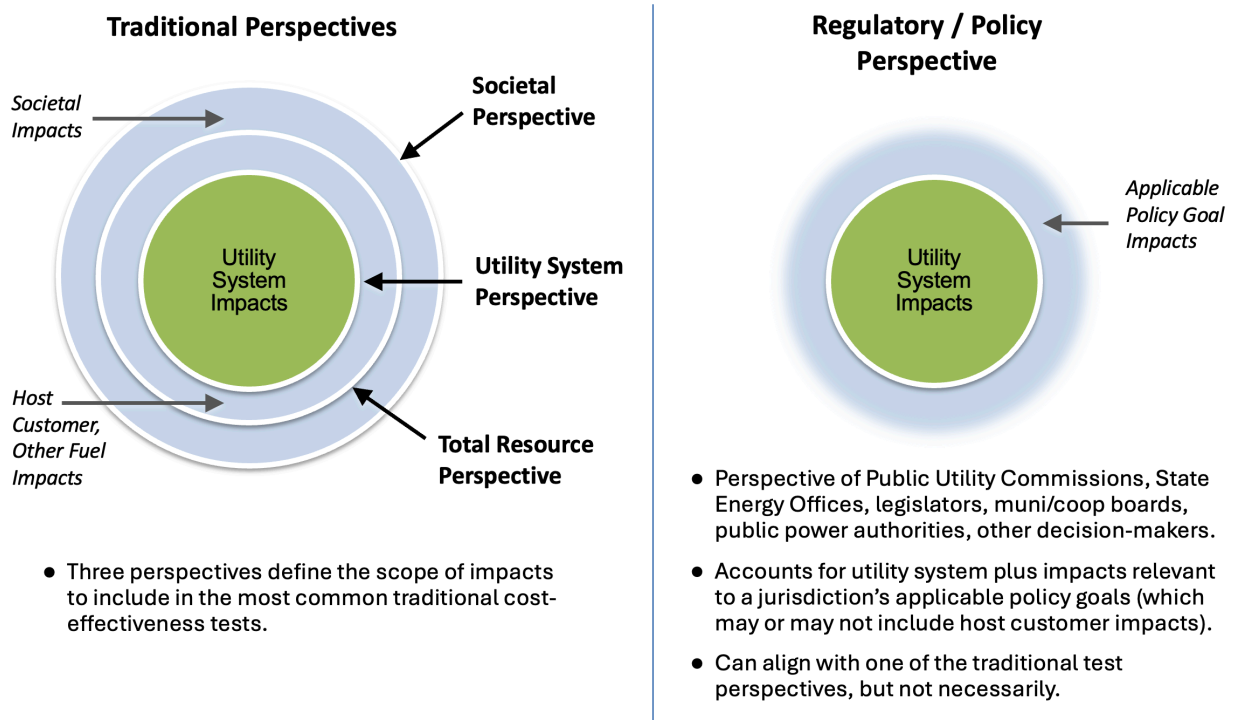
The regulatory perspective reflects a jurisdiction's applicable policy goals that can be articulated in different ways, including but not limited to legislation; executive orders; regulations; commission or board guidelines, standards, or orders; utility resource planning principles and policies; and requirements of other jurisdictional governing agencies.

A jurisdiction's regulatory perspective is often broader than the utility perspective in that it can account for applicable energy policy goals beyond the basic utility goals of providing affordable, safe, reliable electricity services (such as achieving certain societal resilience or environmental goals). However, policy goals often do not encompass the full range of potential societal goals. As such, a jurisdiction's regulatory perspective is likely to fall somewhere along the spectrum of a utility perspective to a societal perspective, depending on its articulated policy goals and objectives.

Thus, the JST often differs from the traditional DER (particularly energy efficiency) cost-effectiveness tests (e.g., utility cost test or total resource cost test) that are not necessarily designed to take a regulatory perspective or consider applicable policy goals. To avoid suboptimal resource selections with respect to a jurisdiction's stated policy goals, the regulatory perspective is necessary to ensure a BCA test considers all relevant policy goals. Otherwise, the jurisdiction might incur additional costs to meet those policy goals.

Figure S-3 illustrates the regulatory perspective (reflecting a jurisdiction's policies) that serves as the basis for the JST, relative to the perspectives underlying the traditional cost-effectiveness tests. **Key to any BCA test perspective is that utility system impacts are foundational and are always included in any test.**

Figure S-3. Cost-Effectiveness Testing (or BCA) Perspectives



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

- Perspective of Public Utility Commissions, State Energy Offices, legislators, muni/coop boards, public power authorities, other 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.

Table S-2 presents the eight-step process for developing a jurisdiction's JST as part of Phase 1. As noted above, the process of developing the JST can lead to decisions to also have one or more secondary BCA tests, and/or to identifying additional complementary analyses that address important policy concerns not addressed by BCA. Secondary BCA tests can provide additional information, represent different perspectives, and answer different questions. Complementary analyses may be needed alongside BCAs to ensure decision-makers have sufficient information to inform decisions on DER investments, such as a rate and bill impact analysis to address affordability of DER investments relative to other options.

Table S-2. Developing a Primary BCA Test: An Eight-Step Process[5]

STEP 1	**Take inventory of applicable energy policy goals and regulatory decisions** Review energy legislation, plans, regulatory decisions, and other related documents and take inventory of the jurisdiction's policy goals and objectives applicable to DER investments.
STEP 2	**Review and account for relevant and material utility system impacts** Review the full range of utility system impacts and identify if any may not be relevant or material for specific DER types, and if any are embedded in other impacts. For impacts affected by geographic scope, determine scope of interest based on applicable policies.
STEP 3	**Decide which non-utility system impacts to include in the primary test** Determine whether to include host customer, other fuel, and/or any societal impacts based on applicable policies, and if so, whether any impacts may not be relevant or material for specific DER types, and if any are embedded in other impact categories. For impacts affected by geographic scope, determine scope of interest based on applicable policies.
STEP 4	**Develop any secondary BCA tests** Decide if one or more secondary test(s) are needed to supplement the results of the primary test in order to explore the sensitivity of the primary BCA results to the inclusion or exclusion of one or more non-utility system impacts and/or to inform answers to different questions than what the primary test helps to answer.
STEP 5	**Select a discount rate(s) for calculating the present value of investments** Select a discount rate to apply to the primary BCA test, as well as the rate(s) to apply to any secondary BCA tests, based on the jurisdiction's applicable energy policies.
STEP 6	**Establish assessment level at which BCA results will inform decisions** Determine the appropriate level of aggregation of DER investments for which BCA results will be used to inform regulatory and other approvals.
STEP 7	**Consider conducting complementary analyses to BCAs** Depending on applicable policies, consider whether other analyses—e.g., rate and bill impact analyses—are warranted alongside BCAs to address questions that BCAs do not answer, but that may be important to achieve policy goals and informing DER investment decisions.
STEP 8	**Document process, comments, and rationale for above steps** Fully document the process and rationale used to establish the primary BCA test, any secondary tests and/or other complementary analyses and BCA parameters.

[5] Note: The 8-step process may not be followed in chronological order and often requires iteration.

The NSPM provides guidance on how secondary tests can help assess marginally cost-effective DERs or to prioritize across DERs. While a jurisdiction's primary test should be used to inform whether a utility should fund or otherwise support DERs, it does not have to be utilized in a vacuum. In some instances, secondary tests can help enhance regulator and stakeholder overall understanding of DER impacts by answering other questions regarding DER investments.

The NSPM does not prescribe any one cost-effectiveness test. Because the JST is based upon each jurisdiction's applicable policy goals, and those goals can vary across jurisdictions, the test may take a variety of forms.

Complementary analyses may also be needed alongside BCAs primary (and secondary) tests to ensure decision-makers have sufficient information to inform decisions on DER investments. BCA tests address the question of whether the total economic benefits of a DER investment are greater than total economic costs. However, as articulated under NPSM Principle 7, some jurisdictions might have policy goals requiring considering other questions, beyond cost-effectiveness, when making decisions on whether to support or approve DER investments. Common examples include:

- How will the DER investments affect utility rates?
- How will benefits and costs of the DER investments be distributed, particularly with respect to low-income, rural, historically neglected, or other populations of particular interest?
- How will the investments affect local economic development and jobs?

Table S-3 summarizes how these complementary concerns are different from cost-effectiveness concerns, both in terms of the questions they address, the impacts they assess, and key metrics or outcomes of potential interest. Guidance on conducting analyses of three commonly considered complementary concerns—rate impacts, economic development and jobs, and distributional equity—is provided in NSPM appendices.

Table S-3. Comparison of BCA to Other Types of Complementary Analyses

	Benefit-Cost Analysis	Rate and Bill Impact Analysis	Distributional Equity Analysis	Economic Development and Job Impacts
Question Answered	Will total costs across all customers increase (net costs) or decrease (net benefits) because of an investment?	Will electricity and/gas rates go up or down (e.g., for all customers, participants, or non-participants)?	How will DER benefits and costs be distributed to certain customers relative to other customers?	Will the local economy including jobs become more or less robust because of an investment?
Impacts Analyzed	• Utility system costs • Other non-Utility costs of state policy interest	• Reduced or increased utility revenues • Change in utility system costs • Program participation	• Specific metrics as identified by jurisdiction's policies (e.g., rate and bill impacts, energy burden)	• Local economic activity • Local employment
Example Metrics	• Present value of change in costs ($) • Present value of change in benefits ($) • Present value of net benefits ($) • Benefit-cost ratio	• Rate Impacts (c/kWh, %) • Bill Impacts ($/month, %) • Participation (#, %)	• Change in electricity rates ($/kWh) • Change in participation rates (% eligible) and participant bills ($/year) • Change in energy burdens (% of income spent on energy bills)	• Changes in GDP ($) • Net change in jobs (FTE) or job-years (direct, indirect, and induced)

S.3.6 Valuing DERs and Other Resources in Different Contexts

There are many situations or contexts that entail evaluating the benefits and costs of DERs and other energy resource investments to assess the cost-effectiveness or identify the optimal mix of resources to serve energy customers to promote efficient and economic decision-making in resource investments. While this Manual focuses on assessing DER benefits and costs in the context of regulatory oversight of DER investments and strategies, the NSPM principles and concepts apply broadly to valuing all energy resources, and moreover, to resource investments in non-regulatory contexts (e.g., state policy, planning, and program development, public/municipal authorities). Table S-4 presents examples of where DERs and other energy resources are evaluated, and the associated questions addressed by each context.

Table S-4. Summary - Valuing DERs and Other Resources in Different Contexts

Context	Examples	Example Questions to be Answered
DER programs	Review of programs including EE, DR, DG, DS, EVs, multi-DER programs (e.g., GEBs, NWS/NPS, VPPs)—both prospective and retrospective	Should there be an investment in the DER program? Can DER programs be designed to increase net benefits?
Utility scale generation	Review of utility investment in large-scale, front of the meter generation, before the investment has been made	Is the generation resource necessary, and will it meet public needs at lower cost than alternatives?
Resource procurements	Procurements from third parties of energy and capacity, large-scale renewable generation, DERs, NWS/NPS, or VPPs	What is the maximum amount that should be paid (i.e., ceiling price) to procure the resource?
Energy price signals	Rate design in rate cases, DR programs, time-varying rates; paying for grid services through price signals	What price signal will optimize customer demand profiles and the adoption of DER?
Grid modernization	Review of grid modernization investments such as grid-enhancing technologies, grid hardening technologies, AMI, DERMS, ADMS	Should the grid modernization investment be made?
Dynamic system planning	Assessment and evaluation of multiple energy resource types relative to a dynamic set of alternative resources, such as Integrated Distribution System, Resource, Grid and/or Electricity Planning	Which portfolio of large-scale and distributed energy resources will provide the greatest benefits?
Retrospective prudence reviews	Review of utility investments after the investments have been made, often during a rate case	Was the capital investment in question expected to provide net benefits to customers at the time it was made?
Performance incentive mechanisms (PIMs)	Determining PIMs to incentivize utilities in context of energy efficiency programs, resource procurements, GHG and other emissions, grid modernization, etc.	How much should a utility be rewarded or penalized, based on the benefits or costs experienced?
State energy policies, planning and programs	Support and implement a variety of state energy policies, legislation, plans, and programs (distinct from regulation or regulated utilities)	Will the state's policies, planning, and program efforts help to meet its specific energy goals and objectives by providing net benefits to the state?

S.4 Part II. DER Benefits and Costs and Cross-Cutting Considerations

Part II of the NSPM catalogs the full range of benefits and costs (impacts) that may be applicable to specific types of DERs. It also includes descriptions of cross-cutting factors and attributes that, across multiple DER types or combinations of DERs, affect the valuation and materiality of each type of impact. These descriptions can be used as a reference when deciding which types of benefits and costs should be included in a jurisdiction's BCA test(s).

S.4.1 DER Benefits and Costs

DERs can have a wide range of impacts that affect the electric utility system, the natural gas utility system, other fuel systems, host customers, and society. The relevance and materiality of an impact can depend on the DER type(s).

Part II of the NSPM catalogs the range of impacts in table format with detailed descriptions of each impact type. As a sample of this information, Table S-5 shows the range of potential DER impacts to the electric utility system, along with brief descriptions of each impact. Similarly, Table S-6 and Table S-7 provide a summary of potential host customer and societal impacts, respectively. Part II also addresses natural gas and other fuel system impacts, and specific host customer impacts including non-energy impacts (NEIs). Key points addressed in Part II regarding the impacts summarized in the tables below are that:

- While some impacts are always a benefit or cost for certain DER types, other impacts can be either a benefit or a cost depending on various factors, such as the DER technology characteristics, where the DER is located, and when and how it operates.
- For DERs funded or otherwise supported by electric (or gas) utilities, it is appropriate for BCA tests to include all electric (or all gas) utility system impacts to the extent they are relevant and material.
- Depending on the applicable policy goals, a jurisdiction's primary BCA test (i.e., JST) might include other fuel system impacts, host customer impacts, and/or societal impacts, to the extent the impacts are relevant and material.

Further details on BCA for each DER type are available in Part III of the NSPM. In cases where a BCA test encompasses multiple DER types, the impacts may be different than those presented for single DER BCA (e.g., the net impact is not equal to the sum of the individual DER impacts). The NSPM Part IV addresses multiple DER BCAs, with guidance on BCA for multi-DERs for specific scenarios.

Table S-5. Potential DER Impacts: Electric Utility System

Type	Impact	Description
Generation	Energy Generation	The production or procurement of energy (kWh) from generation resources on behalf of customers
	Capacity	The generation capacity (kW) required to meet the forecasted system peak load
	Environmental Compliance	Actions needed to comply with environmental regulations
	RPS/CES Compliance	Actions needed to comply with renewable portfolio standards or clean energy standards
	Market Price Effects	The decrease (or increase) in wholesale market prices due to reduced (or increased) customer consumption
	Ancillary Services	Services required to maintain electric grid stability and power quality

Transmission	Transmission Capacity	Maintaining the availability of the transmission system to transport electricity safely and reliably
	Transmission System Losses	Electricity lost through the transmission system
Distribution	Distribution Capacity	Maintaining the availability of the distribution system to transport electricity safely and reliably
	Distribution System Losses	Electricity lost through the distribution system
	Distribution O&M[6]	Operating and maintaining the distribution system
Cross-Cutting GT&D	Risk	An adverse outcome that can occur because of uncertainty.
	Reliability	The ability to prevent or avoid routine short-term outages under normal operating conditions due to fluctuating load and generation, fuel availability, and/or outage of assets
	Resilience	The ability to prepare for threats and hazards, adapt to changing conditions, and withstand and recover rapidly from disruptions
General	Financial Incentives	Utility financial support provided to DER host customers or other market actors to encourage DER implementation
	Utility Direct Investment	Direct costs for development and deployment of DERs by the utility, typically on the utility side of the meter
	Program Administration	Utility outreach to trade allies, technical training, marketing, and administration and management of DERs
	Utility Performance Incentives	Incentives offered to utilities to encourage successful, effective implementation of DER programs
	Credit and Collection	Bad debt, disconnections, reconnections

Table S-6. Potential Benefits and Costs of DERs: Host Customer

Type	Host Customer Impact	Description
Host Customer	Host portion of DER costs	Costs incurred to install and operate DERs
	Host transaction costs	Other costs incurred to install and operate DERs
	Interconnection fees	Costs paid by host customer to interconnect DERs to the electricity grid
	Resilience	The ability to anticipate, prepare for, and adapt to changing conditions and withstand, respond to, and recover rapidly from disruptions
	Tax incentives	Federal, state, and local tax incentives provided to host customers to defray the costs of some DERs
	Host Customer NEIs	Benefits and costs of DERs that non-energy-related

Table S-7. Potential Costs and Benefits of DERs: Societal

	Societal Impact	Description
Societal	GHG Emissions	GHG emissions created by energy resources
	Other Environmental	Other air emissions, solid waste, land, water, and other environmental impacts
	Public Health	Health impacts, medical costs, and productivity affected by health
	Resilience	Resilience impacts beyond those experienced by utilities or host customers

[6] DER impacts on transmission O&M costs are likely immaterial but can be included in a BCA if identified as material.

S.4.2 Cross-Cutting Impacts

There are multiple factors and DER attributes that, across different DER types, affect the valuation and materiality of the specific impacts. Part III of the NSPM addresses a range of cross-cutting factors:

- Temporal and locational impacts of DERs
- Interactive impacts between DER types
- Grid and demand flexibility
- Resource ownership and control
- Behind- versus in front-of-the meter DERs
- Wholesale market revenues
- Program scale and threshold-dependent valuation
- Free-riders and spillover impacts
- Rebound effect
- Renewable generation impacts
- Offsetting transfers

Some of these factors are further discussed in the individual DER chapters in Part III, and in Part IV if they can have a unique impact on multiple combinations of DERs.

Other factors that affect BCA valuation of all DER impacts are discount rates, geographic boundaries, and the assessment level used for applying BCA tests. These factors are discussed in detail in the NSPM appendices.

S.5 Part III: BCA for Specific DER Types

Part III of the NSPM contains five chapters that discuss individual characteristics and impacts of each DER type covered in the Manual: EE, DR, DG, DS, and electrification-related DERs. Part III describes and provides guidance on key factors and challenges that affect the impacts of each DER type.

Tables S-8 through S-12 show the range of benefits and costs in terms of their applicability to each DER type and electrification. They indicate which impacts are typically a benefit, a cost, or depending on the specific DER use case. The tables are a compilation of the DER-specific tables presented in each DER (and electrification) chapter in Part III, for electric utility system, gas utility system, other fuels, host customer, and societal impacts.

Table S-8. Potential Benefits and Costs: Electric Utility System

Category	Utility System Impact	EE	DR	DG	DS	ELEC
Generation	Energy Generation	●	●	●	●	●
	Capacity	●	●	●	●	●
	Environmental Compliance	●	●	●	●	●
	RPS/CES Compliance	●	NM	NR	●	●
	Market Price Effects	●	●	NR	●	●
	Ancillary Services	NM	● / NM	NM	●	NM
Transmission	Transmission Capacity	●	●	●	●	●
	Transmission System Losses	●	●	●	●	●
Distribution	Distribution Capacity	●	●	●	●	●
	Distribution System Losses	●	●	●	●	●
	Distribution O&M	●	●	●	●	●
Cross-cutting GT&D	Risk	●	●	●	●	●
	Reliability	●	●	●	●	●
	Resilience	NR	NR	NM	NM	NM
General	Financial Incentives	●	●	●	●	●
	Utility Direct Investments	NR	NR	●	●	NR
	Program Administration Costs	●	●	●	●	●
	Utility Performance Incentives	● / NR	● / NR	● / NR	● / NR	● / NR
	Credit and Collection Costs	●	●	●	●	●

The following describes the potential impacts of DERs for Tables S-8 through S-12:

- ● = *typically a benefit for DER type*
- ● = *typically a cost for DER type*
- ● = *either a benefit or cost for DER type, depending upon the application of DER*
- *NM = typically not material*
- *NR = not relevant for DER*

Note that all tables are illustrative as there might be specific use cases or contexts where the impact may be differently characterized than how it is presented in the table, and in some 'NM' cases the impact could become material as the grid evolves.

Table S-9. Potential Benefits and Costs: Gas Utility System

Type	Utility System Impact	Gas EE	Gas DR	Gas DG*	Gas DS	ELEC
Energy/Supply	Gas Commodity	●	●	NR	NR	●
	Capacity	●	●	NR	NR	●
	Environmental Compliance	●	NM	NR	NR	●
	Market Price Effects	●	NM	NR	NR	●
Transportation	Pipeline Capacity	●	●	NR	NR	●
	Pipeline Losses	●	●	NR	NR	●
Distribution	Local Delivery Capacity	●	●	NR	NR	●
	Local Delivery Losses	●	●	NR	NR	●
Cross-cutting Energy, T&D	Risk	●	●	NR	NR	●
	Reliability	●	●	NR	NR	●
	Resilience	NR	NR	NR	NR	NR
General	Financial Incentives	●	●	NR	NR	●
	Program Administration Costs	●	●	NR	NR	●
	Utility Performance Incentives	● / NR	● / NR	NR	NR	● / NR
	Credit and Collection Costs	●	●	NR	NR	●

*NSPM Chapter 10 provides additional information on electric utility CHP impacts on the natural gas utility system.

Table S-10. Potential Benefits and Costs: Other Fuels

Type	Impact	EE	DR	DG	DS	ELEC
Other Fuels (oil, propane, wood, gasoline)	Commodity	●	●	●	NR	●
	Environmental Compliance	●	●	●	NR	●
	Market Price Effects	●	NM	NM	NR	●

Table S-11. Potential Benefits and Costs: DER Host Customers

Type	Host Customer Impact	EE	DR	DG	DS	ELEC
Host Customer	Host portion of DER costs	●	●	●	●	●
	Host transaction costs	●	●	●	●	●
	Interconnection fees	NR	NR	●	●	NR
	Tax Incentives	●	NR	●	●	●
	Resilience	●	NR	●	●	NR
	Host Customer NEIs	●	●	●	●	●

Table S-12. Potential Benefits and Costs of DERs: Societal

Type	Societal Impact	EE	DR	DG	DS	ELEC-DER
Societal	GHG Emissions	●	●	●	●	●
	Other Environmental	●	●	●	●	●
	Public Health	●	●	●	●	●
	Resilience	●	NR	●	●	NR

S.6 Part IV: Analyzing Specific DER Scenarios

DERs (and electrification related DERs) are implemented under a wide range of scenarios and often in combinations of DER types. Combining multiple DERs (either of the same type or of multiple types) can provide value to the electricity grid in several ways, including impacts such as reducing GHG emissions, mitigating or reducing the need to build new infrastructure, and providing ancillary grid services. The NSPM's Part IV highlights key considerations specific to conducting BCA for four scenarios in which multiple DERs are often aggregated.

The four scenarios are:

- ***Multiple On-Site DERs:*** When more than one DER is installed in the same building, or at buildings within a contiguous geographic site such as a campus.
- ***Non-Infrastructure DER Solutions:*** DERs typically sited at more than one location are utilized to defer or avoid a utility infrastructure investment (e.g., non-wires solutions, NWS), or to improve system performance and/or customer satisfaction while waiting for the completion of an infrastructure solution.
- ***Virtual Power Plants (VPPs)***: An aggregation of multiple DERs that can be dispatched to benefit the grid and/or participate in a market.
- ***Microgrids***: Coordinated operation of DERs on a portion of the electric grid in a configuration that allows islanding (functioning independently of the rest of the grid) and potentially adds resource value when operating in parallel with the grid.

These scenarios are not mutually exclusive, and situations can arise in which a particular DER project will encompass multiple scenarios. For instance, a VPP comprised of smart thermostats and EV chargers can be leveraged as an NWS to help provide load relief to an overloaded feeder.

Each specific DER scenario, and the technology variations thereof, has its own set of BCA issues, or considerations, that can arise and thus add complexity to properly analyzing the cost-effectiveness of DERs. Part IV of the NSPM addresses nine key BCA considerations that can arise during specific DER scenario analyses:

- Passive interactive load impacts between DERs
- Active interactions, use case, and balancing competing priorities
- Unlocking novel value streams and threshold dependent value quantification
- Accounting for uncertainty when avoiding tangible grid investments or performing as grid assets
- Evaluating the value of flexibility
- Time-dependent value quantification

- Location-dependent value quantification
- Supporting system costs
- Existing DER impacts

These key considerations address issues that are either unique to, or of focal interest for, the four specific DER scenarios described above. These considerations are intended to be complementary to guidance provided in Part II (cross-cutting issues) and Part III (individual DER types, rather than a stand-alone checklist for appropriately conducting BCA for a specific scenario of interest.

S.7 Summary of NSPM Chapters and Supporting Appendices

Table S-13 provides a summary of the NSPM chapters and supporting appendices.

Table S-13. Guide to NSPM Chapters and Appendices

Part/ Chapter	Topic	Description
Chapter 1	Introduction	Describes the purpose and scope of this Manual, and an overview of BCA
Part I	**Benefit-Cost Analysis Decision Framework**	
Chapter 2	BCA Decision Framework	Describes phases of a decision-making process for DER investments
Chapter 3	BCA Principles	Describes fundamental principles that serve as the foundation for this Manual
Chapter 4	Developing BCA Tests	Provides guidance on how to develop a jurisdiction's primary BCA test and any secondary tests, and addresses various BCA parameters to consider
Chapter 5	Valuing Energy Resources in Different Contexts	Addresses the importance of ensuring consistency in the valuation of DERs across a broad range of contexts and describes how the NSPM principles and guidance can be applied across the contexts
Part II	**DER Benefits and Costs, Key Cross-Cutting Issues**	
Chapter 6	DER Benefits and Costs	Presents a catalog of the full range of benefits and costs that may be applicable to specific types of DERs
Chapter 7	Cross-Cutting Benefit and Cost Considerations	Discusses a variety of issues and considerations that span several of the benefits and costs listed in Chapter 6
Part III	**Specific DER Types – BCA Issues and Guidance**	
Chapter 8	Energy Efficiency	Provides guidance on key factors that affect the benefits and costs relevant to specific DER technologies (EE, DR, DG, DS and electrification-related DERs, including EV and building technologies)
Chapter 9	Demand Response	
Chapter 10	Distributed Generation	
Chapter 11	Distributed Storage	
Chapter 12	Electrification-related DERs	
Part IV	**BCA for DER Specific Scenarios**	
Chapter 13	Key Considerations when Analyzing Specific DER Scenarios	Addresses key issues to consider when analyzing: Multiple On-Site DERs, Non-Infrastructure DER Solutions, Virtual Power Plants, and Microgrids. This chapter builds upon material covered in Chapters 7-12

Part/ Chapter	Topic	Description
Part V	**Accounting for DER Impacts**	
Chapter 14	Methods for Calculating DER Impacts	Provides guidance on calculating DER benefits and costs in monetary terms, and accounting for hard-to-quantify impacts, and references tools for conducting BCAs and how to present BCA results
Part VI	**Appendices**	
Appendix A	Valuing Energy Resources in Different Contexts	Provides detailed guidance to support Chapter 5 on valuing DERs consistently across various contexts (e.g., DER programs, procurement, planning) and the application of NSPM principles and guidance
Appendix B	Rate and Bill Impact Analysis (RBA)	Describes the difference between BCA and rate impact analyses, the role of rate, bill, and participation analyses, and the importance of conducting BCA and RBA separately to inform decision making
Appendix C	Economic Development Analysis (EDA)	Describes the difference between BCA and EDA, and the importance of conducting these analyses separately in cases where economic development is an energy policy goal for the jurisdiction
Appendix D	Distributional Equity Analysis (DEA)	Describes the difference between BCA and DEA, and the importance of conducting these analyses separately where addressing the distribution of benefits and costs is an energy policy goal for the jurisdiction
Appendix E	Traditional Cost-Effectiveness Tests	Summarizes the commonly used traditional cost-effectiveness tests from the *California Standard Practice Manual*, with comparison to this Manual
Appendix F	Geographic Boundaries in BCAs	Describes how policies can inform determination of geographic boundaries (state, regional, global) when analyzing certain impacts
Appendix G	Developing Secondary BCA Tests	Provides guidance on the purpose for, and how to develop any secondary BCA tests to inform resource investment decisions
Appendix H	Discount Rates	Describes ways to determine discount rates that are consistent with a jurisdiction's applicable policy goals
Appendix I	BCA Assessment Level	Describes different aggregation levels (e.g., sector, program, portfolio) for analyzing DERs in a BCA, and provides guidance on approaches
Appendix J	Template NSPM Tables	Presents various tables that can be used by jurisdictions to document applicable policies and identify relevant impacts to include in their BCA
Appendix K	Presenting BCA Results	Provides guidance on presenting results in a way that is most useful for making cost-effectiveness decisions
Appendix L	Accounting for Risk & Uncertainty	Defines and describes options on how to account for risk and uncertainty in BCAs
Appendix M	Identifying and Accounting for Transfers in BCAs	Provides guidance on impacts that appear to be both a benefit to one party and a cost to another party, thereby cancelling each other out
References		