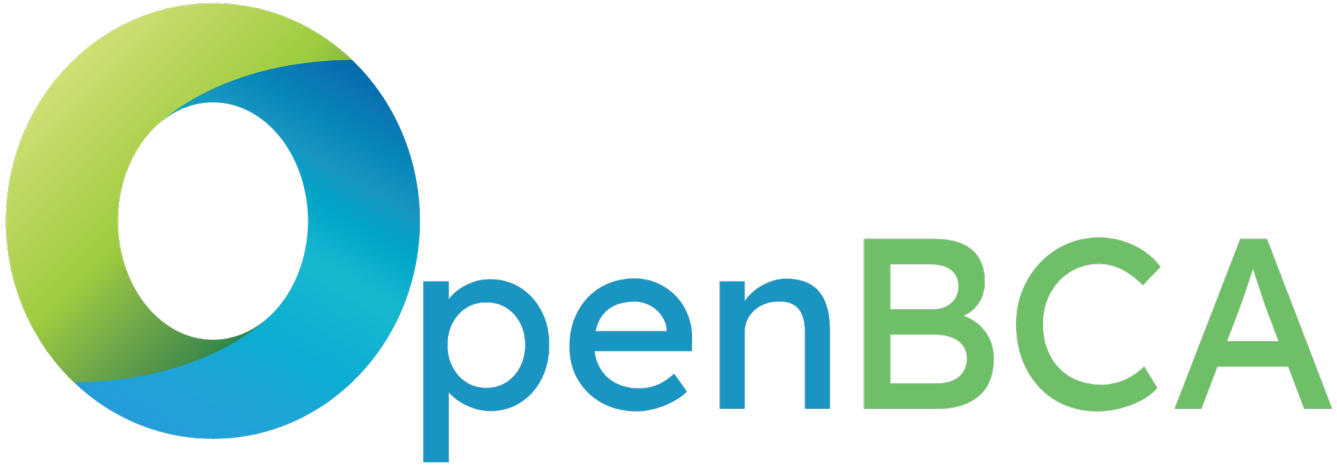

OpenBCA Tool Overview

- Documentation of Value Streams & Calculation methodologies

Value Streams explained

Overview

Value streams represent the individual benefits and costs included in a benefit-cost analysis. In OpenBCA, value streams are the primary mechanism for implementing a Jurisdiction-Specific Test (JST), as they define which impacts are included and how they are calculated. The selection of value streams should reflect jurisdiction-specific policy goals and the scope of the analysis.

Consistent with the National Standard Practice Manual (NSPM), value streams can be grouped into six broad categories:

- Electric utility system impacts
- Natural gas utility system impacts
- General utility system impacts
- Societal impacts
- Host customer impacts
- Other fuel impacts

➢ Additional metrics

OpenBCA Framework

OpenBCA is designed as a flexible, NSPM-aligned framework for conducting benefit-cost analysis, rather than a prescriptive tool that dictates specific input assumptions.

Principles:

- Input-agnostic by design
  - OpenBCA does not prescribe specific avoided costs or assumptions for value streams. Instead, it enables users to apply jurisdiction-appropriate inputs based on policy goals, data availability, and analytical needs.

- Scalable calculation methods
  - Value stream equations and calculation methodologies are designed to work with inputs at varying levels of complexity, ranging from single values to time-series data (e.g., annual, monthly, or hourly).

- Alignment with NSPM best practices
  - The OpenBCA framework follows the principles laid out in the NSPM, including clarity of scope, transparency of assumptions, and consistency within a defined test perspective.

Users are encouraged to pair the OpenBCA framework with jurisdiction-specific resources—such as avoided cost studies, policy filings, or planning models—to inform input assumptions.

Supporting Resources: MTR & NSPM

National Standard Practice Manual (NSPM)

The NSPM establishes best-practice principles for conducting benefit-cost analysis of energy resources.

- Defines how to scope a Jurisdiction-Specific Test (JST)Clarifies which impacts should be included and how they relate to policy objectives
- Emphasizes transparency, consistency, and alignment with jurisdictional goals
- OpenBCA is designed to implement NSPM principles by allowing users to explicitly define the test perspective and included value streams.

Methods, Tools, & Resources (MTR) Handbook

The MTR Handbook, developed by NESP, provides detailed methodological guidance and references for estimating inputs used in benefit-cost analysis.

- Describes established methods for calculating avoided costs.
- Provides links to data sources, studies, and example methodologies
- Supports development of jurisdiction-specific assumptions consistent with NSPM guidance

OpenBCA users should reference the MTR Handbook when sourcing and documenting inputs such as avoided energy, capacity, emissions, and other value stream assumptions.

Acronyms & Glossary

NTG = Net To Gross ratio

NPV = Net Present Value

DER = Distributed Energy Resources

EUL = Estimated Useful Life

y = year, t = time series

$Adder\ (\%)$ = The impact is calculated by applying a percentage to the relevant supply impact (e.g., energy generation, natural gas supply, propane supply).

$Single\ Value\ -\ Bulk\ System$ = The impact is a user-defined monetary value, not derived from a load profile, and is applied directly in the BCA with discounting only.

A. Electric Utility System Impacts

Electric utility system impacts represent benefits and costs experienced by the electric utility system. These impacts are typically the foundation of electric cost-effectiveness tests. For dual-fuel utilities, electric utility system impacts are evaluated alongside natural gas utility system impacts under the broader category of utility system impacts.

Common electric utility system value streams include:

- Energy generation
- Generation capacity
- Transmission capacity
- Distribution capacity
- Environmental compliance
- Market price effects
- Ancillary services
- Risk
- Reliability
- Resilience

These impacts are typically calculated using avoided electric system costs applied to energy and demand savings over time. Accurate estimation often requires consideration of temporal factors (such as hourly or seasonal load shapes) and locational factors (such as congestion or marginal losses).

Electric Utility System | Energy Generation

A.1

$$Time\ Series = \sum_{y=1}^{EUL} \frac{1}{(1 + Discount\ Rate)^y} \left(\frac{NTG \times Avoided\ Cost_{t,y} \times Annual\ Savings_y \times DER\ Loadshape_t}{1 - Line\ Losses} \right)$$

Adder Supported ? : No | Single Value –Bulk System ? : Yes	
NSPM Description:	**Calculation Methodology:**
The production or procurement of energy (kWh) from generation resources on behalf of the customers	Calculated based on avoided costs of energy generation multiplied by DER load profile. Line losses are factored into calculation

Electric Utility System | Generation Capacity

A.2

$$Time\ Series = \sum_{y=1}^{EUL} \frac{1}{(1 + Discount\ Rate)^y} \left(\frac{NTG \times Avoided\ Cost_{t,y} \times Annual\ Savings_y \times DER\ Loadshape_t}{1 - Line\ Losses} \right)$$

$$Peak\ Capacity = \sum_{y=1}^{EUL} \frac{1}{(1 + Discount\ Rate)^y} \left(\frac{NTG \times Avoided\ Cost_{t,y} \times Annual\ Coincident\ Peak\ Savings_y}{1 - Line\ Losses} \right)$$

Adder Supported ? : Yes | Single Value –Bulk System ? : Yes

NSPM Description:	Calculation Methodology:
Impact in terms of reduced need for capacity for the utility through customer-sited generation or load reduction	1. Multiply hourly avoided generation capacity costs (values only during peak coincident hours) by the DER load profile 2. Multiply annual avoided generation capacity costs by the peak coincident kW impact. Line losses are included in both methods

Electric Utility System | Environmental Compliance

A.3

$$Time\ Series = \sum_{y=1}^{EUL} \frac{1}{(1 + Discount\ Rate)^y} \left(\frac{NTG \times Avoided\ Cost_{t,y} \times Annual\ Savings_y \times DER\ Loadshape_t}{1 - Line\ Losses} \right)$$

Adder Supported ? : Yes | Single Value –Bulk System ? : Yes	
NSPM Description:	**Calculation Methodology:**
Actions to comply with environmental regulations	Calculated based on avoided costs of environmental compliance multiplied by DER load profile. Line losses are factored into calculation

Electric Utility System | RPS Compliance

A.4

$$Time\ Series = \sum_{y=1}^{EUL} \frac{1}{(1 + Discount\ Rate)^y} \left(\frac{NTG \times Avoided\ Cost_{t,y} \times Annual\ Savings_y \times DER\ Loadshape_t}{1 - Line\ Losses} \right)$$

Adder Supported ? : Yes | Single Value – Bulk System ? : Yes	
NSPM Description:	**Calculation Methodology:**
Actions to comply with renewable portfolio standards or clean energy standards	Calculated based on avoided costs of RPS compliance multiplied by DER load profile. Line losses are factored into calculation

Electric Utility System | Market Price Effects (Energy)

A.5

$$Time\ Series = \sum_{y=1}^{EUL} \frac{1}{(1 + Discount\ Rate)^y} \left(\frac{NTG \times Avoided\ Cost_{t,y} \times Annual\ Savings_y \times DER\ Loadshape_t}{1 - Line\ Losses} \right)$$

Adder Supported ? : Yes | Single Value – Bulk System ? : Yes	
NSPM Description:	**Calculation Methodology:**
The decrease (or increase) in wholesale market prices as a result of the reduced (or increased) customer consumption	Avoided costs are calculated by applying price impacts from the nearest ISO to market demand, multiplying the resulting prices by the DER load profile. Line losses are factored into calculation.

Electric Utility System | Market Price Effects (Capacity)

A.6

$$Time\ Series = \sum_{y=1}^{EUL} \frac{1}{(1 + Discount\ Rate)^y} \left(\frac{NTG \times Avoided\ Cost_{t,y} \times Annual\ Savings_y \times DER\ Loadshape_t}{1 - Line\ Losses} \right)$$

$$Peak\ Capacity = \sum_{y=1}^{EUL} \frac{1}{(1 + Discount\ Rate)^y} \left(\frac{NTG \times Avoided\ Cost_{t,y} \times Annual\ Coincident\ Peak\ Savings_y}{1 - Line\ Losses} \right)$$

Adder Supported ? : Yes | Single Value – Bulk System ? : Yes

NSPM Description:	Calculation Methodology:
The decrease (or increase) in wholesale market prices as a result of the reduced (or increased) customer consumption	Avoided costs are calculated by applying price impacts from the nearest ISO to market demand, multiplying the resulting prices by the DER load profile. Line losses are factored into calculation.

Electric Utility System | Ancillary Services

A.7

$$Time\ Series = \sum_{y=1}^{EUL} \frac{1}{(1 + Discount\ Rate)^y} \left(\frac{NTG \times Avoided\ Cost_{t,y} \times Annual\ Savings_y \times DER\ Loadshape_t}{1 - Line\ Losses} \right)$$

$$Peak\ Capacity = \sum_{y=1}^{EUL} \frac{1}{(1 + Discount\ Rate)^y} \left(\frac{NTG \times Avoided\ Cost_{t,y} \times Annual\ Coincident\ Peak\ Savings_y}{1 - Line\ Losses} \right)$$

Adder Supported ? : Yes | Single Value – Bulk System ? : Yes

NSPM Description:	Calculation Methodology:
Services required to maintain electrical grid stability	1. Multiply hourly avoided ancillary services costs (values only during peak coincident hours) by the DER load profile 2. Multiply annual avoided ancillary services costs by the peak coincident kW impact. Line losses are included in both methods

Electric Utility System | Transmission Capacity & Line Losses

A.8

$$Time\ Series = \sum_{y=1}^{EUL} \frac{1}{(1 + Discount\ Rate)^y} \left(\frac{NTG \times Avoided\ Cost_{t,y} \times Annual\ Savings_y \times DER\ Loadshape_t}{1 - Line\ Losses} \right)$$

$$Peak\ Capacity = \sum_{y=1}^{EUL} \frac{1}{(1 + Discount\ Rate)^y} \left(\frac{NTG \times Avoided\ Cost_{t,y} \times Annual\ Coincident\ Peak\ Savings_y}{1 - Line\ Losses} \right)$$

Adder Supported ? : Yes | Single Value – Bulk System ? : Yes

NSPM Description:	Calculation Methodology:
Maintaining the availability of the transmission system to transport electricity safely and reliably	1. Multiply hourly avoided transmission capacity costs (with transmission line losses implicitly included) by the DER load profile 2. Multiply annual avoided transmission capacity costs (with transmission line losses implicitly included) by the peak coincident kW impact. Line losses are included in both methods

Electric Utility System | Distribution Capacity & Line Losses

A.9

$$Time\ Series = \sum_{y=1}^{EUL} \frac{1}{(1 + Discount\ Rate)^y} \left(\frac{NTG \times Avoided\ Cost_{t,y} \times Annual\ Savings_y \times DER\ Loadshape_t}{1 - Line\ Losses} \right)$$

$$Peak\ Capacity = \sum_{y=1}^{EUL} \frac{1}{(1 + Discount\ Rate)^y} \left(\frac{NTG \times Avoided\ Cost_{t,y} \times Annual\ Coincident\ Peak\ Savings_y}{1 - Line\ Losses} \right)$$

Adder Supported ? : Yes | Single Value – Bulk System ? : Yes

NSPM Description:	Calculation Methodology:
Maintaining the availability of the distribution system to transport electricity or gas safely and reliably	1. Multiply hourly avoided distribution capacity costs (with distribution line losses implicitly included) by the DER load profile 2. Multiply annual avoided distribution capacity costs (with distribution line losses implicitly included) by the peak coincident kW impact. Line losses are included in both methods

Electric Utility System | Risk

A.10

$$Time\ Series = \sum_{y=1}^{EUL} \frac{1}{(1 + Discount\ Rate)^y} \left(\frac{NTG \times Avoided\ Cost_{t,y} \times Annual\ Savings_y \times DER\ Loadshape_t}{1 - Line\ Losses} \right)$$

Adder Supported ? : Yes | Single Value – Bulk System ? : Yes	
NSPM Description:	**Calculation Methodology:**
Uncertainty including operational, technology, cybersecurity, financial, legal, reputational, and regulatory risks	Calculated based on avoided costs of risk multiplied by DER load profile. Line losses are factored into calculation.

Electric Utility System | Reliability

A.11

$$Time\ Series = \sum_{y=1}^{EUL} \frac{1}{(1 + Discount\ Rate)^y} \left(\frac{NTG \times Avoided\ Cost_{t,y} \times Annual\ Savings_y \times DER\ Loadshape_t}{1 - Line\ Losses} \right)$$

Adder Supported ? : Yes | Single Value – Bulk System ? : Yes	
NSPM Description:	**Calculation Methodology:**
Maintaining generation, transmission, and distribution system to withstand instability, uncontrolled events, cascading failures, or unanticipated loss of system components	Calculated based on avoided costs of reliability multiplied by DER load profile. Line losses are factored into calculation.

Electric Utility System | Resilience

A.12

$$Time\ Series = \sum_{y=1}^{EUL} \frac{1}{(1 + Discount\ Rate)^y} \left(\frac{NTG \times Avoided\ Cost_{t,y} \times Annual\ Savings_y \times DER\ Loadshape_t}{1 - Line\ Losses} \right)$$

Adder Supported ? : Yes | Single Value – Bulk System ? : Yes	
NSPM Description:	**Calculation Methodology:**
The ability to anticipate, prepare for, and adapt to changing conditions and withstand, respond to, and recover rapidly from disruptions	Calculated based on avoided costs of reliability multiplied by DER load profile. Line losses are factored into calculation.

B. Natural Gas Utility System Impacts

Natural gas utility system impacts represent benefits and costs experienced by the natural gas utility system and its customers. These impacts form the foundation of gas cost-effectiveness tests. For dual-fuel utilities, natural gas utility system impacts are evaluated alongside electric utility system impacts under the broader category of utility system impacts.

Common natural gas utility system value streams include:

- Natural gas supply and O&M costs
- Natural gas capacity
- Transmission pipeline capacity
- Distribution delivery capacity
- Environmental compliance
- Market price effects
- Program administration and incentives
- Risk
- Reliability
- Resilience

These impacts are typically calculated using avoided gas system costs applied to reductions in gas consumption or peak demand over time. Accurate estimation often requires consideration of temporal dynamics (such as winter peak conditions) and locational constraints within the gas delivery network.

Gas Utility System | Fuel and Variable O&M

B.1

$$Time\ Series = \sum_{y=1}^{EUL} \frac{1}{(1 + Discount\ Rate)^y} \left(\frac{NTG \times Avoided\ Cost_{t,y} \times Annual\ Savings_y \times DER\ Loadshape_t}{1 - Line\ Losses} \right)$$

Adder Supported ? : No | Single Value – Bulk System ? : Yes	
NSPM Description:	**Calculation Methodology:**
The fuel and O&M impacts associated with gas or other fuels	Calculated based on avoided costs of NG supply and O&M multiplied by DER load profile. Pipeline losses are factored into calculation

Gas Utility System | Capacity

B.2

$$Time\ Series = \sum_{y=1}^{EUL} \frac{1}{(1 + Discount\ Rate)^y} \left(\frac{NTG \times Avoided\ Cost_{t,y} \times Annual\ Savings_y \times DER\ Loadshape_t}{1 - Line\ Losses} \right)$$

Adder Supported ? : No | Single Value – Bulk System ? : Yes	
NSPM Description:	**Calculation Methodology:**
The gas capacity required to meet forecasted peak load	Calculated based on avoided costs of NG capacity multiplied by DER load profile. Pipeline losses are factored into calculation

Gas Utility System | Pipeline Capacity & losses

B.3

$$Time\ Series = \sum_{y=1}^{EUL} \frac{1}{(1 + Discount\ Rate)^y} \left(\frac{NTG \times Avoided\ Cost_{t,y} \times Annual\ Savings_y \times DER\ Loadshape_t}{1 - Line\ Losses} \right)$$

Adder Supported ? : No | Single Value – Bulk System ? : Yes	
NSPM Description:	**Calculation Methodology:**
The transport of natural gas from delivery points located on interstate and intrastate pipelines to distribution utility city gate	Calculated based on avoided costs of NG capacity multiplied by DER load profile. Pipeline losses are factored into calculation

Gas Utility System | Delivery Capacity & losses

B.4

$$Time\ Series = \sum_{y=1}^{EUL} \frac{1}{(1 + Discount\ Rate)^y} \left(\frac{NTG \times Avoided\ Cost_{t,y} \times Annual\ Savings_y \times DER\ Loadshape_t}{1 - Line\ Losses} \right)$$

Adder Supported ? : No | Single Value – Bulk System ? : Yes	
NSPM Description:	**Calculation Methodology:**
Delivery of natural gas from the distribution utility city gate to retail customers	Calculated based on avoided costs of NG capacity multiplied by DER load profile. Pipeline losses are factored into calculation

Gas Utility System | Environmental Compliance

B.5

$$Time\ Series = \sum_{y=1}^{EUL} \frac{1}{(1 + Discount\ Rate)^y} \left(\frac{NTG \times Avoided\ Cost_{t,y} \times Annual\ Savings_y \times DER\ Loadshape_t}{1 - Line\ Losses} \right)$$

Adder Supported ? : No | Single Value – Bulk System ? : Yes	
NSPM Description:	**Calculation Methodology:**
Actions to comply with environmental regulations for NG specifically	Calculated based on avoided costs of environmental compliance multiplied by DER load profile. Pipeline losses are factored into calculation

Gas Utility System | Market Price Effects

B.6

$$Time\ Series = \sum_{y=1}^{EUL} \frac{1}{(1 + Discount\ Rate)^y} \left(\frac{NTG \times Avoided\ Cost_{t,y} \times Annual\ Savings_y \times DER\ Loadshape_t}{1 - Line\ Losses} \right)$$

Adder Supported ? : No | Single Value – Bulk System ? : Yes	
NSPM Description:	**Calculation Methodology:**
The decrease (or increase) in wholesale NG market prices as a result of the reduced (or increase) customer consumption	Avoided costs are calculated by applying price impacts from the nearest ISO to market demand, multiplying the resulting prices by the DER load profile. Pipeline losses are factored into calculation.

Gas Utility System | Risk

B.7

$$Time\ Series = \sum_{y=1}^{EUL} \frac{1}{(1 + Discount\ Rate)^y} \left(\frac{NTG \times Avoided\ Cost_{t,y} \times Annual\ Savings_y \times DER\ Loadshape_t}{1 - Line\ Losses} \right)$$

Adder Supported ? : Yes | Single Value – Bulk System ? : Yes	
NSPM Description:	**Calculation Methodology:**
Uncertainty including operational, technology, cybersecurity, financial, legal, reputational, and regulatory risks	Calculated based on avoided costs of NG risk multiplied by DER load profile. Pipeline losses are factored into calculation.

Gas Utility System | Reliability

B.8

$$Time\ Series = \sum_{y=1}^{EUL} \frac{1}{(1 + Discount\ Rate)^y} \left(\frac{NTG \times Avoided\ Cost_{t,y} \times Annual\ Savings_y \times DER\ Loadshape_t}{1 - Line\ Losses} \right)$$

Adder Supported ? : No | Single Value – Bulk System ? : Yes	
NSPM Description:	**Calculation Methodology:**
Maintaining supply and distribution system to withstand instability, uncontrolled events, cascading failures, or unanticipated loss of system components	Calculated based on avoided costs of NG reliability multiplied by DER load profile. Pipeline losses are factored into calculation.

Gas Utility System | Resilience

B.9

$$Time\ Series = \sum_{y=1}^{EUL} \frac{1}{(1 + Discount\ Rate)^y} \left(\frac{NTG \times Avoided\ Cost_{t,y} \times Annual\ Savings_y \times DER\ Loadshape_t}{1 - Line\ Losses} \right)$$

Adder Supported ? : No | Single Value – Bulk System ? : Yes	
NSPM Description:	**Calculation Methodology:**
The ability to anticipate, prepare for, and adapt to changing conditions and withstand, respond to, and recover rapidly from disruptions	Calculated based on avoided costs of NG reliability multiplied by DER load profile. Pipeline losses are factored into calculation.

C. General Utility System Impacts

General utility system impacts represent costs and benefits experienced by the utility that are associated with the design, administration, and regulatory treatment of programs, rather than with changes to energy production or delivery. These impacts are typically included in cost-effectiveness tests to reflect the utility's direct financial obligations and incentives tied to program implementation.

Common general utility system value streams include:

- Program incentives
- Program administration costs
- Direct utility investment in DERs
- Credit and collections costs
- Performance incentives

These impacts are generally calculated as direct cost or payment streams based on observed expenditures, regulatory determinations, or predefined incentive structures. Unlike energy or capacity impacts, they do not require temporal load shapes or locational adjustments.

General Utility System | Financial Incentives

C.1

$$Program/Measure\ Input = \sum NPV\ (Program/Measure\ Specific\ Input)$$

Adder Supported ? : No | Single Value – Bulk System ? : No	
NSPM Description:	**Calculation Methodology:**
Utility financial support provided to DER host customers or other market actors to encourage DER implementation	Simple calculation, electric utility financial incentives for measure adoption to be a user input at the measure/program level

General Utility System | Program Administration Costs

C.2

$$Program/Measure\ Input = \sum NPV\ (Program/Measure\ Specific\ Input)$$

Adder Supported ? : No | Single Value – Bulk System ? : No	
NSPM Description:	**Calculation Methodology:**
Utility outreach to trade allies, technical training, marketing, and administration and management of DERs	Simple calculation, electric utility program admin costs to be a user input at the measure/program level

General Utility System | Utility Direct Investment in DERs

C.3

$$Program/Measure\ Input = \sum NPV\ (Program/Measure\ Specific\ Input)$$

Adder Supported ? : No | Single Value – Bulk System ? : No	
NSPM Description:	**Calculation Methodology:**
Direct costs for development and deployment of DERs by the utility, typically on the utility side of the meter	Simple calculation, utility direct investments in DERs to be a user input at the measure/program level

General Utility System | Utility Performance Incentives

C.4

$$Program/Measure\ Input = \sum NPV\ (Program/Measure\ Specific\ Input)$$

Adder Supported ? : No | Single Value – Bulk System ? : No	
NSPM Description:	**Calculation Methodology:**
Incentives offered to utilities to encourage successful, effective implementation of DER programs	Simple calculation, electric performance incentives to be a user input at the program level

General Utility System | Credit and Collection Costs

C.5

$$Time\ Series = \sum_{y=1}^{EUL} \frac{1}{(1 + Discount\ Rate)^y} \left(\frac{NTG \times Avoided\ Cost_{t,y} \times Annual\ Savings_y \times DER\ Loadshape_t}{1 - Line\ Losses} \right)$$

$$Program/Measure\ Input = \sum NPV\ (Program/Measure\ Specific\ Input)$$

Adder Supported ? : Yes | Single Value – Bulk System ? : Yes	
NSPM Description:	**Calculation Methodology:**
Credit and collection costs related to customer connections. Bad debt, disconnections, reconnections	1. Annual avoided cost ($/kWh) × DER load impact. Line losses are included 2. Simple calculation, credit and collection cost to be a user input at the program level

D. Societal Impacts

Societal impacts represent broader benefits and costs that extend beyond the utility system and program participants. These impacts often relate to public policy objectives.

Examples include:

- Societal resilience
- Greenhouse gas emissions
- Other environmental impacts
- Public health impacts

Societal impacts can be more difficult to quantify and may require the use of proxy values or assumptions. Consistent with NSPM guidance, relevant impacts should be included where feasible, even if precise quantification is challenging.

Societal Impacts | Resilience

D.1

$$Time\ Series = \sum_{y=1}^{EUL} \frac{1}{(1 + Discount\ Rate)^y} \left(\frac{NTG \times Avoided\ Cost_{t,y} \times Annual\ Savings_y \times DER\ Loadshape_t}{1 - Line\ Losses} \right)$$

$$Single\ Value\ (Measure\ Specific) = \sum_{y=1}^{EUL} \frac{1}{(1 + Discount\ Rate)^y} \left(NTG \times Avoided\ Cost_{y,t} \times Measure\ Input_y \right)$$

Adder Supported ? : Yes | Single Value – Bulk System ? : Yes

NSPM Description:	Calculation Methodology:
Resilience impacts beyond those experienced by utilities or host customers (e.g., allowing critical facilities to continue providing services during an outage)	1. Annual avoided cost due to electricity ($/kWh) × DER load impact. Line losses are factored into calculation 2. Avoided cost of societal resilience is multiplied by the measure-specific critical load, or alternatively by another proxy such as CMO, to estimate the benefit.

Societal Impacts | Greenhouse Gas Emissions (Electric)

D.2

$$Time\ Series = \sum_{y=1}^{EUL} \frac{1}{(1 + Discount\ Rate)^y} \left(\frac{NTG \times Avoided\ Cost_{t,y} \times Annual\ Savings_y \times DER\ Loadshape_t}{1 - Line\ Losses} \right)$$

Adder Supported ? : Yes | Single Value – Bulk System ? : Yes	
NSPM Description:	**Calculation Methodology:**
GHG emissions created by fossil-fueled energy resources for electricity generation	Calculated based on avoided costs of GHG emission due to electricity (Social Cost of Carbon * Emission Intensity) multiplied by DER load profile. Line losses are factored into calculation

Societal Impacts | Greenhouse Gas Emissions (Natural Gas) D.3

$$Time\ Series = \sum_{y=1}^{EUL} \frac{1}{(1 + Discount\ Rate)^y} \left(\frac{NTG \times Avoided\ Cost_{t,y} \times Annual\ Savings_y \times DER\ Loadshape_t}{1 - Line\ Losses} \right)$$

Adder Supported ? : Yes | Single Value – Bulk System ? : Yes	
NSPM Description:	**Calculation Methodology:**
GHG emissions created by fossil-fueled energy resources	Calculated based on avoided costs of GHG emission due to NG (Social Cost of Carbon * Emission Intensity) multiplied by DER load profile. Pipeline losses are factored into calculation

Societal Impacts | Other Environmental

D.4

$$Time\ Series = \sum_{y=1}^{EUL} \frac{1}{(1 + Discount\ Rate)^y} \left(\frac{NTG \times Avoided\ Cost_{t,y} \times Annual\ Savings_y \times DER\ Loadshape_t}{1 - Line\ Losses} \right)$$

Adder Supported ? : Yes | Single Value – Bulk System ? : Yes	
NSPM Description:	**Calculation Methodology:**
Other air emissions, solid waste, land, water, and other environmental impacts	Calculated based on avoided costs of environmental impacts attributed to electricity multiplied by DER load profile. Line losses are factored into calculation

Societal Impacts | Public Health

D.5

$$Time\ Series = \sum_{y=1}^{EUL} \frac{1}{(1 + Discount\ Rate)^y} \left(\frac{NTG \times Avoided\ Cost_{t,y} \times Annual\ Savings_y \times DER\ Loadshape_t}{1 - Line\ Losses} \right)$$

Adder Supported ? : Yes | Single Value – Bulk System ? : Yes	
NSPM Description:	**Calculation Methodology:**
Health impacts, medical costs, and productivity affected by health	Calculated based on avoided costs of public health impacts due to electricity multiplied by DER load profile. Line losses are factored into calculation

E. Host Customer Impacts

Host customer impacts represent benefits and costs experienced directly by participants in DER programs. These may include both financial and non-financial impacts.

Examples include:

- Incremental measure costs
- Transaction costs
- Interconnection costs
- Tax incentives
- Non-energy impacts (NEIs), such as comfort or productivity
- Resilience benefits

The inclusion of host customer impacts depends on jurisdictional policy goals and the design of the JST. When included, these impacts should be treated consistently with other value streams.

Host Customer (Participant) Impacts | Measure Costs

E.1

$$Program/Measure\ Input = \sum NPV\ (Program/Measure\ Specific\ Input)$$

Adder Supported ? : No | Single Value – Bulk System ? : No	
NSPM Description:	**Calculation Methodology:**
Cost incurred to install and operate DERs	Simple calculations, entered as a user input on a measure-by-measure basis

Host Customer (Participant) Impacts | Transaction Costs

E.2

$$Program/Measure\ Input = \sum NPV\ (Program/Measure\ Specific\ Input)$$

Adder Supported ? : No | Single Value – Bulk System ? : No	
NSPM Description:	**Calculation Methodology:**
Other costs incurred to install and operate DERs (e.g., time spent collecting information, obtaining quotes, filing paperwork)	Simple calculations, entered as a user input on a measure-by-measure basis

Host Customer (Participant) Impacts | Interconnection Costs

E.3

$$Program/Measure\ Input = \sum NPV\ (Program/Measure\ Specific\ Input)$$

Adder Supported ? : No | Single Value – Bulk System ? : No	
NSPM Description:	**Calculation Methodology:**
Costs paid by host customer to interconnect DERs to the electricity grid	Simple calculations, entered as a user input on a measure-by-measure basis

Host Customer (Participant) Impacts | Resilience

E.4

$$Time\ Series = \sum_{y=1}^{EUL} \frac{1}{(1 + Discount\ Rate)^y} \left(\frac{NTG \times Avoided\ Cost_{t,y} \times Annual\ Savings_y \times DER\ Loadshape_t}{1 - Line\ Losses} \right)$$

$$Program/Measure\ Input = \sum NPV\ (Program/Measure\ Specific\ Input)$$

Adder Supported ? : No | Single Value – Bulk System ? : No	
NSPM Description:	**Calculation Methodology:**
The ability to anticipate, prepare for, and adapt to changing conditions and withstand, respond to, and recover rapidly from disruptions	1. Annual avoided cost due to electricity ($/kWh) × DER load impact. Line Losses are factored into calculation 2. Simple calculations, entered as a user input on a measure-by-measure basis

Host Customer (Participant) Impacts | Tax Incentives

E.5

$$Program/Measure\ Input = \sum NPV\ (Program/Measure\ Specific\ Input)$$

Adder Supported ? : No | Single Value – Bulk System ? : No	
NSPM Description:	**Calculation Methodology:**
Federal, state, and local tax incentives provided to host customers to defray cost of technology (e.g., DERs). Also includes any donations that may be used to reduce costs for customer or enable participation at no cost.	Simple calculations, entered as a user input on a measure by measure basis

Host Customer (Participant) Impacts | NEIs (Low Income)

E.6

$$Time\ Series = \sum_{y=1}^{EUL} \frac{1}{(1 + Discount\ Rate)^y} \left(\frac{NTG \times Avoided\ Cost_{t,y} \times Annual\ Savings_y \times DER\ Loadshape_t}{1 - Line\ Losses} \right)$$

$$Program/Measure\ Input = \sum NPV\ (Program/Measure\ Specific\ Input)$$

Adder Supported ? : No | Single Value – Bulk System ? : No	
NSPM Description:	**Calculation Methodology:**
Non-energy impacts that affect lower-income DER host customers	1. Annual avoided cost due to electricity ($/kWh) × DER load impact. Line Losses are factored into calculation 2. Simple calculations, entered as a user input on a measure-by-measure basis

Host Customer (Participant) Impacts | NEIs

E.7

$$Time\ Series = \sum_{y=1}^{EUL} \frac{1}{(1 + Discount\ Rate)^y} \left(\frac{NTG \times Avoided\ Cost_{t,y} \times Annual\ Savings_y \times DER\ Loadshape_t}{1 - Line\ Losses} \right)$$

$$Program/Measure\ Input = \sum NPV\ (Program/Measure\ Specific\ Input)$$

Adder Supported ? : No | Single Value – Bulk System ? : No	
NSPM Description:	**Calculation Methodology:**
Non-energy impacts that affect DER host customers	1. Annual avoided cost due to electricity ($/kWh) × DER load impact. Line Losses are factored into calculation 2. Simple calculations, entered as a user input on a measure-by-measure basis

F. Other Fuel Impacts

Other fuel impacts represent benefits and costs associated with changes in consumption of fuels not directly delivered by electric or natural gas utilities, such as propane, heating oil, or diesel. These impacts may occur as a result of efficiency measures, fuel switching, or electrification and are typically evaluated separately from core utility system impacts.

Common other fuel value streams include:

- Supply (avoided fuel purchase or delivery costs)
- Market price effects (changes in regional or local fuel prices due to shifts in demand)
- Environmental compliance (avoided emissions or environmental externalities associated with reduced fuel combustion)

These impacts are generally calculated using avoided fuel costs or environmental damage values applied to changes in fuel consumption over time. Estimation of other fuel impacts may require consideration of fuel-specific pricing assumptions, emissions factors, and applicable temporal or geographic contexts.

Other Fuel Impacts | Supply Impact: Propane

F.1

$$Time\ Series = \sum_{y=1}^{EUL} \frac{1}{(1 + Discount\ Rate)^y} \left(\frac{NTG \times Avoided\ Cost_{t,y} \times Annual\ Savings_y \times DER\ Loadshape_t}{1 - Line\ Losses} \right)$$

Adder Supported ? : No | Single Value – Bulk System ? : Yes	
NSPM Description:	**Calculation Methodology:**
The displacement of propane costs due to new technologies	Annual avoided cost due to propane supply impact ($/MMBtu) × DER load impact

Other Fuel Impacts | Environmental Impact: Propane

F.2

$$Time\ Series = \sum_{y=1}^{EUL} \frac{1}{(1 + Discount\ Rate)^y} \left(\frac{NTG \times Avoided\ Cost_{t,y} \times Annual\ Savings_y \times DER\ Loadshape_t}{1 - Line\ Losses} \right)$$

Adder Supported ? : Yes | Single Value – Bulk System ? : Yes	
NSPM Description:	**Calculation Methodology:**
The environmental impacts associated with displacement of propane costs due to new technologies	Annual avoided cost due to propane environmental impact ($/MMBtu) × DER load impact

Other Fuel Impacts | Market Price : Propane

F.3

$$Time\ Series = \sum_{y=1}^{EUL} \frac{1}{(1 + Discount\ Rate)^y} \left(\frac{NTG \times Avoided\ Cost_{t,y} \times Annual\ Savings_y \times DER\ Loadshape_t}{1 - Line\ Losses} \right)$$

Adder Supported ? : Yes | Single Value – Bulk System ? : Yes	
NSPM Description:	**Calculation Methodology:**
The market price effects associated with displacement of propane costs due to new technologies	Annual avoided cost due to propane market price impact ($/MMBtu) × DER load impact

Other Fuel Impacts | Supply Impact: Heating Oil

F.4

$$Time\ Series = \sum_{y=1}^{EUL} \frac{1}{(1 + Discount\ Rate)^y} \left(\frac{NTG \times Avoided\ Cost_{t,y} \times Annual\ Savings_y \times DER\ Loadshape_t}{1 - Line\ Losses} \right)$$

Adder Supported ? : No | Single Value – Bulk System ? : Yes	
NSPM Description:	**Calculation Methodology:**
The displacement of heating oil costs due to new technologies	Annual avoided cost due to heating oil supply impact ($/MMBtu) × DER load impact

Other Fuel Impacts | Environmental Impact: Heating Oil

$$Time\ Series = \sum_{y=1}^{EUL} \frac{1}{(1 + Discount\ Rate)^y} \left(\frac{NTG \times Avoided\ Cost_{t,y} \times Annual\ Savings_y \times DER\ Loadshape_t}{1 - Line\ Losses} \right)$$

Adder Supported ? : Yes | Single Value – Bulk System ? : Yes	
NSPM Description:	**Calculation Methodology:**
The environmental impacts associated with displacement of heating oil costs due to new technologies	Annual avoided cost due to heating oil environmental impact ($/MMBtu) × DER load impact

Other Fuel Impacts | Market Price : Heating Oil

F.6

$$Time\ Series = \sum_{y=1}^{EUL} \frac{1}{(1 + Discount\ Rate)^y} \left(\frac{NTG \times Avoided\ Cost_{t,y} \times Annual\ Savings_y \times DER\ Loadshape_t}{1 - Line\ Losses} \right)$$

Adder Supported ? : Yes | Single Value – Bulk System ? : Yes	
NSPM Description:	**Calculation Methodology:**
The market price effects associated with displacement of heating oil costs due to new technologies	Annual avoided cost due to heating oil market price impact ($/MMBtu) × DER load impact

Other Fuel Impacts | Supply Impact: Diesel

$$Time\ Series = \sum_{y=1}^{EUL} \frac{1}{(1 + Discount\ Rate)^y} \left(\frac{NTG \times Avoided\ Cost_{t,y} \times Annual\ Savings_y \times DER\ Loadshape_t}{1 - Line\ Losses} \right)$$

Adder Supported ? : No | Single Value – Bulk System ? : Yes	
NSPM Description:	**Calculation Methodology:**
The displacement of diesel costs due to new technologies	Annual avoided cost due to diesel supply impact ($/MMBtu) × DER load impact

Other Fuel Impacts | Environmental Impact: Diesel

$$Time\ Series = \sum_{y=1}^{EUL} \frac{1}{(1 + Discount\ Rate)^y} \left(\frac{NTG \times Avoided\ Cost_{t,y} \times Annual\ Savings_y \times DER\ Loadshape_t}{1 - Line\ Losses} \right)$$

Adder Supported ? : Yes | Single Value – Bulk System ? : Yes	
NSPM Description:	**Calculation Methodology:**
The environmental impacts associated with displacement of diesel costs due to new technologies	Annual avoided cost due to diesel environmental impact ($/MMBtu) × DER load impact

Other Fuel Impacts | Market Price : Diesel

$$Time\ Series = \sum_{y=1}^{EUL} \frac{1}{(1 + Discount\ Rate)^y} \left(\frac{NTG \times Avoided\ Cost_{t,y} \times Annual\ Savings_y \times DER\ Loadshape_t}{1 - Line\ Losses} \right)$$

Adder Supported ? : Yes | Single Value – Bulk System ? : Yes	
NSPM Description:	**Calculation Methodology:**
The market price effects associated with displacement of diesel costs due to new technologies	Annual avoided cost due to diesel market price impact ($/MMBtu) × DER load impact

Other Fuel Impacts | Supply Impact: Wood

$$Time\ Series = \sum_{y=1}^{EUL} \frac{1}{(1 + Discount\ Rate)^y} \left(\frac{NTG \times Avoided\ Cost_{t,y} \times Annual\ Savings_y \times DER\ Loadshape_t}{1 - Line\ Losses} \right)$$

Adder Supported ? : No | Single Value – Bulk System ? : Yes	
NSPM Description:	**Calculation Methodology:**
The displacement of diesel costs due to new technologies	Annual avoided cost due to wood supply impact ($/MMBtu) × DER load impact

Other Fuel Impacts | Environmental Impact: Wood

$$Time\ Series = \sum_{y=1}^{EUL} \frac{1}{(1 + Discount\ Rate)^y} \left(\frac{NTG \times Avoided\ Cost_{t,y} \times Annual\ Savings_y \times DER\ Loadshape_t}{1 - Line\ Losses} \right)$$

Adder Supported ? : Yes | Single Value – Bulk System ? : Yes	
NSPM Description:	**Calculation Methodology:**
The environmental impacts associated with displacement of diesel costs due to new technologies	Annual avoided cost due to wood environmental impact ($/MMBtu) × DER load impact

Other Fuel Impacts | Market Price : Wood

$$Time\ Series = \sum_{y=1}^{EUL} \frac{1}{(1 + Discount\ Rate)^y} \left(\frac{NTG \times Avoided\ Cost_{t,y} \times Annual\ Savings_y \times DER\ Loadshape_t}{1 - Line\ Losses} \right)$$

Adder Supported ? : Yes | Single Value – Bulk System ? : Yes	
NSPM Description:	**Calculation Methodology:**
The market price effects associated with displacement of diesel costs due to new technologies	Annual avoided cost due to wood market price impact ($/MMBtu) × DER load impact

G. Additional Metrics

Additional metrics provide supplemental insight into the performance and impacts of a measure or portfolio but are not directly incorporated into benefit-cost analysis (BCA) results. These metrics are included to help stakeholders better understand outcomes such as energy savings, emissions performance, or intensity-based impacts, like GHG intensity.

Common additional metrics may include:

- GHG intensity metrics (e.g., emissions per unit of energy)

These metrics are typically calculated based on changes in energy consumption and associated emissions factors over time. While they are not monetized or used directly in cost-effectiveness tests, they provide valuable context for evaluating program impacts, supporting policy goals, and facilitating comparison across measures or portfolios.

Additional Metrics | Greenhouse Gas Intensity (All Fuels)

G.1

$$Time\ Series = \sum_{y=1}^{EUL} \left(\frac{NTG \times Emission\ Intensity_{t,y} \times Annual\ Savings_y \times DER\ Loadshape_t}{1 - Line\ Losses} \right)$$

Adder Supported ? : No | Single Value – Bulk System ? : No	
NSPM Description:	**Calculation Methodology:**
GHG emissions created by fossil-fueled energy resources	Calculated based on emission intensity multiplied by DER load profile. Line losses are factored into calculation wherever applicable

Equation Summary

Defining formulas for different calculation types

$$Time\ Series = \sum_{y=1}^{EUL} \frac{1}{(1 + Discount\ Rate)^y} \left(\frac{NTG \times Avoided\ Cost_{t,y} \times Annual\ Savings_y \times DER\ Loadshape_t}{1 - Line\ Losses} \right)$$

$$Peak\ Capacity = \sum_{y=1}^{EUL} \frac{1}{(1 + Discount\ Rate)^y} \left(\frac{NTG \times Avoided\ Cost_{t,y} \times Annual\ Coincident\ Peak\ Savings_y}{1 - Line\ Losses} \right)$$

$$Adder\ Impact\ = Adder\ (\%) \times NPV\ (Energy\ Generation\ Impact\ (\$))$$

$$Single\ Value\ (Measure\ Specific) = \sum_{y=1}^{EUL} \frac{1}{(1 + Discount\ Rate)^y} \left(NTG \times Avoided\ Cost_{y,t} \times Measure\ Input_y \right)$$

$$Single\ Value\ -\ Bulk\ System = \sum NPV(Bulk\ System\ Impact_y)$$

$$Program/Measure\ Input = \sum NPV\ (Program/Measure\ Specific\ Input)$$