Massachusetts Grid Services & DER Compensation Study

Workshop 1

December 16, 2024

MASSACHUSETTS CLEAN ENERGY CENTER®

In Partnership With

DOER Massachusetts Department of Energy Resources

Office of the Attorney General, Commonwealth of Massachusetts

EVERSOURCE

Unitil

nationalgrid

RMI

Energy+Environmental Economics

Welcome and Check -In

- Please use the rename function to add your affiliation after your name – eg. "Brett Webster, RMI"

- Please put in the chat:
  - Your name, org, and a brief description of your interest in this work.

Disclaimer Prior to Recording

- This workshop will be recorded to ensure transparency in this process and provide participants or those unable to attend the opportunity to refer back to the workshop at a later date.
- This recording and the slides presented will be posted publicly on the MassCEC website at the link below.
  - https://www.masscec.com/grid-modernization-and-infrastructure-planning/grid-services-study
- If you are not comfortable being recorded, you may mute your video and microphones now.
  - Once the time dedicated to the primary content of this meeting has concluded, the recording will be ended.
- In order to facilitate free and open discussion during the workshop, it should be understood that statements made, positions taken, and information provided by the participants are part of an evolving and collaborative effort to encourage discussion and develop effective solutions to the challenges presented. As such, except as set forth below, these perspectives and materials should not be used by or against participants or presenters in any litigation, including administrative proceedings before federal, state, or local governmental authorities.
- This prohibition does not prevent any participant from using its own statements, positions, or information provided in any subsequent litigation, provided that such use contains no reference or indication that these materials were made and presented in the workshops.

RMI is an independent, nonprofit organization of 700 global experts accelerating the clean energy transition.

Decarbonizing 4 interdependent industries

Buildings

Industry

Transportation

Electricity

Workshop 1 Objectives

- Build foundational understanding and vision for grid services in MA
- Share the motivations, goals, and intended approach for establishing a compensation mechanism for the value that distributed energy resources (DERs) can provide to the distribution grid
- Align on the role of stakeholder engagement throughout the work
- Begin to solicit input and feedback from diverse groups on their priorities and concerns related to the work, and on the proposed approach and methods (with additional opportunities in future sessions)

Agenda

1:00 - 1:20	1.	Introduction to the study and workshop
1:20 - 1:40	2.	Joint presentation of Grid Services proposals by Eversource, National Grid, and Unitil
1:40 - 1:50	3.	Study objectives
1:50 - 2:15	4.	Study approach
2:15 - 2:45	5.	Stakeholder role and input: Our ask of you and yours of us (including Q+A)
2:45 – 3:00	6.	Closing and next steps

Workshop Participation Guidelines

- Please mute yourself when not speaking
- We suggest minimizing distractions by silencing or turning off cell phones during the workshop
- Please post questions in chat as we go along, or use the raise hand function for any questions during the Q&A breaks
- There will be brief pauses for Q+A after each section, with a dedicated half hour for questions and feedback near the end of today's workshop
- Please identify yourself when speaking or commenting in the chat, including the organization or community you represent if applicable

Workshop Resources and Communication

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- **Workshop session slides and the recording of this presentation will be made available on the MassCEC website:**
  - https://www.masscec.com/grid-modernization-and-infrastructure-planning/grid-services-study
  - This site also contains general information about the study and a primer for this workshop series
  - A form for additional feedback will be sent following the meeting
- **Please share any questions or feedback after the meeting with:**
  - Andrew.Solfest@ethree.com
  - Grid@masscec.com
  - Bwebster@rmi.org

Introduction to Study and Workshop Series

Energy+Environmental Economics

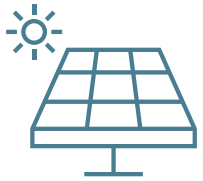
Team Introductions

+ **Collaborative study led & funded by MassCEC's Net Zero Grid team**

+ **Representatives from MA state agencies:**
  - Department of Energy Resources (DOER)
  - Attorney General's Office (AGO), Office of the Ratepayer Advocate

+ **Representatives from each of the investor-owned MA electric distribution companies (EDCs):**
  - Eversource
  - Unitil
  - National Grid

Workshop Context – What are DERs?



Distributed energy resources (DERs) are technologies connected to the distribution grid which can generate electricity or reduce or shift grid loads.

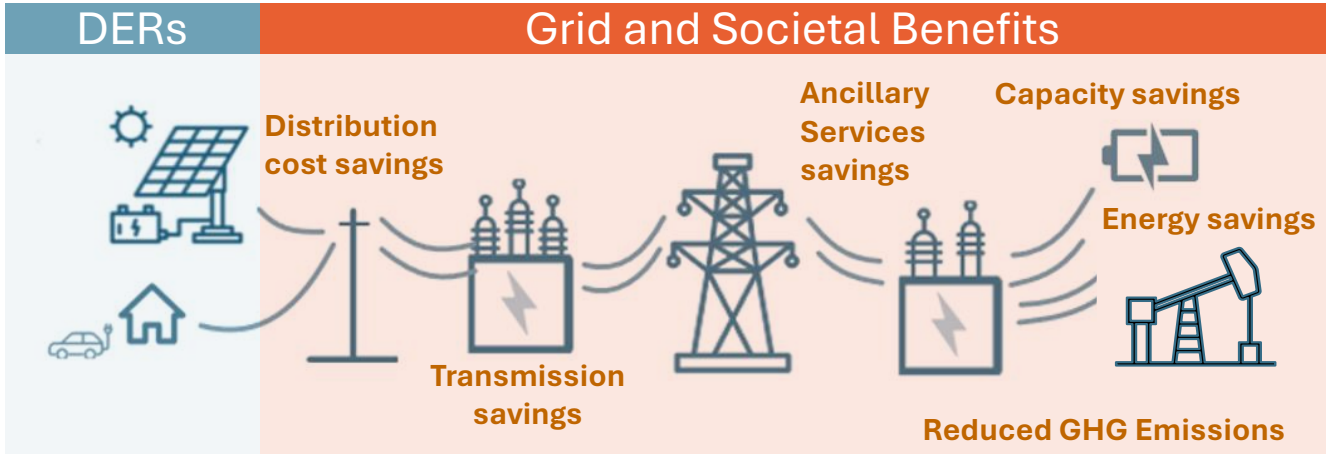
DERs include energy efficiency, demand response, distributed solar PV, distributed energy storage, and electrification loads such as from EV and heat pumps.

DERs can provide a range of services to the electric grid, including generating, storing, and modulating the use of electricity, among others. DER grid services can play a critical role in meeting local demand, easing localized constraints, and improving reliability.

DERs can perform valuable functions for the electric system grid, referred to as grid services

+ **DERs frequently benefit the grid by:**
  - Generating carbon-free electricity
  - Reducing customer electricity loads
  - Shifting customer loads to times when the grid is less constrained

These benefits reduce costs for electric grid operators; resulting savings can be passed on to ratepayers



+ **DERs can also provide societal benefits in the form of 'Non-Rate Impacts', such as reduced emissions**

This study focuses specifically on *distribution* grid services, with the goal of establishing a framework for valuing these services and laying out a roadmap for how we can capture and compensate those benefits

Joint Presentation of Grid Services Proposals

EVERSOURCE Unitil nationalgrid

Energy+Environmental Economics

The electric utilities (EDCs) highlight the importance of leveraging customer DERs for local grid services in their ESMPs

+ **In August 2024, the MA Department of Public Utilities approved all three EDCs' Electric Sector Modernization Plans (ESMPs)**
  - The ESMPs are long-term strategic plans to safely deliver an electric distribution system capable of supporting Massachusetts' Net Zero by 2050 vision
  - Each EDC plan includes five years of investments needed starting in July 2025
+ **The plans are unique to each EDC, but each of the plans includes investments and programs intended to:**
  - Facilitate the proactive buildout of the electric distribution system for electrification and DER growth
  - Make it easier for customers to participate in the clean energy transition
  - Operationalize customer flexibility and maximize its value, including:
    - Grid Service Compensation Funds (GSCF) to provide customer incentives for new local distribution grid service programs/markets
    - Enabling technology investments that will provide EDC grid operators and planners with tools needed to reliably manage customer DERs to those programs and markets

Focus for today

"Customer Flexibility" is a technology- agnostic term that could include active management of flexible demand (e.g., EVs, controllable thermostats), exporting DER including front of the meter (e.g., ESS, PV, vehicle to grid), and demand destruction (e.g., EE). These technologies can be aggregated together as Virtual Power Plants (VPPs), managed by an aggregator, and/or managed individually.

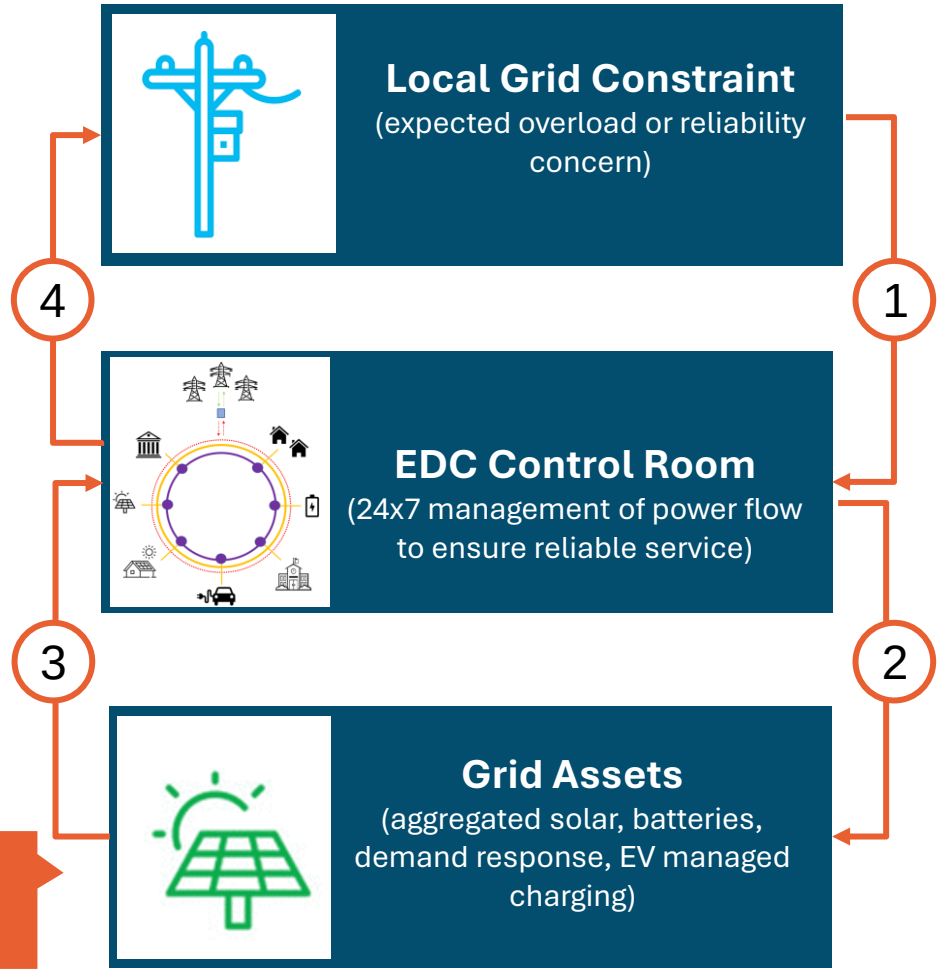
The utility / energy sector is early on the journey of using customer DERs to address local grid constraints

- **The EDCs envision a future** in which customer flexibility is further integrated into distribution network planning and operations as a complementary lever to physical distribution investments, maximizing the value of customer flexibility to reduce the costs of the clean energy transition
- In Massachusetts, **we have industry-leading *system-wide* EE and DR programs**, but **the collective industry is nascent on its journey to leverage customer flexibility for *local* distribution grid constraints**
- **A "walk before you run" approach** will enable EDCs and their customers to start capturing the benefits of DER providing local grid services while gathering best practices and insights to further develop programs over time
- **This Grid Services Study will provide critical input** to EDCs as we develop programs that provide compensation for customers that enroll their DERs to provide local grid services
  - **Statewide valuation frameworks** that provide guidance on how compensation should vary based on location, driven by the value of local grid needs
  - **Consistent guidelines** to inform program development (e.g., added value in EJ communities, coordination with existing non-locational DER compensation programs)
  - **Implementation roadmap** with guidance on short-term techniques to get started animating the market for flexibility and more advanced capabilities to build towards.

Grid Services Opportunities

- **Bridge-to-Wires.** Immediate need to avoid an overload on the local distribution system while more permanent traditional solution is under construction
- **Deferral.** Delay in-service date for traditional solution, reducing costs for customers
- **Operational Flexibility.** Additional "tool-in-the-toolbox" for system operators to manage real-time power flows (e.g., support reliability, voltage management, or peak load management use cases)

Illustrative Diagram of Interactions



EDCs would provide compensation for enrolled DERs based on agreed upon terms

Study Objectives

Energy+Environmental Economics

About E3

130+ full-time consultants

30+ years of deep expertise

Engineering, Economics, Mathematics, Public Policy…


San Francisco


New York

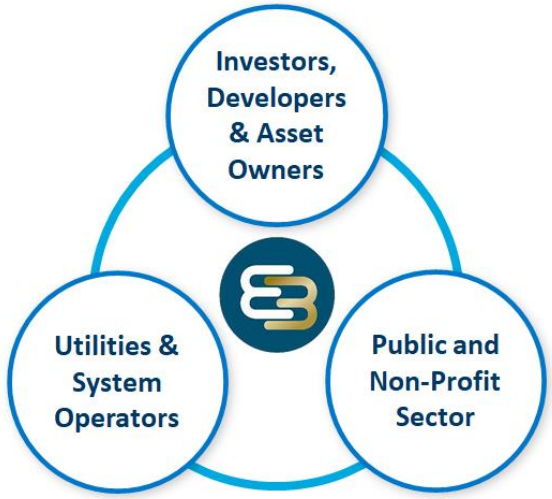

Boston


Calgary


Denver

E3 Clients

250+ projects per year across our diverse client base



Example Recent Related Projects

- **Massachusetts Interagency Rates Working Group (IRWG),** Rate design for electrification and affordability (2024)
- **MassCEC/DOER**, *Charging Forward* energy storage roadmap (2023)
- **California Public Utilities Commission (CPUC)**, Avoided Cost Methodology and "E3 Calculator" (2003 -Present)
- **New York State Energy Research & Development Authority (NYSERDA)**, Value of Distributed Energy Resources Proceeding Support (2016 - Present)
- **Sacramento Municipal Utility District (SMUD),** Virtual Power Plant Cost Effectiveness & Resource Planning (2020 - 2021)
- Confidential DER valuation work for developer clients in several other jurisdictions

Consultant and Advisory Team

E3 Project Leadership and Management

Eric Cutter
Project Partner

Andrew DeBenedictis
Project Lead

Andrew Solfest
Project Manager

RMI Advisory Team

Cara Goldenberg
Engagement & Implementation Advisor

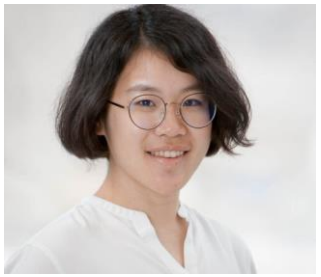
Brett Webster
Engagement & Implementation Advisor

E3 Subject Matter Experts and Analysis Team

Hannah Platter
Non-Rate Impacts & Implementation

Sophia Greszczuk
BCA Modeling

Stephanie Kinser
Grid Benefit Evaluation



Fangxing Liu
SME – Avoided and Deferred Costs

Electric sector modernization requires innovative analysis and policy to keep pace with technology adoption

The electric grid is **evolving rapidly** – creating new challenges as well as new opportunities to solve them

Existing frameworks are best at recognizing **systemwide resource value**; they are less effective for the granular distribution networks

We need a new framework for understanding location-specific value: both to maximize and appropriately capture it

This framework must be:

1. **Actionable** for the near-term
2. **Adaptable** as available data and technologies improve

Resulting objectives

1. Develop a methodology and determine appropriate inputs to calculate grid services value provided by DERs in Massachusetts
2. Develop methodologies to qualify or quantify non-rate impacts provided of DERs for the state
3. Determine a grid services compensation mechanism that avoids overcompensation when combined with other available benefits/incentives
4. Determine an appropriate means for considering equity and environmental justice in both valuation and compensation for grid services
5. Create a roadmap that identifies near-term implementation considerations and long-term triggers to update to the compensation
6. Develop a report describing the methodology, detailing the roadmap, and incorporating stakeholder feedback

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7. ***Provide opportunities for stakeholder input – we want this to be a transparent and collaborative process!***

Study work products

Valuation Framework

- Incorporate distribution grid services and non-rate impacts
- Must be applicable statewide and include consideration for EJ communities

Implementation Mechanism

- Compare candidate mechanisms
- Determine qualitative considerations of each mechanism

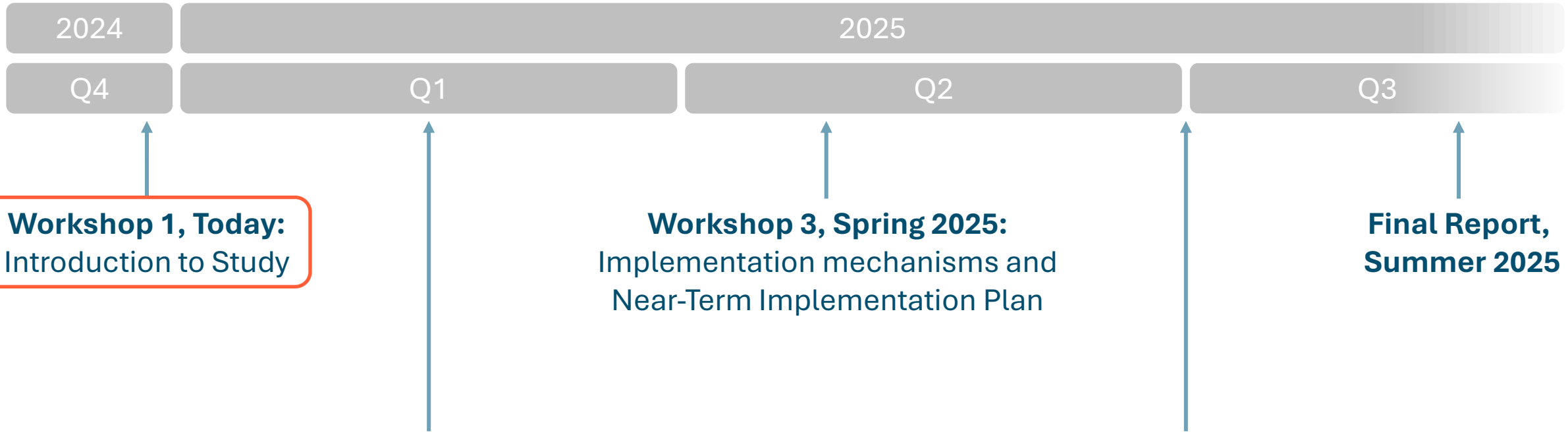
Near Term Implementation Plan

- Provide steps for engaging stakeholders and supporting EJ communities in implementation
- Identify potential barriers to implementation and recommend improvements

Long Term Implementation Plan

- Consider the future of the electric sector and impacts on compensation design
- Discuss milestones that can be used to determine when to re-evaluate the mechanism

Workshop Timeline



Study Approach

Understanding Grid Services Value in Context

Energy+Environmental Economics

Driving questions for this study

+ **What are the benefits that DERs can provide to the distribution grid?**
+ **How do we quantify the different types of benefits?**
+ **What determines where on the grid these benefits where appear and what value they provide?**
  - How may these benefits impact Environmental Justice populations differently and specifically?
+ **What is required for utilities to be able to realize these benefits?**
+ **How should we go about compensating these benefits?**

Beginning with Valuation

+ **What are the benefits that DERs can provide to the distribution grid?**
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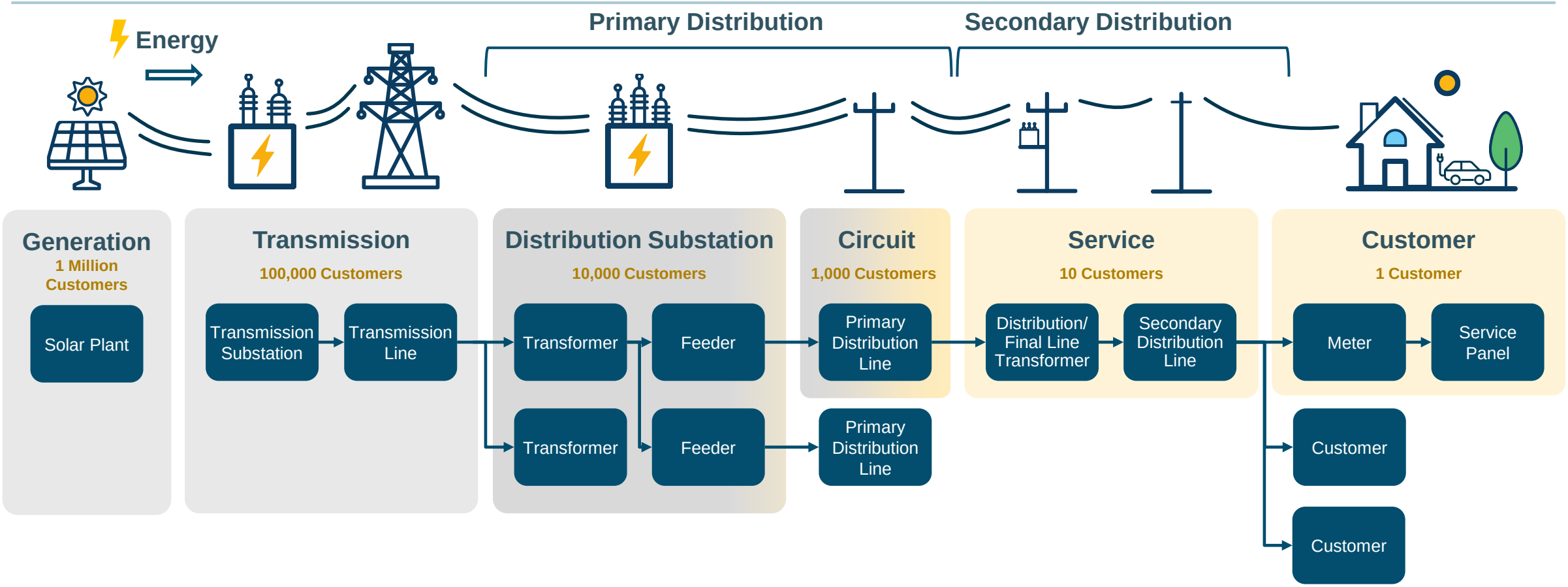
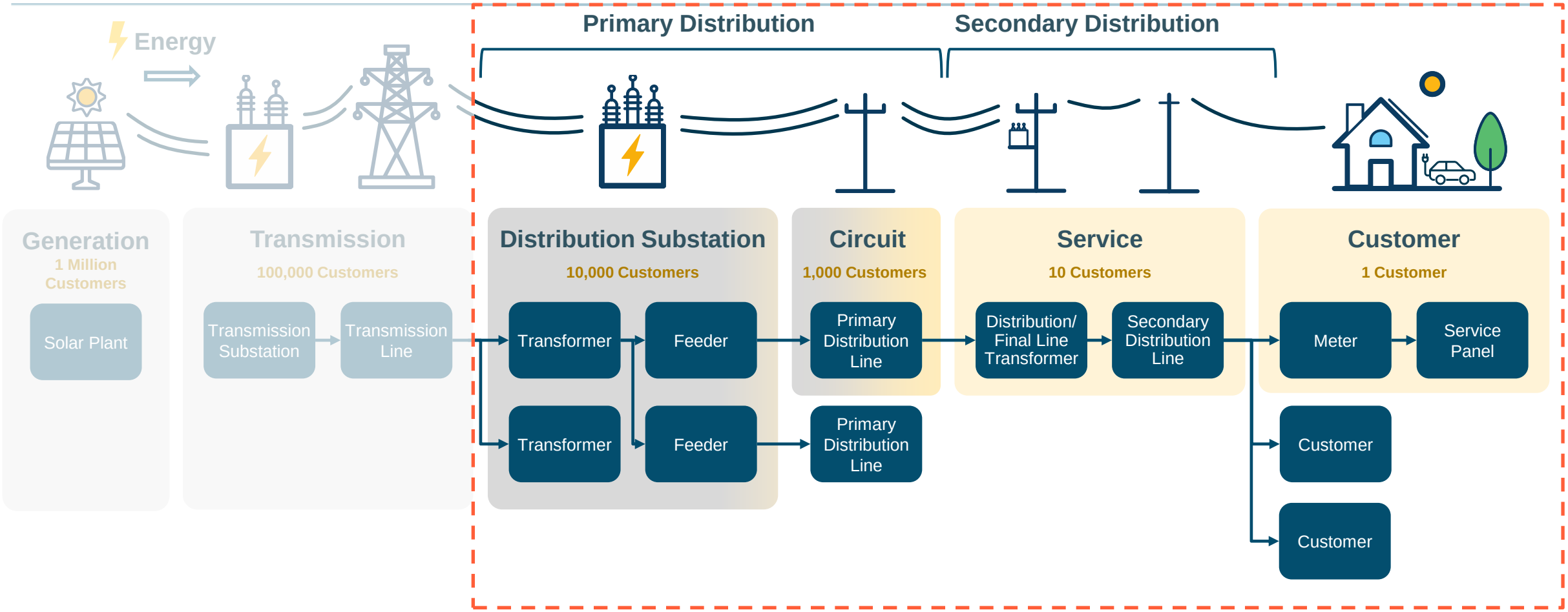
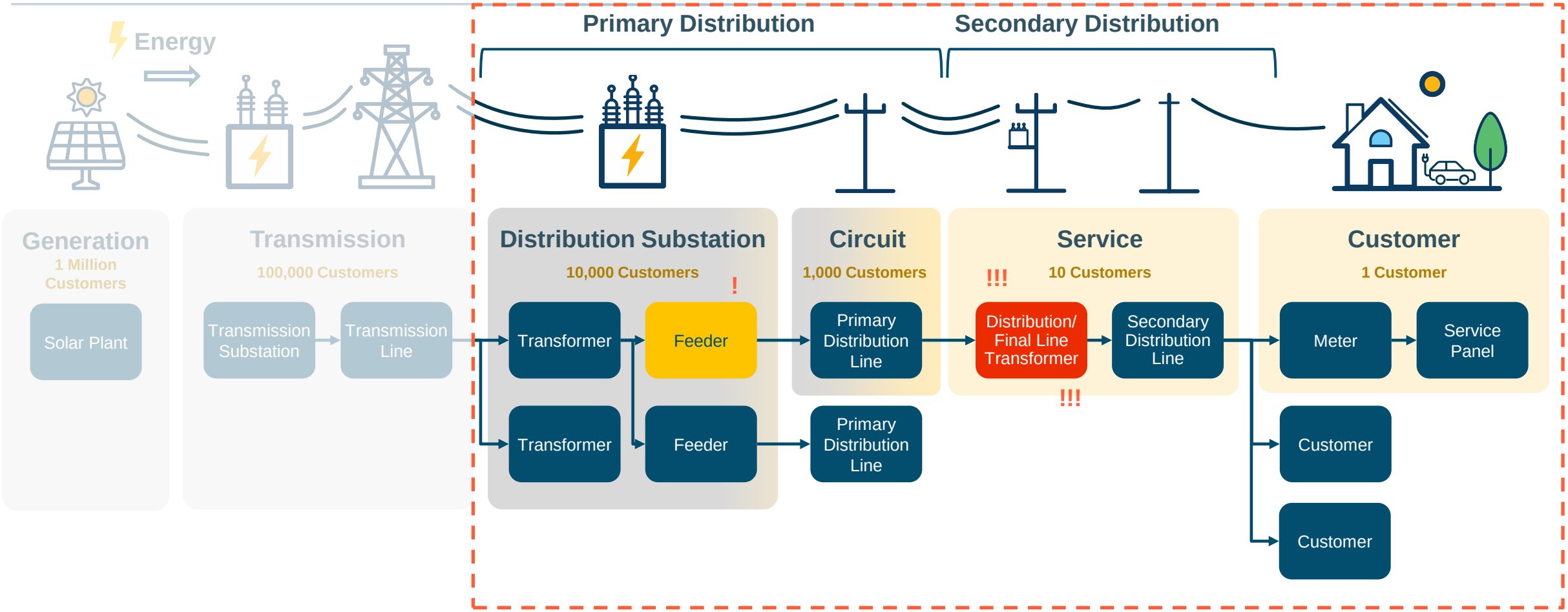
DERs may reduce costs at different points along the electric grid



We want to home in on distribution system costs …



… which can be highly location-specific

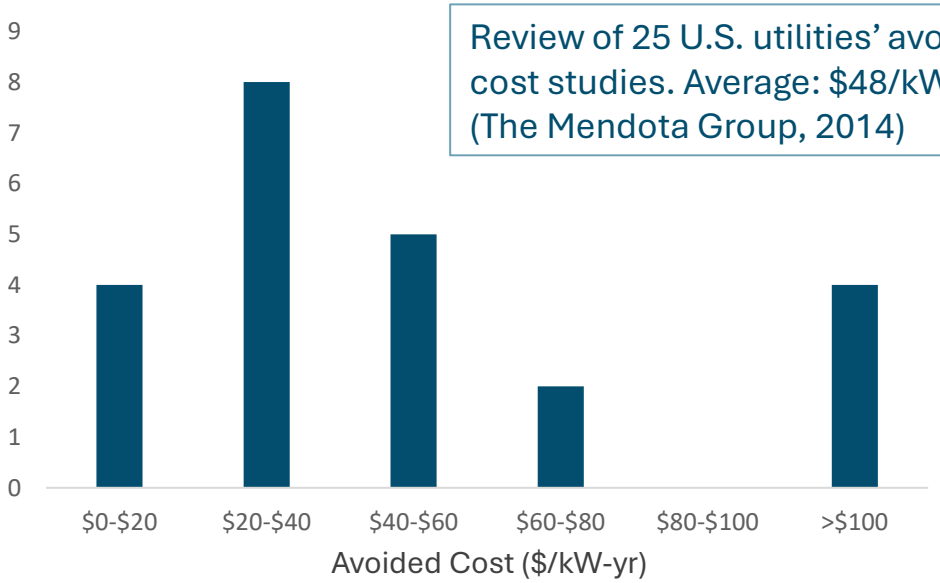


Distribution avoided and deferred costs values vary significantly down to the feeder and transformer level

Distribution costs have a wide range across and within individual electric systems, with some extremely expensive or high-need areas and a long tail where benefits are negligible

Distribution of ranges

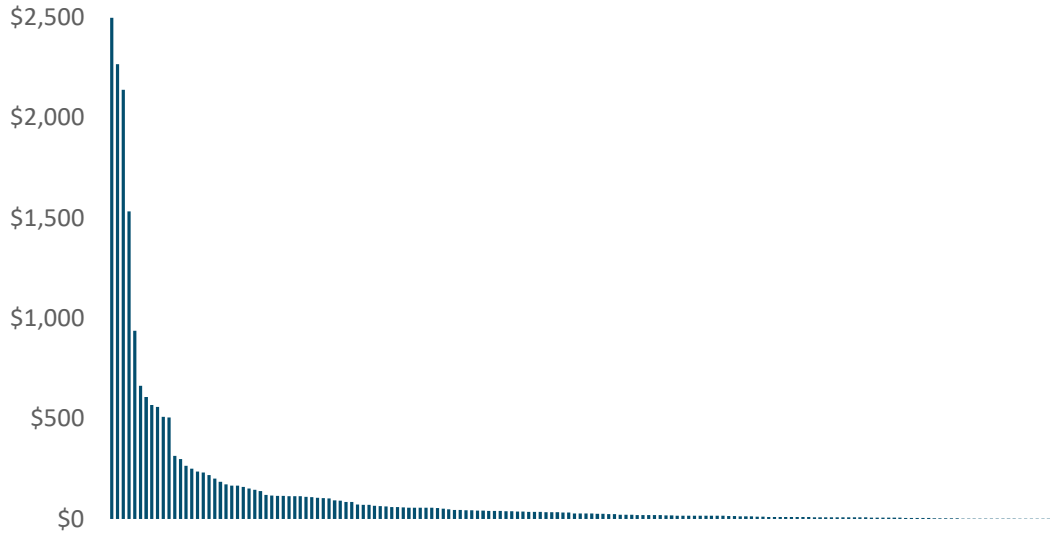
Count



Review of 25 U.S. utilities' avoided cost studies. Average: $48/kW-yr (The Mendota Group, 2014)

Example distribution avoided costs by feeder

$/kW-yr

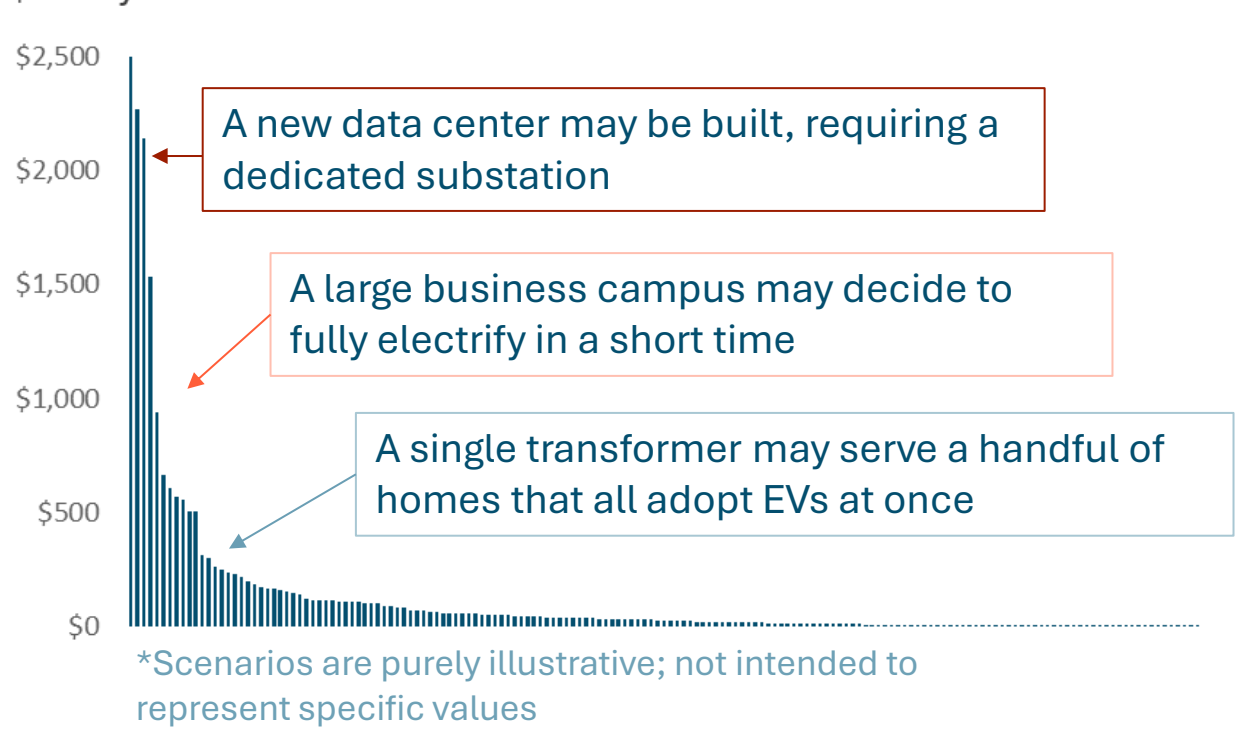


This means that it's hugely beneficial if you can drill down to the location-specific impact of DERs

Why the range of value?

- **At any given point in time, much of the distribution grid will not be constrained or experiencing high stress**
- **However, in small pockets of increasing demand, there can be significant value in alleviating even a small amount of strain**
- **Even where DERs might not be able to meet the entire need permanently:**
  - Meeting needs for a number of years may allow the utility to delay or defer infrastructure investments
  - When needs are imminent and project lead times are long, DERs can act as a 'bridge-to-wires', reducing grid risk and reliability concerns for other customers

Example distribution system costs by feeder



*Scenarios are purely illustrative; not intended to represent specific values

Capturing grid service value requires being in the right place at the right time

+ **In addition to siting resources where they are needed, grid services value requires them to be available *when* there are local constraints**
+ **These local constraints may diverge from systemwide peaks or times of need**
  - The more localized the constrained equipment, the more diverse the load profile
+ **Dispatchable resources are well suited to provide this; utility-controllable resources are even better**
  - Sophisticated communication systems are required to provide the right localized signals
  - A simple systemwide real time price will not be sufficient

DER Profile vs. System Need

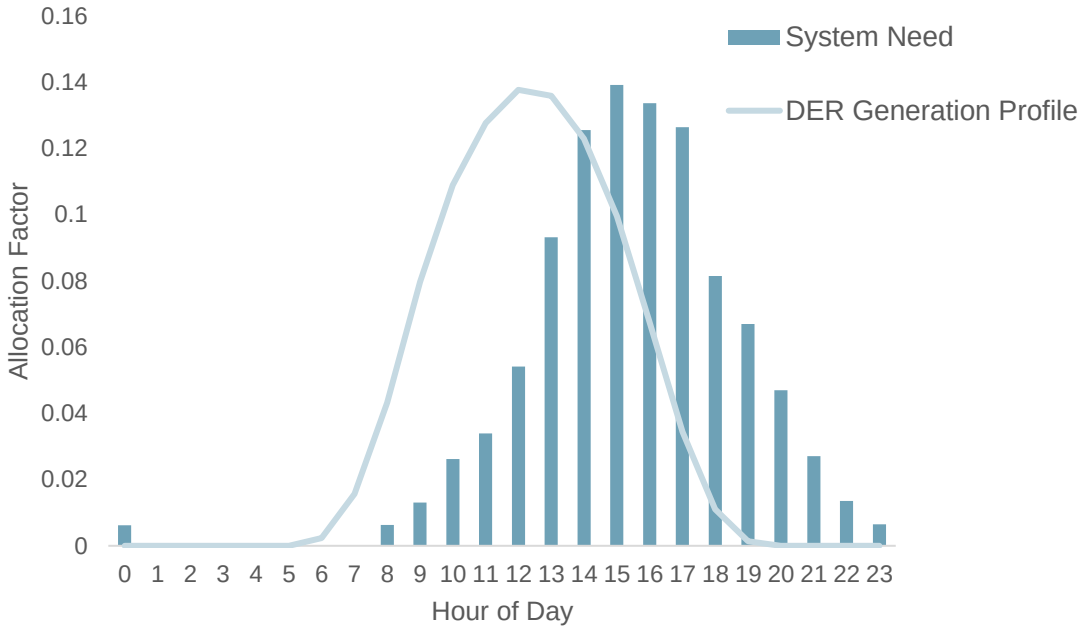


Illustration of sample alignment between a solar profile and systemwide hours of need

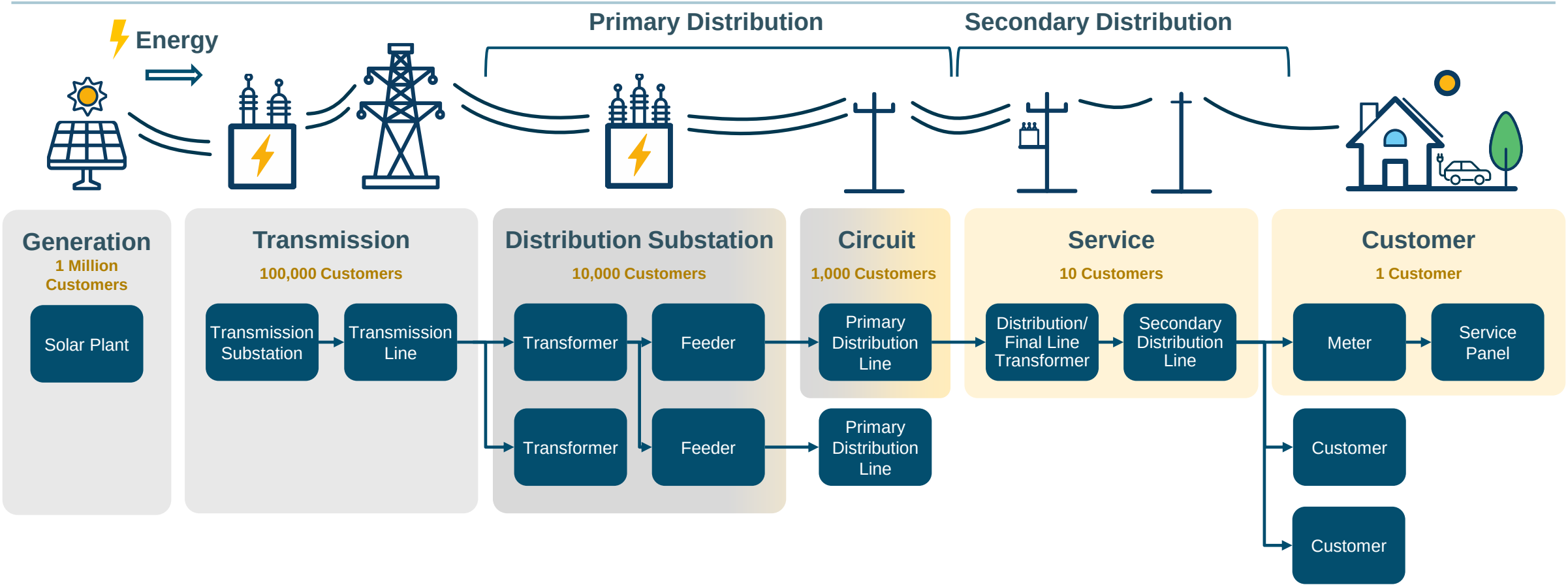
Value must also be accessible to be real

+ What are the benefits that DERs can provide to the distribution grid?
+ How do we quantify the different types of benefits?
+ What determines where on the grid these benefits where appear and what value they provide?
  - How may these benefits impact Environmental Justice populations differently and specifically?
+ **What is required for utilities to be able to realize these benefits?**
+ How should we go about compensating these benefits?

Unlocking full grid service value requires some level of certainty

- **The greatest grid services value comes from being able to plan years in advance**
- **While a resource might happen to be available at a given time and in the right location, if distribution grid planners can't count on it being there, they can't scope or schedule their investments around it**
  - Without this ability, the potential for cost savings is relatively minimal
- **However, this also implies that there is value in simply knowing a resources is there and ready to be called upon; even if the call is never made**

Zooming back out



Compensation should take all of this into account, and more

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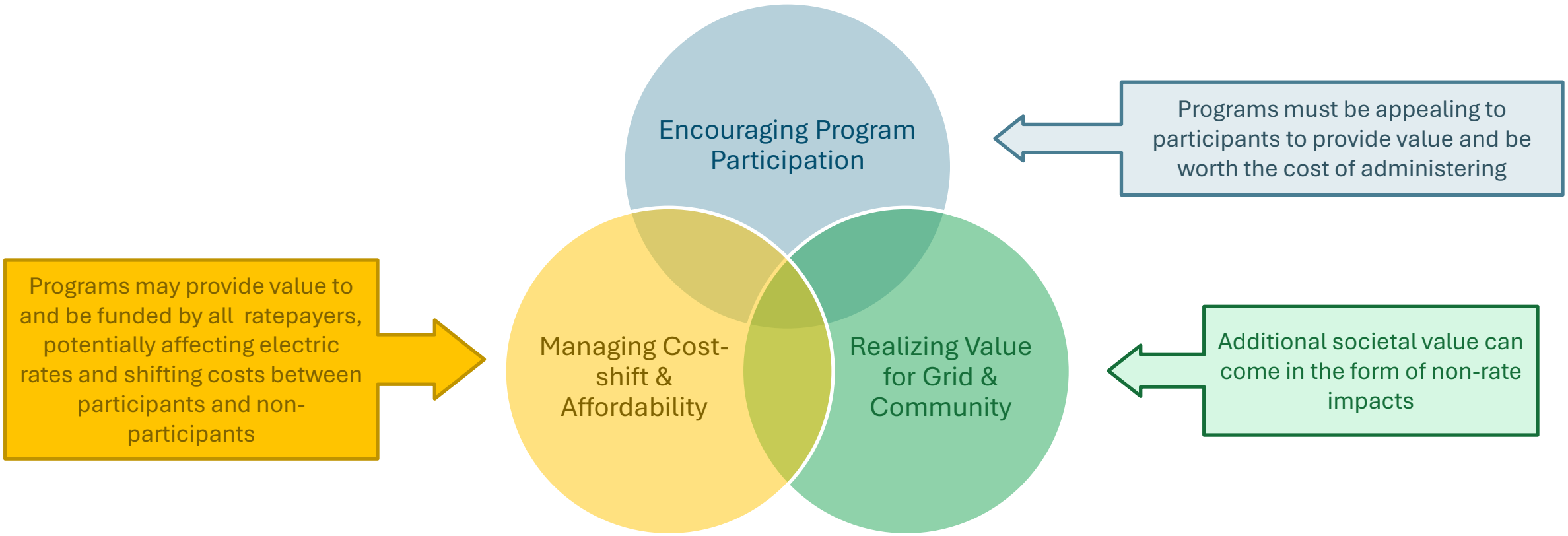
- **How should we go about compensating these benefits?**

Compensation design must balance competing policy goals and ultimately be actionable

Competing policy goals



Ideal compensation addresses all three key goals

All while remaining simple enough for participants to understand and for administrators to implement

Compensation mechanisms should be designed with consideration for the context in which they are applied

1. Value Stacking

In practice, grid services compensation may be stacked up with other customer programs intended to capture a range of different or overlapping benefits

- Program design must be careful to avoid double-counting individual benefits
- This stacking exacerbate discrepancies between value provided to the grid and what ratepayers pay for it

2. Policy Outcomes

The mechanism should align with desired policy outcomes and be measured against them

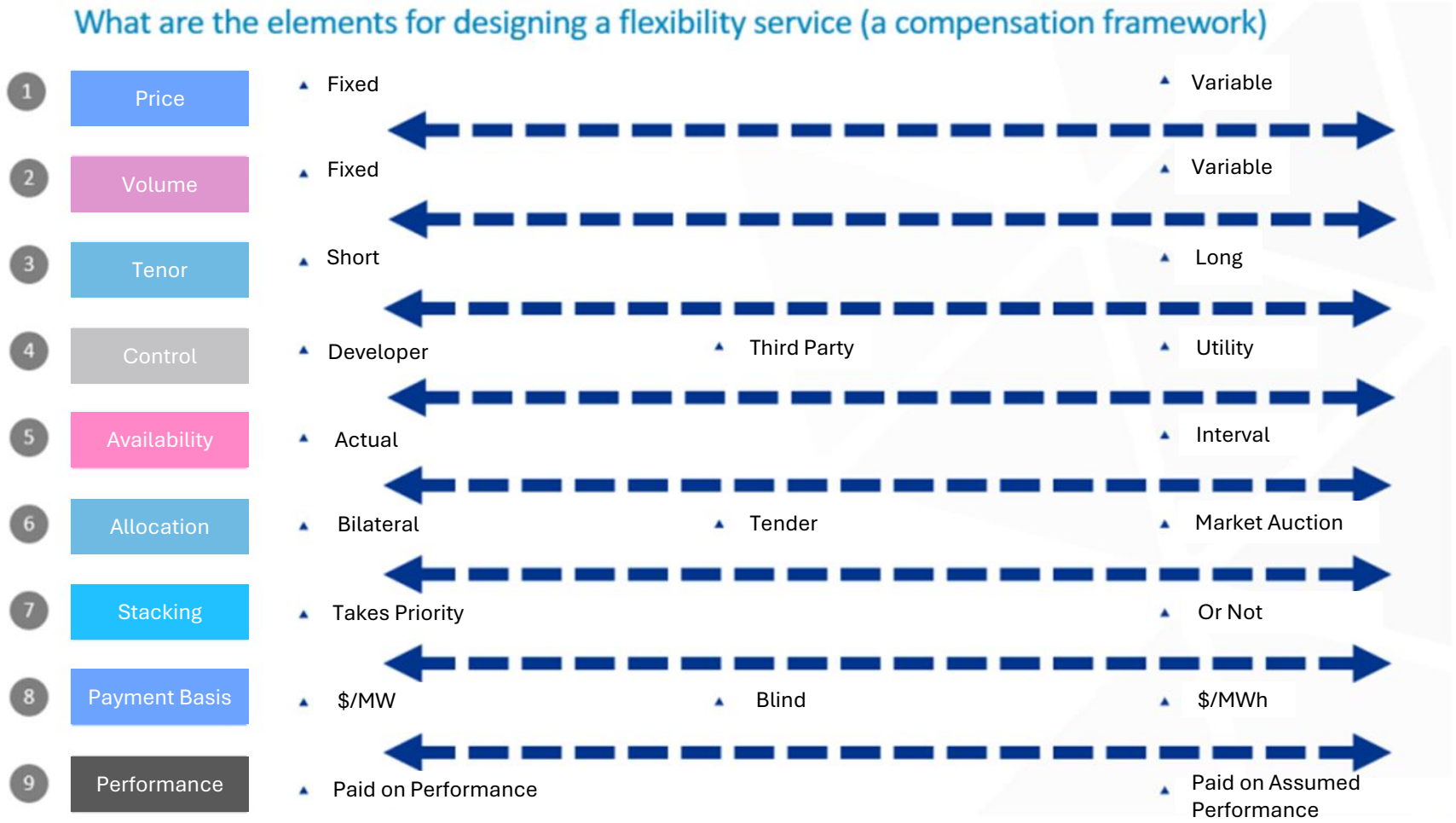
3. Ease of Implementation

Implementation strategy must be clear and actionable in the near term, without relying on an expectation of ideal conditions to be carried out

4. Market Signals

Potential participants must be able to understand and reasonably act on any price signals provided

Future compensation design may adapt along many dimensions



Source: Baringa Partners. Value of DER Report, March 2024

Exploring equity and Environmental Justice impacts

- **Core to this work is early integration of equity considerations into the design and analysis. Initial questions we are asking and seeking to answer:**
  - How can a grid services program provide direct benefits to EJCs and reduce energy burden?
  - How do we measure the benefits and the value of a Grid Services program to EJCs?
  - What are, or what will be, the barriers to entry to participate in a grid services market? How do they differ by participant type? What are the steps to reduce those barriers?
  - What are the right channels to share knowledge and gather perspectives of impacted communities?
- **What other questions should we ask?**

Stakeholder Role and Input

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Stakeholder Feedback and Questions on Objectives, Definitions

- What's not clear to you at this point? What needs further clarification?
- What initial feedback do you have on the study objectives/goals?
- Any reflections on the approach/methods proposed today? Are there important elements missing?

What we're hoping to learn from you

- What are your top priorities that you'd like to see incorporated into this work?
- What are your top concerns?
- What are the outcomes you'd like to see as a result of this work?
- As we think ahead toward implementation, what does success look like from your perspective?

Closing and Next Steps

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Workshop Timeline

+ **Workshop 1: Monday, Dec 16**
  - Introduction to Study
+ **Workshop 2: February 2025**
  - Detailed analytical approach to Grid Services valuation
+ **Workshop 3: Spring 2025**
  - Implementation mechanisms for Grid Services compensation
  - Discussion of a Near-Term Implementation Plan
+ **Workshop 4: Early Summer 2025**
  - Discussion and feedback on the long-term Implementation Roadmap
+ **Final Report: Summer 2025**

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  - Andrew.Solfest@ethree.com
  - Bwebster@rmi.org

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Thank You

Video recording
will be ended now