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Briefing Reports on Microgrid Financing and Use Cases

NARUC-NASEO Microgrids State Working Group

Sam Cramer, NASEO

Kiera Zitelman, NARUC

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About NARUC

- Founded in 1889, the National Association of Regulatory Utility Commissioners (NARUC) is a non-profit organization dedicated to representing the state public service commissions (PSCs) who regulate the utilities that provide essential services such as energy, telecommunications, power, water, and transportation.
- NARUC's members include all 50 states, the District of Columbia, Puerto Rico, and the Virgin Islands. Most state commissioners are appointed to their positions by their governor or legislature, while commissioners in about one-third of states are elected.
- Our mission is to serve in the public interest by improving the quality and effectiveness of public utility regulation.
- NARUC’s Center for Partnerships and Innovation (CPI) is NARUC’s grant-funded technical assistance office for state PSCs.

About NASEO

- NASEO is the only national organization whose membership includes the governor-designated energy directors and their offices – *over 3,000 state energy professionals* – from each of the 56 states, territories, and District of Columbia.
- NASEO engages with federal energy policy and regulatory officials and private sector energy organizations on behalf of the states. NASEO's structure includes six regions and various topical energy committees (e.g., Security, Electricity, Financing, Transportation, Equity).
- State Energy Directors and their offices have broad policy and program responsibility over all energy sectors (e.g., grid, fuels, DERs, codes, efficiency, standards) , with over 80% having direct access to the governor and/or relevant cabinet secretary.
- State Energy Directors advise and support their governors and state legislators with 50% of the State Energy Directors serve as governor's energy advisor, and others function in an expert supporting role.

Microgrids State Working Group

In fall 2019, NARUC and NASEO initiated a joint Microgrids State Working Group (MSWG), funded by the U.S. Department of Energy (DOE) Office of Electricity (OE). The MSWG convenes NARUC and NASEO members representing more than 20 states to:

- Explore the capabilities, costs, and benefits of microgrids;
- Discuss barriers to microgrid development; and
- Develop strategies to plan, finance, and deploy microgrids to improve resilience.

Agenda Today

1. *User Objectives and Design Approaches for Microgrids*
2. *Private, State, and Federal Funding and Financing Options to Enable Resilient, Affordable, and Clean Microgrids*
3. Q&A
4. MSWG announcements

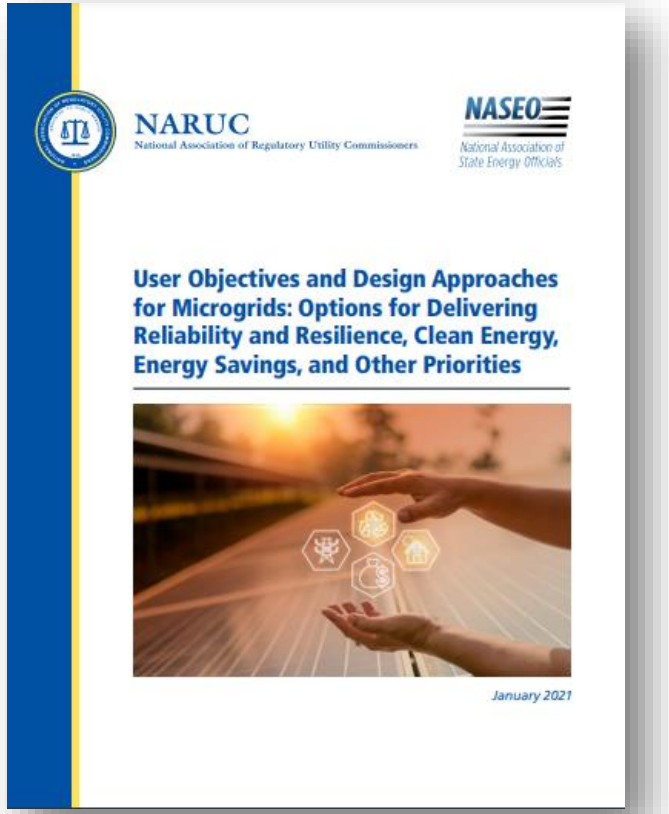
Download the Reports

- *User Objectives and Design Approaches for Microgrids: Options for Delivering Reliability and Resilience, Clean Energy, Energy Savings, and Other Priorities:* bit.ly/narucmicrogrids
- *Private, State, and Federal Funding and Financing Options to Enable Resilient, Affordable, and Clean Microgrids:* bit.ly/naseomicrogrids

User Objectives and Design Approaches for Microgrids: Options for Delivering Reliability and Resilience, Clean Energy, Energy Savings, and Other Priorities

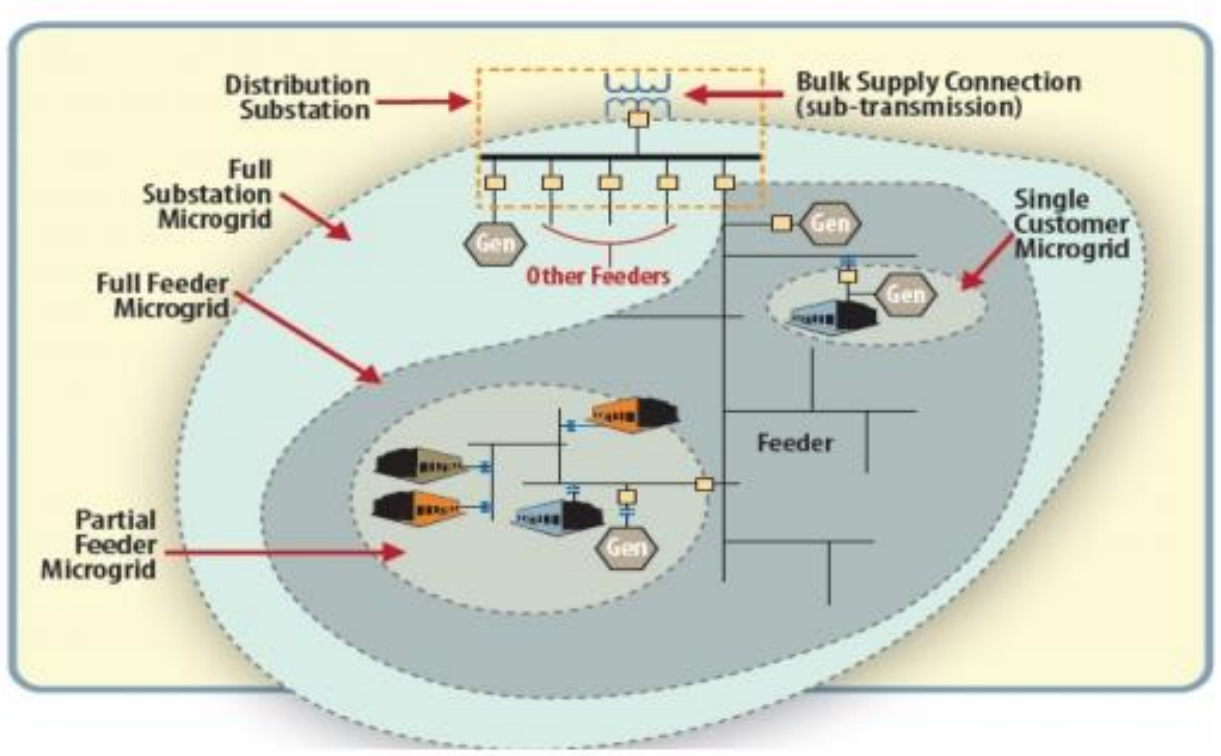
User Objectives and Design Approaches for Microgrids

1. Definitions
2. Decision Points and Design Process
3. Exploring Microgrid Objectives
4. Modeling Microgrid Objectives



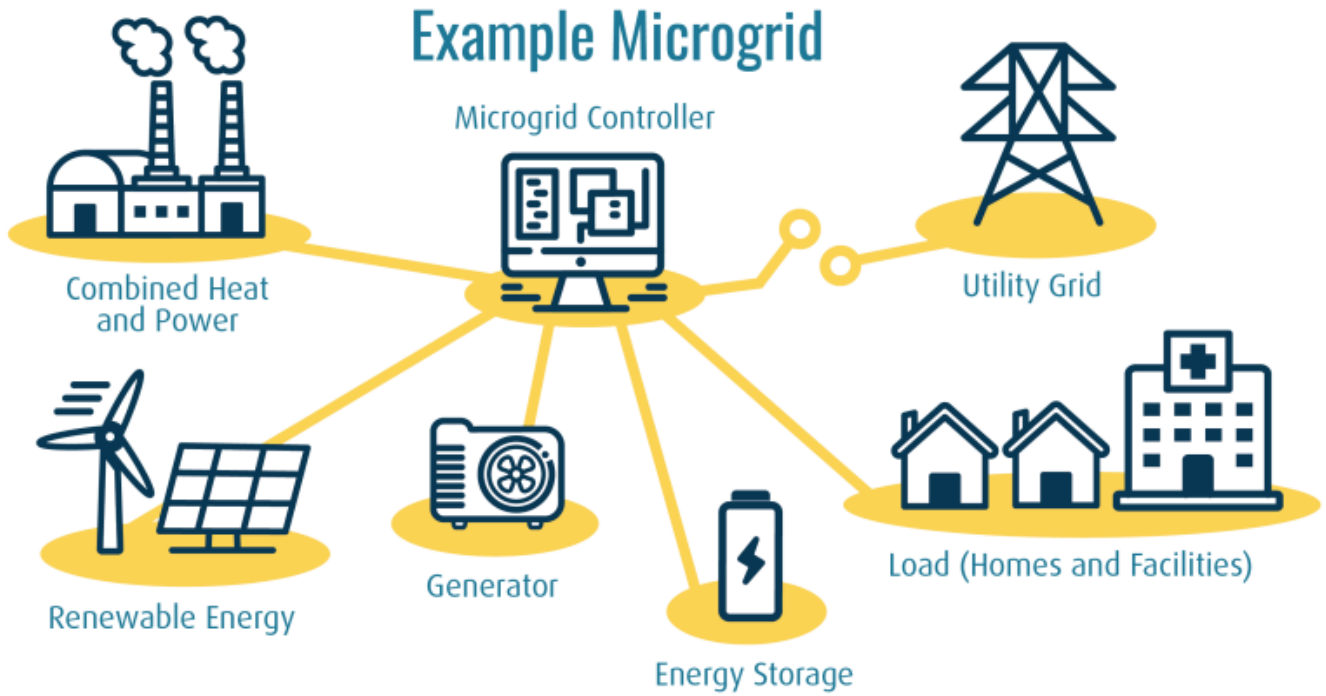
Definition of a Microgrid

"[A microgrid is] a group of interconnected loads and distributed energy resources within clearly defined electrical boundaries that acts as a single controllable entity with respect to the grid. A microgrid can connect and disconnect from the grid to enable it to operate in both grid-connected or island-mode."



Components of a Microgrid

1. Load(s)
2. Distributed energy resources (DERs)
3. Controls
4. Interconnection/point of common coupling



Microgrid Procurement Process

1. Feasibility study
2. Engineering, design, and business planning
3. Construction
4. Operation

Common Motivations for Microgrid Procurement

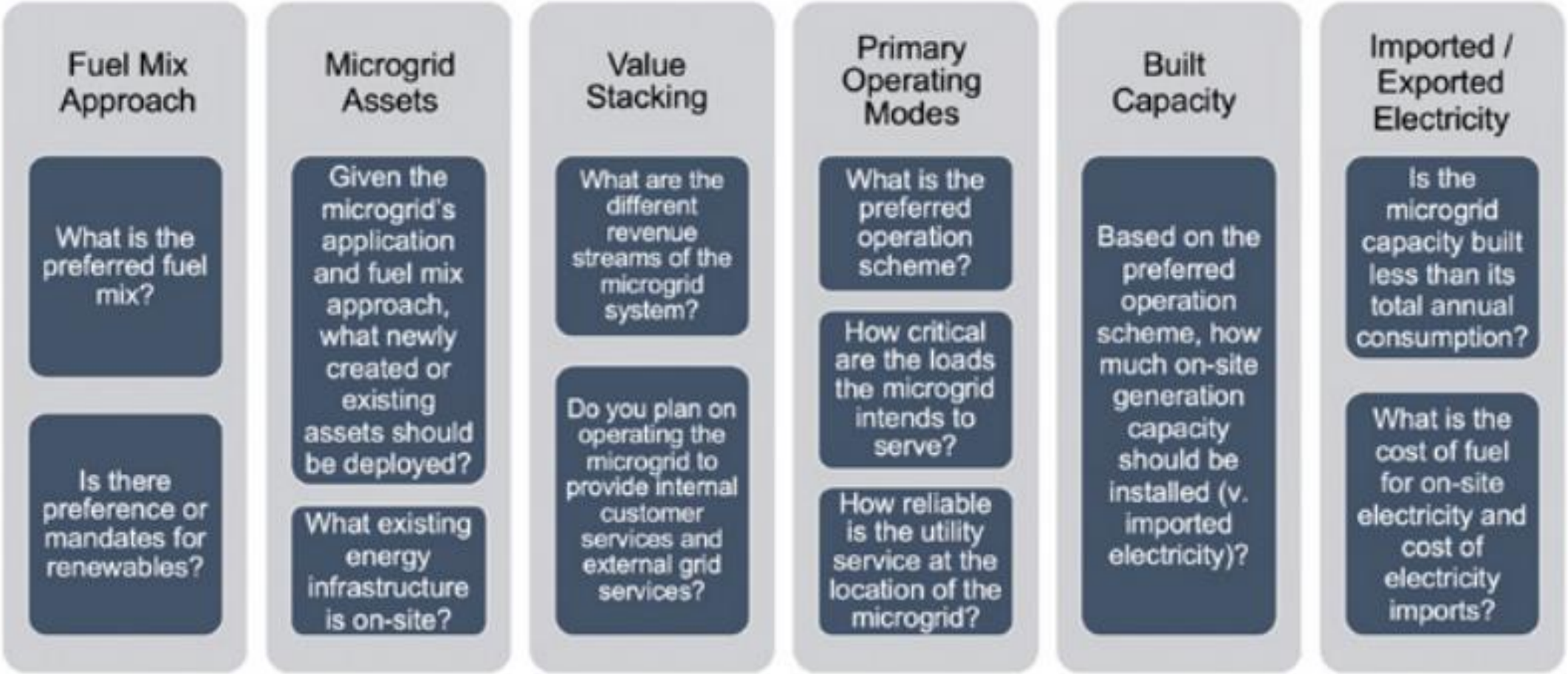
1. Increased reliability and resilience
2. Decreasing electricity costs
3. Expanding access to clean energy
4. Providing power to remote/island communities

Case Studies

Key Decision Points and Factors

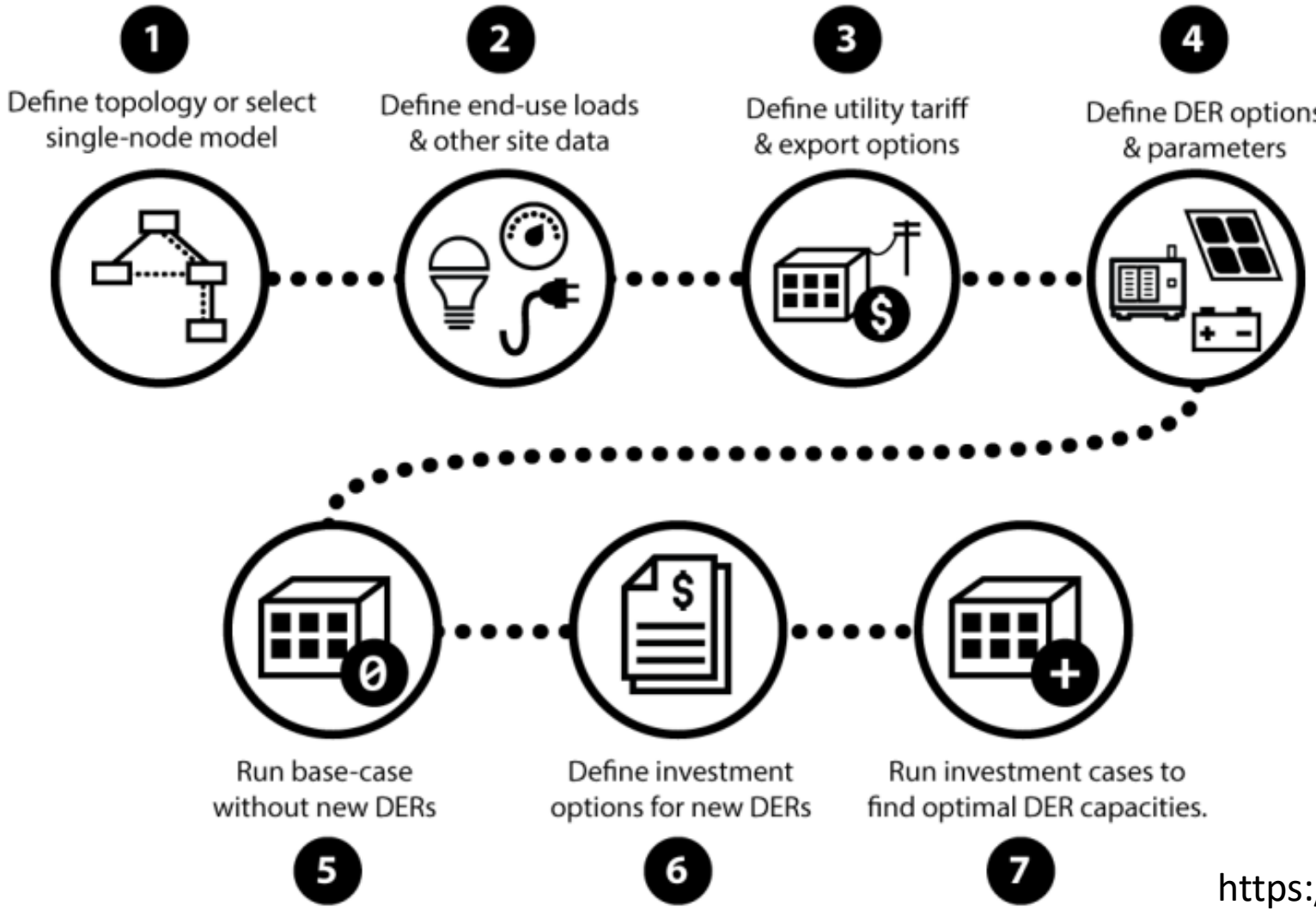
1. Designating critical loads and energy efficiency investment options;
2. Considering connecting multiple facilities to the microgrid;
3. Selecting generation and storage resources;
4. Considering cost drivers;
5. Selecting software, inverters, communication, and control systems; and
6. Exploring interconnection options.

Key Decision Points and Factors



Modeling Objectives

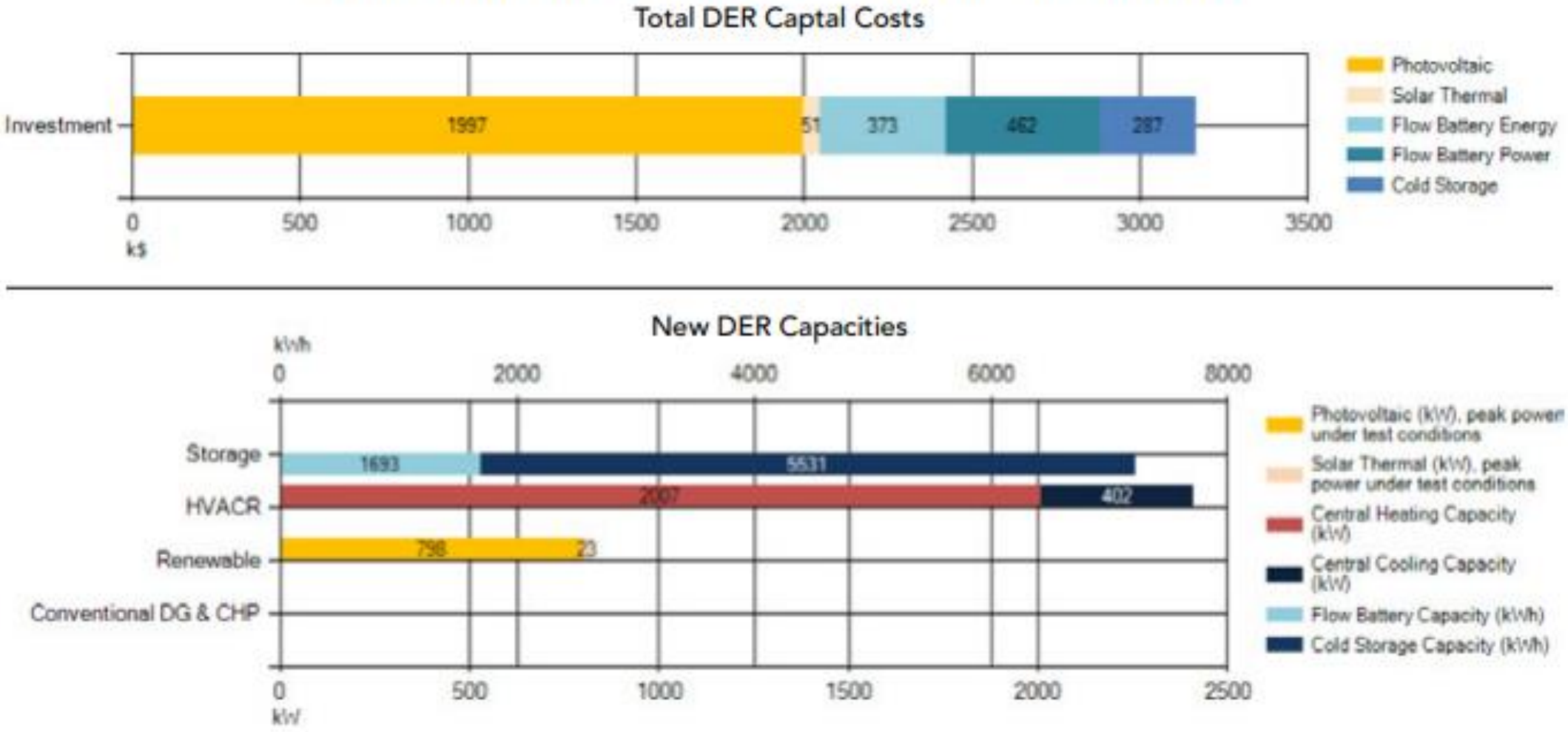
DER-CAM Project Workflow:



https://gridintegration.lbl.gov/der-cam

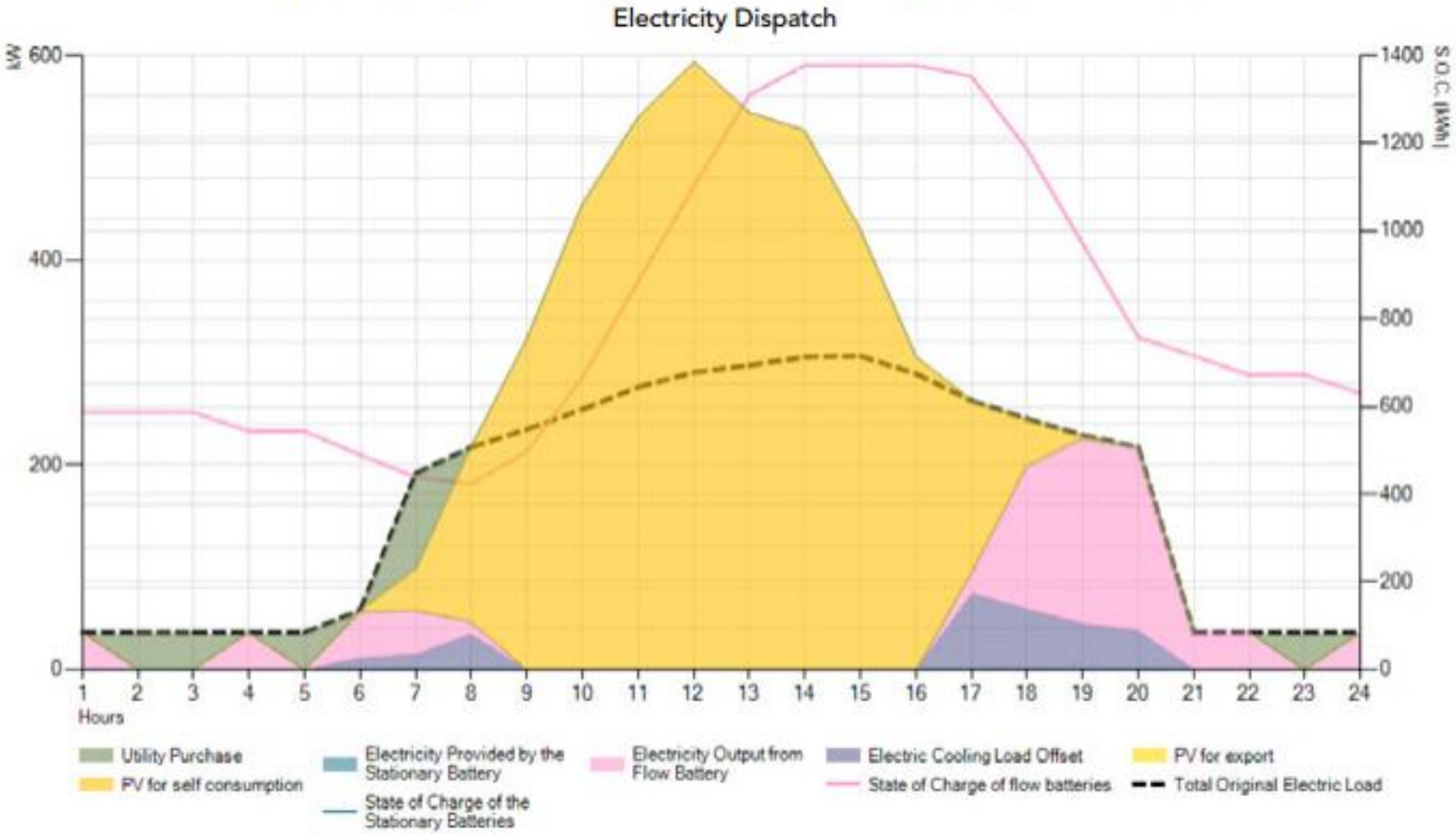
Modeling Objectives: Clean Energy Integration Use Case

Figure 23: Maryland School DER Capital Costs and Capacities



Modeling Objectives: Clean Energy Integration Use Case

Figure 26: Maryland School Electricity Dispatch, September Weekday



Determinants of Payback Periods

1. Current on-site energy consumption and spending
2. Generation from the microgrid
3. Capital cost of the microgrid
4. Funding and/or financing arrangements

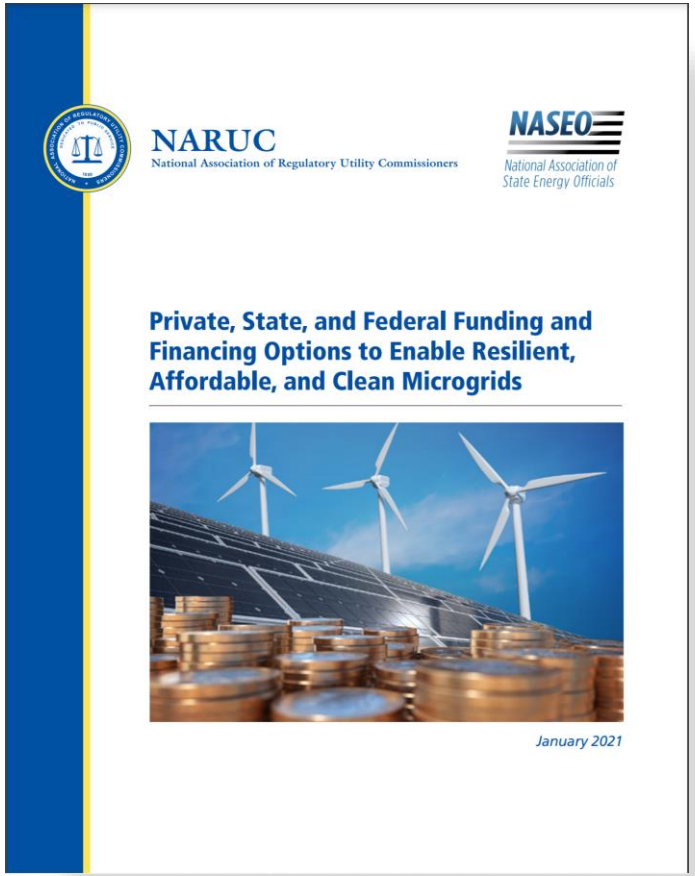
Recommendations for PUC and SEO Action

1. **Clarify the regulatory treatment** of microgrids by developing state-specific definitions reflective of jurisdictional characteristics, needs, and challenges.
2. **Encourage the provision of transparent and current interconnection information** to facilitate timely, cost-effective interconnection for microgrid customers.
3. **Continue to discuss and advance methodologies** to value the full range of benefits that microgrids can offer, particularly regarding energy resilience.
4. **Facilitate productive engagement** between microgrid adopters and community/stakeholder groups to identify opportunities for microgrids to provide greater energy, socioeconomic, and/or environmental benefits to both connected customers and the surrounding community.

State, and Federal Funding and Financing Options to Enable Resilient, Affordable, and Clean Microgrids

Content

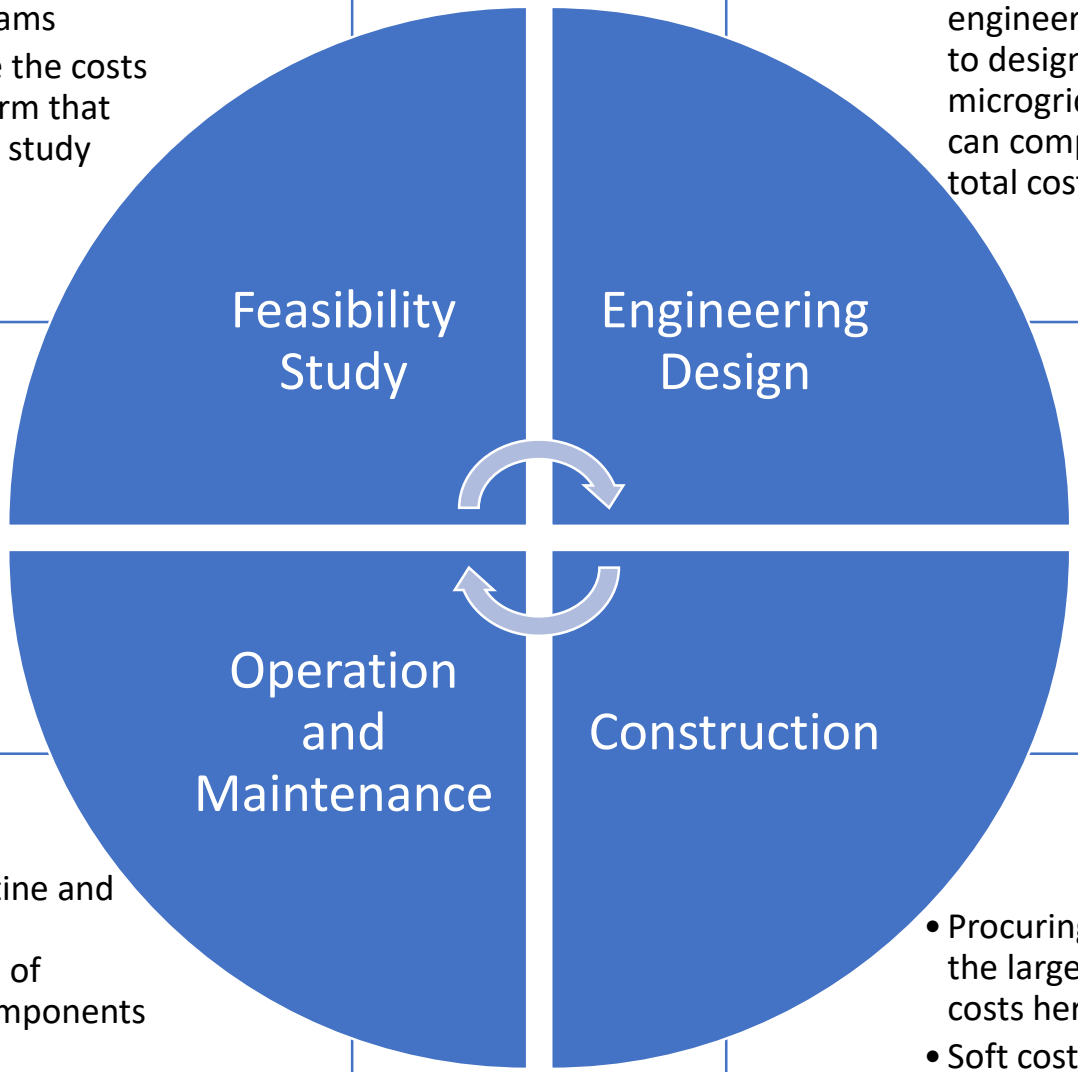
1. Why Fund or Finance Microgrids?
2. Cost Drivers and Revenue Streams for Microgrids
3. Public-Private Partnership Financing Models for Microgrids
4. State Microgrid Funding Programs
5. Federal Funds for Microgrids
6. Actions State Energy Offices and Public Utility Commissions Can Take to Support Microgrid Funding and Financing Efforts



Why Should a State Fund/Finance Microgrid Development?

- Microgrids provide reliable, resilient, and affordable electric power to critical infrastructure in a state.
- Microgrids can require substantial amounts of capital to design, construct, and operate.
- States have limited capital budgets available to spend on various energy priorities
- Financing allows microgrid consumers to borrow public or private capital and repay that capital over a number of years according to a set schedule, instead of the more difficult proposition of paying all costs up front
- There are now a number of different financing mechanisms that can fund microgrid development

Microgrid Cost Drivers



- Evaluation of potential revenue streams
- Costs include the costs paid to the firm that conducts the study

- Soft costs for the engineering firm hired to design the microgrid at this stage can comprise 4-10% of total costs

- Includes routine and unexpected maintenance of microgrid components and controls

- Procuring generation is the largest share of costs here
- Soft costs can cost between 10-45%

Microgrid Revenue Streams

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- Federal/State/Utility Incentives
- Reduced Energy Costs
- Demand Response
- Electricity Exports
- Ancillary Services
- Distribution Support Service Agreements
- Local Energy Market Participation
- Reduced Flood Insurance Premiums
- Non-Wires Solutions
- Renewable Energy and Battery Subsidies

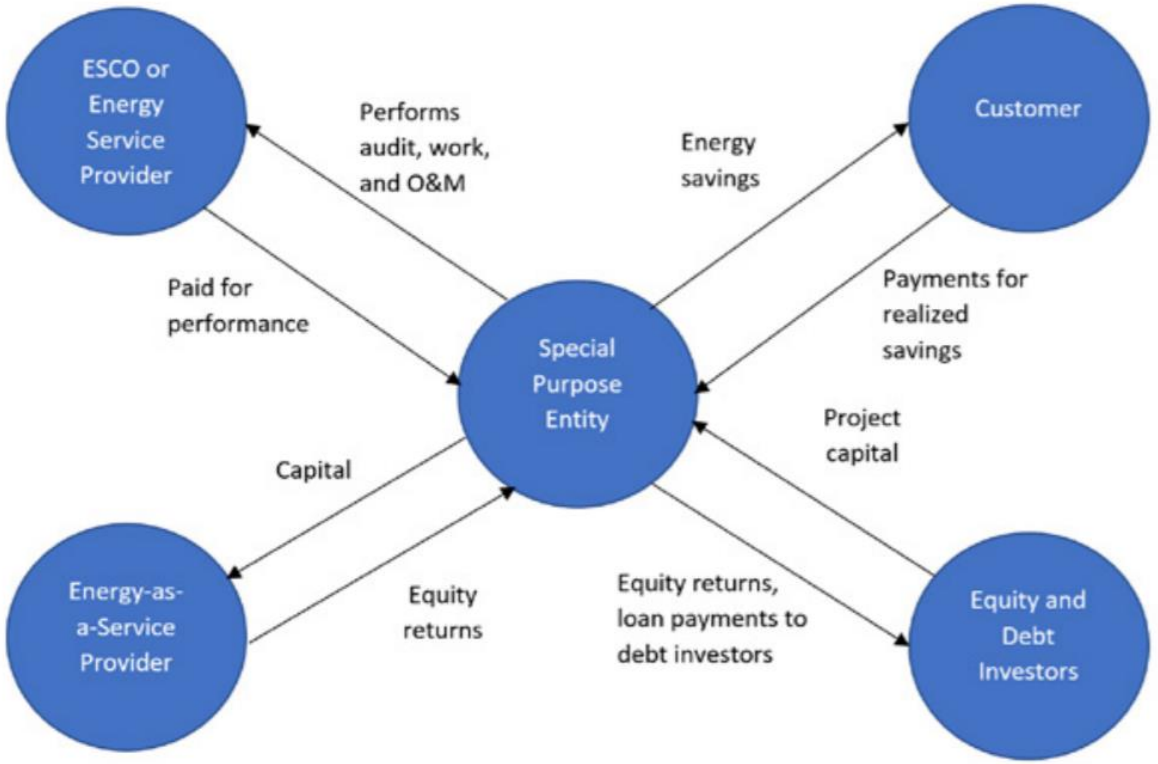
Public-Private Partnership Opportunities for Microgrids

- Energy-as-a-Service (EaaS)
- Energy Savings Performance Contracts (ESPCs)
- Commercial Property Assessed Clean Energy (C-PACE)

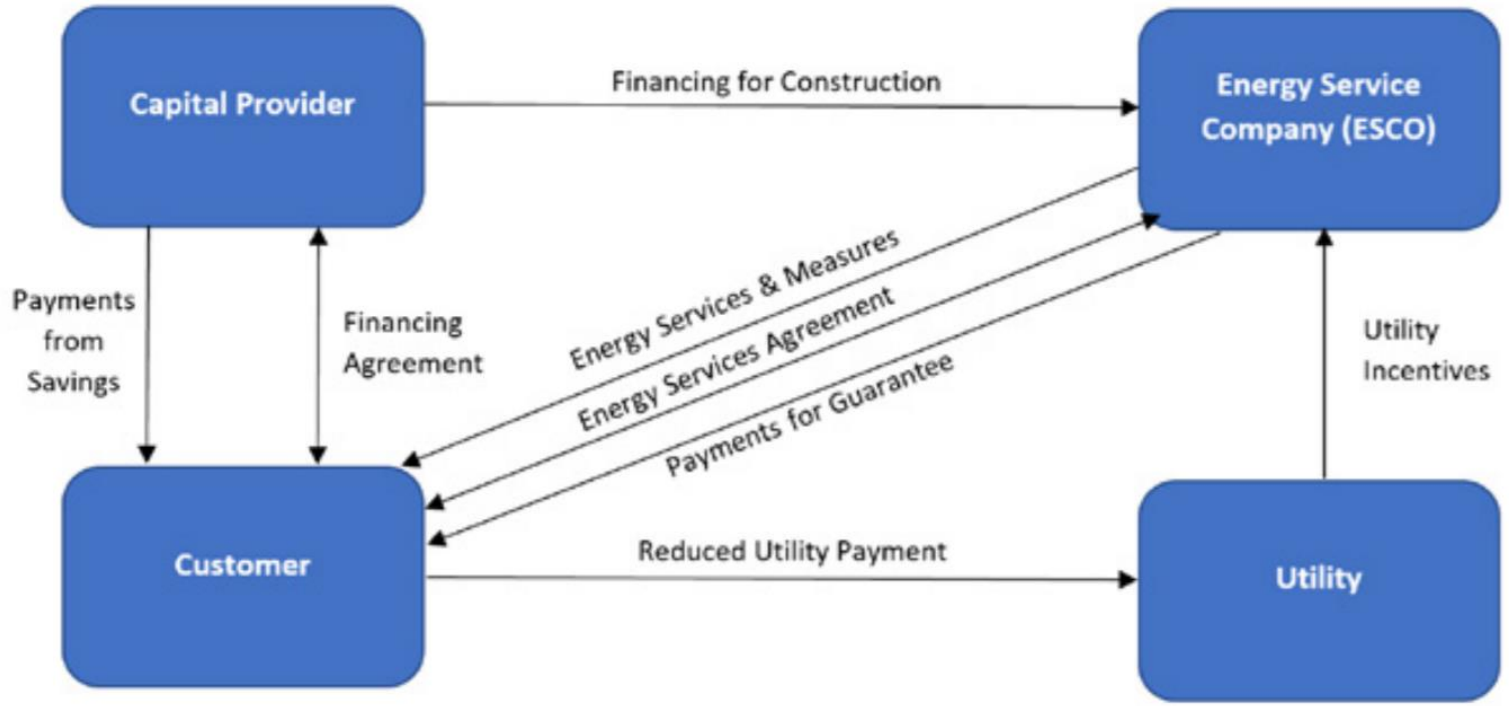
Energy-as-a-Service

- Uses performance savings to pay for project upgrades
- Off-balance sheet transaction
- Complex; involves multiple parties working together
- Almost exclusively used by privately-owned buildings
- Third-party ownership of improvements may cause regulatory issues, depending on state and local government laws
- Ex: Montgomery County, MD Public Safety Headquarters Microgrid

Figure 2: Generalized Energy-as-a-Service Financial Agreement



Adapted from G. Leventis, et al., "Current Practices in Efficiency Financing," Lawrence Berkeley National Laboratory, November 2016, p. 54, http://eta-institutionalations.lbl.gov/sites/default/files/lbnl-1006406.pdf.



Energy Savings Performance Contracts (ESPC)

- Provides a guarantee of level of savings; uses savings to repay capital loans
- Relies on specific energy savings to provide revenues; mostly suited for building upgrades
- Ex: U.S.Navy Microgrids at Portsmouth Naval Shipyard and New London Submarine Base

Commercial Property Assessed Clean Energy (C-PACE)

Can be used to help fill in financing gaps, if building efficiency savings can cover costs of other microgrid technologies

Mostly single-building specific

Ex: Single-building microgrid, City of Hartford, CT

Roles for Public Funding in Microgrid Projects

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- There may be pieces of a microgrid that private capital is either unable or unwilling to finance, particularly community microgrids with multiple critical facilities operating within the same microgrid system.

Grants

- Grants can be especially useful at the beginning stages of the microgrid design process (the feasibility study and detailed design phases)
    - Costs to complete these stages are lower (thus easier for public entities to shoulder); and
    - Grants can potentially cover the full costs of the design.
- Grants are sustainable only if the money available for them continues to be appropriated as part of legislative or agency budgets.

Financing

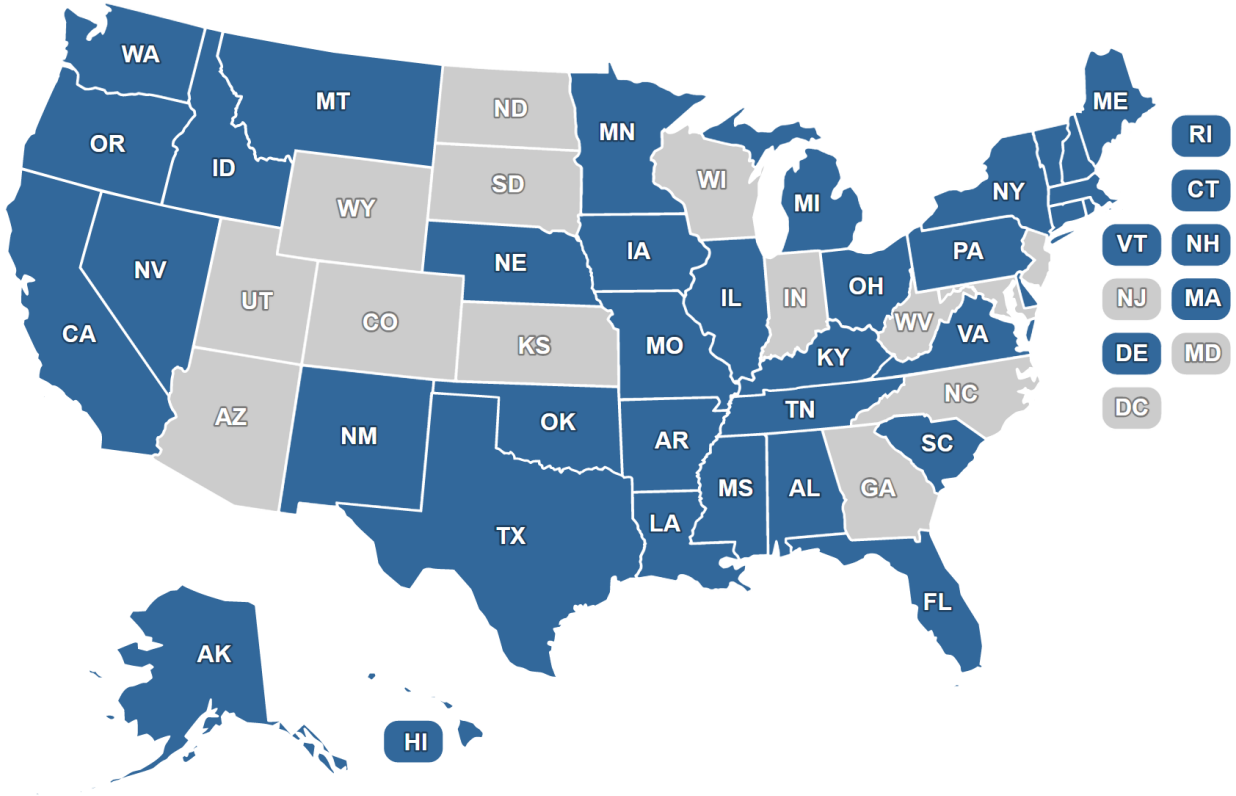
- Pure financing offers a more sustainable solution, as loan repayments can be used to make more loans over time; this is the key principle underlying a Revolving Loan Fund.
- It may be difficult for microgrid customers to attract significant private financing until later on in the design or construction process when the customer has determined what revenue streams to pursue.

State Funding and Financing Programs for Microgrids

- State Energy Revolving Loan Funds
- Grant and Incentive Programs
- State-Supported Green Banks
- Green Bonds
- Competitive Grants
- Utility Rate Recovery

State Energy Revolving Loan Funds

- State Energy Officials/Public Utility Commissioners have strong familiarity with these programs
- State-run loan programs can offer below-market rate financing
- Agencies limited by what their existing programs are allowed to fund
- Davis-Bacon, Buy American, and ARRA reporting provisions apply to loan funds capitalized with ARRA funds
- Ex: Washington Clean Energy Fund Microgrid



Grant and Incentive Programs

- Available for all stages of the microgrid development processState-run loan programs can offer below-market rate financing
- Especially useful for the feasibility study and design stages before revenue streams are identified
- Grant programs limited by amount of money appropriated by legislature/agency; non-replenishable otherwise
- Ex: New Jersey Town Center Microgrids

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State-Supported Green Banks

- Ability to lend and provide “gap financing” for larger microgrid projects
- Currently limited to those states that have already established Green Banks
- Ex: Connecticut Green Bank Microgrid Financing Program

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Green Bonds

- Take advantage of state/local governments' ability to borrow to finance projects
- Relatively novel solution for microgrids; not many examples for state/local governments to emulate
- Ex: Camden County, New Jersey microgrid

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Competitive Grants

- Can focus development of microgrids towards meeting state goals
- Ability to foster microgrid development on large scale
- May require significant amounts of capital to entice developers to participate in the competition
- Ex: NY Prize Microgrid Competition

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Utility Rate Recovery

- Utility owns and operates microgrid. Can reduce issues surrounding rightof-way, interconnection, and other microgrid barriers
- Utility can site microgrid for optimal support towards the larger grid
- Reluctance of Public Utility Commissions to allow utilities to use ratepayer funds to construct microgrids
- Potential issues around cross-subsidization of microgrid customers
- Ex: Commonwealth Edison Bronzeville Microgrid

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Federal Funding for Microgrids

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- FEMA Building Resilient Infrastructure and Communities Pre-Disaster Mitigation Grants
- FEMA Hazard Mitigation Grant Program
- HUD Community Development Block Grant – Disaster Relief

Actions State Energy Offices and Public Utility Commissions Can Take to Support Microgrid Funding and Financing Efforts

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- Developing new rate structures that microgrids can use to develop predictable revenue streams
- Enabling public-private capital financing options as a first step to provide more alternatives for microgrids to source capital
- Providing public funding at key points in the microgrid financing process to reduce private investment risk in microgrid development
- Providing comprehensive technical assistance and support for customers considering various funding and financing options
- Ensuring that regulatory certainty for microgrids is present to support investor plans
- Empowering underserved communities to finance microgrids to meet their needs


Q&A

MSWG Announcements

Next webinar: April 7, 2021 | 3:00 – 4:00 pm ET + members-only discussion with the Rhode Island Office of Energy Innovation

Natural disasters and severe weather events have increased in both magnitude and frequency in recent years posing a serious threat to the electric power system and emphasizing the need for a more resilient grid. One-way regulators and state energy officials are looking to increase resilience is by strategically deploying microgrids to provide backup power to critical facilities in the event of a power outage. During this webinar, the Smart Electric Power Alliance (SEPA) and Kentucky Office of Energy Policy will present the findings from their recent study on microgrid deployment strategies in Kentucky and how these strategies can be replicated in other states to enhance resilience.

Thanks for your attention!

Feel free to reach out with additional feedback.

NARUC contacts:

- Kiera Zitelman, kzitelman@naruc.org
- Dominic Liberatore, dliberatore@naruc.org

NASEO contacts:

- Sam Cramer, scramer@naseo.org
- Kirsten Verclas, kverclas@naseo.org