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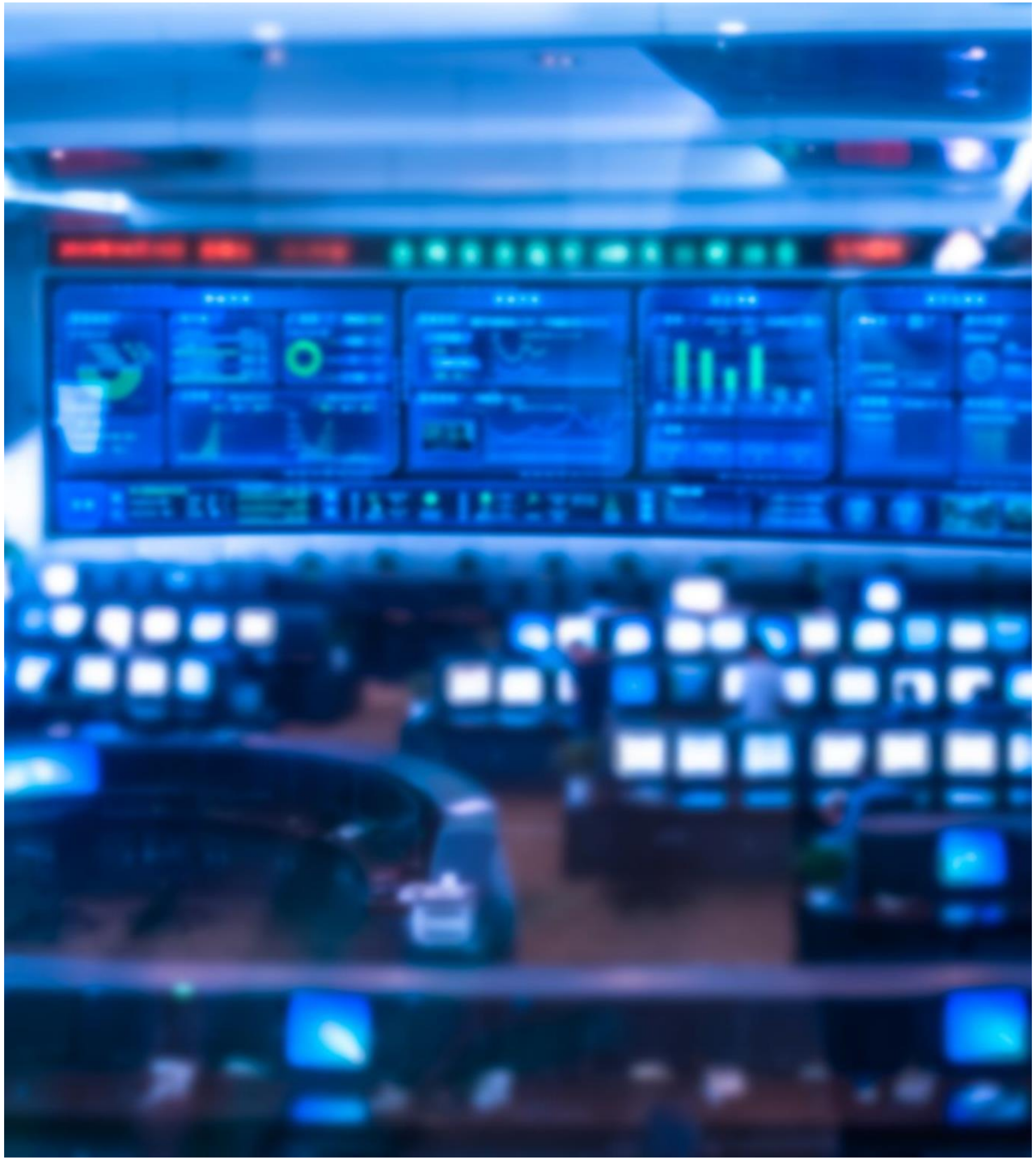
SEPA:
NSPM for DERs & Transportation Electrification

Maryland PC 44 EV Working Group Presentation
February 19, 2021

Clean + Modern Grid

Regulatory and Business Innovation | Grid Integration | Electrification



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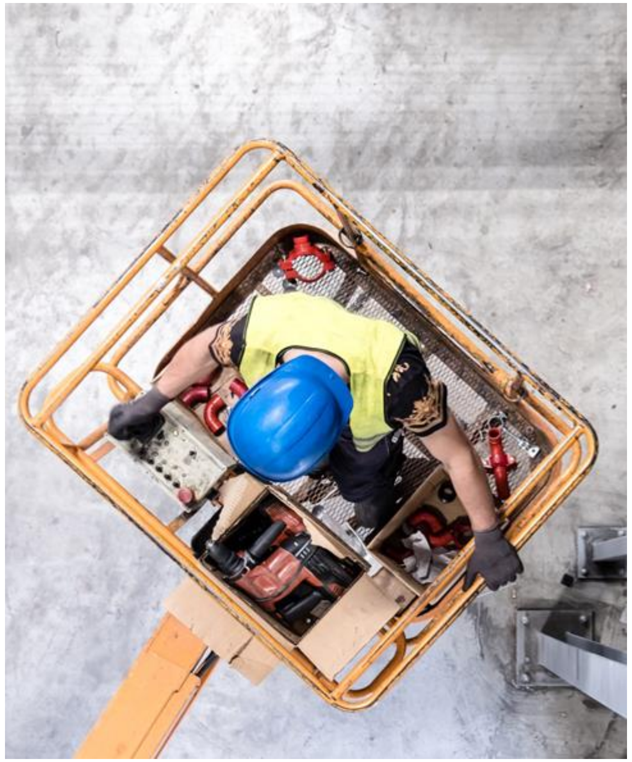
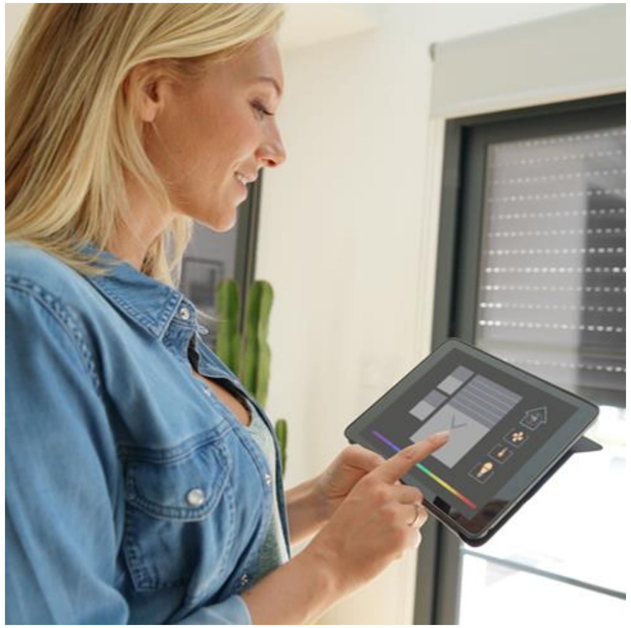
Vision

A carbon-free energy system by 2050

Mission

To facilitate the electric power industry's **smart transition** to a clean and modern energy future.





Who Are We?

Smart Electric Power Alliance

- A membership organization
- Staff of ~50
- Based in Washington, D.C.
- No Advocacy – 501c3
- Founded in 1992
- Research, Education, Collaboration & Standards
- Unbiased
- Technology Agnostic

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>1,150

Total Members

Membership

SEPA is an **alliance** of over 1,150 members made up of utilities, technology solution providers, regulators, and other stakeholders.

74%

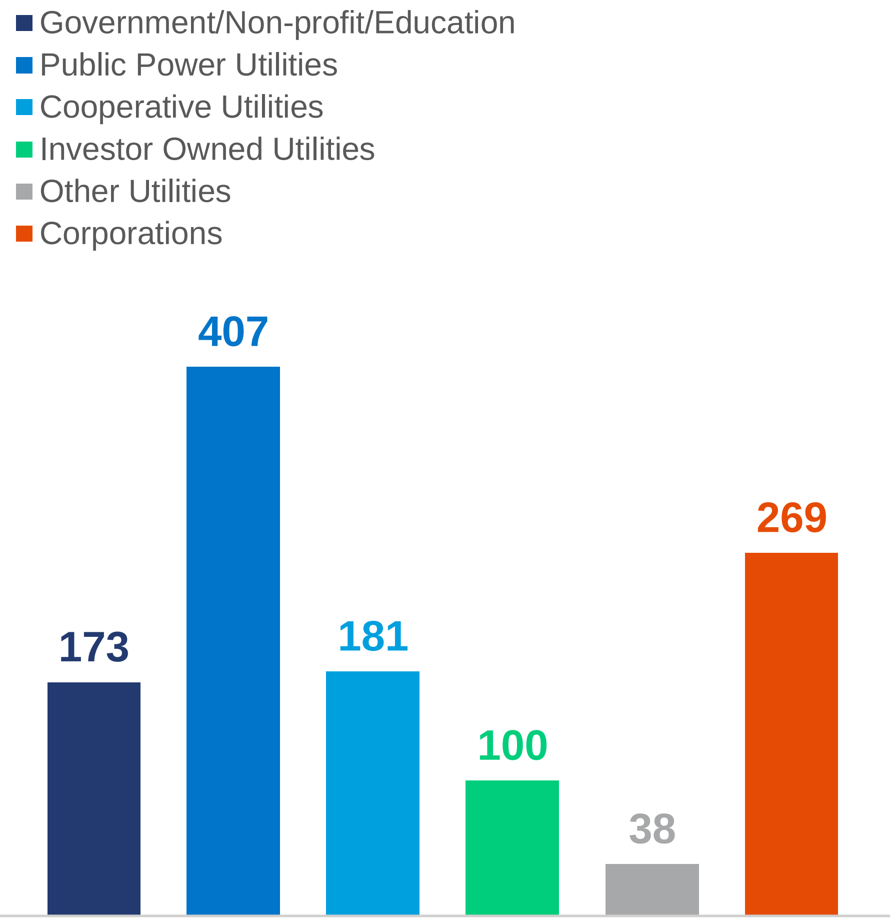
of MWh sold

80%

of utilities with carbon-free or net-zero emissions goals

72%

of utility commissions



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SEPA Research & Education

- Advisory Services
- Workshops
- Research Reports
- Webinars
- Conferences

UTILITY CONFERENCE

Grid Evolution Summit

EXECUTIVE FACT FINDING MISSION SEPA

NORTH AMERICA SMART ENERGY WEEK

SEPA Utility Transformation CHALLENGE

SEPA POWER PLAYERS

SEPA TV

Pathways

Regulatory and Business Innovation

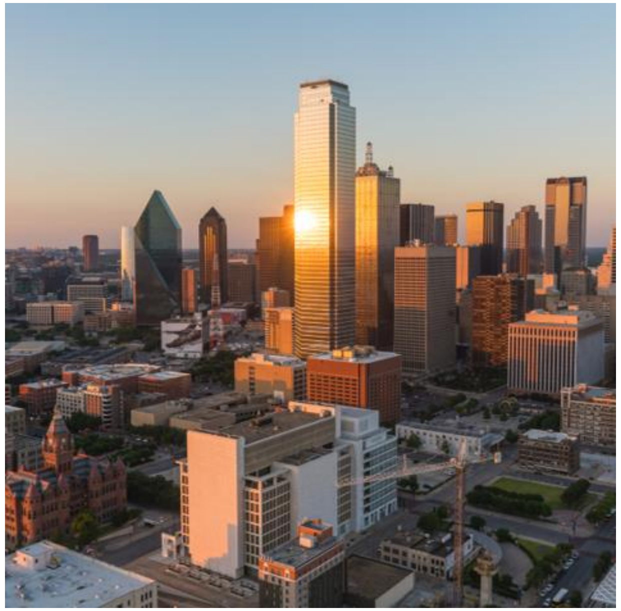
Facilitates sustainable utility business models and the state regulatory processes needed to achieve a carbon-free energy future.

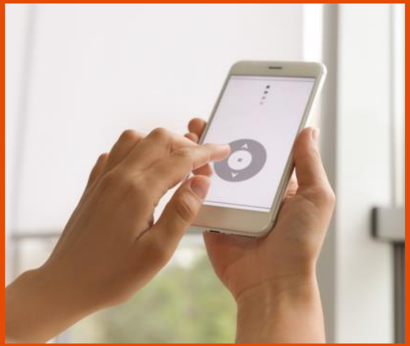
Grid Integration

Enables carbon-free energy to be easily integrated with positive impact to affordability, safety, security, reliability, resilience, and customer satisfaction.

Electrification

Facilitates the transition of the nation's vehicles and buildings to be powered by carbon-free electricity.





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NSPM for DERs - Overview

What is the NSPM for DERs?

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What: “NSPM for DERs” = *National Standard Practice Manual for Benefit-Cost Analysis of Distributed Energy Resources (DERs)* (2020).

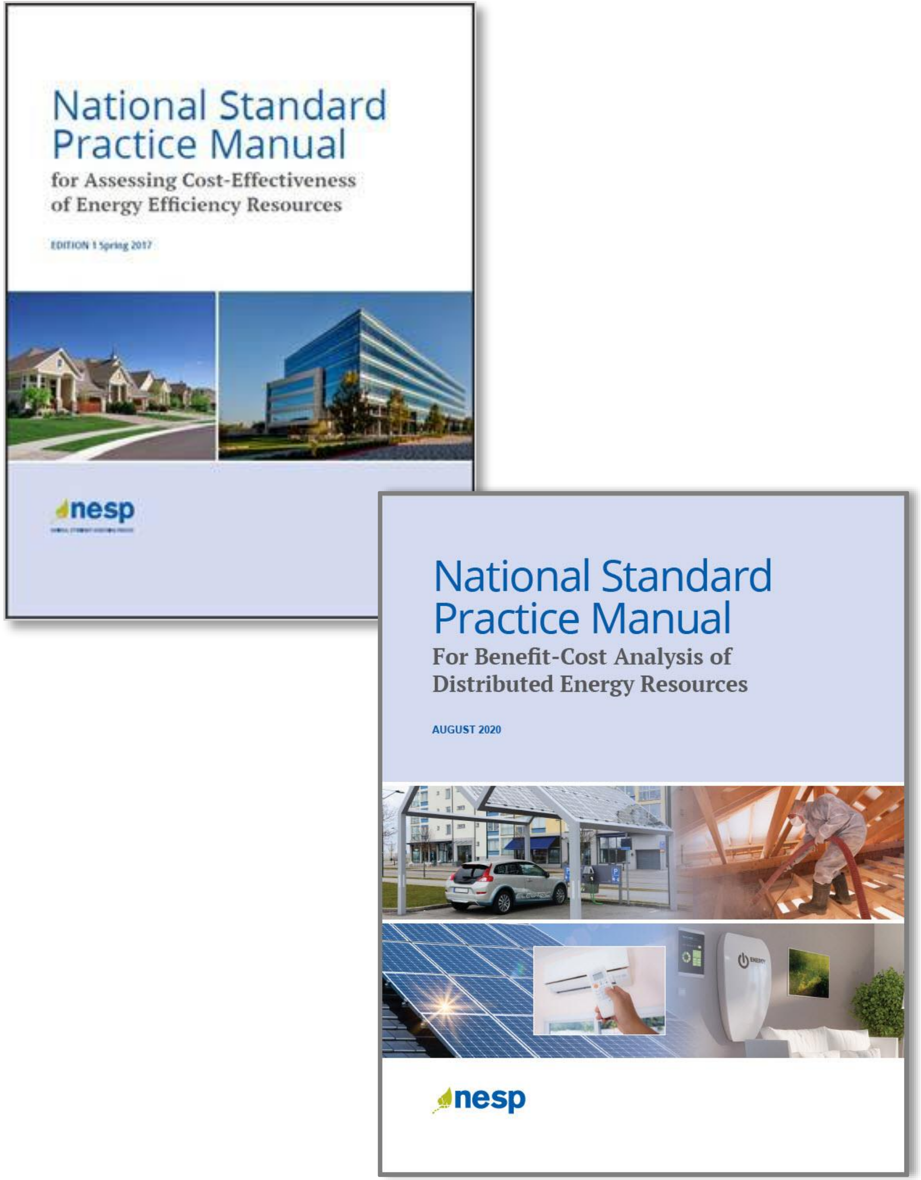
- NSPM for DERs builds on NSPM for EE (2017)

Description:

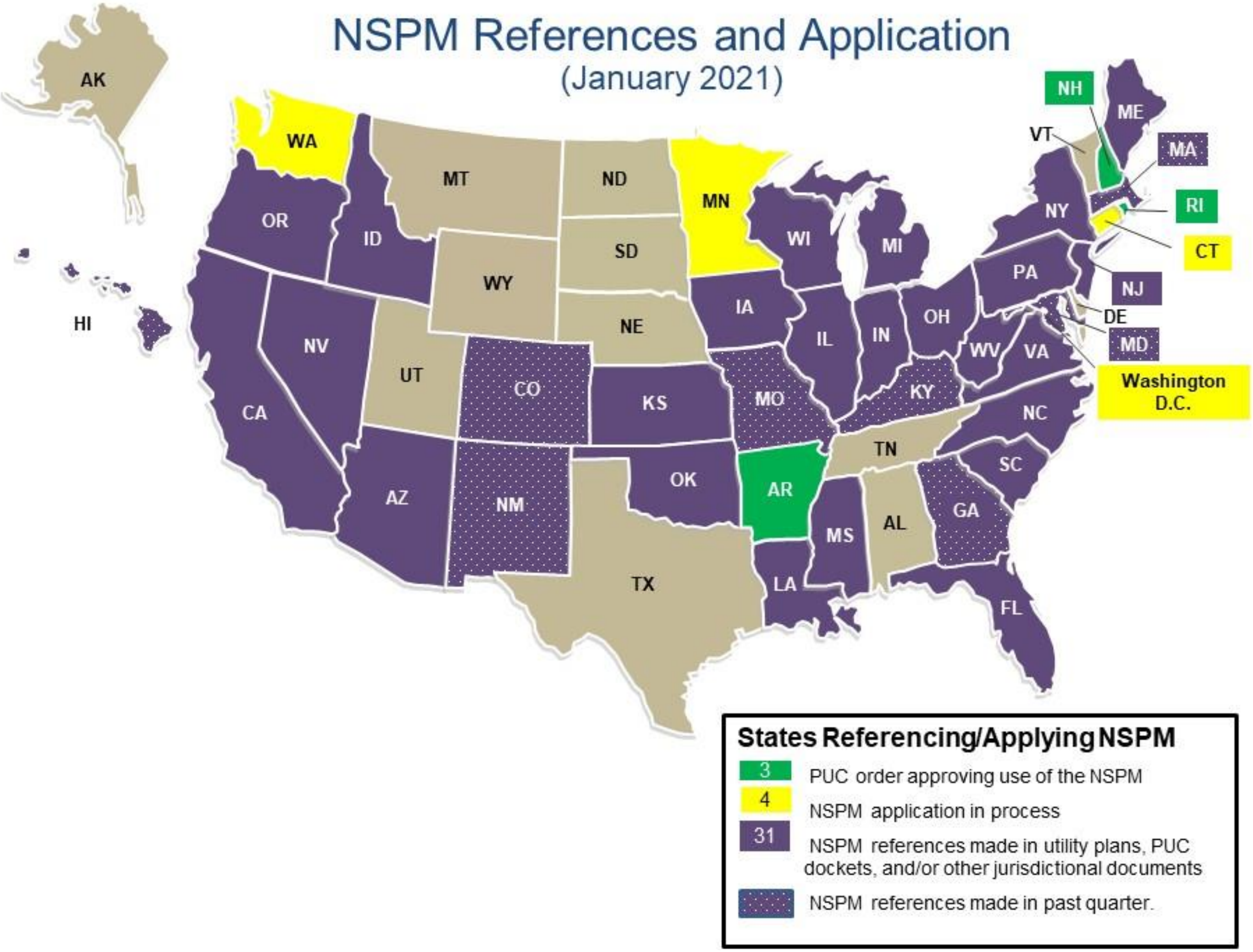
- Comprehensive framework for cost-effectiveness assessment of DERs.
- Set of policy-neutral, non-biased, and economically-sound principles, concepts, and methodologies to support single- and multi-DER benefit-cost analysis (BCA) for:
  - Energy efficiency (EE)
  - Demand response (DR)
  - Distributed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

Who: Managed and funded by E4TheFuture (with support from US DOE via LBNL), developed by multiple co-authors & advisory group

NSPM is a ‘living document’ and will be updated and improved over time, adding case studies, addressing gaps, etc. contingent upon funding.



NSPM References & Application



Why an NSPM for DERs?

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- Traditional cost-effectiveness tests often do not address pertinent jurisdictional/state policies.
- Traditional tests are often modified by states in an ad-hoc manner, without clear principles or guidelines.
- DERs are treated inconsistently in many BCAs or valuations (i.e., in context of programs, procurement, pricing mechanisms, distribution planning, IRP, etc.)
- DERs are often not accurately valued.
- There is a lack of transparency on why tests are chosen and how they are applied.

NSPM for DERs: Audiences & Purpose

Audience: All entities overseeing/guiding DER decision (PUCs, SEOs, utilities, DER reps, evaluators, consumer advocates, and others)

Purpose: Guidance for valuing DER opportunities to inform policies and strategies that support state goals/objectives, such as:

- expanding EE/DR plans, strategies, and programs to a broader set of DERs;
- evaluating and planning for non-wires/pipes solutions;
- incorporating DERs into distribution system planning;
- achieving electrification goals, including EV goals;
- achieving environmental and carbon emission objectives.

Applies to:

- **Programs**: initiatives and policies implemented by utilities or other entities to encourage adoption of DERs
- **Procurements:** initiatives to procure DERs, whether built by a utility or procured from third-party vendors, e.g., competitive procurement
- **Pricing Mechanisms**: such as those designed to compensate DERs for their value to grid or to achieve other policy objectives (e.g., time-of-use rates, peak time rebates, critical peak pricing)

NSPM for DERs: Table of Contents

Table 1-2. Overview of the National Standard Practice Manual for DERs

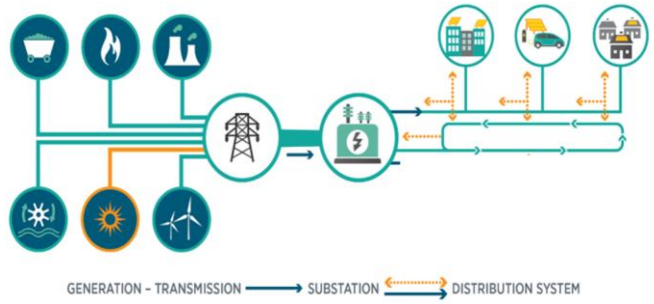
Part/ Chapter	Topic	Description
Chapter 1	Introduction	Describes the purpose and scope of this manual, with an overview of BCA
Part I	**The NSPM Benefit-Cost Analysis Framework**	
Chapter 2	Benefit-Cost Analysis Principles	Describes fundamental BCA principles that serve as the foundation for remainder of this manual
Chapter 3	Developing BCA Tests	Provides guidance on how to develop a jurisdiction's primary cost-effectiveness test, and any secondary tests
Part II	**DER Benefits and Costs**	
Chapter 4	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 5	Cross-Cutting Benefit and Cost Considerations	Discusses a variety of issues and considerations that span several of the benefits and costs listed in Chapter 4
Part III	**Specific DER Types – BCA Issues and Guidance**	
Chapter 6	Energy Efficiency Resources	These chapters describe and provide guidance on key factors that affect the benefits and costs relevant to specific DER technologies (EE, DR, DG, DS and Electrification)
Chapter 7	Demand Response Resources	
Chapter 8	Distributed Generation Resources	
Chapter 9	Distributed Storage Resources	
Chapter 10	Electrification	
Part IV	**Multiple DER Types – BCA Issues and Guidance**	
Chapter 11	Multiple On-Site DERs	Describes how to apply BCA principles and concepts to situations with multiple DER types per customer site, such as grid interactive efficient buildings
Chapter 12	Non-Wires Solutions	Describes how to apply BCA principles and concepts to situations with multiple DER types in a geographic region, such as non-wires solutions
Chapter 13	System-wide DER Portfolios	Describes how to apply BCA principles and concepts to situations with multiple DER types across a utility service territory
Chapter 14	Dynamic System Planning	Provides a brief overview of the key concepts of integrated distribution planning and integrated grid planning

NSPM for DERs: Table of Contents

NSPM for DERs: Three Tiers of Analysis

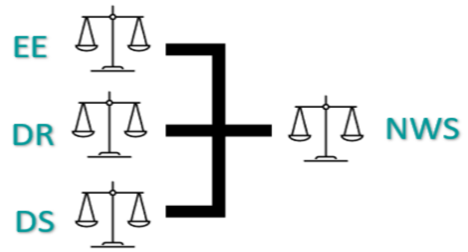
Level Three: Multiple DERs + Utility System

- Assessing ***multiple DER types*** relative to a ***dynamic set*** of alternative resources; goal to optimize both DERs and utility-scale resources



Level Two: Multiple DERs*

- Assessing ***more than one DER type*** at the same time, relative to a ***static or dynamic*** set of alternative resources



Level One: Single DER*

- Assessing ***one DER type*** in isolation from other DER types, relative to a ***static*** set of alternative resources

Adapted from LBNL 2020 and US DOE Solar Energy Technologies Office

** NSPM primarily addresses Levels 1-2*

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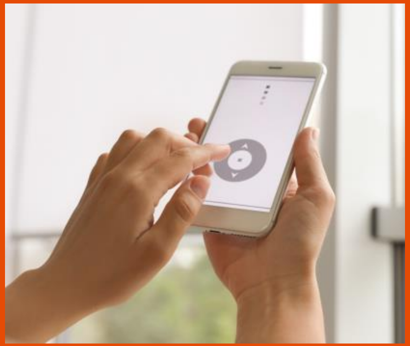

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NSPM for DERs – BCA Framework

NSPM for DERs – General Scope

Presents a comprehensive **BCA Framework** with 3 components:

1. Fundamental BCA **Principles**
2. Multi-Step Process to Develop a **Primary** Cost-effectiveness Test
3. When and How to Use **Secondary** Cost-Effectiveness Tests

NSPM for DERs – Principles

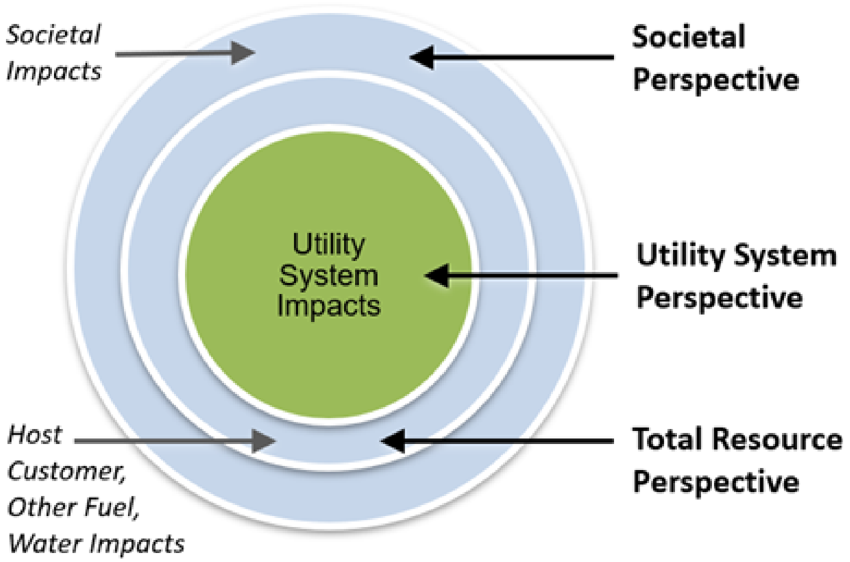
1. **Recognize that DERs can provide energy/power system needs and should be compared with other energy resources and treated consistently for BCA.**
2. Align primary test with jurisdiction's applicable policy goals.
3. Ensure symmetry across costs and benefits.
4. Account for all relevant, material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

Principles are not mutually exclusive.

NSPM for DERs – Cost-Effectiveness Perspectives

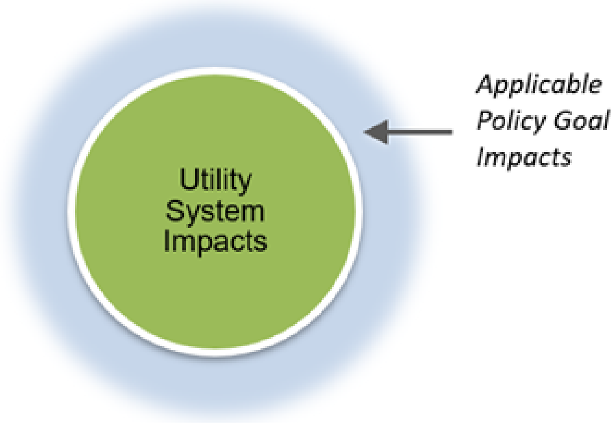
NSPM for DERs – Jurisdiction Specific Test

Traditional Perspectives



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

Regulatory Perspective



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

Jurisdiction Specific Test (JST) Compared with Traditional Tests

Test	Perspective	Key Question Answered	Categories of Benefits and Costs Included
Jurisdiction-Specific Test	Regulators or decision-makers	Will the cost of meeting utility system needs, while achieving applicable policy goals, be reduced?	Includes the utility system impacts, and those impacts associated with achieving applicable policy goals
Utility Cost Test*	The utility system	Will utility system costs be reduced?	Includes the utility system impacts
Total Resource Cost Test	The utility system plus host customers	Will utility system costs and host customers' costs collectively be reduced?	Includes the utility system impacts, and host customer impacts
Societal Cost	Society as a whole	Will total costs to society be reduced?	Includes the utility system impacts, host customer impacts, and societal impacts such as environmental and economic development impacts

NSPM for DERs – Defining Your Primary Cost-Effectiveness Test

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STEP 1	**Articulate Applicable Policy Goals** Articulate the jurisdiction's applicable policy goals related to DERs.
STEP 2	**Include All Utility System Impacts** Identify and include the full range of utility system impacts in the primary test, and all BCA tests.
STEP 3	**Decide Which Non-Utility System Impacts to Include** Identify those non-utility system impacts to include in the primary test based on applicable policy goals identified in Step 1: • Determine whether to include host customer impacts, low-income impacts, other fuel and water impacts, and/or societal impacts.
STEP 4	**Ensure that Benefits and Costs are Properly Addressed** Ensure that the impacts identified in Steps 2 and 3 are properly addressed, where: • Benefits and costs are treated symmetrically; • Relevant and material impacts are included, even if hard to quantify; • Benefits and costs are not double-counted; and • Benefits and costs are treated consistently across DER types
STEP 5	**Establish Comprehensive, Transparent Documentation** Establish comprehensive, transparent documentation and reporting, whereby: • The process used to determine the primary test is fully documented; and • Reporting requirements and/or use of templates for presenting assumptions and results are developed.

Steps 1-3: Articulate Policy Goals and Identify Relevant Impacts

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

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

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

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

Step 4: Ensure that Impacts are Properly Addressed

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

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

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Ensure Symmetry of Benefits & Costs

Illustrative Example: Treatment of Host Customer Costs and Benefits

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

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Develop Methodologies and Inputs to Account for All Relevant Impacts

(Including Hard-to-Quantify Impacts)

Approach	Application
Jurisdiction-specific studies	Best approach for estimating and monetizing relevant impacts.
Studies from other jurisdictions	Often reasonable to extrapolate from other jurisdiction studies when local studies not available.
Proxies	If no relevant studies of monetized impacts, proxies can be used.
Alternative thresholds	Benefit-cost thresholds different from 1.0 can be used to account for relevant impacts that are not monetized.
Other considerations	Relevant quantitative and qualitative information can be used to consider impacts that cannot or should not be monetized.

Step 5: Establish Comprehensive, Transparent Documentation

- Development of primary test - process should be transparent to all interested stakeholders

- Stakeholder input can be achieved through a variety of means:
  - Rulemaking process
  - Generic jurisdiction-wide docket
  - Working groups or technical sessions

- Address objectives based on current jurisdiction policies
  - Flexibility needed to incorporate evolution of policies over time

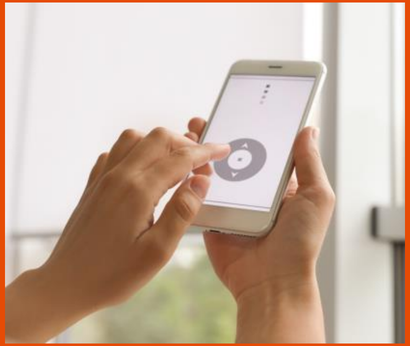
- Review of policy goals may require consultation with other government agencies
  - Environmental protection
  - Transportation
  - Health and human services
  - Economic development

NSPM for DERs – Use of Secondary Tests

NSPM provides guidance on **when and how to use secondary tests.**

While a jurisdiction's primary test informs whether to fund or otherwise support DERs, secondary tests can help to:

- inform decisions on how to prioritize DERs;
- inform decisions regarding marginally non- and/or cost-effective DERs; and
- encourage consistency across DER types.



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NSPM for DERs – Transportation Electrification

NSPM Contents: Electrification Chapter

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10.1 Summary of Key Points

10.2 Introduction

10.3 Benefits and Costs of Electrification

10.4 Key Factors that Affect Electrification Impacts

- 10.4.1 Technology Characteristics
- 10.4.2 Technology Operating Profile
- 10.4.3 Enabling of DR Capability
- 10.4.4 Other Fuel Impacts
- 10.4.5 Host Customer Non-Energy Impacts
- 10.4.6 Air Emissions Impacts
- 10.4.7 Increased Electricity Costs

10.5 Common Challenges in Estimating Benefits and Costs

- 10.5.1 Seasonal and Daily Load Profiles
- 10.5.2 Charging Methods Used by EV Consumers
- 10.5.3 Impacts on Curtailment of Renewable Resources

10.6 Lost Revenues, Increased Revenues and Rate Impacts

What is Electrification?

Electrification is broadly described as the powering of a process or application by electricity. Utilities have done this for 100+ years but it is receiving new attention as means to achieve carbon reduction.

In the context of the NSPM, Electrification more narrowly encompasses the **transition of an existing energy** consuming device from direct consumption of fossil fuel (e.g., natural gas, gasoline, etc.) to one powered directly by electricity (e.g., heat pumps, electric vehicles).

In this context, Electrification is serving some other purpose:

- Electrification **can be energy efficiency** – heat pumps use less ENERGY than gas heating, EVs use less energy than ICEs
- Electrification **can be demand response** – properly designed tariffs and incentives program increase demand side flexibility and reduce emissions
- Electrification can be a **cost effective path to a low carbon economy**
- Electrification is required to achieve economy wide carbon reduction targets

Why is Electrification addressed in the NSPM

Electrification of different segments of the economy will increase net electric utility system costs because it will require increased electricity generation, transmission, and distribution. Managing those cost needs to be the goal of electrification efforts

Electrification itself is not a utility choice

Vehicles, buildings, and industrial **electrification is happening now** and will accelerate in the coming years. It is driven by forces exogenous to utilities:

- It is driven by global market forces and local customer demand
- It is required to meet carbon reduction targets at local, national, and global level
- Cost and technology improvements will continue to accelerate the customer driven adoption

Comparing any scenario of Electrification against 'no electrification' is not useful or a relevant consideration. When considering cost effectiveness of Electrification it is necessary to understand what will happen with **no utility influence as compared to optimal utility influence**.

Evaluating the Program not the Electrification itself

Electrification impacts on the grid will depend considerably on their load shape and the location on the grid where this load is added.

The key is to understand what happens as sectors of the economy electrify without utility input and design programs that minimize or eliminate avoidable costs. BCAs must consider benefits that are traditionally outside of utility perspective (see JST).

- Many electrification measures have the potential to be managed by customers or the utility to minimize costs to the grid. **Not doing this is a cost that should be avoided**
- Some electrification measures—namely EVs and electric water heaters—are particularly well-suited to load management through DR programs and in the future could provide additional grid services.

Managing what is happening already

If electrification is happening or going to happen, compare the resource or program to what is happening and not against ‘no electrification’

Use the JST & include benefits and costs

If the program or resource is meant to increase electrification, more than likely it is motivated by extra-utility benefits (society, customer, etc..) for other non-cost benefits

Electrification itself is rarely THE desire

Electrification alone is not typically what should being considered in a BCA

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Unmanaged or ‘reactive’ electrification is always a cost

Table 10-1. Potential Impacts of Electrification: Electric Utility System

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

Managed or ‘proactive’ Electrification is usually a benefit

Table 7-1. Potential Impacts of Demand Response: Electric Utility System

Type	Utility System Impact	Benefit or Cost	Notes/Typical Applicability
Generation	Energy Generation	🟠	A benefit for DR that reduces electricity generation, but load-shifting might result in costs
	Generation Capacity	🟢	A benefit because reduced system peak demand is frequently the primary objective of DR
	Environmental Compliance	🟠	A benefit for DR that reduces electricity generation, but load-shifting might result in costs
	RPS/CES Compliance	🟠	A benefit for DR that reduces electricity generation, but load-shifting might result in costs
	Market Price Response	🟢	A benefit since DR tends to target higher-priced supply in wholesale markets; depends on generation market operation
	Ancillary Services	🟢	A benefit due to load reductions during peak periods
Transmission	Transmission Capacity	🟢	A benefit due to load reductions during peak periods
	Transmission System Losses	🟢	A benefit due to load reductions during peak periods
Distribution	Distribution Capacity	🟢	A benefit due to load reductions during peak periods; however, circuit-level peaks are not always aligned with system peaks, and thus load-shifting to address system peaks could result in increased peak demand at the circuit or substation level, and *vice versa*
	Distribution System Losses	🟢	
	Distribution O&M	🟢	
	Distribution Voltage	🟢	A benefit when DR is used to manage voltage fluctuations on the grid
General	Financial Incentives	🔴	Always a cost, where relevant
	Program Administration Costs	🔴	Always a cost, where relevant
	Utility Performance Incentives	🔴	A cost (where jurisdictions have performance incentives)
	Credit and Collection	🟢	A benefit because customer savings make bill payment easier, especially for low-income customers
	Risk	🟢	A benefit due to reduced load during peak periods
	Reliability	🟢	A benefit due to better asset utilization of generation resources and enhanced grid flexibility
	Resilience	🟢	Potentially a benefit due to reduced restart load

🟢 = usually a benefit

🔴 = usually a cost

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

○ = not relevant

Electrification requires a nuanced approach

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Defining what you are evaluating

- What is the future that will happen without this program and what does that electrification look like. [load shape, grid impacts, etc..]
- Don’t conduct a BCA against a future that is not going to happen (e.g., no EVs)
- Remember that Electrification is not about increasing load, it is either serving another goal or it is about managing costs of new load that is imminent

Ensuring symmetry in costs and benefits

Apply BCA consistently and symmetrically:

- Include all host customer benefits and costs **or**
- Include no host customer benefits and costs

Being clear with what is in the JST

Electrification of transportation and cooking have benefits that extend beyond normal BCA consideration.

- Carbon emissions, tailpipe vs regional
- Indoor air quality and health impacts
- Avoided curtailment or associated avoided T&D infrastructure
- Customer fuel savings

Key Electrification BCA Points

Benefit-cost analysis ≠ rate impact analysis

- Serve different purposes, answer different questions
- Unmanaged Electrification itself will almost always increase utility costs

Not cost-effective if only considering utility system impacts ***relative to no electrification***

- Can add or lower cost to electric utility system relative to natural or unmanaged electrification (e.g., where electrification is not influenced by utility programs)
- Many of the significant benefits fall outside utility perspective. (societal, consumer)

Time and location of charging impact electric system costs and can be influenced by program design

- Optimized and informed siting of charging infrastructure reduces costs
- Managed charging times can reduce costs with little or no impact on customer
- V2G capability can further mitigate costs (storage resource)

Charging locations/options can affect electric system costs

- Home vs. work vs. public; DCFC vs L2; Fleets charging hubs vs on route charging
- Local T&D constraints

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SEPA & Industry Findings

SEPA Utility EV Starter Kit

- One-stop shop for new utility transportation electrification staff
- Bonus resources for SEPA members
- Available at sepapower.org

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Direct Links

A full set of the reports are freely available online as part of the EV Starter kit. Link to the starter kit here.

1. Guidelines for Selecting a Communications Protocol for Vehicle-Grid Integration
2. Utility Best Practices for EV Infrastructure Deployment
3. Residential Electric Vehicle Rates That Work: Attributes That Increase Enrollment
4. Preparing for an Electric Vehicle Future: How Utilities Can Succeed
5. A Comprehensive Guide to Electric Vehicle Managed Charging
6. A Comprehensive Guide to Electric Vehicle Managed Charging Dataset [Members Only]
7. Utilities and Electric Vehicles: Evolving to Unlock Grid Value

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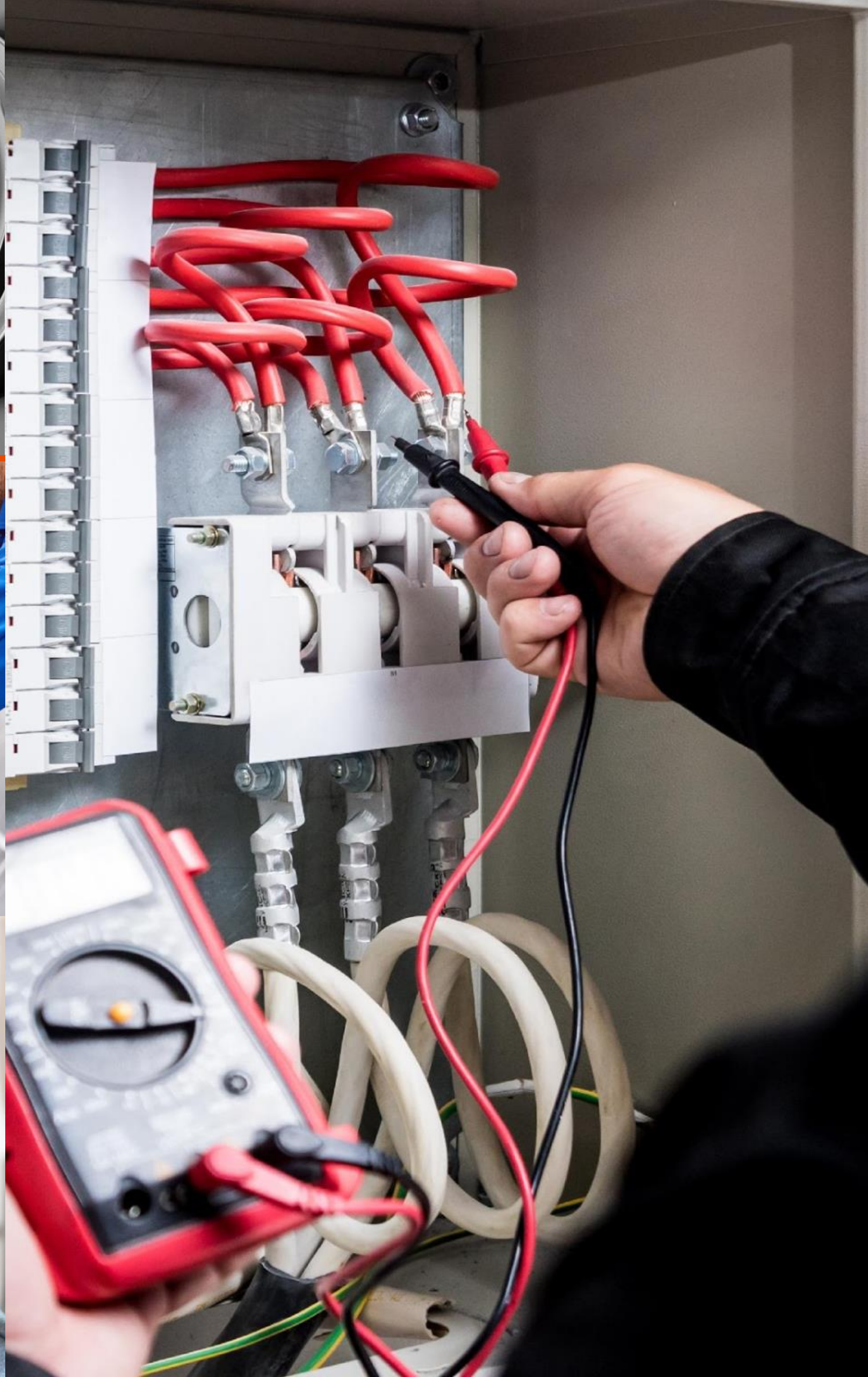
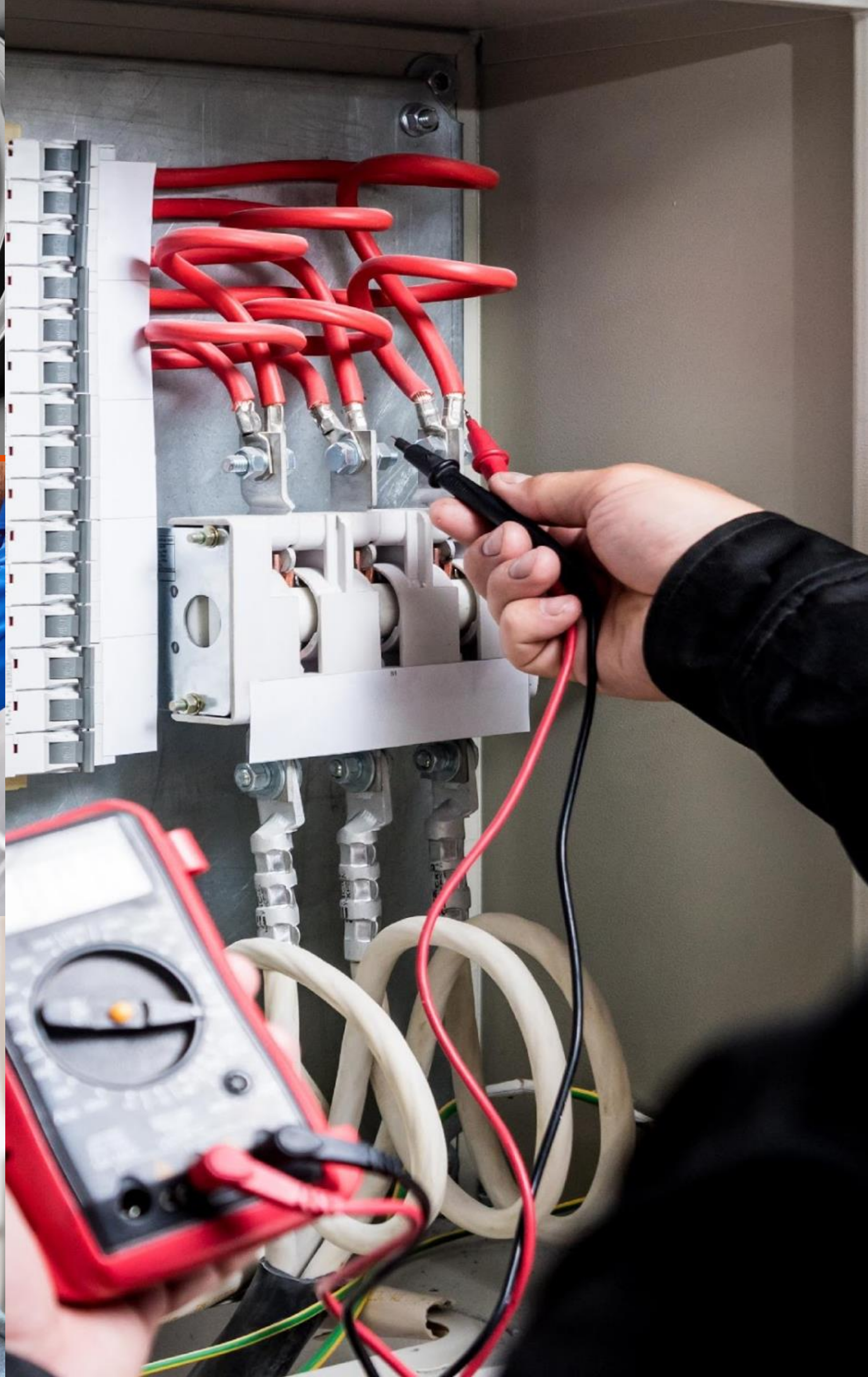


Appendix



NSPM for DERs – Resources

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

- Download the **NSPM for DERs Summary** (20 pages)*
- Download the full guidance document: **NSPM for DERs** (300 pages)*
- Download the **NSPM for DERs Overview Presentation.**
- **View media release** announcing publication
- **Webinars and Events**

2017 *National Standard Practice Manual for Assessing Cost-Effectiveness of Energy Efficiency Resources*

Case Studies:

- **New Hampshire -** NSPM Case Study authored by NESP (January 2019: NSPM for EE)
- **Arkansas -** NSPM Case Study authored by NESP (May 2019: NSPM for EE)
- **Minnesota -** NSPM Case Study authored by NESP (December 2018: NSPM for EE)
- **Rhode Island -** NSPM Case Study authored by NESP (December 2018: NSPM for EE)

NSPM for DERs: Key Terms

- ***Jurisdiction*** refers broadly to any region or service territory that would be served by the DERs being analyzed. This includes a state, a province, a utility service territory, a city or a town, or some other jurisdiction covered by regulators or other entities that oversee DER initiatives.
- ***Utility*** refers broadly to any entity that funds, implements, or supports DERs using customer or public funds that are overseen by regulators or other decision-makers. This includes investor-owned utilities; publicly owned utilities; municipal or cooperative utilities; program administrators; community choice aggregators; regional transmission organizations and independent system operators; federal, state, and local governments; and other energy service providers. *Utility expenditures* refers to spending by any of these entities on DERs.
- ***Regulator*** refers broadly to any entity that oversees and guides DER analyses. This includes legislators and their staff; public utility commissions and their staff; boards overseeing public power authorities, municipal or cooperative utilities, or regional grid operators; and federal, state, and local governments.
- ***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 parties*** refer to the broad range of independent providers such as aggregators or implementation, service, or technology providers.

NSPM for DERs: Table of Contents

Figure 1-1. Process of Conducting BCA for DERs

Develop Primary BCA Test

- Identify applicable policy goals
- Decide which benefits and costs to include in test
- Refer to:
  - Parts I-II
  - Appendices A-F

Develop Secondary BCA Test(s)

- Decide which benefits and costs to include in any secondary test(s)
- Decide how the secondary tests will be used
- Refer to:
  - Parts I-II
  - Appendices A-F

Conduct/Implement BCA

- Determine values for each benefit and cost in test(s)
- Determine which discount rate(s) to use
- Conduct individual DER or multiple DER BCA
- Refer to:
  - Parts III-IV
  - Appendices C, F, G, H

Present BCA Results

- Present test(s), values of benefits and costs, key assumptions
- Present results
- Refer to:
  - Parts I, II and IV
  - Appendices B and D

NSPM for DERs – DER Benefits & Costs

Smart Electric Power Alliance

Table 4-1. Potential DER Benefits and Costs: Electric Utility System

Type	Utility System 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 to comply with environmental regulations
	RPS/CES Compliance	Actions to comply with renewable portfolio standards or clean energy standards
	Market Price Effects	The decrease (or increase) in wholesale market prices as a result of 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 or gas lost through the transmission system
Distribution	Distribution Capacity	Maintaining the availability of the distribution system to transport electricity or gas safely and reliably
	Distribution System Losses	Electricity lost through the distribution system
	Distribution O&M	Operating and maintaining the distribution system
	Distribution Voltage	Maintaining voltage levels within an acceptable range to ensure that both real and reactive power production are matched with demand
General	Financial Incentives	Utility financial support provided to DER host customers or other market actors to encourage DER implementation
	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
	Risk	Uncertainty including operational, technology, cybersecurity, financial, legal, reputational, and regulatory risks
	Reliability	Maintaining generation, transmission, and distribution system to withstand instability, uncontrolled events, cascading failures, or unanticipated loss of system components
	Resilience	The ability to anticipate, prepare for, and adapt to changing conditions and withstand, respond to, and recover rapidly from disruptions

Table 4-2. Potential Benefits and Costs of DERs: Gas Utility or Other Fuel Impacts

Type	Gas Utility or Other Fuel Impact	Description
Energy	Fuel and Variable O&M	The fuel and O&M impacts associated with gas or other fuels
	Capacity	The gas capacity required to meet forecasted peak load
	Environmental Compliance	Actions required to comply with environmental regulations
	Market Price Effects	The decrease (or increase) in wholesale prices as a result of reduced (or increased) customer consumption
General	Financial Incentives	Utility financial support provided to DER host customers or other market actors to encourage DER implementation
	Program Administration Costs	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 Costs	Bad debt, disconnections, reconnections
	Risk	Uncertainty including operational, technology, cybersecurity, financial, legal, reputational, and regulatory risks
	Reliability	Maintaining the gas or other fuel system to withstand instability, uncontrolled events, cascading failures, or unanticipated loss of system components
	Resilience	The ability to anticipate, prepare for, and adapt to changing conditions and withstand, respond to, and recover rapidly from disruptions

NSPM for DERs – DER Benefits & Costs

Smart Electric Power Alliance

Table 4-3. 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
	Risk	Uncertainty including price volatility, power quality, outages, and operational risk related to failure of installed DER equipment and user error; this type of risk may depend on the type of DER
	Reliability	The ability to prevent or reduce the duration of host customer outages
	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 are separate from energy-related impacts
	Low-income NEIs	Non-energy benefits and costs that affect low-income DER host customers

Table 4-5. Potential Host Customer Non-Energy Impacts

Host Customer NEI	Summary Description
Transaction costs	Costs incurred to adopt DERs, beyond those related to the technology or service itself (e.g., application fees, time spent researching, paperwork)
Asset value	Changes in the value of a home or business as a result of the DER (e.g., increased building value, improved equipment value, extended equipment life)
Productivity	Changes in a customer's productivity (e.g., changes in labor costs, operational flexibility, O&M costs, reduced waste streams, reduced spoilage)
Economic well-being	Economic impacts beyond bill savings (e.g., reduced complaints about bills, reduced terminations and reconnections, reduced foreclosures—especially for low-income customers)
Comfort	Changes in comfort level (e.g., thermal, noise, and lighting impacts)
Health & safety	Changes in customer health or safety (e.g., fewer sick days from work or school, reduced medical costs, improved indoor air quality, reduced deaths)
Empowerment & control	The satisfaction of being able to control one's energy consumption and energy bill
Satisfaction & pride	The satisfaction of helping to reduce environmental impacts (e.g., one of the reasons why residential customers install rooftop PV)

Table 4-6. Potential Benefits and Costs of DERs: Societal

Type	Societal Impact	Description
Societal	Resilience	Resilience impacts beyond those experienced by utilities or host customers
	GHG Emissions	GHG emissions created by fossil-fueled energy resources
	Other Environmental	Other air emissions, solid waste, land, water, and other environmental impacts
	Economic and Jobs	Incremental economic development and job impacts
	Public Health	Health impacts, medical costs, and productivity affected by health
	Low Income: Society	Poverty alleviation, environmental justice, and reduced home foreclosures
	Energy Security	Energy imports and energy independence