NATIONAL COUNCIL
ON ELECTRICITY POLICY

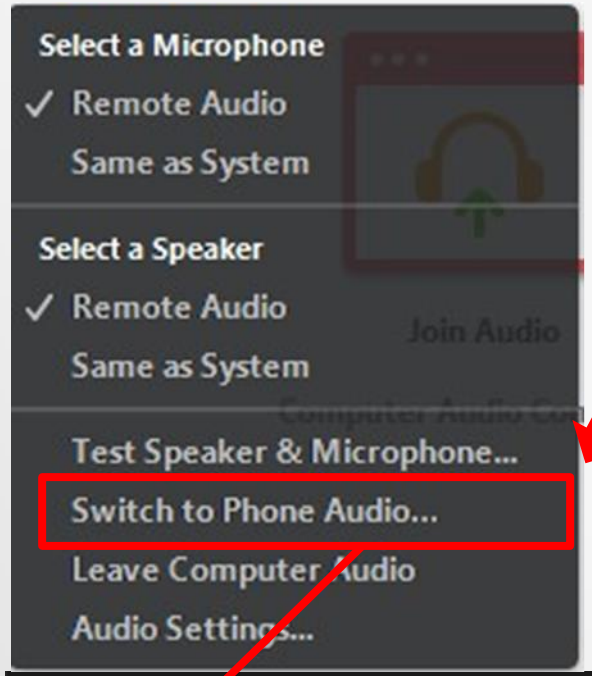
Special Session

Exploring Optimization through Benefit-Cost Analysis

Thursday, February 25, 2021

Virtual Venue: Zoom

Zoom Meeting 101



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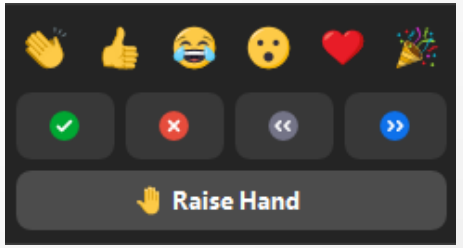
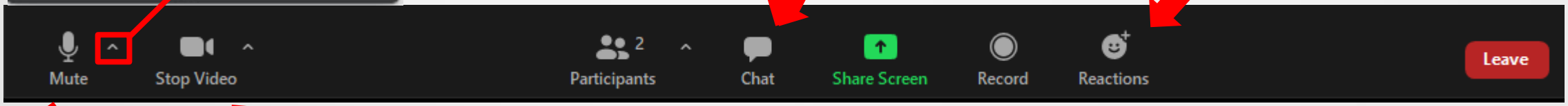
Click **Chat** to show the chat window.

Click **Reactions** to react to the speaker with an emoji or raise your hand.





Mute/Unmute

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Click **Participants** to see who else is in the meeting.

Welcome

During the webinar:

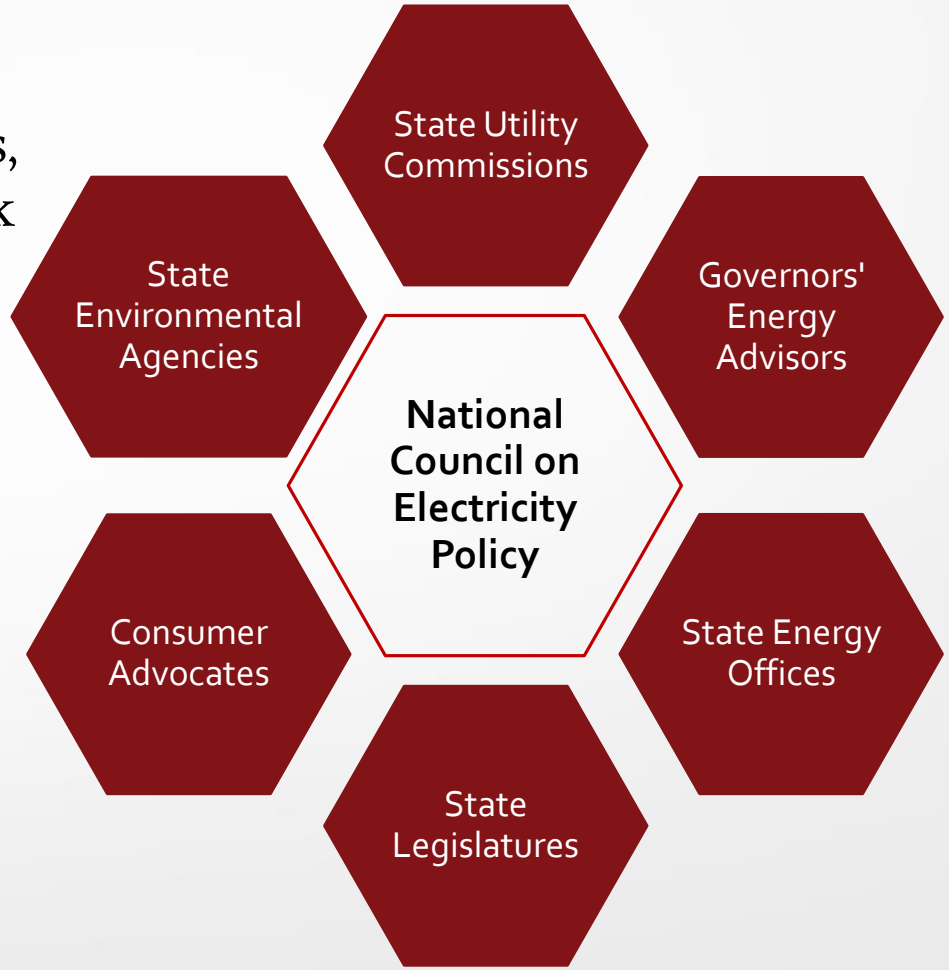
- This webinar is being recorded.
- Chat questions to Ask me, Kerry anytime in the Zoom application and Kerry will forward the questions to the moderator.
- We look forward to seeing audience members during Q&A.

After the webinar:

- Presentation and recording posted on www.electricitypolicy.org.
- Unanswered questions will be sent to panelists for follow up.
- Join our listserv by checking off NCEP as an interest area in your MYNARUC account at www.naruc.org/mynaruc/ or e-mail Kerry Worthington at Kworthington@naruc.org after your profile has been created.

The National Council on Electricity Policy

- NCEP is a peer-learning platform to examine the ways new technologies, policies, regulations, and markets impact state resources and the bulk power system.
- NCEP is currently exploring the evolving interface between the transmission and distribution systems as the resource mix on the grid changes (planning, operations, and markets).
- **All NCEP resources are available at www.electricitypolicy.org.**
- NCEP thanks the U.S. Department of Energy for its ongoing support. NCEP is an affiliate project of NARUC.



Exploring Optimization through Benefit-Cost Analysis

Tanya McCloskey,

Pennsylvania Office of the Consumer Advocate (Moderator)

Hon. **Abigail Anthony**, Rhode Island Public Utility Commission

Julie Michals, E4TheFuture

Snuller Price, E3

Exploring Optimization through Benefit-Cost Analysis

Hon. **Abigail Anthony**, Rhode Island Public Utility Commission

Regulatory Considerations on Benefit Cost Analysis

Abigail Anthony, Commissioner

Rhode Island Public Utilities Commission

February 2021

Common misunderstandings about benefit cost analysis in regulatory decisions

- BCA is an informative part of a business case, it is not determinative.
- Utility customers must have a stake in the outcome of the investment.
- BCA provides stakeholders with transparency and information to help create a supporting or opposing case.

What a Business Case Should Show

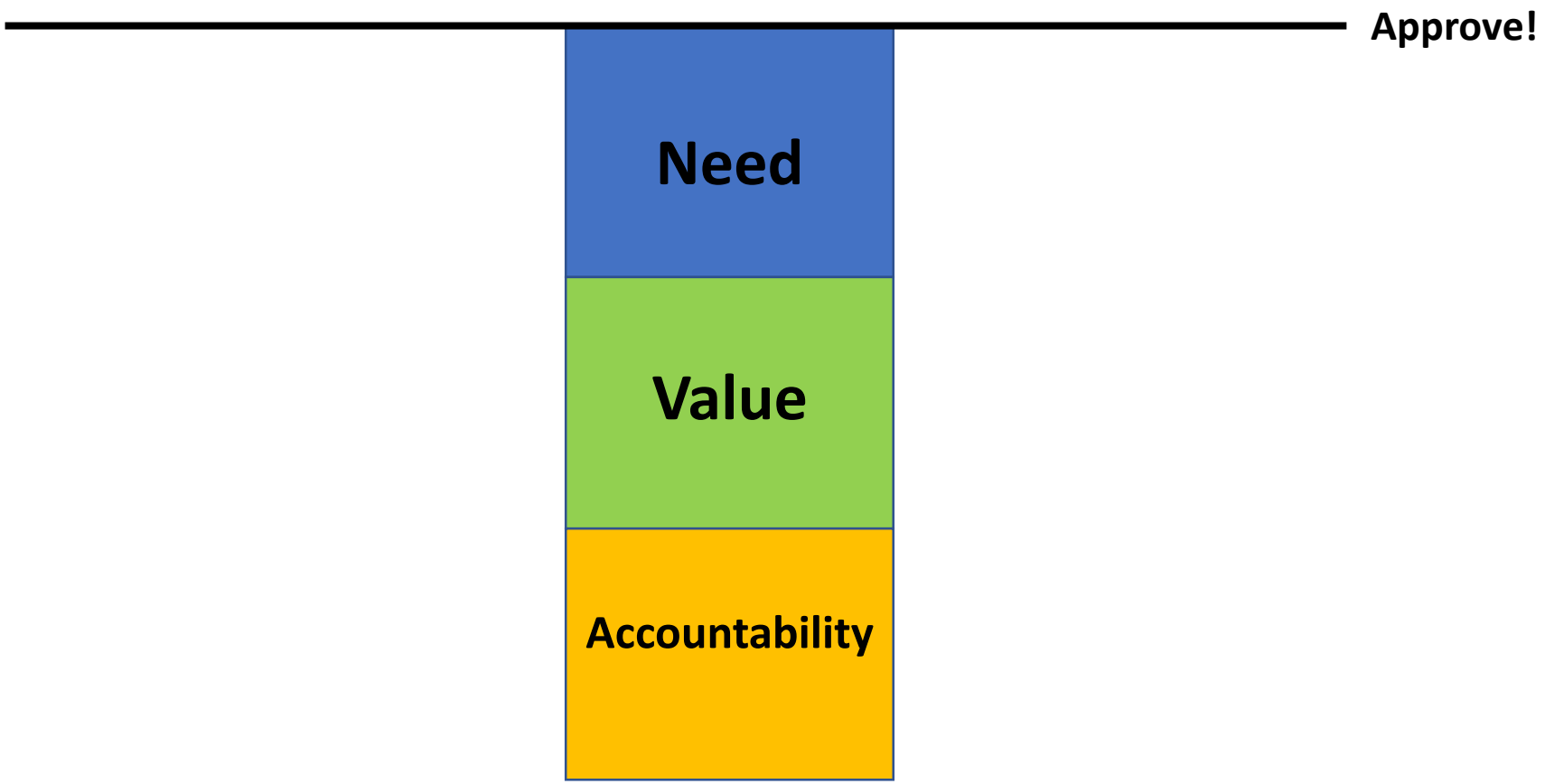
- What is the problem that needs to be solved?
- What is the expected value of the proposed investment?
- Is the utility the appropriate entity to deliver these benefits/solve this problem?
  - What are the values and who receives the benefits?
  - Will utility customers benefit?
  - Is the utility reasonably accountable to delivering the proposed benefits?

The Case for Need

- Statutory
- Power system
- Customer demands

* If the investment isn’t needed, there has to be value for utility customers.

Regulators Need a Strong Business Case



The Value Case

- Benefit cost analysis is a tool for showing value.
- Quantitative evidence that customers will save money on their utility bills.
- RI has a jurisdiction-specific cost benefit framework. These are all the benefits and costs that the PUC will consider in its assessment of value, including some benefits that are outside the power system.

*If the investment won't benefit customers, why should the utility be making the investment?

Accountability

- Can we determine whether the benefits happened?
- What is in the utility's control?
- What conditions are necessary for benefits to be realized?

* If the utility can't be held accountable to ratepayer benefits, why should this be part of the monopoly utility's business?

Determinations the Regulator Makes

- Can the “do nothing” scenario be rejected?
- Is *now* the right time, or can the investment be deferred?
- Is the proposed investment the most cost-effective option for meeting the need?
- What will be gained by making the investment now, and what is being forgone?
- Why is the utility the best positioned to make this investment?

Is the utility best positioned for this role?

- Utility incentives to switch to vegetarianism
  - Value: Participant cost-savings at the grocery store, participant health benefits, societal GHG reductions.
  - Need: Factory farms are inhumane
  - Accountability: None. The utility bill will not reflect the reduction in meat consumed.

- Carport solar feed-in tariff adder @ 6 cents/kWh

  (based on real PY 2020 proposal to RI PUC)

  - Value: Societal farm/forest land preservation & carbon sink value
  - Need: Statutory requirement for the program; 400 MW must go somewhere in RI in the next 10 years; siting challenges.
  - Accountability: None, the utility bill and enrollment statistics can't reflect whether land was preserved and why (e.g. even if ground-mount solar didn't get built on a parcel of farmland, condos might be built).

- Ratepayer-funded rebates for the purchase of electric vehicles
  - Value: Lower GHG from transportation fuels; possible driver cost savings on fuel
  - Need: We don’t have a statutory need. One might argue that people aren’t buying enough electric vehicles because they are too expensive. This isn’t a utility problem. It is a car company problem.
  - Accountability: Not a lot. GHG reductions accrue to the world. Drivers who receive a rebate might save money on gasoline. Electric customers don’t realize any real savings or avoided costs on their utility bill.

Key Points

- Regulators need to be convinced that the proposed investment is the most cost-effective option to solve a timely utility problem.
- Benefit cost analysis adds transparency so you can compare investments.
- Benefit cost analysis shows whether an investment is fair to ratepayers by identifying who is benefiting, and how.
- Benefit cost analysis is not a substitute for legislating.

Exploring Optimization through Benefit-Cost Analysis

Hon. **Abigail Anthony**, Rhode Island Public Utility Commission

Exploring Optimization through Benefit-Cost Analysis

Julie Michals, E4TheFuture

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

EXPLORING OPTIMIZATION THROUGH BENEFIT-COST ANALYSIS

NCEP Special Session

Julie Michals – E4TheFuture

February 25, 2021

About NESP

The National Energy Screening Project (NESP) is a stakeholder organization that is open to all organizations and individuals with an interest in working collaboratively to improve cost-effectiveness screening practices for energy efficiency and other distributed energy resources (DERs).

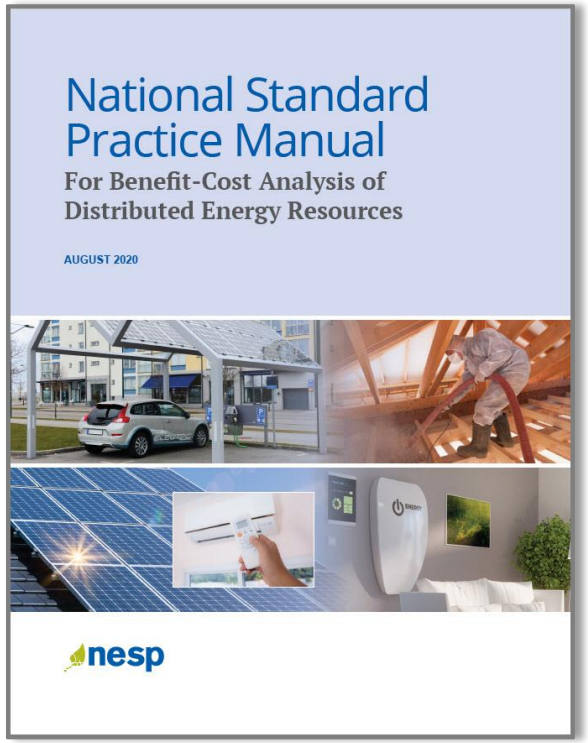
Products include:

- NSPM for EE (2017)
- NSPM for DERs (2020)
- Database of Screening Practices (DSP)

NESP work is managed by E4TheFuture, with coordinated state outreach via key partners.

NESP work is funded by E4TheFuture and in part by US DOE.

https://nationalenergyscreeningproject.org/



Why an NSPM for DERs?

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

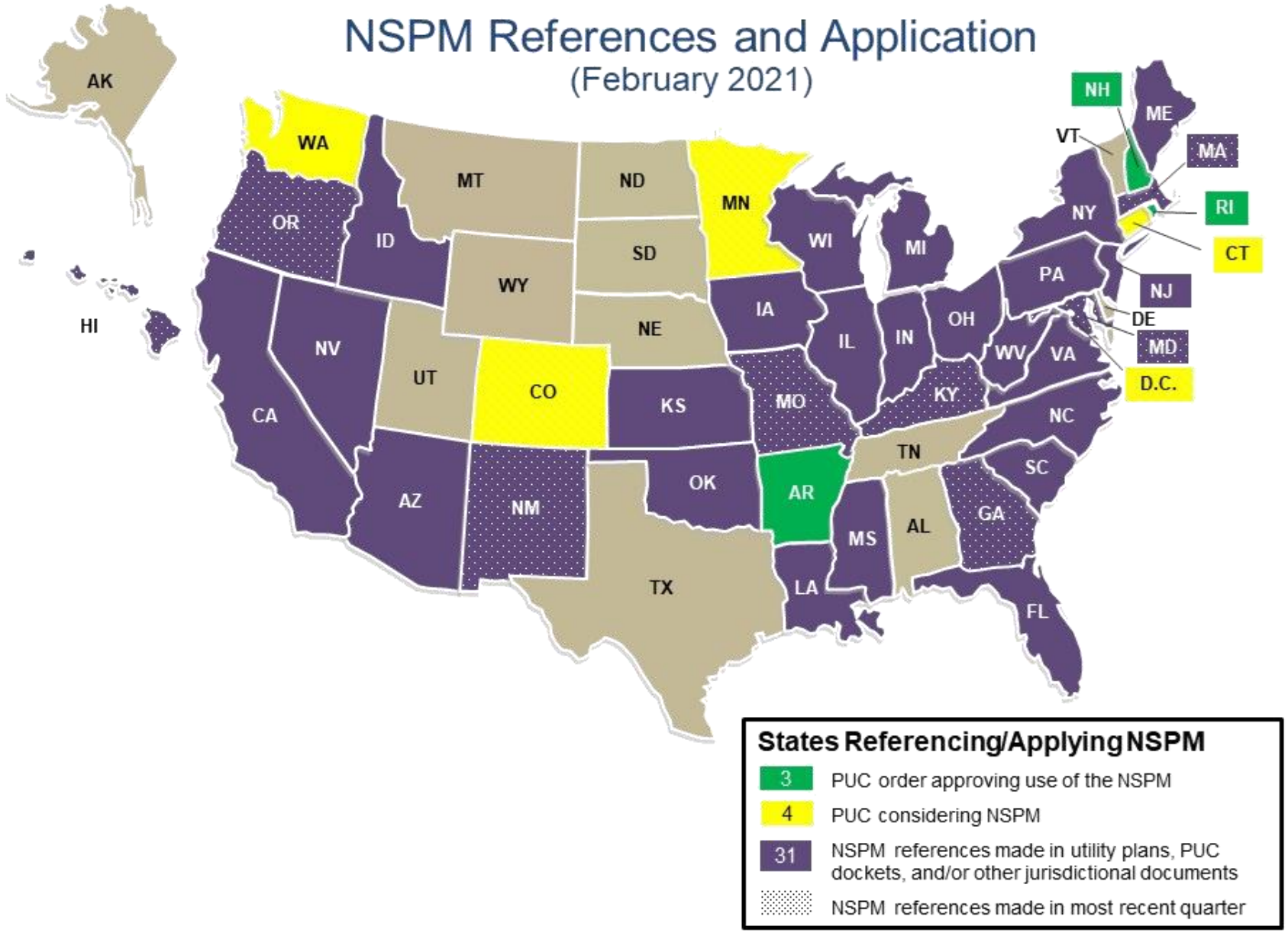
NSPM for DERs – Audience and Uses

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

Purpose: Guidance for valuing DER opportunities to inform policies and strategies such as:

- Expanding EE/DR plans, strategies, and programs to broader set of DERs
- Evaluating and planning for non-wires/pipes solutions
- Incorporating DERs into distribution system planning
- Achieving jurisdictional policy goals and objectives, e.g.
  - Environmental and carbon emission reductions
  - Electrification goals, including in buildings and EVs
  - Economic development
  - Energy security
  - etc.

NSPM References and Application
(February 2021)



NSPM for DERs – TOC

NSPM BCA Framework

NSPM provides a ‘process’ that jurisdictions can use to develop (or modify existing) CE testing practices for a range of DERs or some combination of them.

Why Consistency in BCA across DERs?

- Consistent BCA framework reduces risk of either over or under-investing in a resource (or combination thereof)
- Siloed approach to valuing different DERs can be complex and overwhelming for commissions, utilities and stakeholders
- Allows for comparison and prioritizing of DER investment options to answer questions such as:

    1. *Which DERs should be implemented, and which should be rejected based on key objectives?*
    2. *Will key policy goals be met by investing in the DER(s)?*
    3. *How can we ensure that customers are not paying too much for policy goals?*

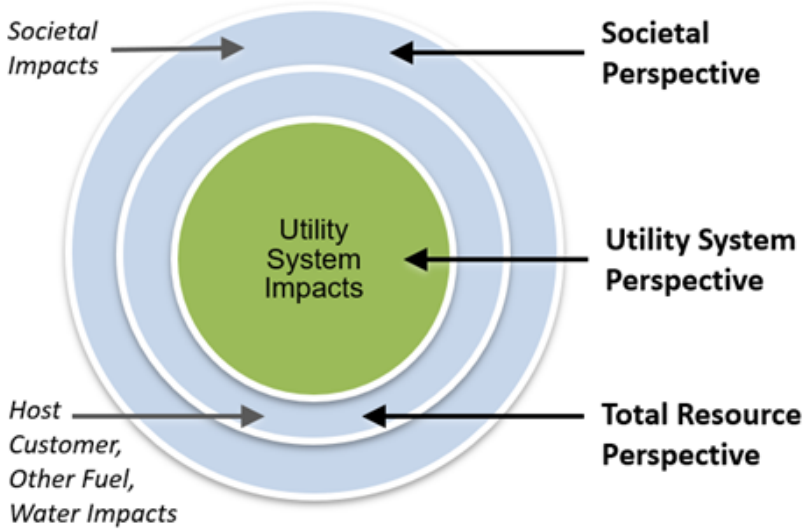
NSPM BCA Principles

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

Cost-Effectiveness Perspectives

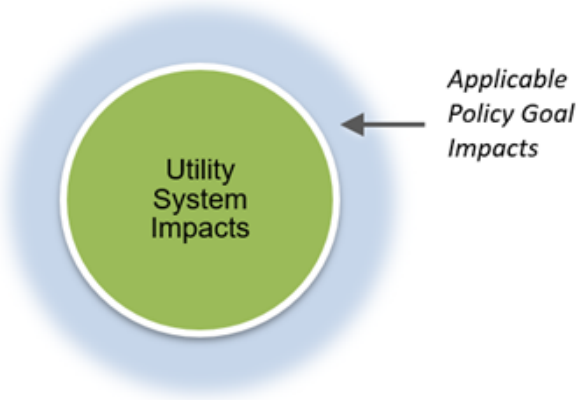
NSPM for DERs

Traditional Perspectives



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

Regulatory Perspective

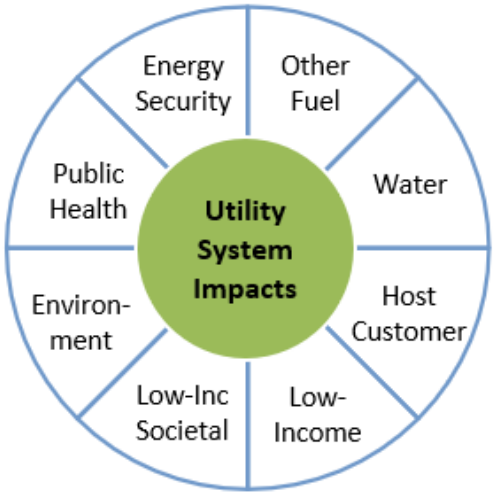


- Perspective of public utility commissions, legislators, muni/coop boards, public power authorities, and other relevant decision-makers.
- Accounts for utility system plus impacts relevant to a jurisdiction's applicable policy goals (which may or may not include host customer impacts).
- Can align with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

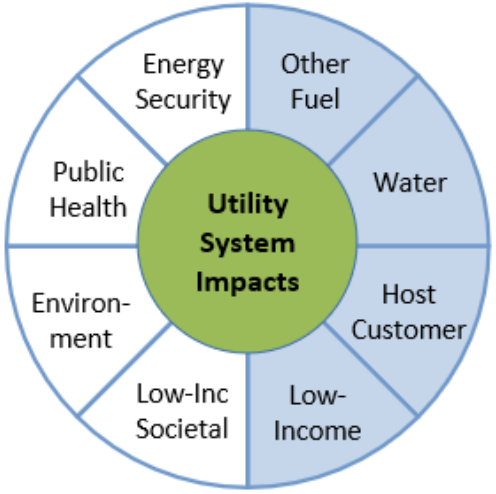
Primary Test = Jurisdiction Specific Test (JST)

Hypothetical JSTs as compared to traditional tests

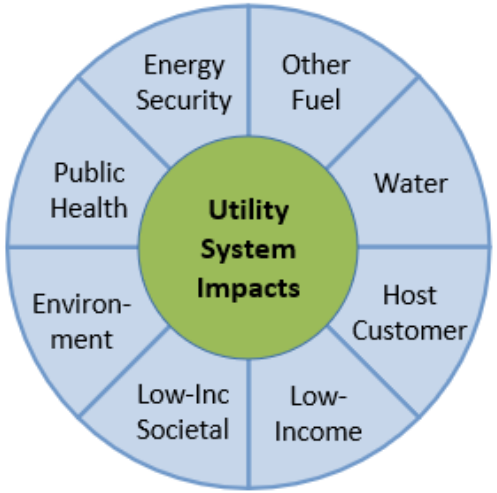
JST 1 = UCT/PACT



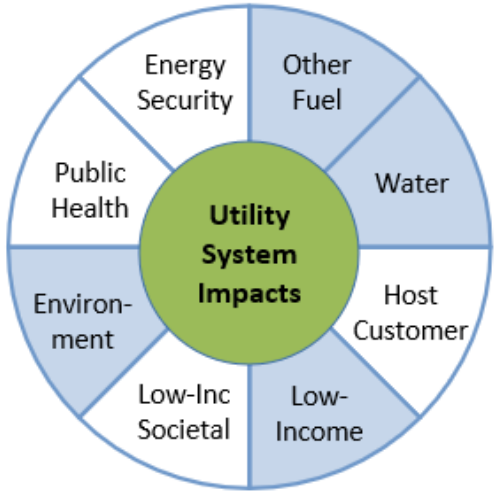
JST 2 = TRC Test



JST 3 = SCT



JST 4 ≠ traditional CE test *



UCT = Utility Cost Test (or PACT = Program Admin Cost Test)
TRC = Total Resource Cost Test
SCT = Societal Cost Test

All utility system impacts included

Non-utility system impacts included

Non-utility system impacts *not* included

*JST 4 includes a different set of non-utility system impacts based on *its applicable policies.*

JSTs may or may not align with traditional tests.

BCA Alignment with Applicable Policy Goals

- Alignment with a jurisdiction's policy goals is necessary to help ensure policy goals are met
- Policies evolve and are dynamic, not static – as such BCAs need updating/refinement to account for relevant impacts
- Where inconsistencies in policies exist across DERs, determination may be needed to broadly or narrowly interpret policies and associated relevant impacts to account for in BCA primary test

Use of Secondary Tests

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

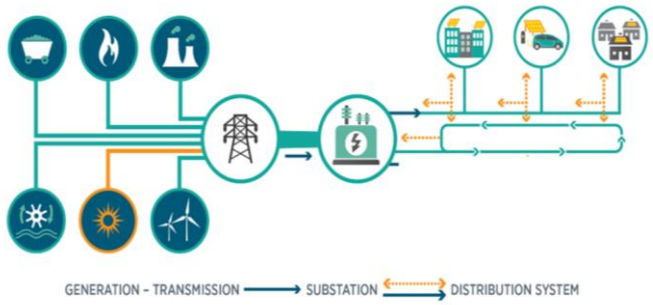
While a jurisdiction's primary test informs a resource merits acquisition, secondary tests can help to:

- To address situations where there are inconsistent policy goals across different DER types.
- To address DERs that are marginally cost-effective.
- To assess implications of achieving policy goals.

Three Tiers of DER Analysis
(NSPM covers levels 1-2 primarily)

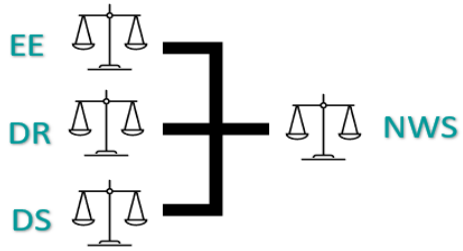
Level Three: Multiple DERs + Utility System

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



Level Two: Multiple DERs

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



Level One: Single DER

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

Adapted from LBNL 2020 and US DOE Solar Energy Technologies Office

EE and Other DER Benefits & Costs

Utility-system Impacts are foundational – Always include

Type	Utility System Impact
Generation	Energy Generation
	Capacity
	Environmental Compliance
	RPS/CES Compliance
	Market Price Effects
	Ancillary Services
Transmission	Transmission Capacity
	Transmission System Losses
Distribution	Distribution Capacity
	Distribution System Losses
	Distribution O&M
	Distribution Voltage
General	Financial Incentives
	Program Administration
	Utility Performance Incentives
	Credit and Collection
	Risk
	Reliability
	Resilience

Non-Utility System Impacts – Inclusion depends on applicable policy goals & objectives

Type	Host Customer Impact
Host Customer	Host portion of DER costs
	Host transaction costs
	Interconnection fees
	Risk
	Reliability
	Resilience
	Tax incentives
	Non-energy Impacts
	Low-income non-energy impacts

Type	Societal Impact
Societal	Resilience
	GHG Emissions
	Other Environmental
	Economic and Jobs
	Public Health
	Low Income: Society
	Energy Security

DER BCA – Utility System Impacts

Potential Benefit, Cost or Depends?

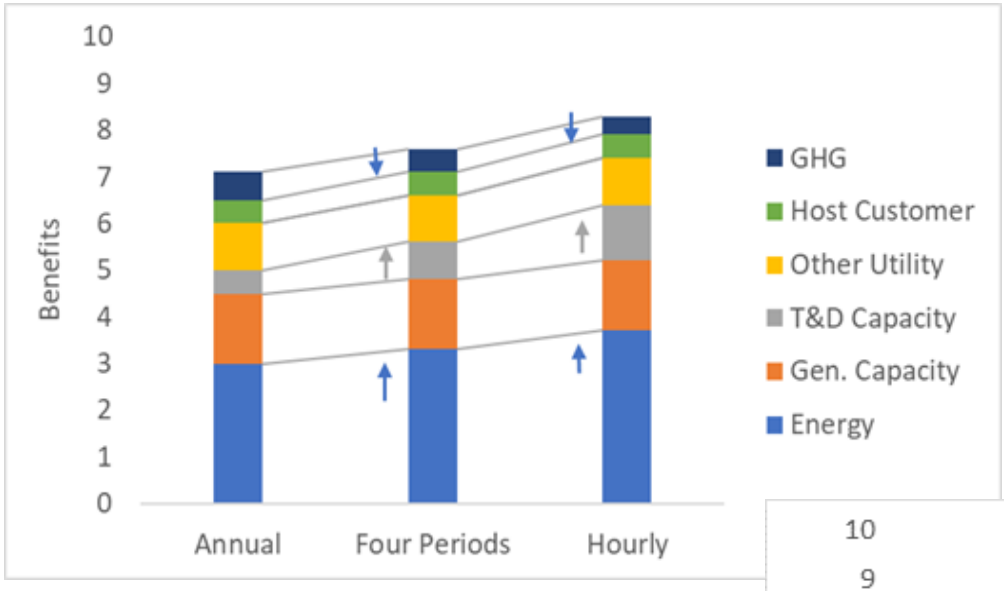
Type	Utility System Impact	EE	DR	DG	Storage	Electrification
Generation	Energy Generation	●	●	●	●	●
	Capacity	●	●	●	●	●
	Environmental Compliance	●	●	●	●	●
	RPS/CES Compliance	●	●	●	●	●
	Market Price Effects	●	●	●	●	●
	Ancillary Services	●	●	●	●	●
Transmission	Transmission Capacity	●	●	●	●	●
	Transmission System Losses	●	●	●	●	●
Distribution	Distribution Capacity	●	●	●	●	●
	Distribution System Losses	●	●	●	●	●
	Distribution O&M	●	●	●	●	●
	Distribution Voltage	●	●	●	●	●
General	Financial Incentives	●	●	●	●	●
	Program Administration Costs	●	●	●	●	●
	Utility Performance Incentives	●	●	●	●	●
	Credit and Collection Costs	●	●	●	●	●
	Risk	●	●	●	●	●
	Reliability	●	●	●	●	●
	Resilience	●	●	●	●	○

● = *typically a benefit*
● = *typically a cost*
● = *either a benefit or cost depending upon the application*
○ = *not relevant*

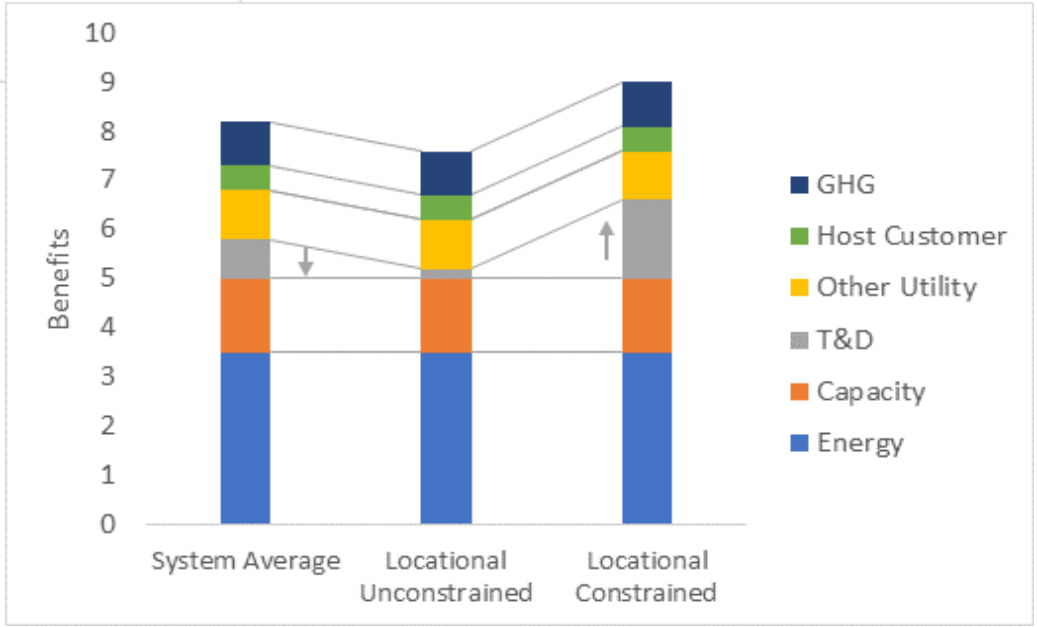
Factors that can affect DER Impacts
Examples

- Types of DERs deployed – *specific use cases*
- DER capabilities and operational profiles
- Who owns and operates the DERs
- Specific locational and temporal impacts
- Potential interactive effects between DERs

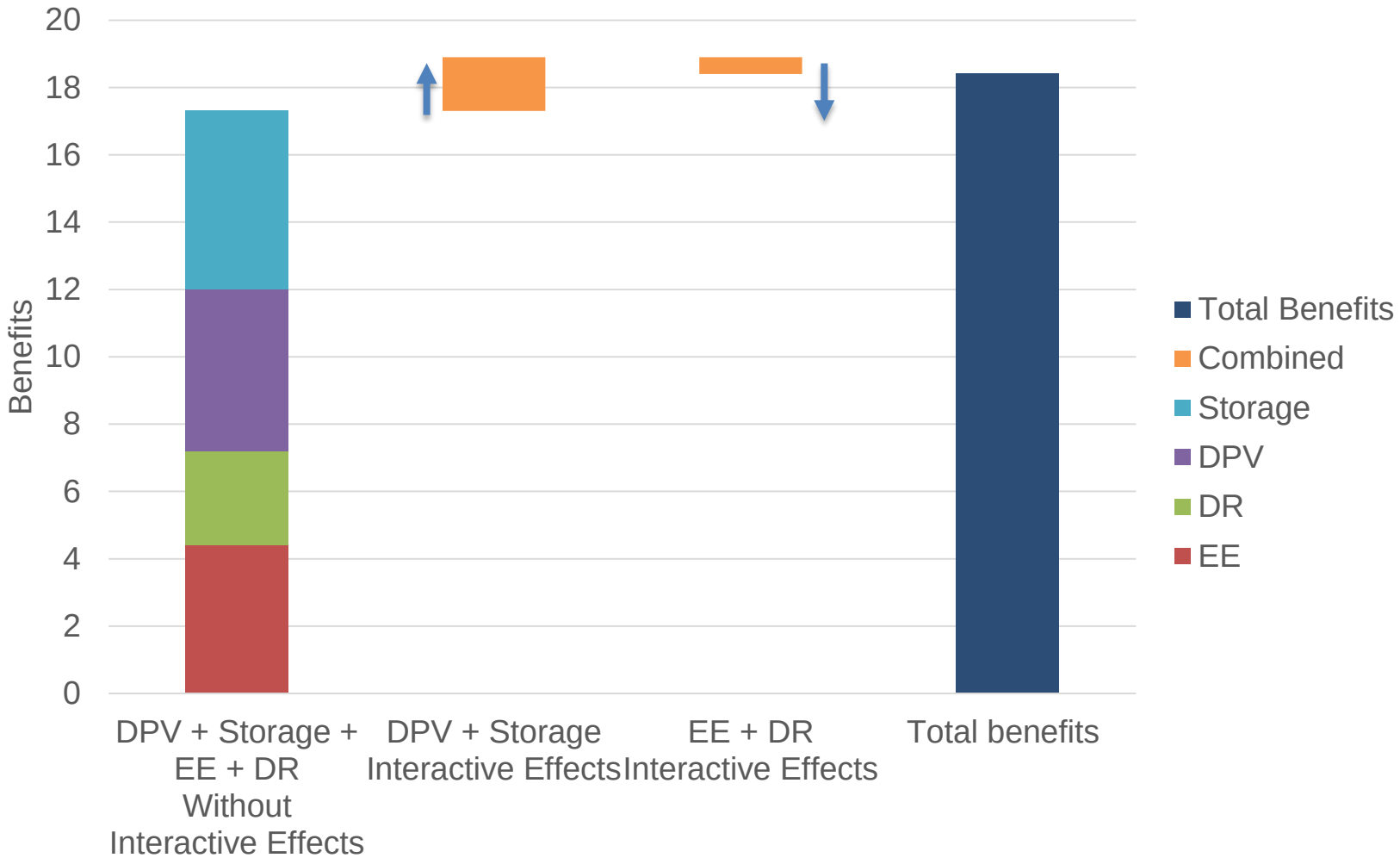
Temporal Impacts on EE Benefits
Hypothetical Example



Location Impacts on DR Benefits
Hypothetical Example



Multiple DER BCA
Example of Interactive Effects



Additional topics/slides from NCEP Dec 9, 2020 Deep Dive Session on BCA

1. Developing a Jurisdiction's **Primary Test** for all DERs
2. Use of **Secondary Tests** and **Prioritizing DERs**
3. Addressing **Rate Impacts**

View the Deep Dive Session Segments 3.1 – 3.4.4 on YouTube, here.

NSPM 2021 Planned Efforts

- Repository of methods, tools and techniques for quantifying utility and non-utility system impacts
- BCA algorithm catalog
- ‘Real world' DER BCA use case examples
- BCA on-line training for regulators, evaluators, others
- Technical assistance to support application of the NSPM in selected states

For more information:

NSPM for DERs and supporting resources:

http://www.nationalenergyscreeningproject.org/

Stay informed with the *NESP Quarterly* newsletter:

https://nationalenergyscreeningproject.org/national-standard-practice-manual/news/

Questions?

Julie Michals, Director of Valuation – E4TheFuture

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Exploring Optimization through Benefit-Cost Analysis

Julie Michals, E4TheFuture

Exploring Optimization through Benefit-Cost Analysis

Snuller Price, E3

Energy+Environmental Economics

DER Portfolio Optimization

National Council on Energy Policy Annual Meeting

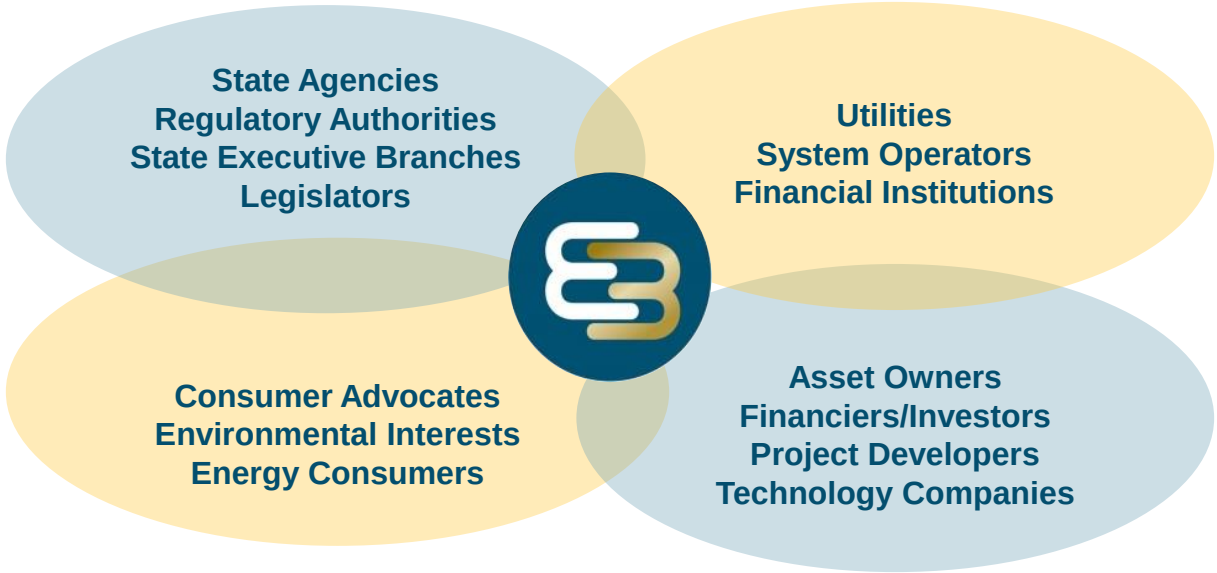
December 7th, 2020

Snuller Price, Sr. Partner

About Energy and Environmental Economics

- **Founded in 1989, E3 is a North American consultancy in the electric power sector**
- **Focus on energy transition and dedication to evidence-based analysis**
- **E3's project scope and breadth is unmatched for a firm of its size**
  - We complete over 250 projects a year across the energy sector
  - Constant innovation and in-house development of best-in-class tools

Client Types



Why Focus on Optimizing DER Now?

+ **Low Energy Costs ($/kWh)**
  - Energy efficiency cost-effectiveness challenges
+ **Higher Capacity Costs ($/kW)**
  - Coal, nuclear, and OTC retirements
  - Low growth on distribution
+ **Anticipated Rate Pressure**
  - Low sales during global COVID-19 pandemic
  - Low growth rate generally
  - Scrutiny on DER spending and ratepayer value
+ **Emerging market opportunities, FERC 2222**
  - Better business models for dynamic DER?
  - Dropping cost of communication and controls

Rebalance portfolio between energy and capacity resources

Raises the bar on the rigor needed on DER spending

Creates new opportunities that our frameworks may not properly value

How are we comparing DER resources?

Standard Practice Manual Approach

Deploy all cost-effective DER

Benefits = Avoided Costs
Generation capacity
Transmission capacity
Distribution capacity
Energy
Losses
Other elements depending on the state priorities and history
(CO2, DRIPE, A/S)

Integrated Resource Planning Approach

Develop least cost integrated portfolio to achieve goals and balance risks and outcomes

Typical goals
Reliability, Cost, Environment

Emerging GHG goals
GHG < X by 2030

"Least-cost Best-fit"

Additional Goals

Equity and low-income

Air quality improvement

Technology development

COVID-recovery and jobs

Mitigate climate change

Higher reliability

… many others as well

Questions

Do we need to rebalance our spending to maximize ratepayer value?

Do we have consistent treatment across all DER types, or are we siloed?

Do we have the right primary cost-effectiveness perspectives?

How much ratepayer money should we spend to achieve additional goals?

What is on the list of DER options?

+ Traditional DER Measures

+ Budgeted

- Energy efficiency
- Demand Response
  - DR Shed (System capacity focus)
- AMI deployment

+ Not budgeted (typically)

- Time-of-use rates & rate design
- Solar rooftop systems
  - Driven by Net Energy Metering rate

+ Growing DER Opportunities

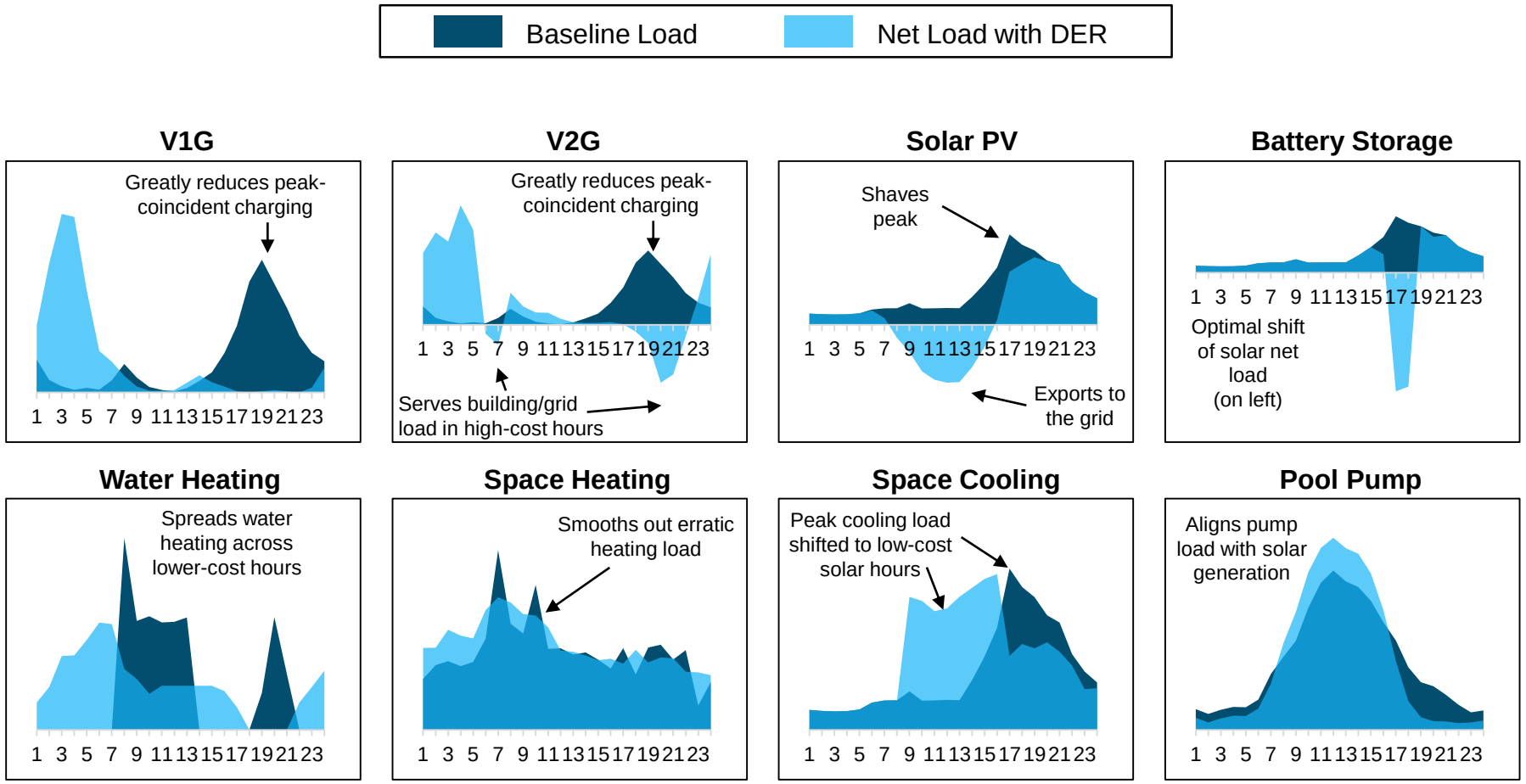
+ Dynamic response

- Smart controls, e.g. thermostats
- Demand response
  - DR Shed (System capacity focus)
  - DR Shift
  - DR Shimmy
- Smart EV charging & VGI
- Battery storage

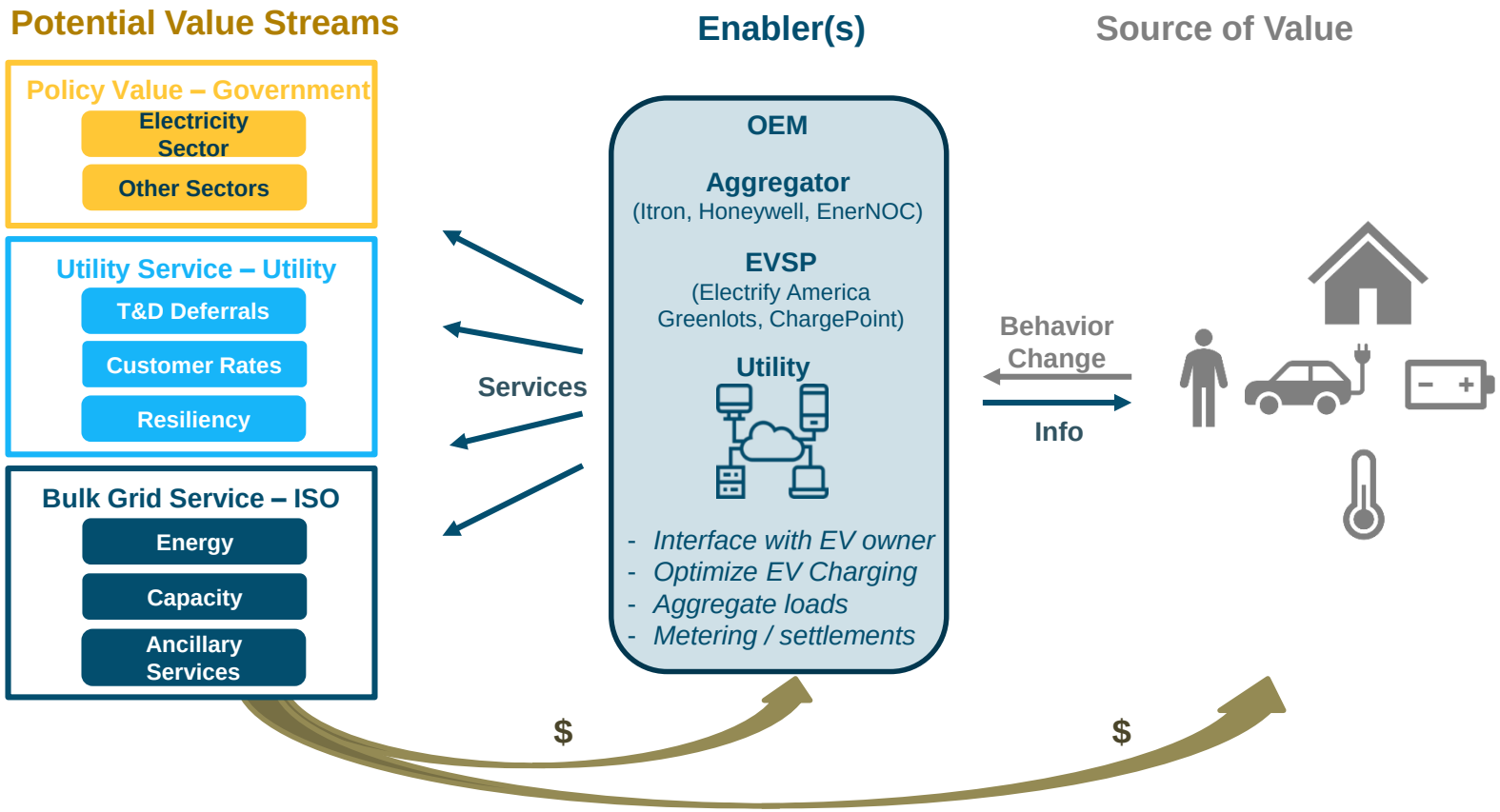
+ GHG Reduction

- Building electrification
- Vehicle electrification

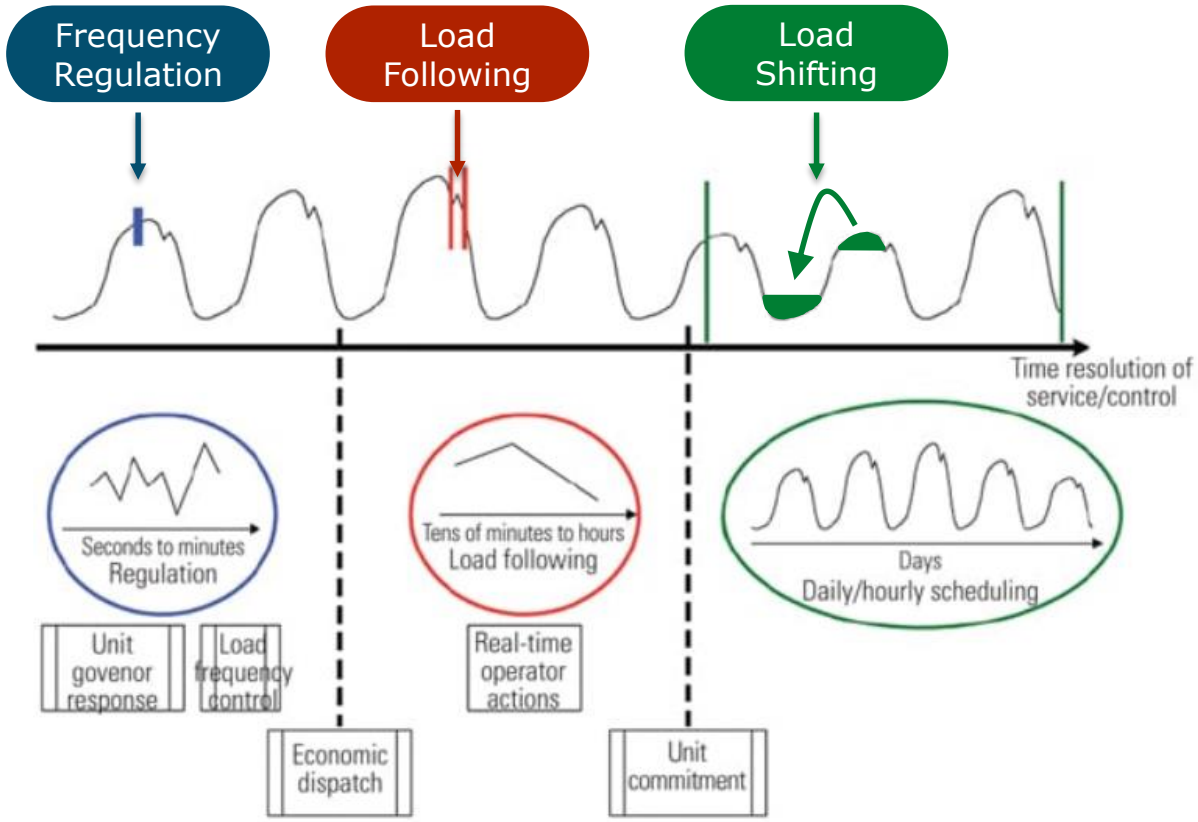
Diversity of Loads That Can Be Managed with Communication and Controls



Multiple players between consumer and revenue sources seek to tap VGI value



Which VGI services have the highest value?



https://www.powermag.com/getting-bulk-storage-projects-built/?pagenum=3

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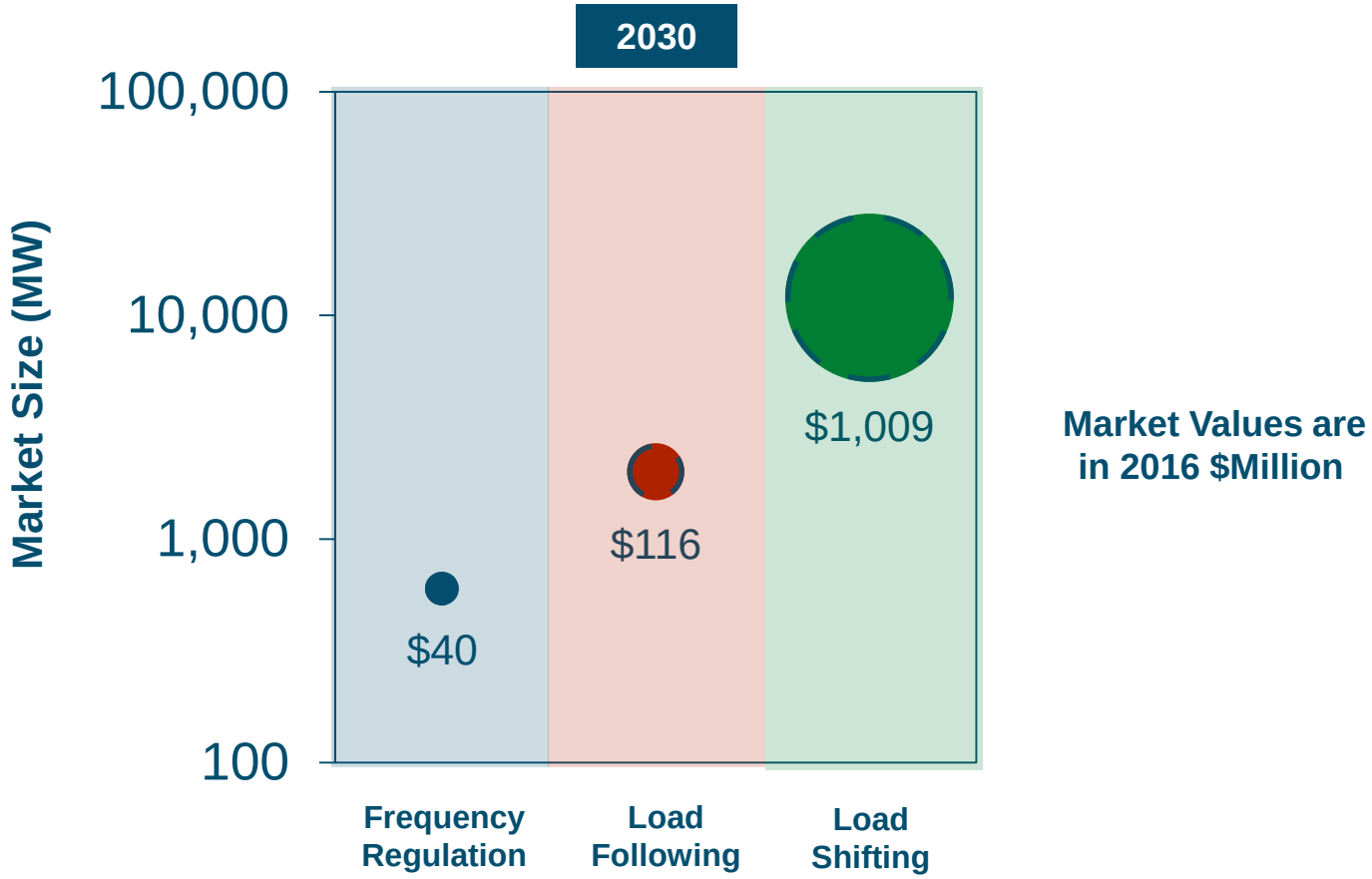
Load shifting will have the largest value in high renewables systems – CA Example



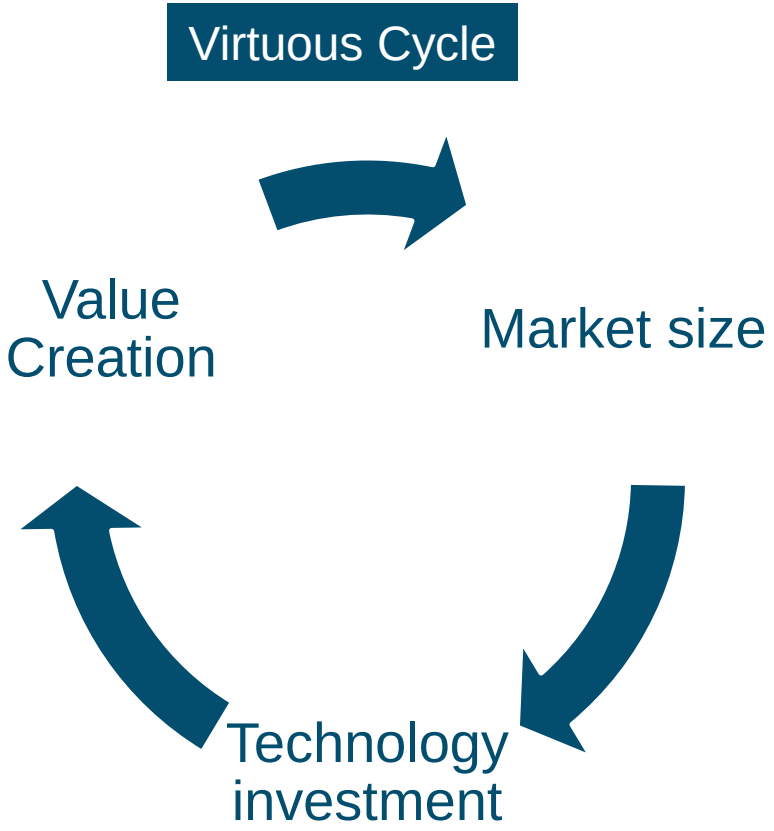
2018 CPUC IRP (CA 2018-2030 levelized value, 2016 $/kW-yr.)

Summary – Regulators and Regulated Utilities are Critical to DER Evolution

Regulatory actions
- Rebalance DER portfolios
- Integrate dynamic value streams for measurable capacity resources

Support investment in emerging DER technology
- Busines models for aggregators, enablers are essential

Wholesale market coordination through FERC 2222
- Opportunity for scale, standardization, rigor, and DER & system operations
- Needs a strong DER proponent to be workable and practical



Energy+Environmental Economics

Thank You

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Exploring Optimization through Benefit-Cost Analysis

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Q&A

Send questions to

Ask me, Kerry