National Association of State Energy Officials

National Association of Regulatory Utility Commissioners

DER INTEGRATION & COMPENSATION INITIATIVE

WEBINAR #2: VALUATION OF AGGREGATED DER GRID SERVICES

December 18, 2023

Problem Statement

Current and anticipated growth of distributed energy resources (DERs) and introduction of aggregated DERs into wholesale markets as a result of Order 2222 is fundamentally changing the way the grid is planned and operated.

Policy makers and regulators will increasingly need to evaluate, consider, and establish the rules and requirements as well as enabling policies and programs to bring these resources online safely and fairly to provide retail and wholesale services.

New myriad technical and economic issues will require new information and tools to make informed decisions related to the connection, technical operation, and compensation of aggregated distributed energy resources---in the distribution, bulk power system, and wholesale energy markets.

DER-I&C Initiative Description

Convene and support state members to understand the impact of their decision making related to the connection, operation, and compensation of aggregated DERs.

NARUC and NASEO will provide information, tools, access to experts, and peer sharing opportunities that assist members with FERC Order 2222 implementation in RTO/ISO regions and State oversight of transmission-distribution-customer (TDC) coordination outside of RTO/ISO regions.

Objectives:

- Inform key state decision makers
- Raise and evaluate risks and opportunities of different decision options
- Bring different perspectives to the table

Advisory Group:
An advisory group of 10 NARUC and NASEO members representing diverse regional perspectives help guide the project.

Curriculum Design 2023-24

The DER I&C Initiative 2023-24 curriculum is designed around three sequential modules

DER I&C
Aggregated DERs

Module 1 – The modern landscape
Learn best practices & lessons from what's being done today

Module 2 – Hot topics
Collectively explore cutting-edge applications

Module 3 – Deep dive
Advance a pressing topic through intentional collaboration

Module 1: The Modern Landscape

Learn best practices & lessons from what's being done today

Module 1 begins with **three webinars** in December 2023 and January 2024:

- Webinar 1: Aggregated DER Grid Services, December 4, 2023
- Webinar 2: Aggregated DER Valuation, December 18, 2023, 3:00-4:30pm ET
  - Moderator: Commissioner Andrew McAllister, CEC
  - Expert: Samir Succar, ICF
  - Panelist: Natalie Mims Frick, LBNL
  - Panelist: Sandra Sweet, NY DPS
- Webinar 3: Compensation Options for Aggregated DER Grid Services, January 8, 2024, 3:00-4:30pm ET
  - Moderator: Commissioner Riley Allen, VT PUC
  - Expert: Travis Kavulla, NRG
  - Panelist: Pete Polonsky, Hawaii PUC
  - *Final panelist TBC.*

Today's Agenda

***<u>Objective</u>*: Explore different approaches to turning benefits and costs into dollar values for customers and utilities. Highlight price discovery and the comparative costs of traditional vs. ADER grid services with a focus on "How can we find out what the right prices are for ADER grid services?"**

Time (ET)	Agenda
3:00-3:10pm	Welcome and DER I&C initiative Opening remarks: Moderator, Commissioner McAllister (CA)
3:10-3:35pm	Presentation on Valuation of ADER Grid Services: Samir Succar, ICF Q&A
3:35-3:55pm	Panelists: Natalie Mims Frick, LBNL Sandra Sweet, NY Department of Public Service
3:55-4:25pm	Moderated and audience Q&A
4:25-4:30pm	Closing

www.naruc.org/cpi-1/energy-distribution/der-integration-compensation/

National Association of State Energy Officials

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Aggregated DER Valuation

NARUC-NASEO DER Integration Compensation Initiative

Samir Succar

December 2023

Objectives can guide selection of value components

Value can be localized, variable, uncertain, expanding, and evolving

Alignment between resource performance and grid needs enables value

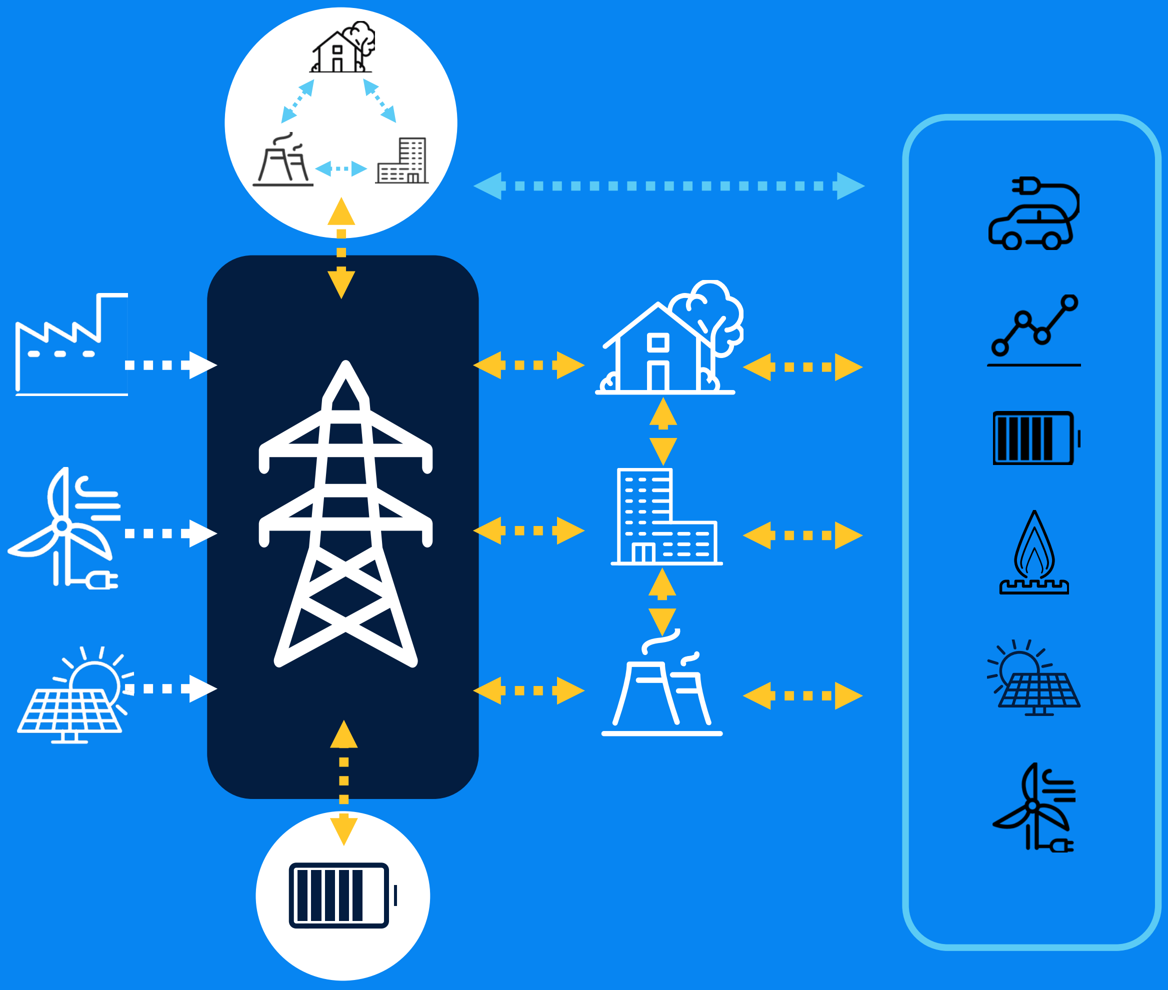
Tradeoffs will inform the impacts of DER valuation

Key Takeaways

The Utility Industry is moving to an "orchestrated decentralization" model

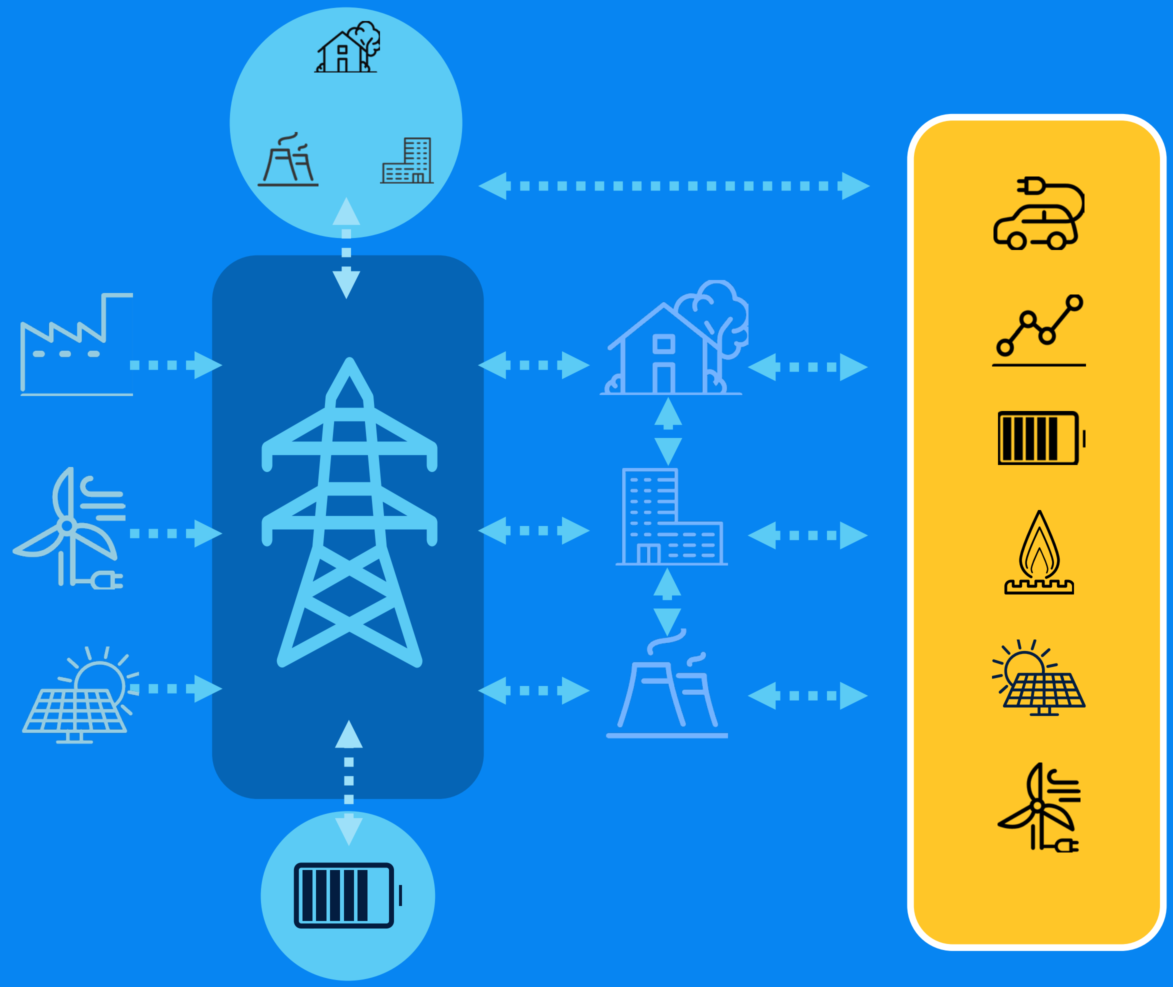
From one to many

From many to many



Distributed Energy Resources (DER) deliver customer value and system value

- Local jobs
- Local resilience
- Local air quality
- Community empowerment
- Customer choice
- Reduced reliance on utility-scale resources
- Etc.



There are a lot of value components to consider

- DER Valuation methodologies account for both the locational and temporal aspects of DER value
- Value components such as emissions and societal values can vary by jurisdiction

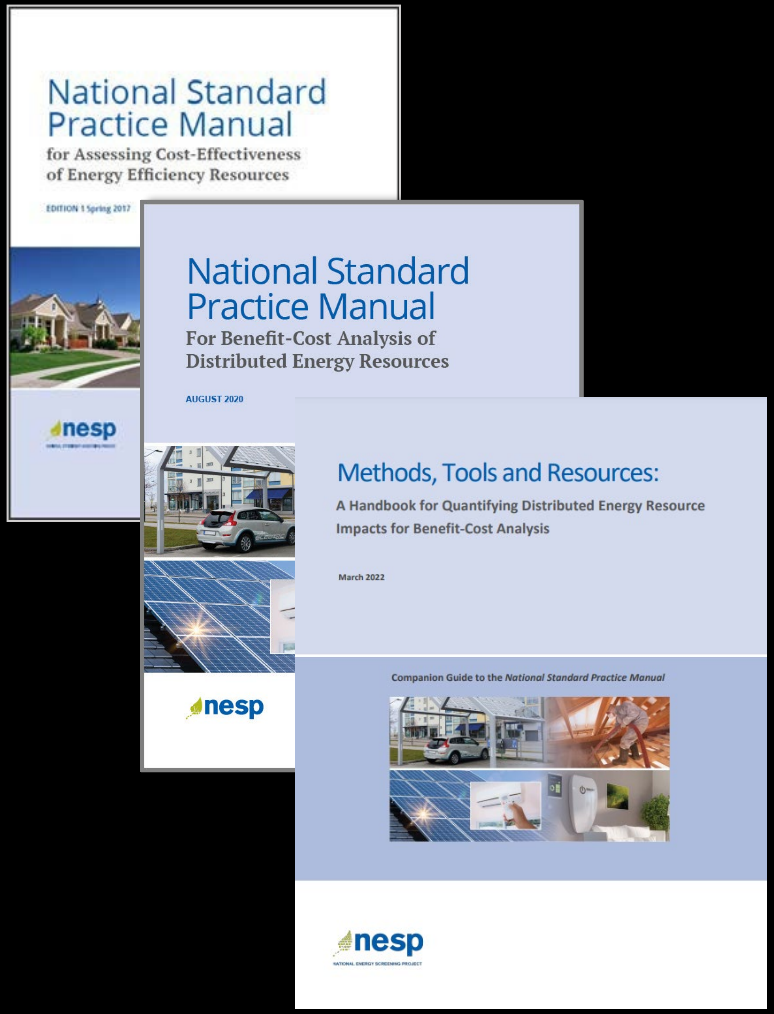
VALUE CATEGORY	BENEFIT / AVOIDED COST	CA 2016	NY 2017
DISTRIBUTION	DISTRIBUTION CAPACITY		
	DISTRIBUTION O&M		
	VOLTAGE / POWER QUALITY		
	RELIABILITY		
	RESILIENCE		
	DISTRIBUTION LOSSES		
	REVENUE CYCLE SERVICE / STAGING ASSETS		
TRANSMISSION	TRANSMISSION CAPACITY		
	TRANSMISSION LOSSES		
GENERATION	RESOURCE ADEQUACY		
	RENEWABLE INTEGRATION		
	ENERGY		
	ANCILLARY SERVICES		
ENVIRONMENTAL / SOCIETY	GHG		
	RPS COMPLIANCE		
	CRITERIA AIR POLLUTANTS		
	WATER / LAND IMPACTS		
	NON-ENERGY BENEFITS		

Standardized approaches are emerging

- The National Standard Practice Manual for DER provides a 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, Demand Response, Distributed Generation, Distributed Storage, Building Electrification and Electric Vehicles

- Advocates for the formulation of a Jurisdiction Specific Test (JST) which can include utility, host customer and societal impacts



[National Standard Practice Manual - NESP]
[Quantifying DER Impacts - NESP]

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The National Standard Practice Manual provides guidance on DER value components

Host Customer

1. Customer Bill Savings
2. Incremental Costs
3. Interconnection Fees
4. Reliability
5. Tax Incentives
6. Non-energy impacts

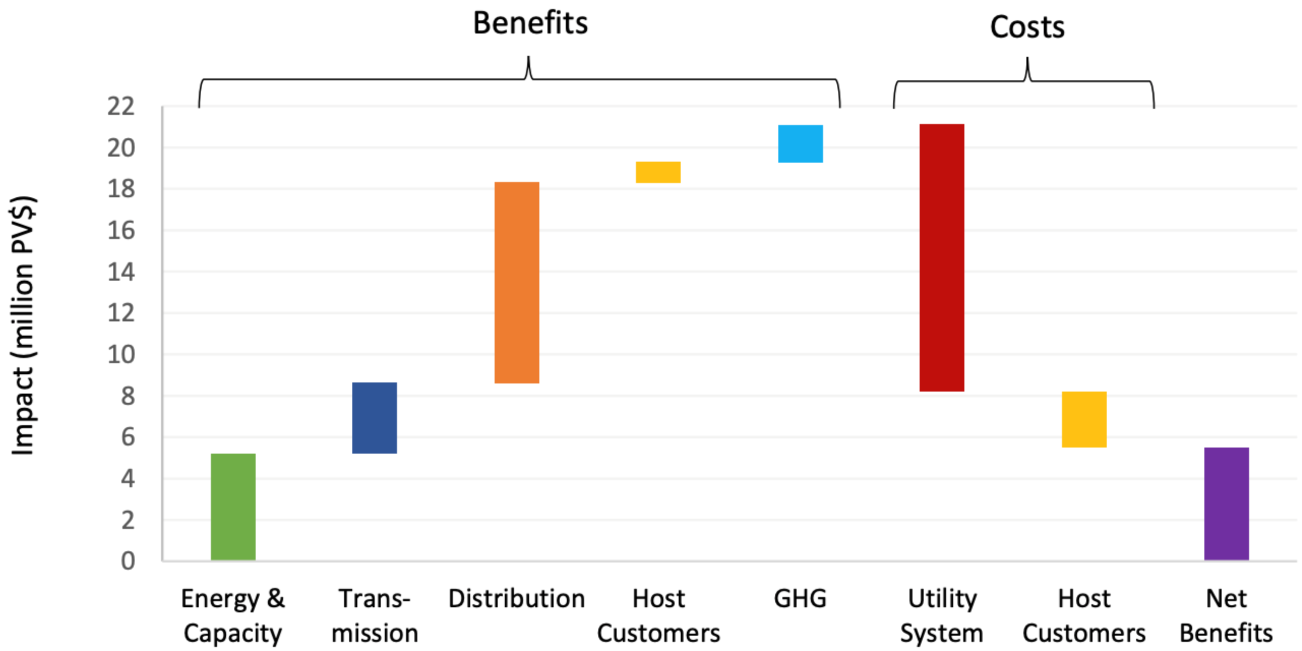
Utility System

1. Energy Generation Impacts
2. Generation, Transmission, and Distribution Capacity
3. Environmental Compliance
4. RPS/CEP Compliance
5. Ancillary Services
6. Utility Performance Incentives
7. Credit & Collection
8. Risk
9. Reliability
10. Resilience

Societal

1. Resilience
2. Reduced Greenhouse Gas Emissions
3. Economic Development and Jobs
4. Public Health
5. Energy Security

Illustrative Example of NWS Cost-Effectiveness
Case Study: Commercial Grid-Interactive Efficient Building (GEB)



[National Standard Practice Manual - NESP]

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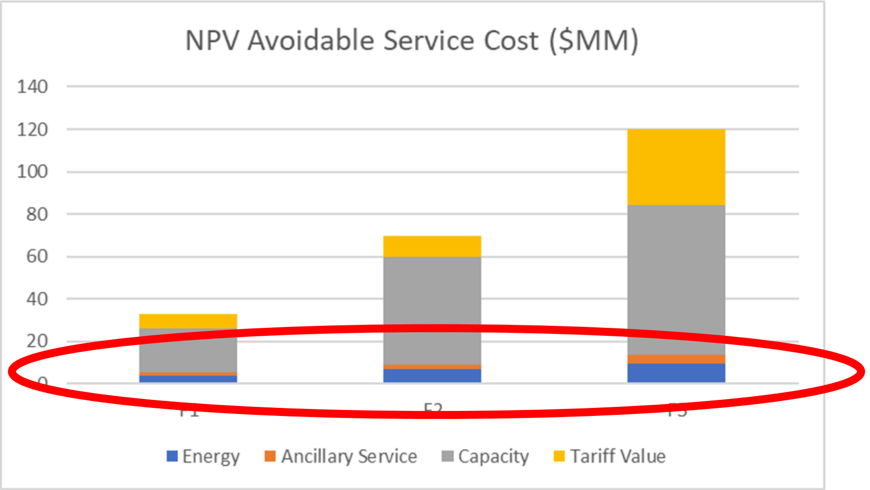
Wholesale energy and ancillary services often don't drive the value

- Transmission tariff and capacity cost avoidance drive 90%+ of value
- Battery and EV chargers, along with existing thermal storage, are by far the most valuable resources on a $/MW basis mainly because they are not dispatch-limited and therefore can have success mitigating transmission tariffs
- Energy value is limited, and AS value is almost negligible under current assumptions
- Costly control technologies required to enable advanced AS not worth the money

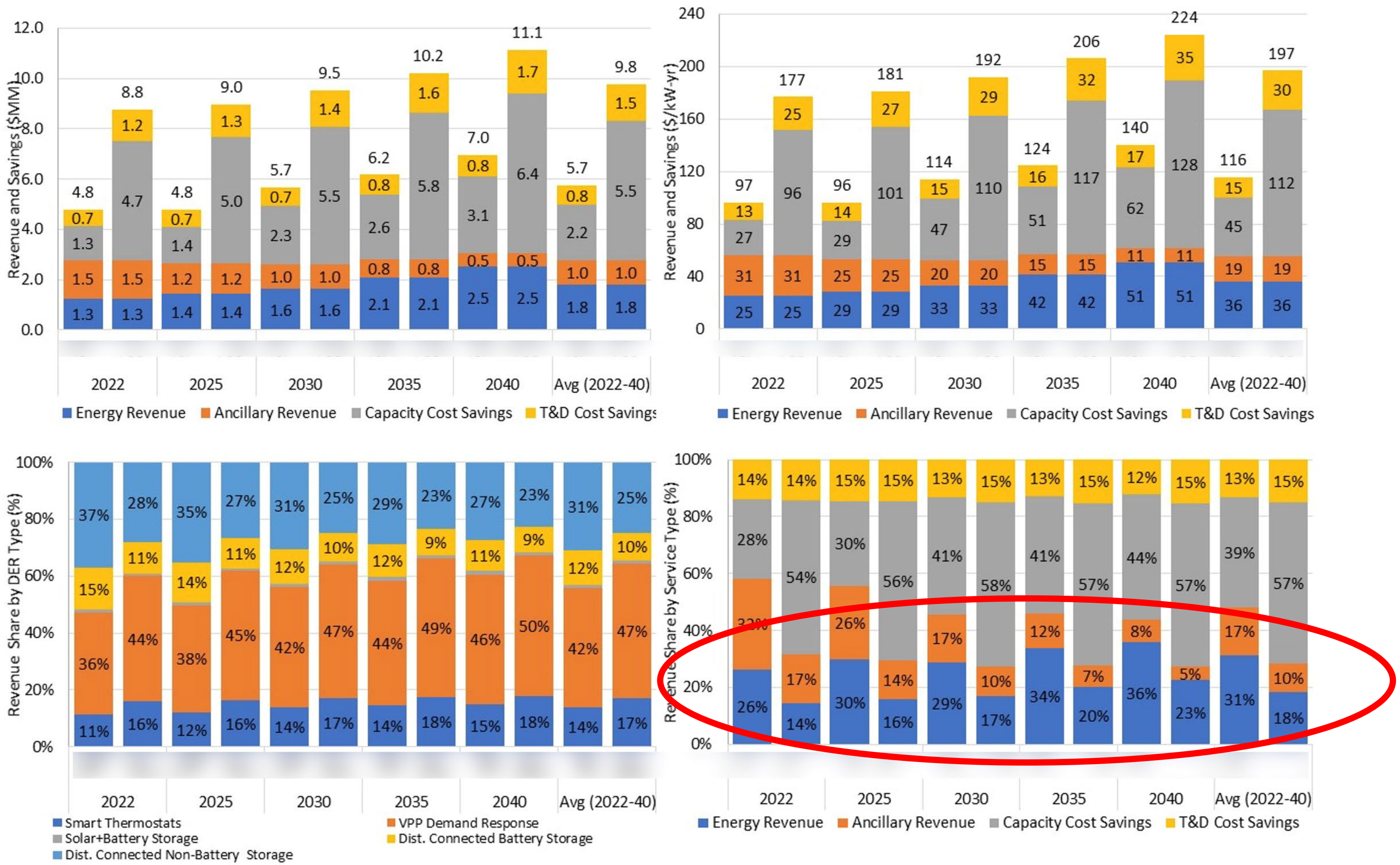


→ Drivers of Value: By Service

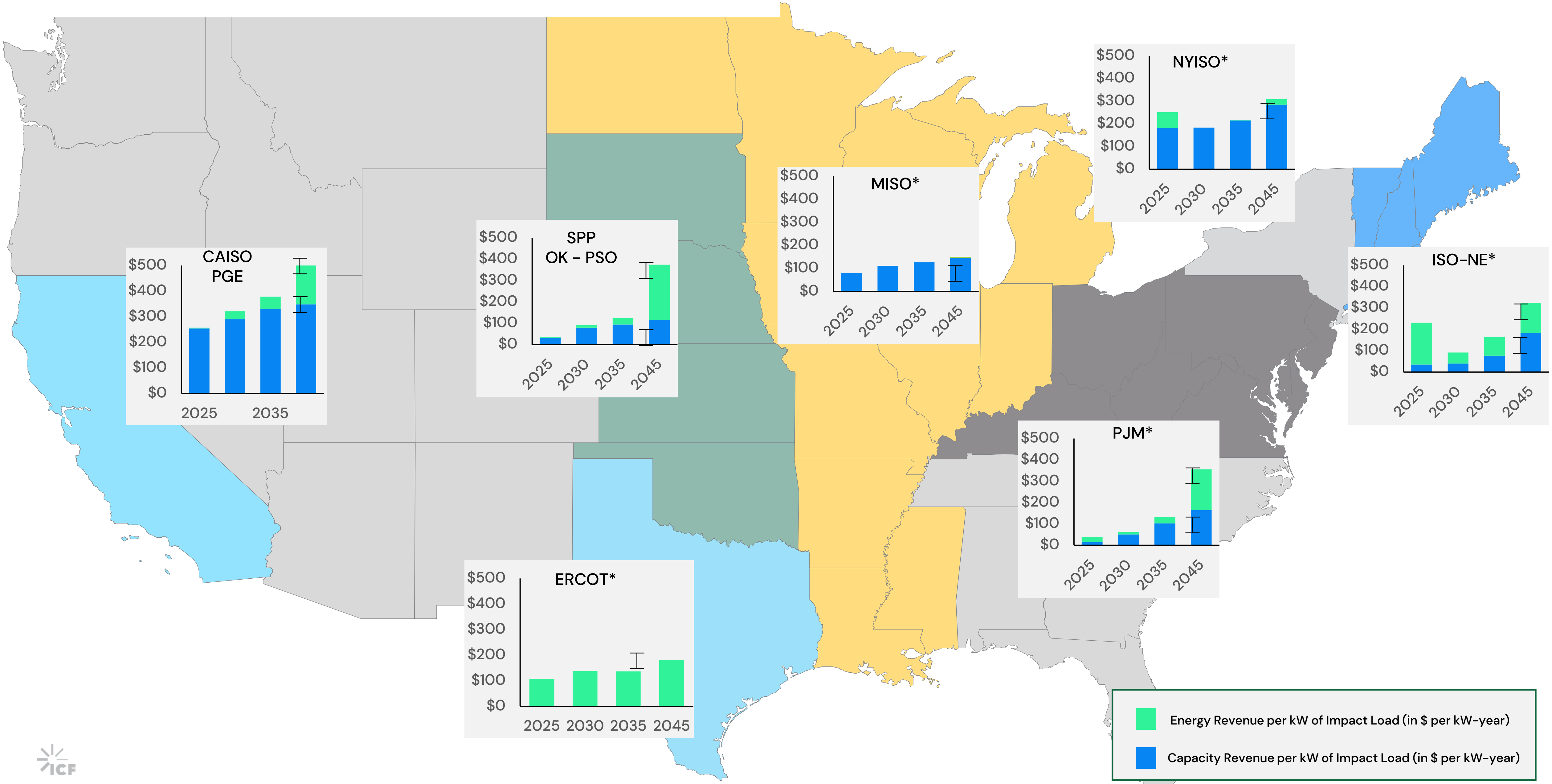
Source: ICF value stack analysis for Midwest utility

Wholesale energy and ancillary services often don't drive the value

Figure 1: Projected Revenues and Savings under ICF Base Case in $ MM and $/kW-yr



Wholesale Electricity Market Revenue Forecast for Aggregated Smart Thermostats



Data is representative of average revenue potential across various zones and/or utilites

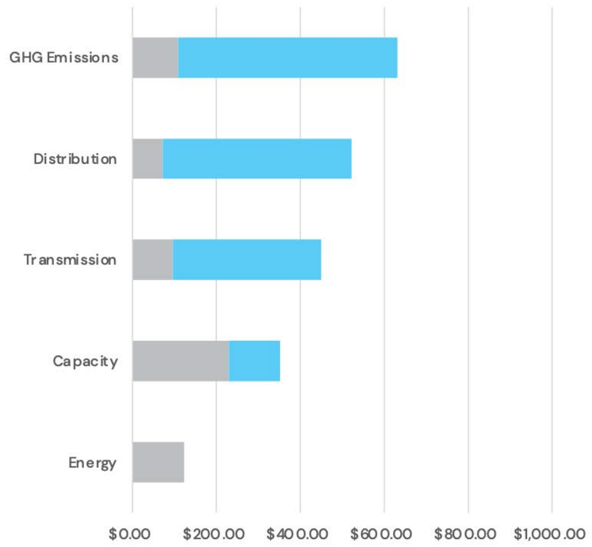
ICF DER Insight

Pilot Potential Value

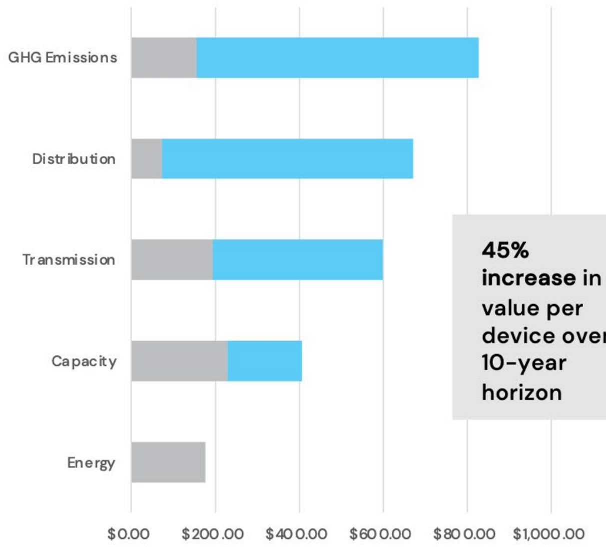
Results

Traditional DR	FLM
Avg. kW Load Shed / Device: **0.92**	Avg. kW Load Shed / Device: **1.02**
Avg. Dispatch Hours / Cohort: **2.50**	Avg. Dispatch Hours / Cohort: **0.68**
Avg. % Opt-Out / Event: **14.0%**	Avg. % Opt-Out / Event: **1.8%**

Traditional DR
10 Year NPV Benefits Per Device
$631/Device



FLM
10 Year NPV Benefits Per Device
$917/Device



45% increase in value per device over 10-year horizon


NWA Study Dashboard
Refresh
Example
Substation
0
Years of Deferral
307.49
Peak kW Saving
$513K
Incentive (NPV)
$125K
Non-Incentive Cost (NPV)
1,816K
Total Benefit (NPV)
Last Updated
8/2/2021
3:39:26 PM
Year
2022
Program/Measure
All
Admin Costs
Select
Program Name
Admin Cost (NPV)
HVAC $677
Appliance Rebate $34
Appliance Recycling $1,133
Demand Response $961
Prescriptive $2,167
DI Lighting $1,508
Residential BESS $1,834
Incentive Levels
Select
2X Incentive
Tesla PowerWall
CoolCurrents
Facility Lighting Upgrade
Tubular LEDs
Screw-In LEDs
Occupancy Sensor
Occupancy & Daylight Sensor
LED Low Bay Fixtures
LED High Bay Fixtures
LED Downlight Fixture
Chiller Tune Up
Smart Savers
Room Unit AC Recycling
Deferral Investment Inputs
Distribution Investment Cost
$7,000,000
Deferral Accounting
Partial
Cost Effectiveness Measure
PAC Ratio
Supply Stack
PAC Ratio
Peak kW Saving
Appliance Rebate
HVAC
Demand Response
DI Lighting
Appliance Recycling
Prescriptive
Residential BESS
Cost-Effectiveness
PAC Ratio
Peak kW Saving
Hourly Load Relief
25 Percentile
Projected Load Relief (kW), Median
75 Percentile
Required Load Relief (kW)
kW Saving
Hour
Measure Demand Reduction
0.3%
7.9%
20.2%
27.1%
27.5%
2.3%
14.7%
Residential
C&I
Appliance Rebate
Demand Response
HVAC
Residential BESS
Appliance Recycling
DI Lighting
Prescriptive

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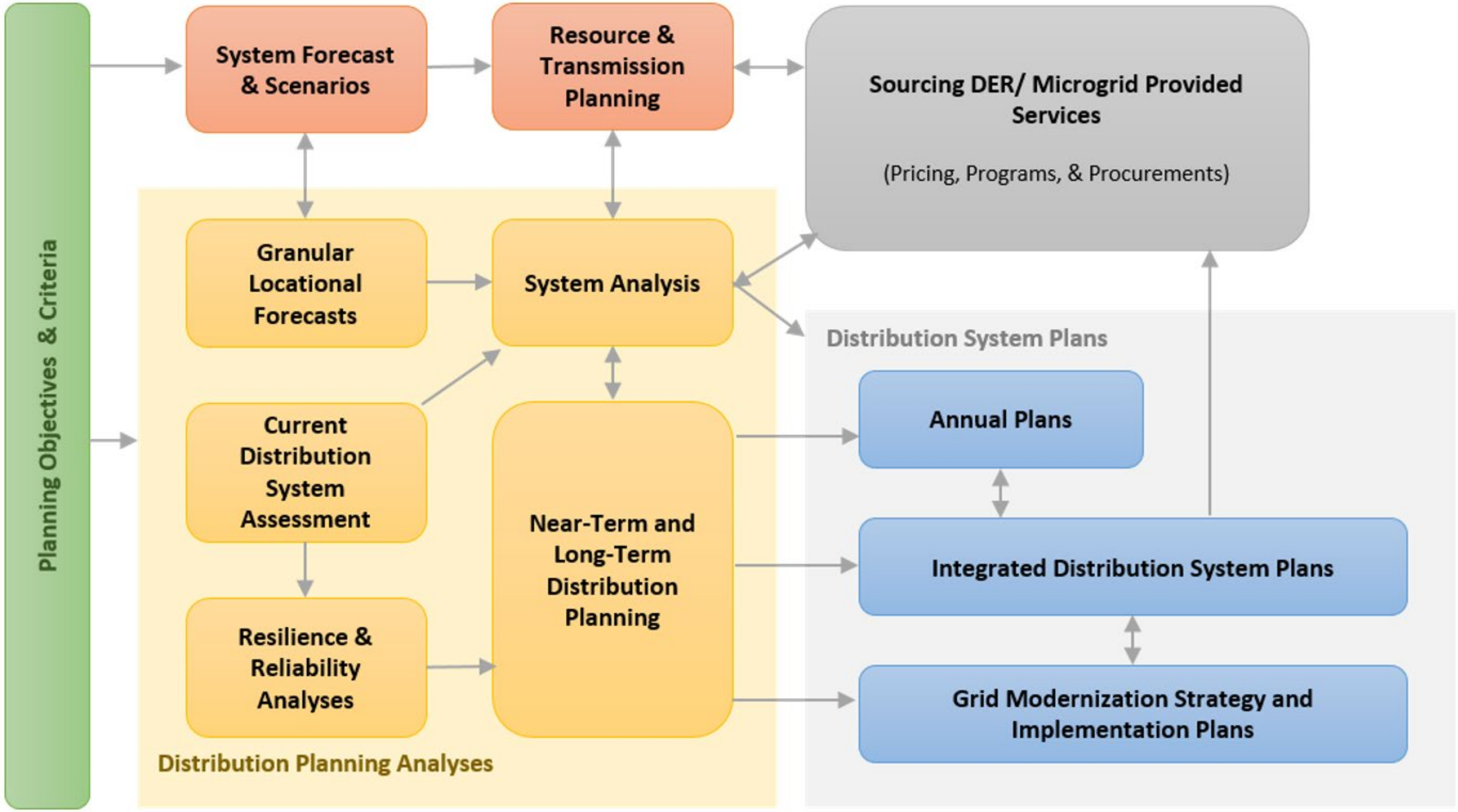
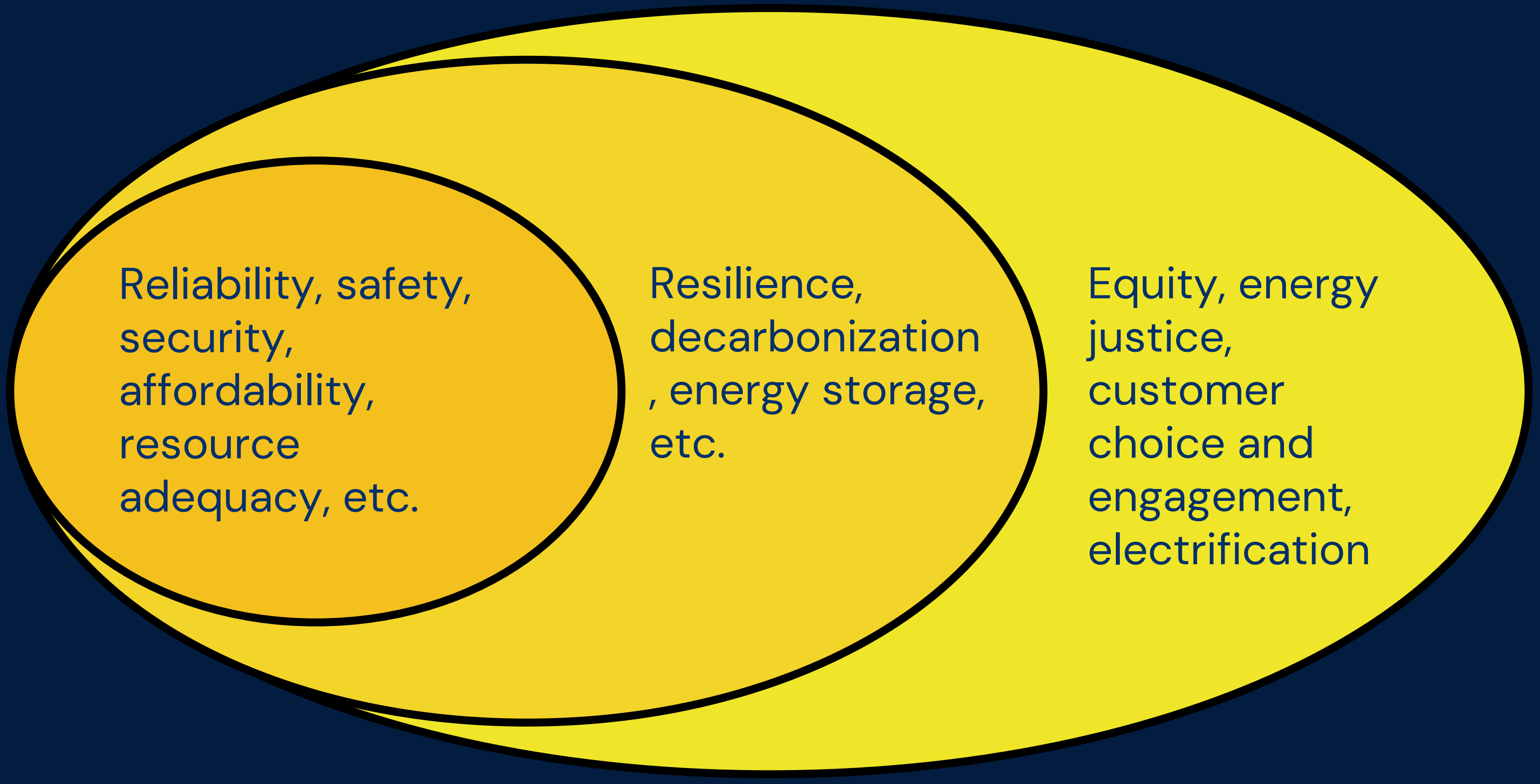
Which value components are relevant?

State policies and community and customer needs drive planning objectives and criteria.



Source: [Modern Distribution Grid Guidebook](), Volume 4, June 2020

Objectives inform DER value components selection



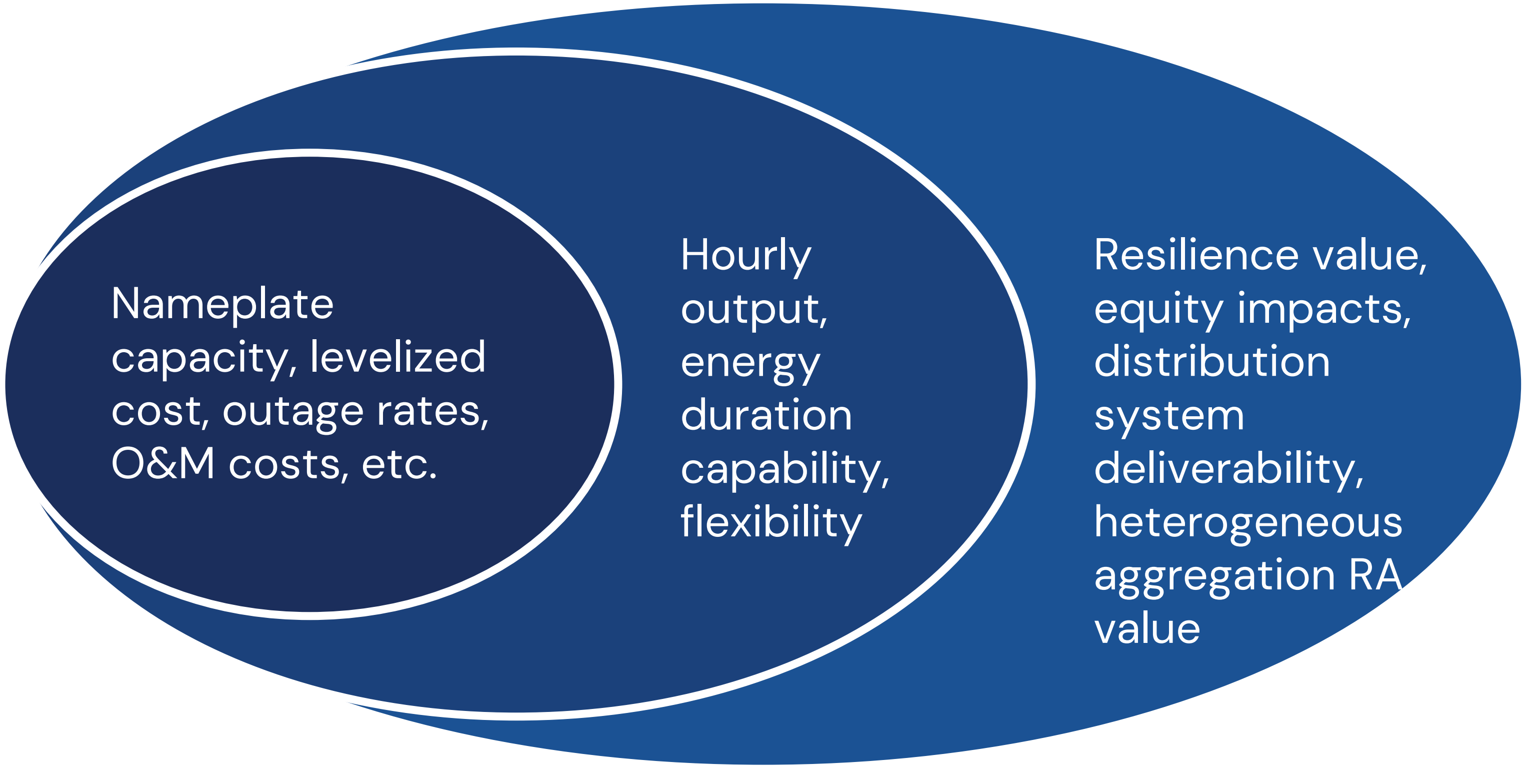
Traditional Planning Requirements

New Planning Requirements

Emerging Planning Requirements

Sources:
Opportunities to Improve Analytical Capabilities towards Comprehensive Electricity System Planning, NARUC-NASEO Working Paper
Survey of state planning objectives, Schwartz, Berkeley Lab

Changing system composition imply changes in planning



Traditional Resource Characteristics

New Resources Characteristics

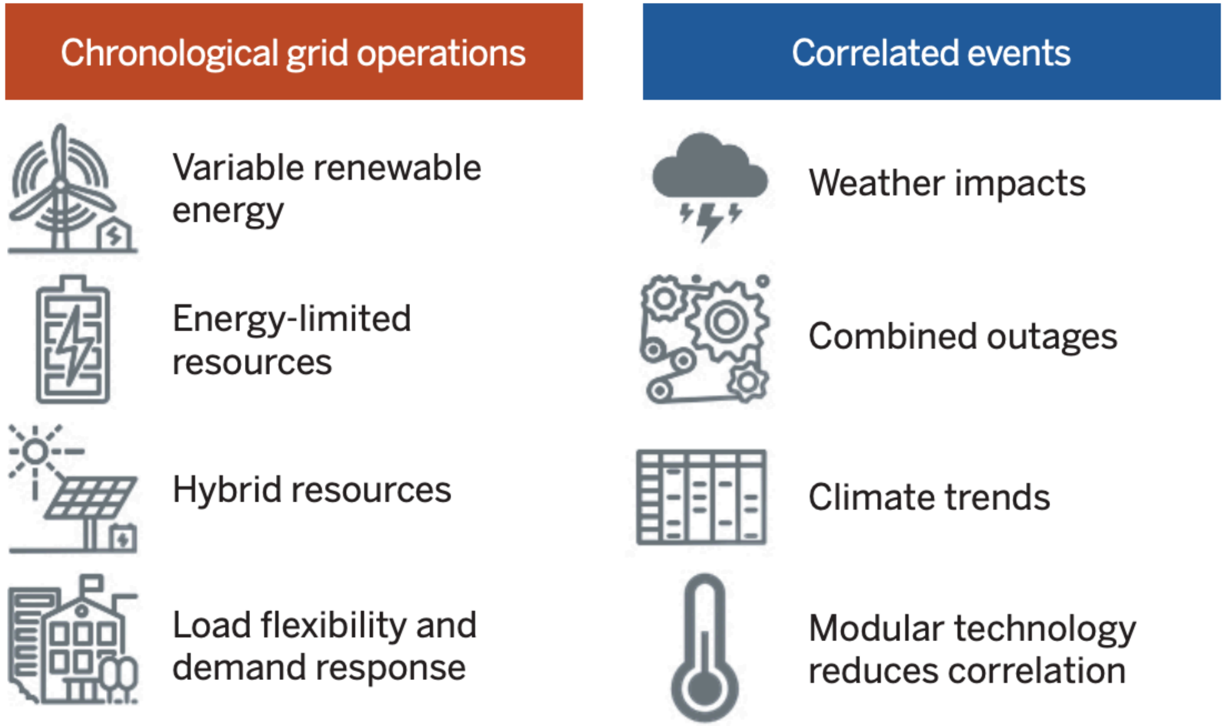
Emerging Resource Characteristics

Source: Opportunities to Improve Analytical Capabilities towards Comprehensive Electricity System Planning, NARUC-NASEO Working Paper

This also means that the way we define value is evolving

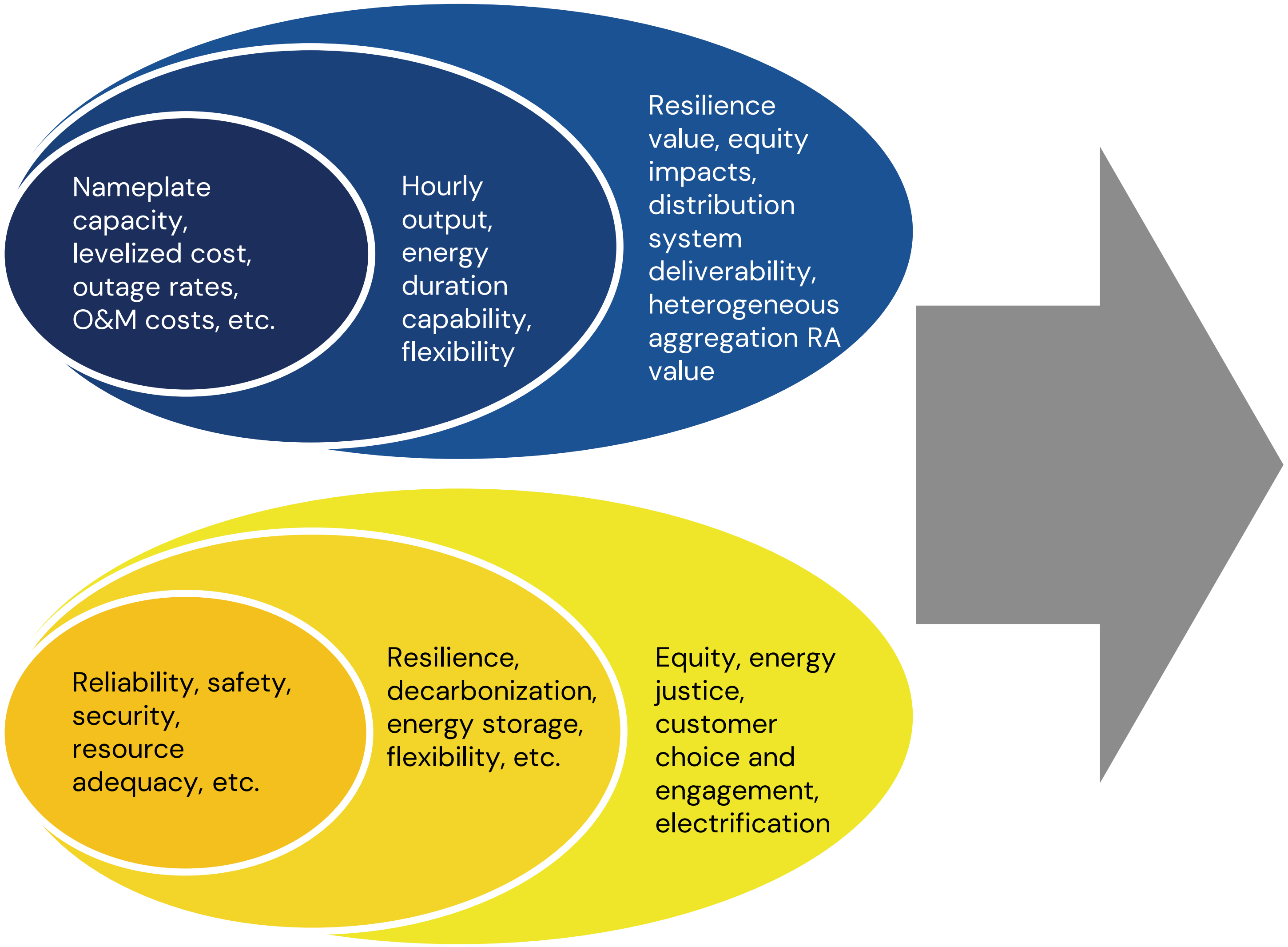
- New objectives -> new value definitions and metrics, and…
- Changing system composition also driving reexamination of traditional objectives
- Quantities related to system dynamics, transient stability and short circuit ratio might become more relevant in the planning context

Two Factors Driving the Need for New Approaches to Resource Adequacy



Source: Energy Systems Integration Group.

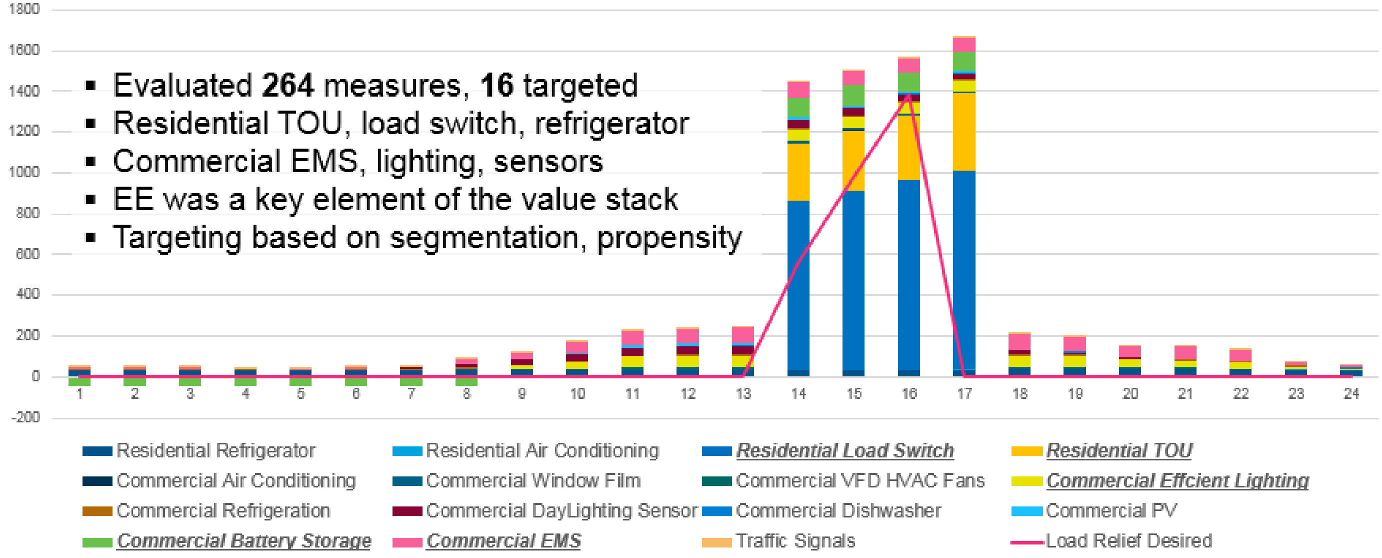
ESIG "Redefining Resource Adequacy for Modern Power Systems"



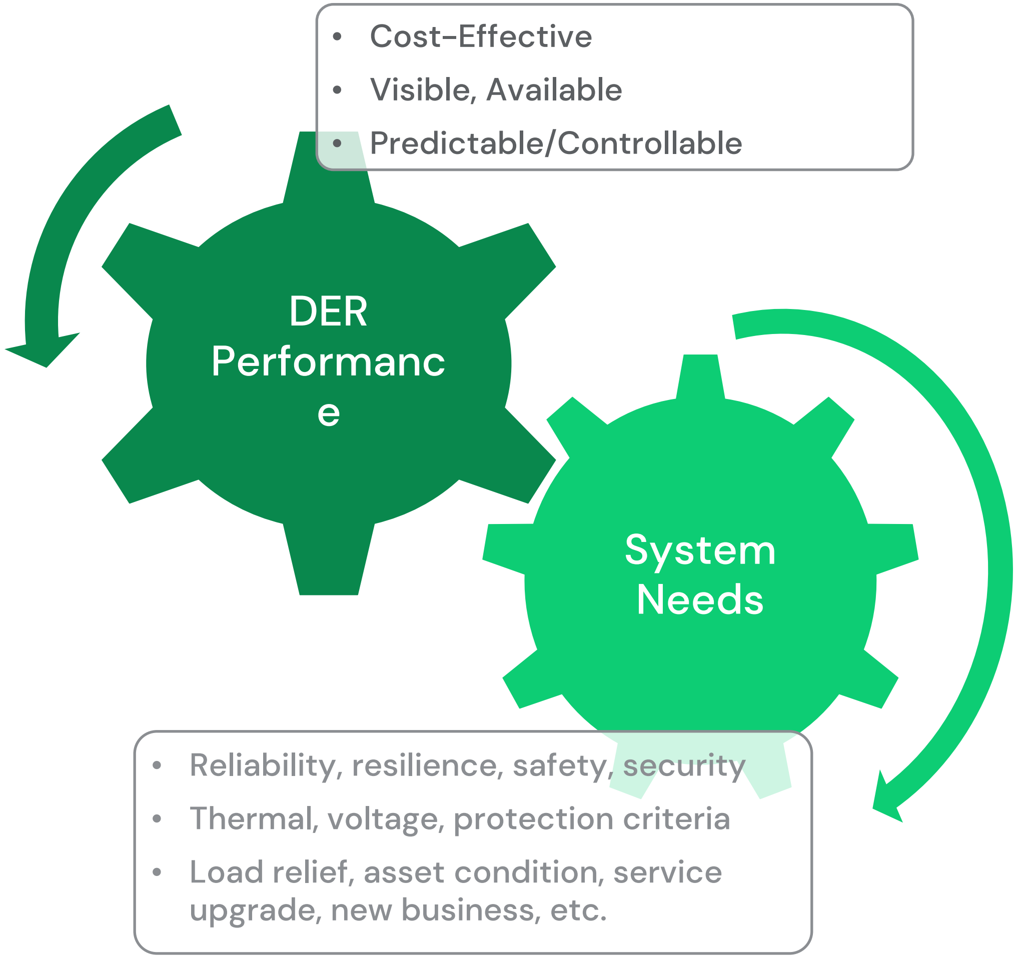
Objectives are expanding, the system is changing, DER valuation is evolving

Connecting DER Performance to DER Value

Example: DER Demand Reduction (Load Relief)



- Value depends on performance
- Can system operators and planners depend on DER?
- Temporal and locational specificity



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[Source: Navigating the complexity and challenges of non-wires solutions (ICF)]

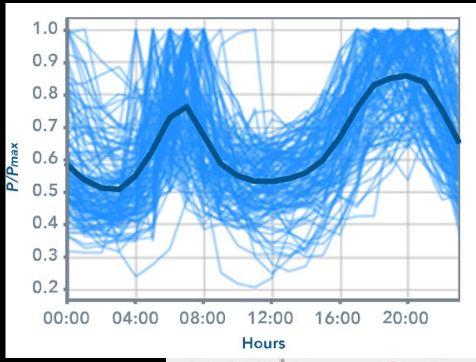
Does Value Maximization Provide the Best Outcome?

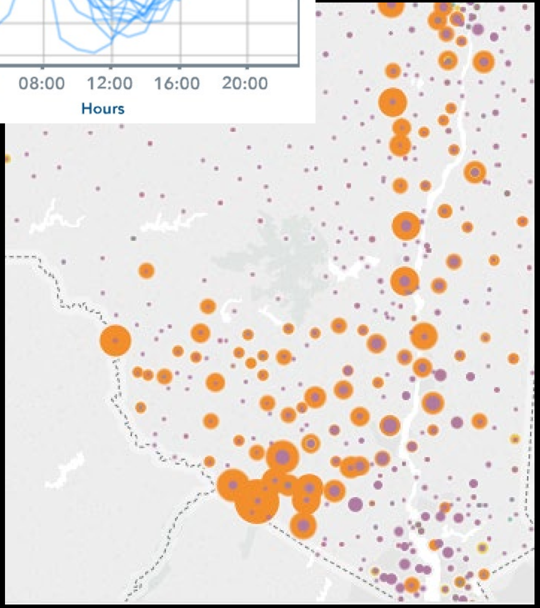
Testing the Hypothesis:

Aligning compensation with system value delivers the best outcomes and helps us maximize DER value to the grid and to customers

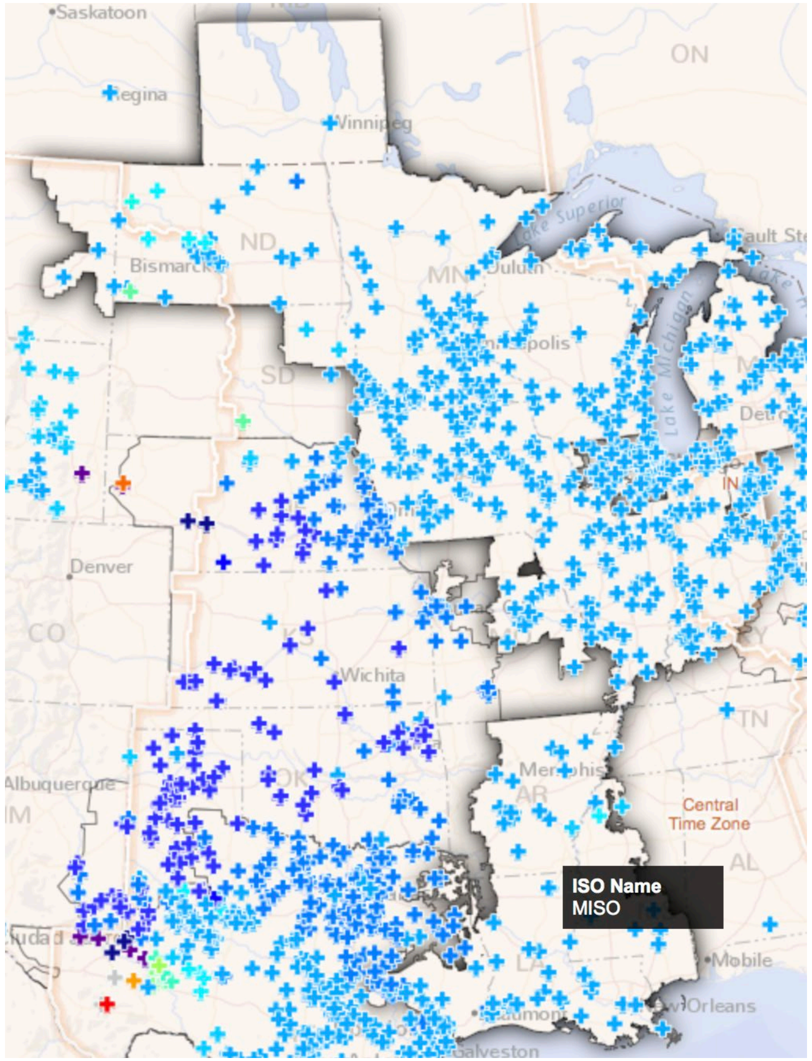
Challenges

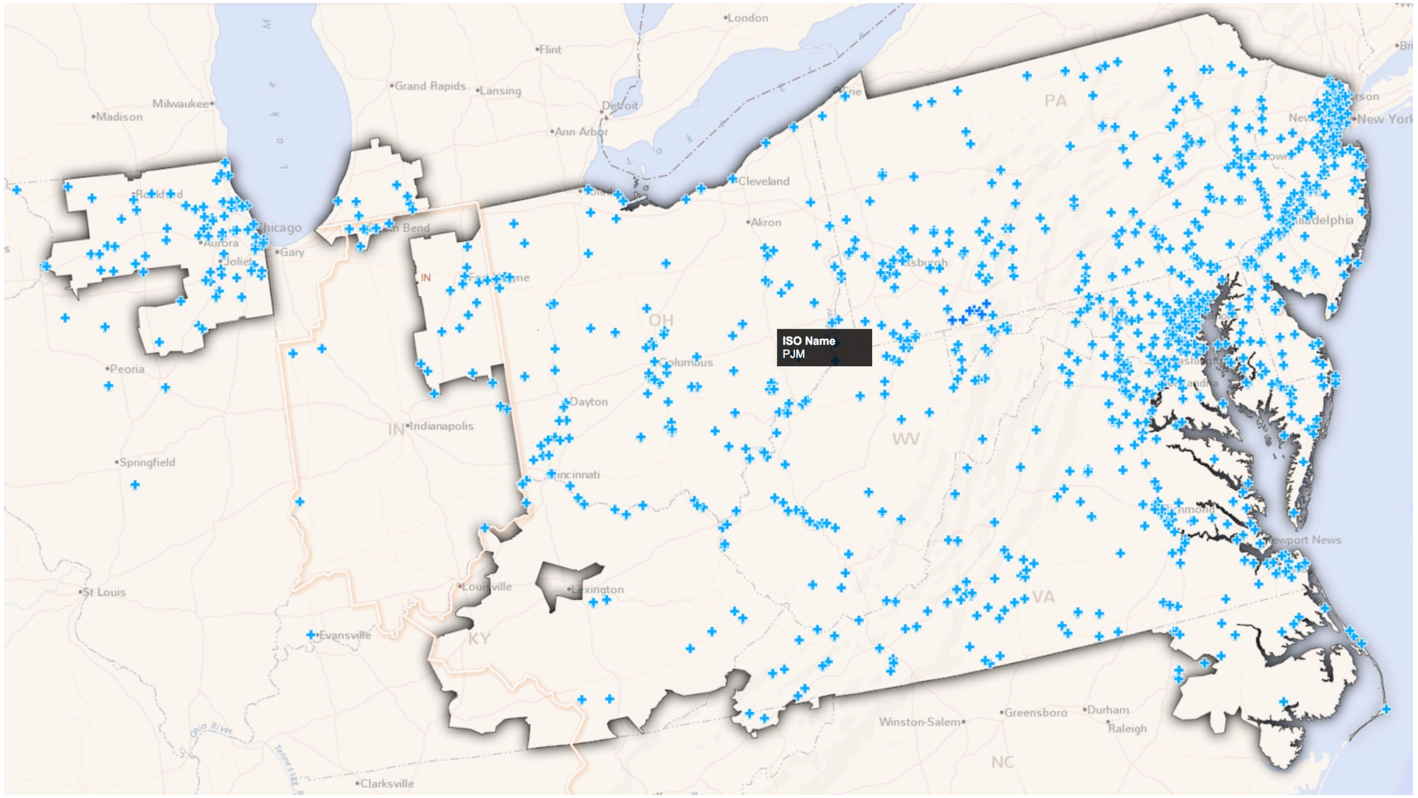
- Locational specificity
- Temporal variability
- Uncertainty, volatility
- Performance requirements
- Opportunity cost
- Expanding objectives
- Changing system needs
- Evolving definitions
- Variation across jurisdictions





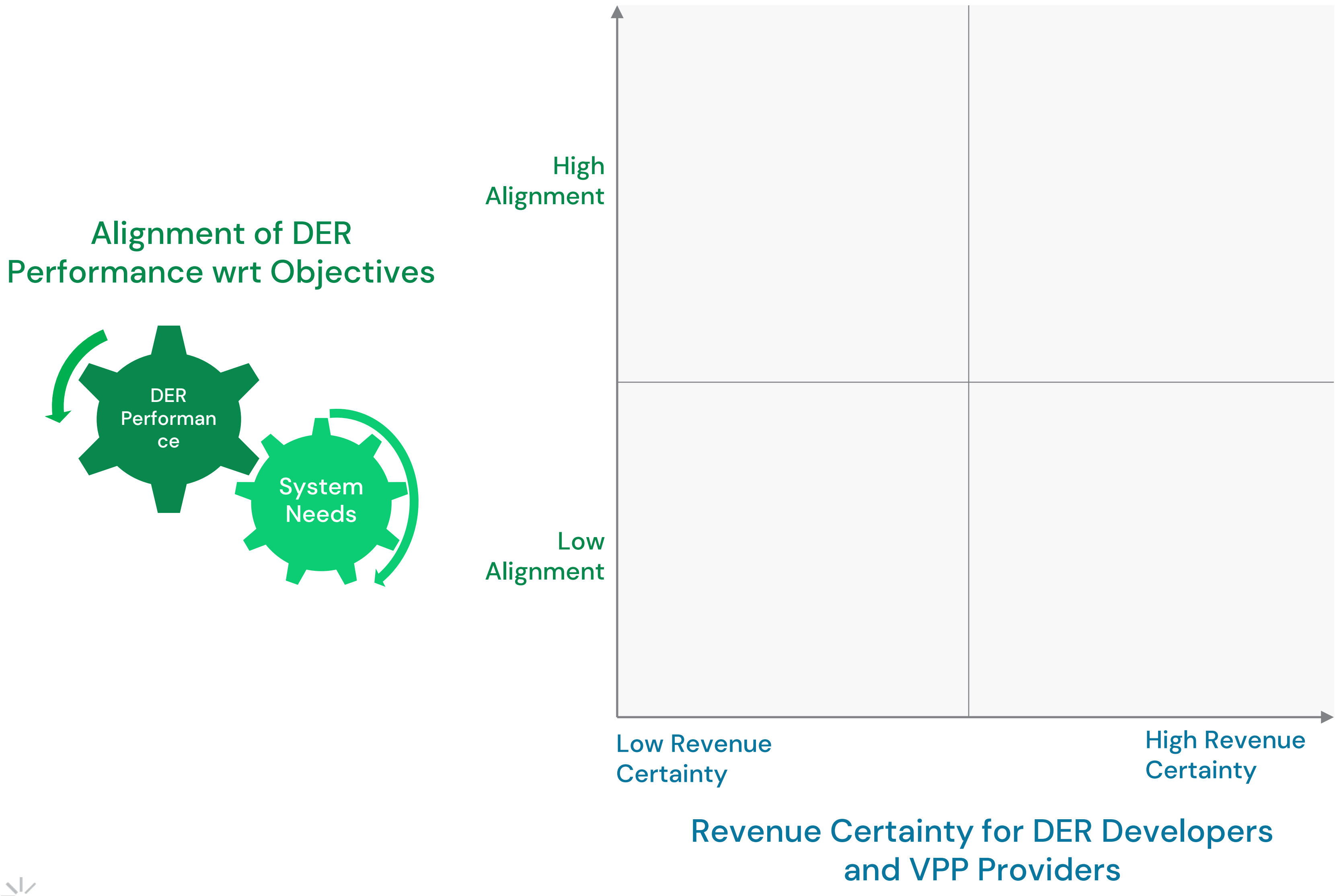
Does it matter whether DER aggregations span multiple nodes?





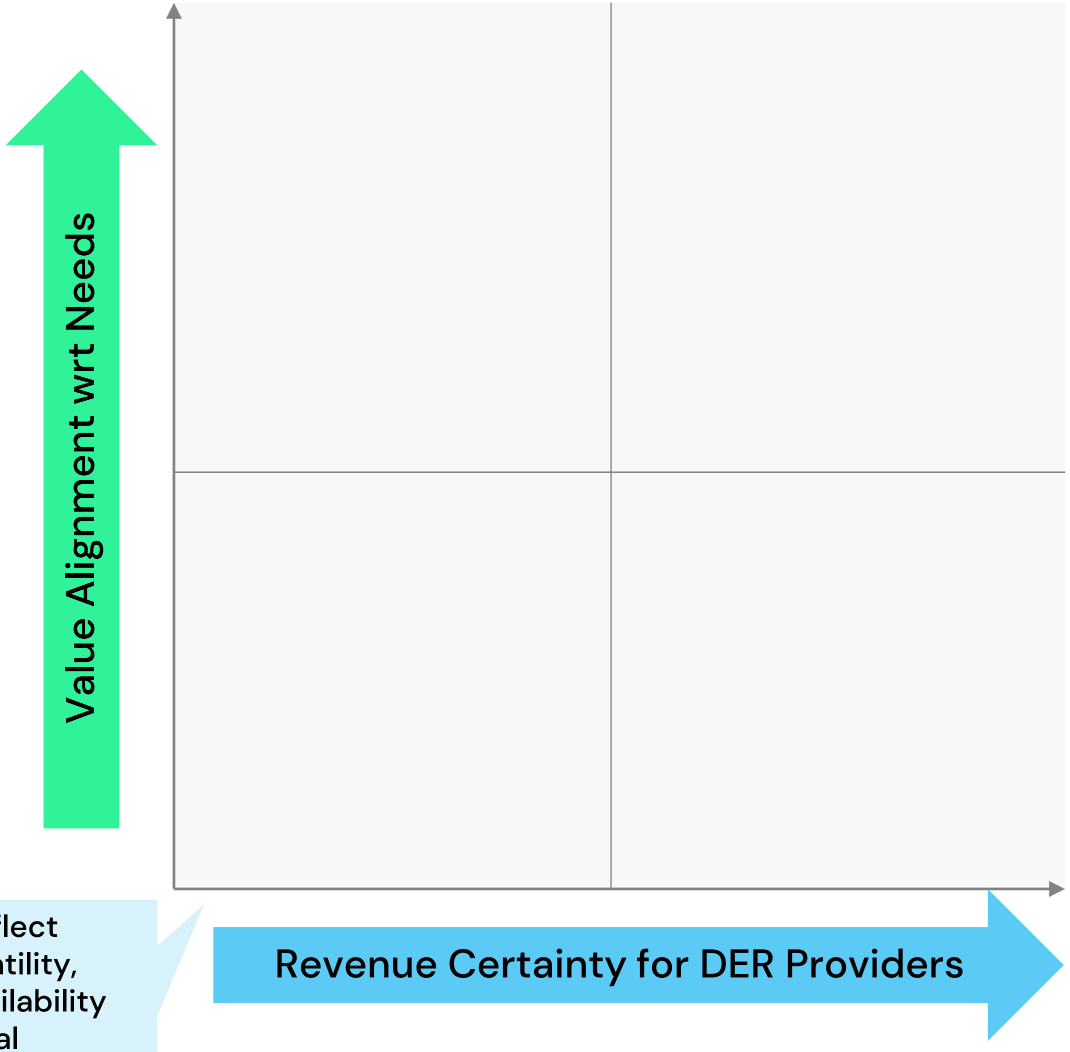
Locational Marginal Pricing Nodes for MISO and PJM

Aggregations: the bigger the net, the bigger the catch


Alignment of DER
Performance wrt Objectives
DER
Performan
ce
System
Needs
High
Alignment
Low
Alignment
Low Revenue
Certainty
High Revenue
Certainty
Revenue Certainty for DER Developers
and VPP Providers

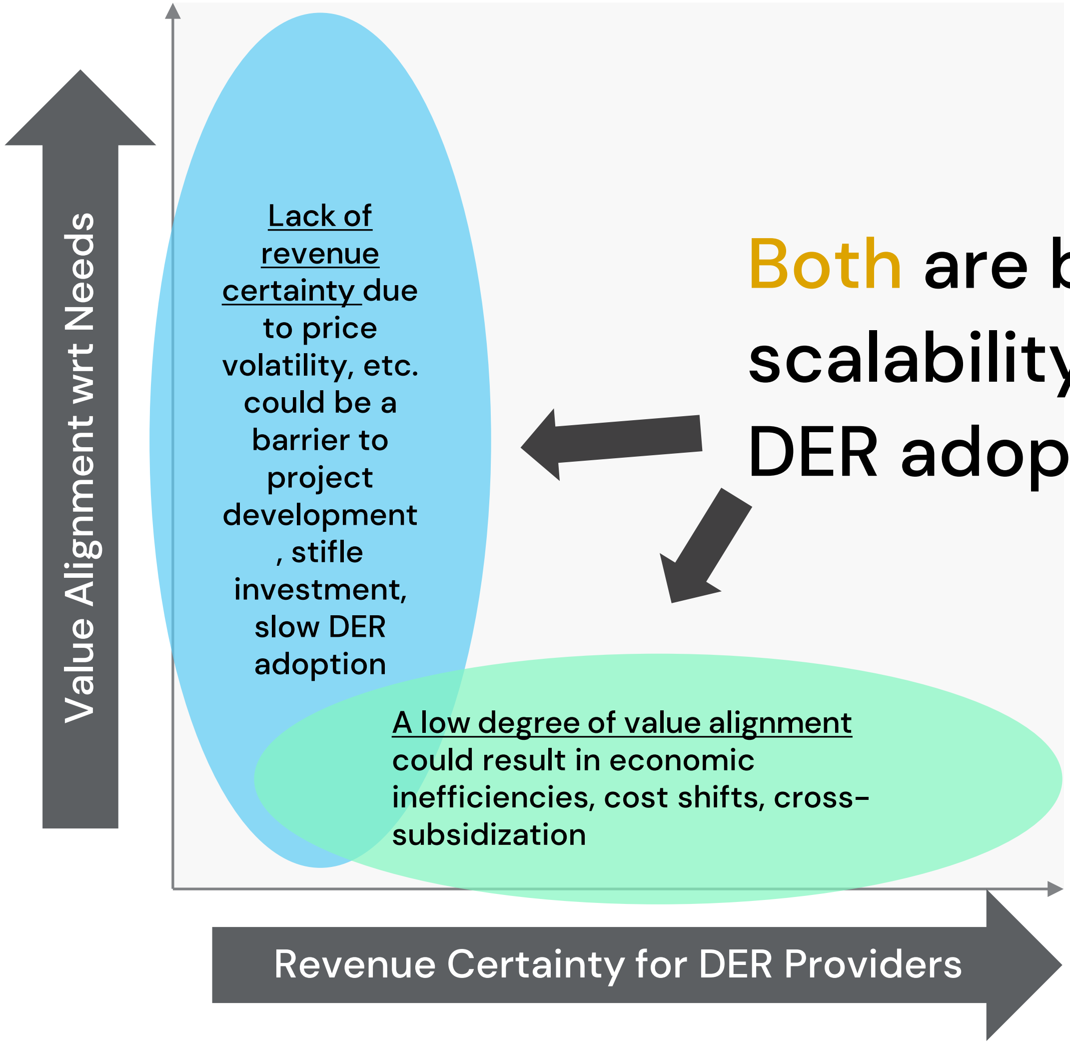
<u>High system value alignment</u> indicates that DER performance requirements are well-aligned to ensure DER address grid needs, meet system planning criteria, advance objectives

<u>Low system value alignment</u> indicates that DER performance requirements lack direct alignment with the needs on the grid in the relevant timeframe and/or location



<u>Low revenue certainty</u> could reflect some combination of price volatility, performance risk penalties, availability requirements that preclude dual participation, deliverability risk, curtailment risk, or other source of uncertainty

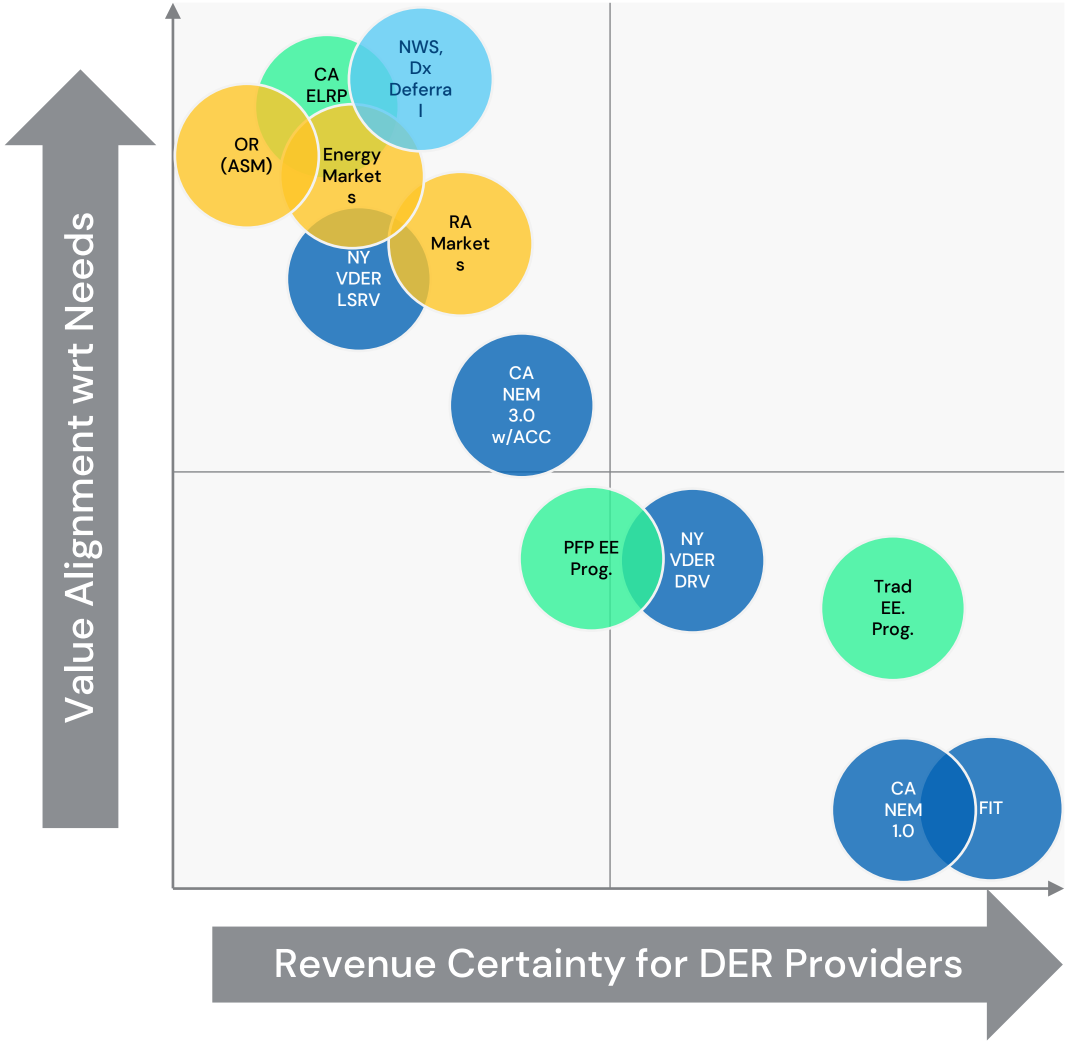
<u>High revenue certainty</u> means project revenues streams and cash flow over asset lifetimes are relatively predictable, uncertainties are well-understood, and risks are quantifiable



Both are barriers to scalability at high rates of DER adoption

How does this look in practice?

- Value maximization comes at a price
- Alignment with grid needs drives complexity and uncertainty
- The choice of tradeoffs varies across products and jurisdictions



Each bubble represents a pricing, procurement or program for DER

- Wholesale market
- Retail Tariff
- Customer Program
- Procurement

Note: This figure is meant to be illustrative, there is no quantitative analysis behind the location of the individual elements, but I welcome your feedback!

Objectives can guide selection of value components

Value can be localized, variable, uncertain, expanding, and evolving

Alignment between resource performance and grid needs enables value

Tradeoffs will inform the impacts of DER valuation

Key Takeaways

Additional Slides

What’s available today?

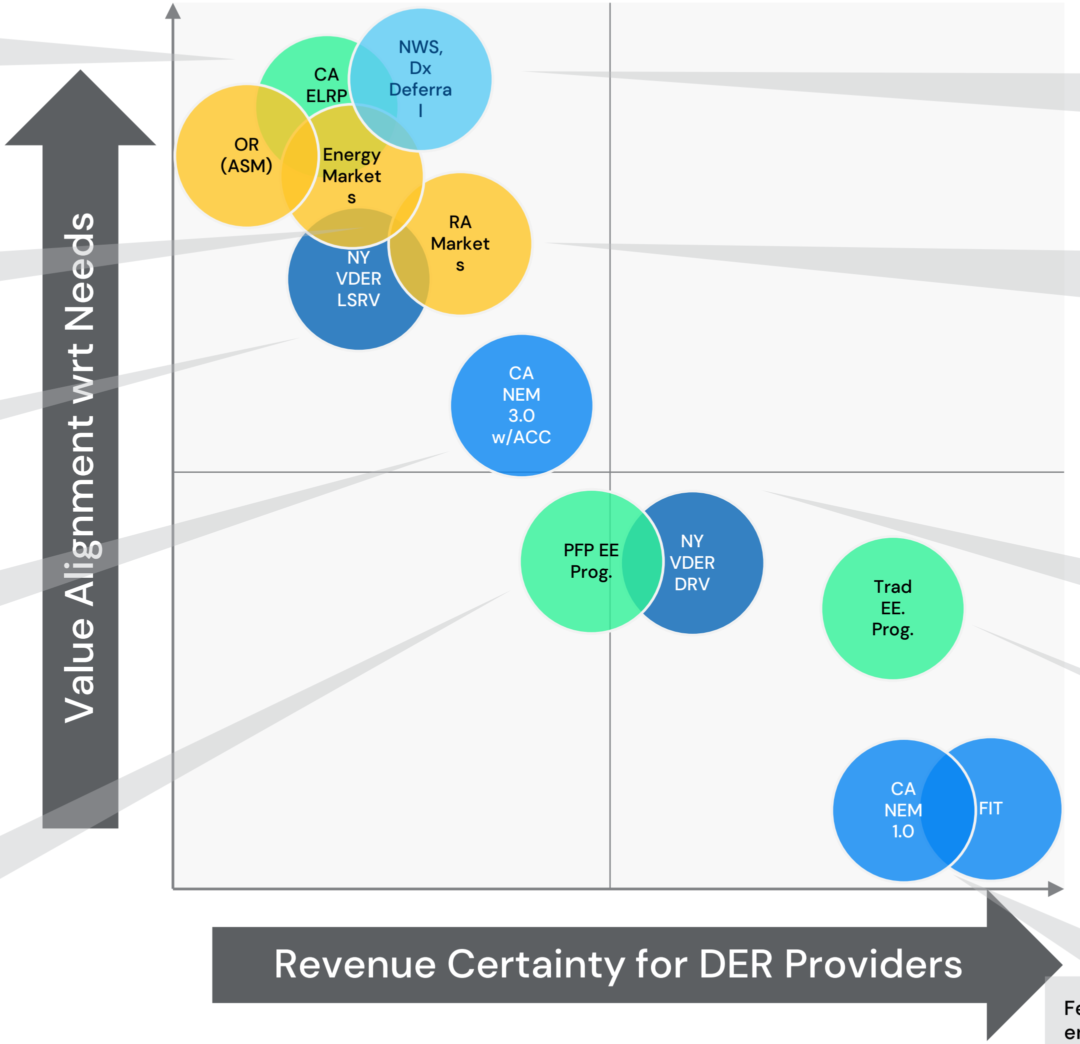
The California Emergency Load Reduction Program (ELRP) pays customers who voluntarily reduce electricity demand during a grid emergency declared by CAISO, but the frequency and duration of qualifying events is uncertain

Real-time energy, day-ahead energy, and ancillary services markets (ASM) will have significant price volatility, particularly in the case of ASM, where market saturation introduces significant revenue risk

VDER Locational System Relief Value (LSRV) varies by substation location and has limited available capacity at each location but is locked in for 10 years

The introduction of the avoided cost calculator (ACC) with NEM 3.0 added temporal and geospatial value elements that aligned closer with system impacts of solar but also reduced revenue certainty for solar projects and created further incentives to collocate solar and storage

Pay for performance programs can better align compensation with achieved efficiency, but this also introduces revenue uncertainty and doesn’t further align reductions in load with times and locations of system constraint



Non-Wires Solutions are designed explicitly to defer distribution investments by delivering system value, but impose performance and availability requirements that increase revenue risk and non-performance risk

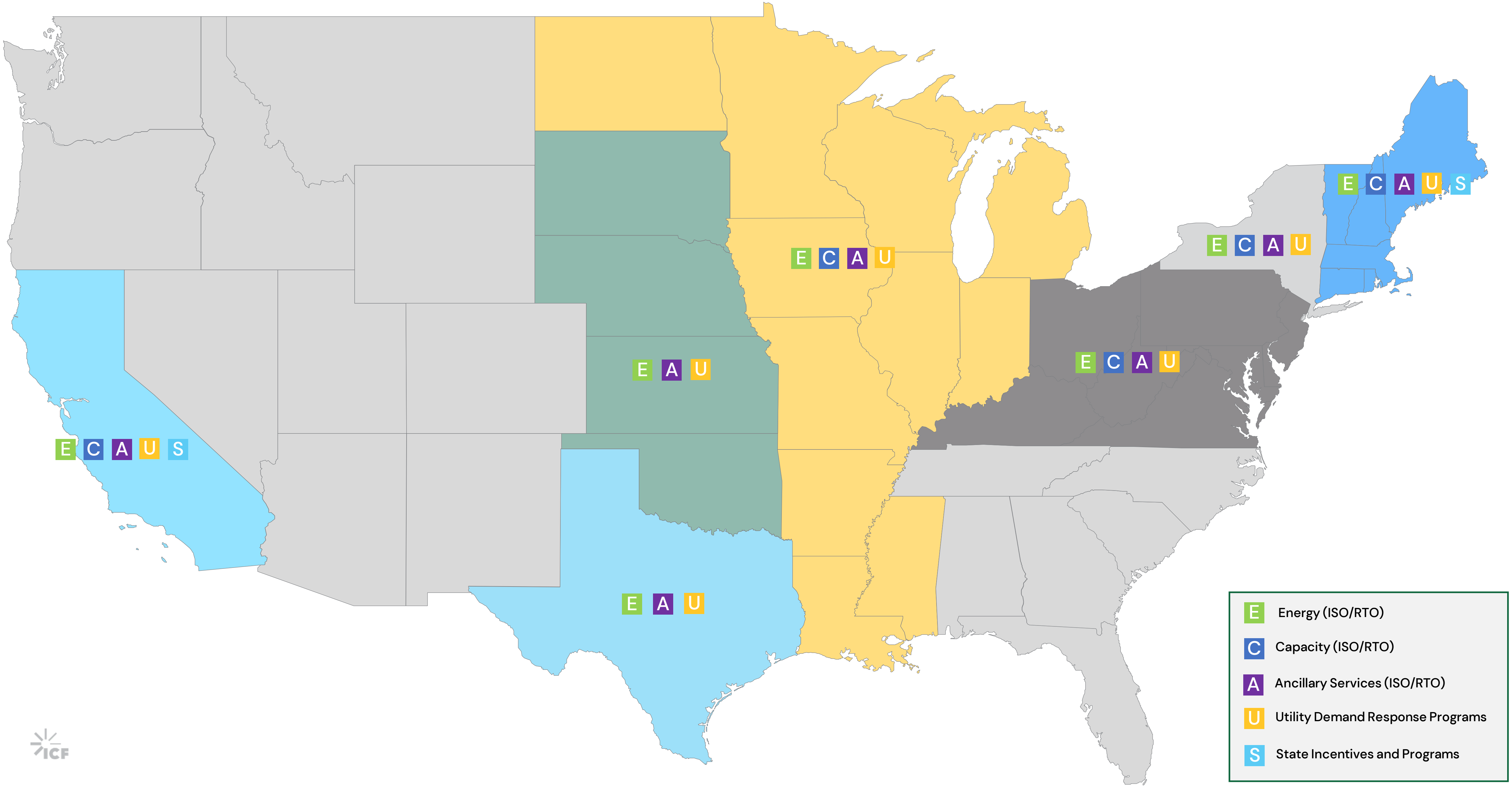
Capacity market participation, e.g. in ISO-NE FCA, provides greater revenue certainty compared to energy markets and ancillary services, but typically only over a limited number of years while also imposing significance performance requirments (duration, availability), must-offer requirements with opportunity cost implications and non-performance penalty risk

The VDER demand reduction value (DRV) is intended to provide load relief, but because it isn’t locationally-specific and not tied to a specific need, it is unlikely to directly result in deferred utility investment.

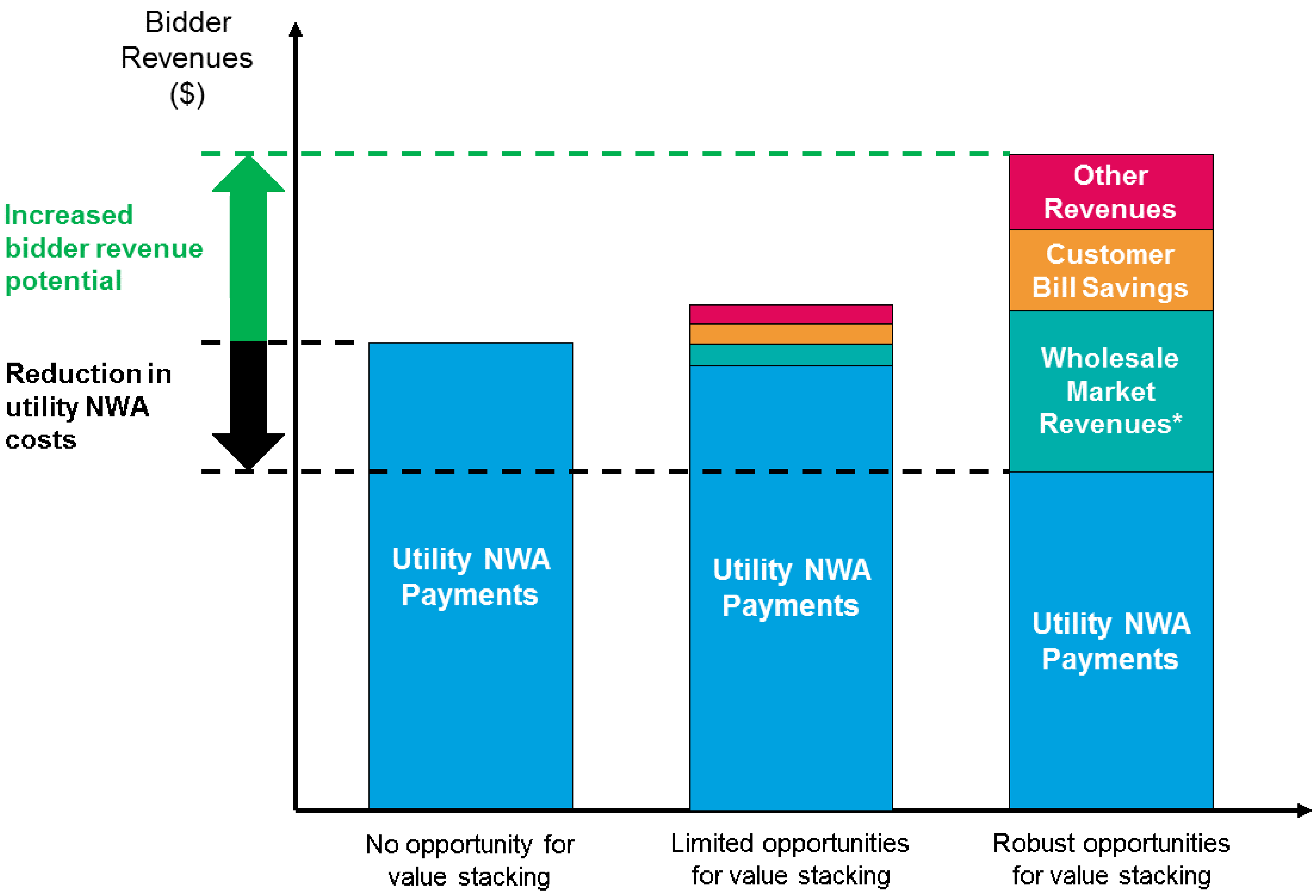
Traditional energy efficiency customer programs typically provide compensation to all resources according to deemed savings with no locational or temporal differentiation

Feed-in tariffs (FIT) and net energy metering (NEM) as originally implemented in CA provide a great deal of certainty around project cash flow, but don’t align well with system value

Electricity Market Revenue Stack for Demand Response Resources



Opportunity cost: Eyeing the “value stack”

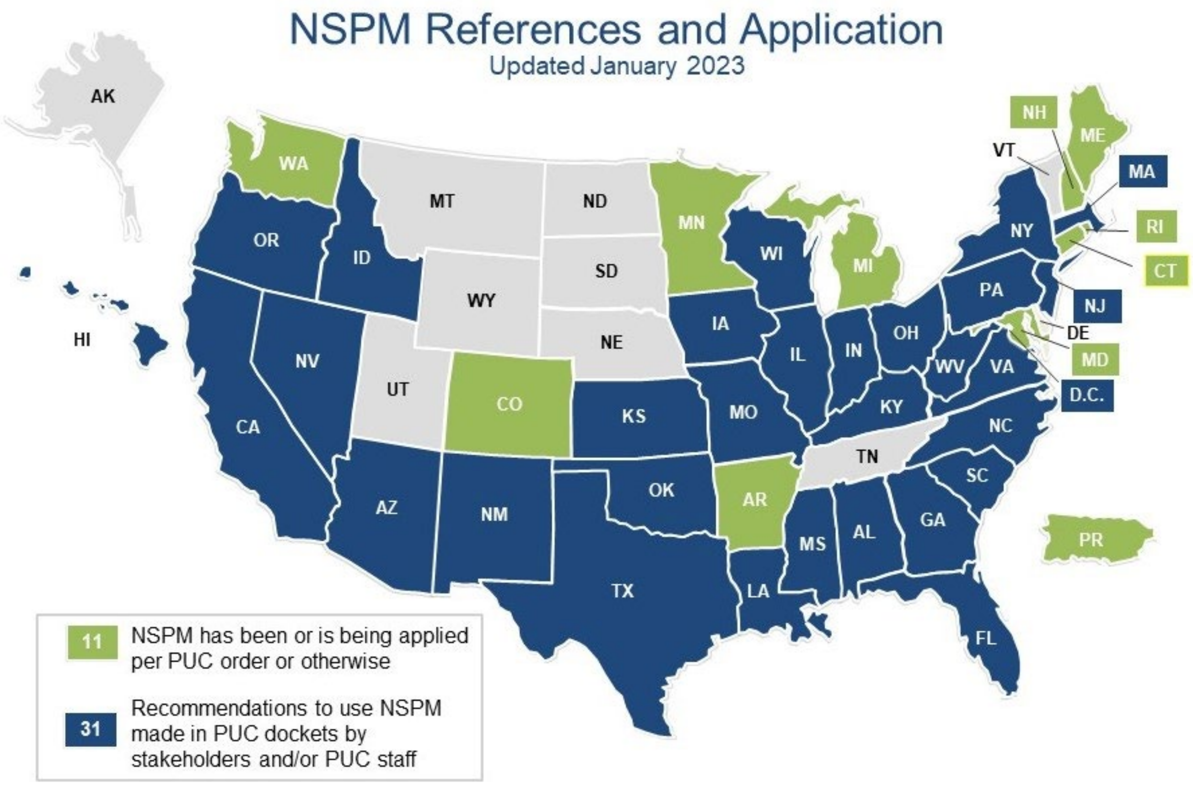


Source: How to 'Stack' Your Way to a Successful NWA (ICF).

NSPM's Widespread Regulatory Deployment

NSPM is at the bleeding edge of BCA development. Regulators are increasingly asking utilities to use NSPM for:

- Primary Cost Effectiveness Metric for DSM Portfolio
- Pilots and other Innovative Programs
- Non-Wire Solutions
- Non-Traditional DSM Investments
- Distribution-level Generation Facilities



National Energy Screening Project (NESP)

8,000
Employees
75 Global Locations
Reston, VA HQ

1,100+ Energy Professionals

$1.59B
2021 Revenue

Carbon Neutral
Since 2006

50+ Years of Energy Work

53% Female Leaders

"A" ESG Rating
from the Carbon Disclosure Project

13.7 Years
Average Tenure of ICF Leaders

AMERICA'S BEST MANAGEMENT CONSULTING FIRMS
Forbes 2022
POWERED BY STATISTA

THE BEST EMPLOYERS FOR DIVERSITY
Forbes 2022
POWERED BY STATISTA

Energy, environment, and infrastructure

Health and social programs

Consumer and financial

Safety and security

ICF's broad-based energy business

Sectors

- Power and transmission
- Oil and gas
- Distributed resources
- Renewables
- Energy efficiency Demand Response
- Electrification
- Climate change

Clients

- State & Local Gov't
- Federal agencies
- Gas & electric utilities
- Developers
- Investors
- Owners
- Regional transmission organizations

Selected services

Program Planning & Delivery

- Energy efficiency
- Electrification
- Flexible Load Management
- Marketing & IT
- Innovative rates
- Green bank design, launch and operations
- Unregulated services

Advisory

- Decarbonization pathways
- Policy and program design
- Integrated resource planning
- Grid planning & modernization
- Transmission planning
- Market & technology planning
- Resiliency & vulnerability planning
- Asset valuation & management
- Project development, siting, engineering & financing

About me

Samir Succar, Ph.D.

Senior Director

samir.succar@icf.com

My work focuses on transmission-distribution coordination, DER integration/utilization, system planning, distribution system operations and DER aggregation, optimization, and coordination. As part of ongoing work with DOE OE, he has participated in the NARUC-NASEO Task Force on Comprehensive Electricity Planning, the TDC coordination initiative, the NARUC Utility Data Sharing Collaborative, Integrated Distribution Planning studies and numerous state technical assistance efforts

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Distributed Demand-Side Resources Aggregation by Utilities: Insights and Challenges from Arizona

Presented by Natalie Mims Frick
Contributions from Lisa Schwartz

NARUC – NASEO Distributed Energy Resources Integration & Compensation Initiative
December 18, 2023

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This presentation was funded by the Office of Energy Efficiency and Renewable Energy

DER Aggregation Example: Arizona (1)

- The Arizona Corporation Commission (ACC) directed Arizona Public Service (APS) to file a tariff for Distributed Demand-Side Resources (DDSR) Aggregation in 2020 (Decision 77855).
- The ACC required that the tariff provide compensation for multiple values provided by DDSR aggregation, including capacity, demand reduction, load shifting, locational value, voltage support, and ancillary and grid services.
- ACC requested and approved technical assistance from Berkeley Lab to support review of the tariff.
- APS issued a request for proposals (RFP) in June 2021 to inform the tariff and select an aggregator to provide grid services in 2023 (DDSR pilot).
  - Berkeley Lab reviewed the draft RFP based on criteria established by the ACC and compared it with typical practices by other U.S. utilities. We identified several issues, some of which APS addressed in the final RFP.

APS's DER Aggregation Programs

Program	Forecasted Capacity	Participation	Availability	Event Parameters
Cool Rewards	116 MW+	~80k t-stats	June 1-Sept 30	≤3 hours/event ≤20 events; ≤3 consecutive days
Peak Solutions	50MW	75+ C&I customers	June 1-Sept 30	≤5 hours/event ≤18 events; ≤3 consecutive days
Res. Battery Pilot	1 MW	126+ res. batteries	Year round	≤4 hours/event ≤100 events/year
Energy Savings Days	7 MW	340k emails sent to res. customers	June 1-Sept 30	≤5 events Voluntary request to reduce peak usage in afternoon/evening

DER Aggregation Example: Arizona (2)

- APS received responses from 6 bidders (see table) and selected one aggregator to provide all three grid services with residential batteries. APS also used RFP responses to inform tariff design and define tariff issues and values.
- A Berkeley Lab expert review of APS's cost/benefit analysis found undercounted and excluded benefits.

	Product A	Product B	Product C
Product Focus	System capacity, energy and load shifting value	Locational value on 6 APS feeders	Ancillary services
Requested Capacity Range	5-40 MW aggregated load	1-5 MW aggregated load	1-5 MW system support
Bids Submitted	6	4	2
Capacity Range Among Bids	5-40 MW	1-2.8 MW	5-15 MW

- For example, using a 10-year battery life, instead of APS's proposed program term (5 years), would make most capacity bids cost-effective. And a more conventional de-rating of energy and capacity benefits would make most locational value bids cost-effective.
- Berkeley Lab's analysis (Attachment 3) of the proposed aggregation found significant reductions in peak load for the utility system. And considering reliability and resilience benefits, 66% of Product A (capacity) customers and 50% of Product B (locational value) customers would be expected to benefit financially.
- APS discontinued the DDSR pilot program with the RFP selected aggregator (see next slide).
- Separately, the ACC rejected APS's tariff and required the utility to issue a new RFP and DDSR Aggregation tariff (see next slide).

Some Lessons Learned

RFP

- **Keep the proposal fee modest.** (The RFP fee was $10,000; a separate fee was required for changing terms such as in-service date.) Many utilities do not require any proposal fees for RFPs seeking demand-side resources, as the effort required to submit a responsive bid is barrier enough to eliminate non-serious respondents.
- **Do not include a preference for proposals offering multiple products.** Firms that can site and install DDSR to provide capacity for seasonal peak capacity needs may not have expertise to provide ancillary and grid services. And firms that specialize in providing certain types of services may offer lower prices for them.
- **Appropriately value all benefits** and use best practices for inputs and calculations.
- For locational value, **target feeders where reducing demand has infrastructure deferral value** — e.g., where an upgrade is likely needed within 6 years. (Distribution deferral benefits were not analyzed because the targeted feeder was not constrained.)

DDSR Aggregation Pilot

- **Identify customer needs.** APS customers were interested in whole home backup over the cooling season. Such systems exceed the largest battery the aggregator offered, resulting in low participation.
- **Consider aggregator and installer infrastructure.** The aggregator did not have a significant presence in Arizona, and their largest installer went bankrupt.
- **Mitigate competition with the utility**. APS's residential battery pilot is similar to the DDSR aggregation offer that APS selected, and the offers were marketed to customers at the same time. APS's DDSR aggregation could have instead tested a *combination* of resources — e.g., demand response plus batteries.

DER Aggregation Resources for Regulators

Wholesale Market Resources

- NASEO and NARUC, Summary of Expert Recommendations for Supporting DER Aggregator Participation in Wholesale Markets and Operations in Line with FERC Order 2222
- Energy Systems Integration Group, DER Integration into Wholesale Markets and Operations
- Advanced Energy United, FERC Order No. 2222 Implementation: Preparing the Distribution System for DER Participation in Wholesale Markets
- Electric Power Research Institute, DER Aggregation Participation in Electricity Markets: EPRI Collaborative Forum Final Report and FERC Order 2222 Roadmap
- Advanced Energy Economy and GridLab, FERC Order 2222 Implementation: Preparing the Distribution System for DER Participation in Wholesale Markets (2022)
- FERC Dockets EL-16-92/ER17-996

Retail and Mixed Wholesale/Retail Market Resources

- Berkeley Lab, Regulation of Third-Party Aggregation in the MISO and SPP Footprints
- Berkeley Lab, Opportunities and Challenges to Capturing Distributed Battery Value via Retail Utility Rates and Programs
- Berkeley Lab, Integrated Distribution System Planning
- Berkeley Lab, Locational Value of Distributed Energy Resources
- Arizona Public Service Distributed Demand-Side Resources Aggregation tariff (Docket E-01345A-22-0143 and Docket E-01345A-19-0148)
- CPower, Regulating Demand Response and Aggregators in the Midwest While Safeguarding Local Jurisdiction: A Guide for State Regulatory Commissions, Electric Cooperatives and Municipal Electric Utilities (2022)
- US DOE Loan Program Office, Pathway to Commercial Liftoff for Virtual Power Plants (forthcoming)
- Demand Response Information Workshop, Missouri PSC. Recording forthcoming.

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New York State - Value of Distributed Energy Resources

Sandra Sweet

December 18, 2023

Background

The Road from Net Energy Metering to VDER

<u>1997</u>: Legislature enacted residential Net Energy Metering (NEM) for solar systems <10 kW

<u>1997-2011</u>: Legislature expands NEM eligibility through multiple changes in law.

<u>2012</u>: Legislature Authorizes Remote Net Metering (RNM) for Commercial --The "Lightbulb in the Field"

<u>2014</u>: NYS PSC ends "monetary" RNM crediting and implements "Volumetric" RNM

<u>July 2015</u>: PSC Approves Community Distributed Generation "Community Solar" which allows "Satellite" customers who cannot install DER on-site to participate in NEM

<u>Oct. 2015</u>: PSC Begins VDER Case to Transition from NEM to Value-Based Crediting

<u>Mar. 2017</u>: First VDER Order

<u>Sept. 2017</u>: Implemented VDER Phase One NEM and VDER Value Stack

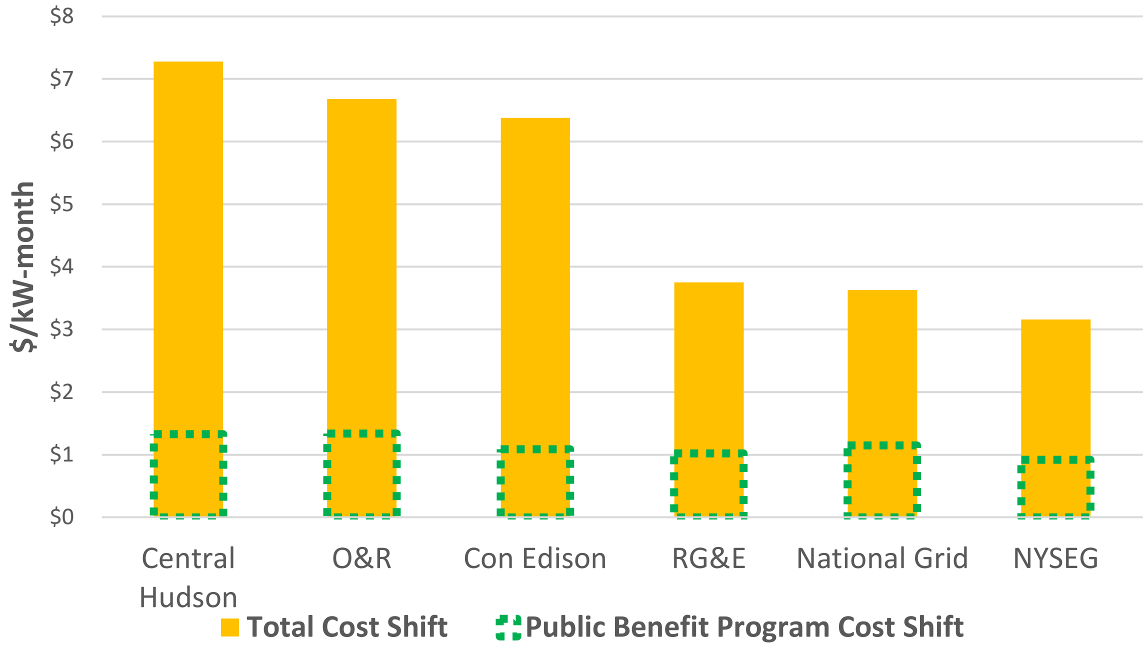
<u>July 2020</u>: Phase One NEM – Customer Benefit Charge

<u>July 2023</u>: VDER Wholesale Value Stack per FERC Order No. 2222

Why is Net-Energy Metering Changing?

Cost Shift of Residential solar w/ Phase One NEM

From Rate Design Working Group & Utility CBC Filings



- Cost shifts to non-NEM customers became unsustainable in certain utilities & rate classes
- Public Benefit Programs[3] not funded by current NEM customers… 13% - 26% of total cost shift in 2018
- NEM poorly aligned w/Principles of Rate Design[2] & doesn't encourage use of the grid at beneficial times
- VDER Transition Order (2017) directs Staff to replace Phase One NEM by 1/1/2020… later extended to 1/1/2022 to allow industry to recover from COVID

Successor tariff(s) should transition to more equitable compensation frameworks w/gradual, customer-oriented transition

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1 – The Principles of Rate Design were introduced in the REV Track Two order.
2 – The non-supply Public Benefit Programs include Low- & Moderate-Income programs, Energy Efficiency and Clean Energy Programs. RECs and ZECs are excluded.

Crediting/Compensation Types

- **Monetary Crediting**
  - A utility will convert any kWh injections into the electric distribution system to a dollar value

  Example: In a monthly billing cycle, the kWh delivery rate is $0.04472. A DG customer generates 200 kWh. The customer has consumption of 100 kWh. The monetary credit that is applied to the utility bill is $4.47.

  $0.04472 /kWh X 100 kWh = $4.47

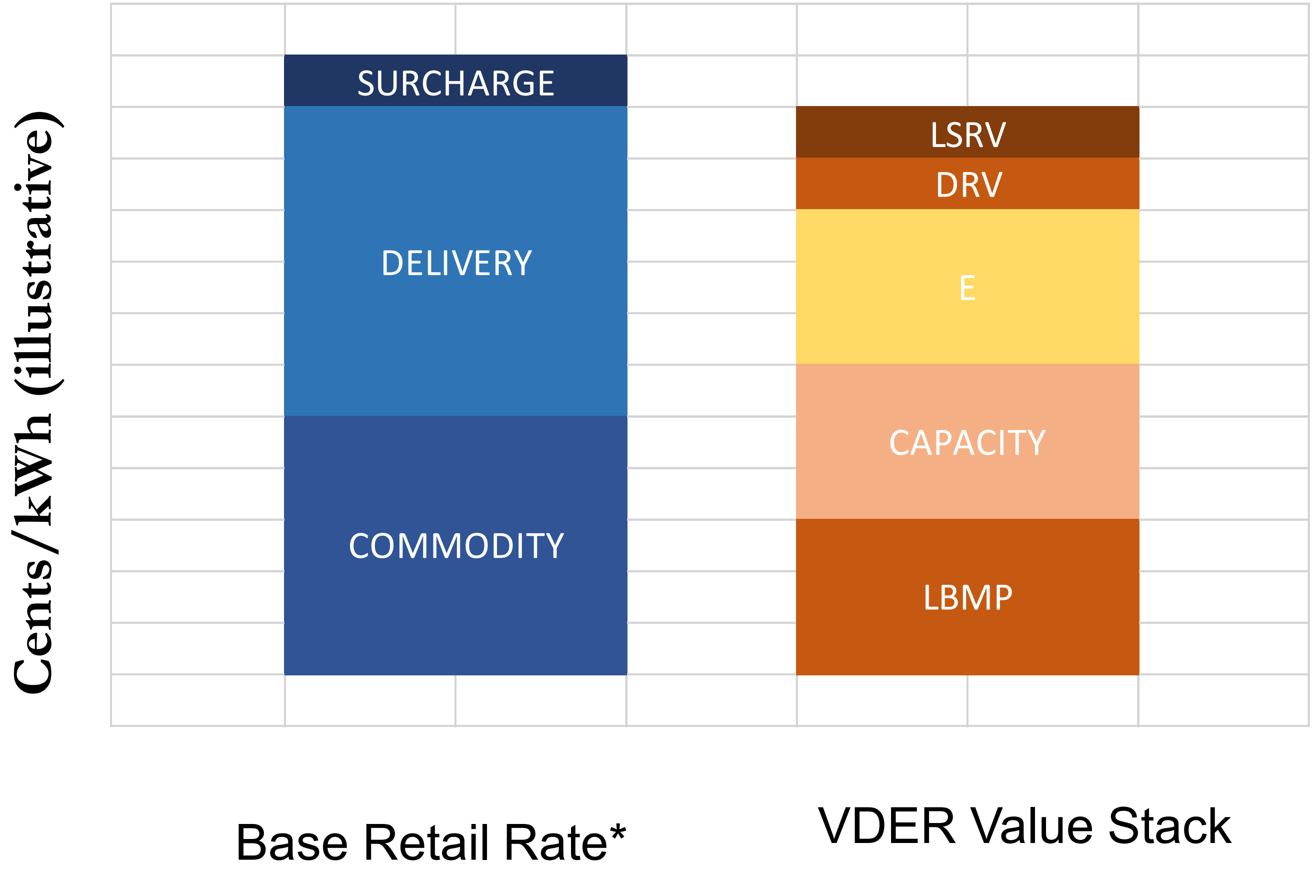
- **Volumetric Crediting**
  - A utility will net the usage and injections and apply the Net Excess kWh's as a direct credit to a customer's **next monthly** bill with any remaining kWh credits rolling over until consumed.

  Example: In a monthly billing cycle, a DG system generates 100 kWh and consumes 50 kWh. The difference of 50 kWh will be applied to the bill and the excess will roll over to the next billing cycle.

- **VDER**
  - Phase One NEM (Volumetric)
  - VDER Value Stack (Monetary)
  - VDER Wholesale Value Stack (Monetary)

VDER - Value Stack

NEM vs. VDER Value Stack Components



- **Avoided Distribution Value** – Includes demand reduction value (DRV) & locational system relief value (LSRV)
- **E** – environmental benefit
- **Capacity** – ICAP
- **LBMP** – energy commodity

* Note – reflects NEM and Phase One NEM compensation levels

VDER Value Stack Phases

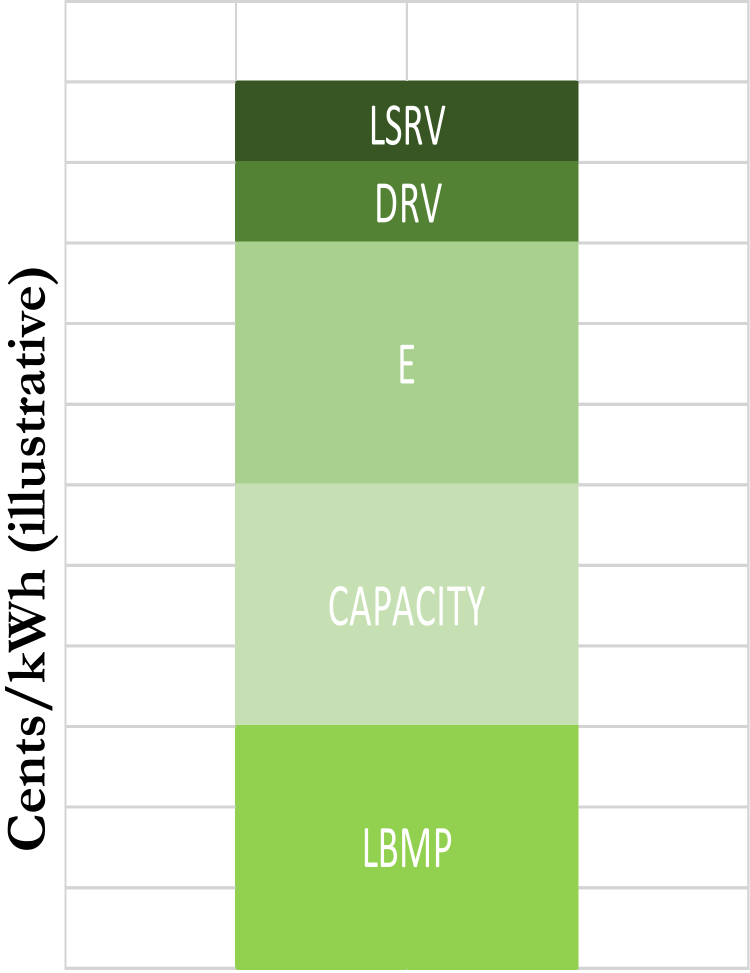
- Value Stack Phase One:
  - Applies to:
    - Customers that, on or prior to July 26, 2018, have paid at least 25 percent of their interconnection costs or executed the interconnection agreement if no such payment is required; and,
    - Customers that have met criteria (1) and had opted into the Value Stack Tariff prior to June 1, 2019.

- Value Stack Phase Two:
  - Modifications were made to Capacity Component Alternatives 1 and 2
  - Applies to:
    - Customers that, on or after July 27, 2018, have paid at least 25 percent of their interconnection costs or executed the interconnection agreement if no such payment is required; and,
    - Customers who opt into the Value Stack Tariff on or after June 1, 2019 subject to the next paragraph.

- The PSC approved the implementation of the Wholesale Value Stack beginning on July 1, 2023

- Utilities propose to implement a Wholesale Value Stack for DER customers to opt in and sell energy and capacity in the wholesale market directly to the New York State Independent System Operator (NYISO) while preventing duplicate compensation from the retail and wholesale markets.

- Customers who elect to export to the NYISO will also take service under each utilities' Wholesale Distribution Service tariff to be filed with FERC.



Wholesale Value Stack

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Appendix

Resources for New York State DER

- Standard Interconnection Requirements Addendum
  - https://dps.ny.gov/distributed-generation-information
- New York State Utility Electric Tariffs
  - https://dps.ny.gov/electric-tariffs
- New York State Energy Research and Development Authority
  - https://www.nyserda.ny.gov/All-Programs/NY-Sun/Contractors/Value-of-Distributed-Energy-Resources/Solar-Value-Stack-Calculator

History of DER Technologies and Sizes under PSL §66-j and §66-l

- 2002 – added anaerobic digester (farm waste) electric generators up to 400 kW.
- 2004 – added wind generators up to 25 kW for residential and 125 kW for residential/farm customers.
- 2008 – increased residential solar to 25kW, added non-residential solar and wind up to the lesser of 2 MW or customer's prior 12- month historical peak billing demand, and increased farm waste digesters and residential/farm wind generators to 500 kW.
- 2009 – added residential micro-turbine CHP and fuel cell installations up to 10 kW and 1.5 MW for non-residential.
- 2012 – the size of micro-hydroelectric generating systems was increased up to 25 kW for residential customers.
- 2014 – size of fuel cells increased from 1.5 MW to 2 MW and farm waste increased from 500 kW to 1 MW.

Thank you for joining today!

Upcoming:

- <u>Webinar:</u> **Compensation Options for ADER Services, Jan 8, 2024, 3-4:30pm ET**
- <u>In-Person:</u> **Integrated Distribution System Planning & Resilience Training, Jan 24-25, 2024** in Irvine, CA [*state agencies only*]
  www.naruc.org/about-naruc/event-calendar/western-dspr-training/

National Association of State Energy Officials

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www.naruc.org/cpi-1/energy-distribution/der-integration-compensation/