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State Microgrid Policy, Programmatic, and Regulatory Framework

NASEO-NARUC Microgrids State Working Group

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Executive Summary

The reliability and resilience of the United States electric grid is a paramount concern for state and federal policymakers and regulators. As extreme weather and physical and cyber-attacks on grid infrastructure have led to outages of increased duration, scale, and impact on power customers and communities, policy and regulatory attention has shifted toward innovative investments to improve grid resilience.

Numerous state and federal statutes and non-legislative state actions, such as governors' directives, have focused on the deployment of resilience investments, such as microgrids, as a tool to help mitigate the impacts of power outages, integrate more clean energy within the grid, support more localized control of electricity generation, and other goals. In particular, microgrids provide significant resilience benefits with their ability to island and maintain critical loads during outages. Many State Energy Offices and Public Utility Commissions (PUCs) have been tasked by their governors and legislatures with translating this interest into action by designing programs, policies, rules, and regulations for microgrids. As a result, the National Association of State Energy Officials (NASEO) and the National Association of Regulatory Utility Commissioners (NARUC) created this framework to serve as a resource and guidance for developing a state microgrid policy, program, or regulation.

This framework provides relevant background information for State Energy Offices and PUC consideration, regardless of their state's microgrid landscape, through examples from peers as states across the country have implemented varying strategies to enable microgrids. It is a reference for state officials to consult when faced with new statutory authority or a non-legislative impetus to revise existing or create new microgrid programs and / or regulations. In addition to state officials, this framework can be a valuable tool for federal, state, and local policymakers, investor and consumer-owned utilities, consumers, community groups, and other stakeholders seeking to understand the complex policy and regulatory environment of microgrids, the roles of State Energy Offices and PUCs in supporting microgrid development and deployment, and how to engage with policy, programmatic and regulatory initiatives.

Although State Energy Offices and PUCs have different electric distribution system roles, each is interested in ensuring the safe, reliable, affordable, and beneficial deployment of resilience projects, such as microgrids, to achieve their state's policy goals and requirements.

- **Section I:** this framework begins with background information on microgrids in the context of today's energy and climate goals. Section I provides a brief overview of relevant definitions and how the framework can serve as a resource for State Energy Offices and PUCs.
- **Section II:** the next section provides an overview of existing State Energy Office and PUC efforts related to microgrids and examines factors like resilience threats and market structure. The section also looks at the role of investor and consumer-owned utilities in the microgrid development process and provides an overview of legislative activity.
- **Section III:** the framework then discusses State Energy Office and PUC needs when they scope and launch a microgrid policy, program, project, or regulatory action. These include stakeholder engagement and technical assistance with examples to support each.
- **Section IV and V:** the next two sections discuss existing state programs and regulatory initiatives as examples to walk through illustrative steps for developing microgrid policy and programs or regulations. These sections are set up so that a State Energy Office or PUC can select the relevant section and determine what might be needed for developing a microgrid program, policy, or regulation for their state.

In exploring this framework, the authors also recommend that readers reference previous publications from NARUC and NASEO, including papers on valuing resilience, user objectives and design approaches, funding and financing options, and clean energy microgrids.

I. Introduction

The purpose of this framework is to provide a resource for PUCs and State Energy Offices as they develop policies, regulations, and programs to support microgrids. Through shared understanding of the roles of these different entities, the framework aims to foster productive collaboration to support microgrid development. The framework builds on discussions held by the NASEO-NARUC Microgrids State Working Group (MSWG).[1] Regardless of where a State Energy Office or PUC may be in the process of designing and implementing microgrid policy, programs, or regulations, all can benefit from sharing knowledge and strategies. Further, other state-level decision makers such as legislators and emergency management agencies, as well as investor and consumer-owned utilities, municipal leaders, critical infrastructure owners / operators, and customers, can gain from understanding the roles of PUCs and State Energy Offices in facilitating microgrid deployment.

In the context of distributed energy resource (DER) proliferation, growing threats to the power grid, and increasing reliance on electricity for mission critical facilities and services, microgrids have emerged as a compelling solution for customers and communities looking to improve their ability to prepare for, adapt to, withstand, and recover from disruptions and minimize their impacts on life-saving and critical services. Microgrids have drawn the attention of PUCs and State Energy Offices, agencies responsible for setting regulatory rules, incentives, policies, and programs affecting the grid. Microgrids enable customers to maintain some level of electricity flow to critical loads during a broader outage (also known as island mode). Microgrids can also operate under normal "blue sky" conditions to generate on-site electricity for consumption or export and provide grid services to help stabilize the grid and manage DERs. The definition of a microgrid from DOE is:

> "[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." (Ton & Smith, 2012)

PUCs have a key role in assuring the safety, reliability, and affordability of the distribution system, and can establish the regulatory guidelines for microgrid developers and customers, particularly for microgrids that interconnect to the distribution grid. Several PUCs have put forth their own definitions for microgrids, sometimes involving multiple tiers depending on how many customers, facilities, and generation sources are included in the microgrid's footprint. The New Jersey Board of Public Utilities (BPU), for example, developed a three-tiered system to describe microgrids:

> "Level 1 or single customer microgrid. This is a single DER system such as a photovoltaic solar (PV) system, combined heat and power (CHP) or fuel cell (FC) system that is serving one customer through a single meter. This microgrid class is connected to and can island from the distribution grid.
>
> "Level 2 or single customer / campus setting; also referred to as the partial feeder microgrid. This classification includes either a single or multiple DER systems connecting multiple buildings, but controlled by one meter at the point of common coupling.[2] This microgrid class is connected to and can island from the distribution grid.
>
> "Level 3 or multiple customers / advanced microgrid; also referred to as the full feeder microgrid. This is a single or multiple DER system that serves several different buildings/customers that are not

1 The NASEO-NARUC Microgrids State Working Group, with support from the DOE Office of Electricity, brings together State Energy Offices and PUCs to explore microgrid technologies and applications, policy and regulatory frameworks, and financing models to understand the full range of benefits that microgrids can provide. The working group highlights existing microgrid projects and shares best practices and resources for states.

2 The Institute of Electrical and Electronics Engineers (IEEE) defines the point of common coupling (PCC) as the point in the power system at which the interface between the electric utility and the customer occurs. In general, this point is the customer side of the utility's meter. See https://www.sciencedirect.com/topics/engineering/point-of-common-coupling.

on the same meter or on the same site as the DER. An advanced microgrid has one [PCC]. The individual buildings/customers may be independently connected to the larger distribution grid and through the microgrid PCC." (New Jersey BPU, n.d.)

The ability of microgrids to island is an attractive feature to customers, with many customers citing resilience as a primary motivation for procuring a microgrid (Zitelman, 2021). The prospect of scaling up a microgrid to provide resilience to multiple customers, while of interest to customers, also brings up regulatory and policy questions for PUCs charged with regulating the distribution of electricity. While most microgrids in the United States are designed and operated as a single-site, single customer, 'behind-the-meter' installment, regulatory considerations primarily impact 'front-of-meter' microgrids directly connected to the distribution system.

Microgrids are of great interest to State Energy Offices because they are responsible for allocating state and federal taxpayer dollars to beneficial investments. State Energy Offices advance energy policies; support technological research and deployment; and support economic development, resilience, and decarbonization goals through their programs and activities. They work closely with the private sector, community-based organizations, consumer-owned utilities, and other key stakeholders and play an important role in convening these different groups to explore opportunities and challenges associated with innovative technologies, such as microgrids. State Energy Offices are also responsible for developing a State Energy Plan, which looks at overall energy strategy and needs, and, often, a State Energy Security Plan, which explores hazard mitigation and energy emergency response measures.

Concurrently, with increasing interest in microgrids, DERs, and resilience, the energy delivery system has faced growing threats to reliable service. Local and regional interruptions to electricity service within the United States occurred nearly three times as often in 2016 as in 1984 (Barrett, 2016). The frequency of weather and climate-related disasters causing at least $1 billion in damages has steadily risen – in 2021, 20 such events caused a collective $152.6 billion in damages and 724 fatalities across the country, compared to an annual average of 3.1 events, $20.2 billion, and 297 fatalities in the 1980s, adjusted for inflation (NOAA, 2022).

Another trend has been the increased reliance on electricity for a growing range of services, particularly heating and transportation. In addition, the United States is reliant on data centers and related telecommunications for all critical services and this sector requires extraordinary electric reliability. Driven by state policy goals favoring low- and zero-carbon energy sources and customer desires to diversify away from fossil fuels (e.g., coal, natural gas, diesel, and gasoline) due to climate concerns and as a hedge against price volatility, many services previously reliant on fossil fuels have transitioned or will in the near future rely on electricity.

II. State Microgrid Landscape

States are taking various steps to facilitate the deployment of microgrids that improve resilience and further the achievement of other policy goals, such as integrating clean energy, expanding access to electricity, reducing energy costs, and/or addressing the needs of underserved communities. The urgency by which states approach the development of microgrid programs, policies, and/or regulations are affected by numerous factors, including:

- **Reliability:** Are outages frequent, long in duration, and / or impacting large numbers of customers? How is quality of service impacted?
- **Resilience threats:** What threats are impacting utility service, and are microgrids a feasible solution to protect customers and communities from these risks? How might microgrids enhance critical infrastructure security from either physical or cyber threats? How are climate impacts affecting the long-term threat outlook? Is replacement equipment readily available?
- **Customer outlook:** What types of customers are expected to procure microgrids (e.g., aggregations of residential customers, municipalities, large commercial and industrial customers, educational campuses)?
- **Market structure:** What types of entities are expected to participate in the market for microgrids? Are there standardized interconnection agreements to facilitate the ease of microgrid deployment? Will community-owned microgrids become subject to state regulation?
- **Utility business model:** Can utilities own and / or operate certain components of microgrids (such as generation) or entire microgrids meeting certain characteristics? How should multi-customer, front-of-meter microgrids be planned, regulated, and financed? Can microgrids access value streams from wholesale markets?
- **State policy goals:** Is the state working to achieve clean energy, electrification, affordability, resilience / reliability, or other policy goals? Are there specific carve-outs, incentives, or targets for DERs or microgrids? Can microgrids aid in the achievement of these goals? How do microgrids fit into broader state plans centered around resilience, clean energy, and energy security?

Typically, microgrid programs and regulations may originate within state legislation, which encourages or requires State Energy Offices and / or PUCs to initiate decision-making processes, to launch a microgrid grant program, or otherwise reduce barriers to microgrids. Statutes creating microgrid programs often include appropriations of taxpayer resources to support programs; those requiring regulatory action may not include specific public appropriations but may be funded by utility ratepayers and clarify the purpose the regulations should work towards. Statutes often include definitions of microgrids and other relevant terms. Additionally, a microgrid may not inherently consist of clean or renewable energy resources. Requirements regarding fuel source or emissions reduction will need to be legislated, negotiated, or established by regulatory rulemaking, if not already specified.

Translating a statute into regulatory and / or programmatic actions can take anywhere from one to five years, or even longer depending on the complexity of issues and number of stakeholders involved. Microgrid regulatory initiatives at the **California** and **Hawaii** commissions were initiated by statutes passed into law in 2018; both dockets remain open and active as commissioners, staff, and stakeholders move from simple or short-term actions to more complex, multi-stakeholder, and long-term questions. While stakeholders may push for speed, State Energy Offices and PUCs are faced with the responsibility of weighing public interest considerations, programmatic objectives, the scope of their statutory authority, and other factors before taking action. Stakeholder input is a critical component of any regulatory or programmatic effort, and State Energy Offices and PUCs may organize in-person and / or virtual workshops, technical working group meetings,

written notices for public comment opportunities, and other chances for stakeholders to provide information and perspectives to regulators and program staff. Stakeholder input is further explored in sections below.

When considering the market for microgrids, a state's energy policies, regulatory structure, and utility market structure, as well as the utility's ability to own generation and/or storage resources connected to the distribution network, are important drivers of microgrid development and deployment. For investor-owned utilities, there is substantial diversity between states in vertically integrated markets versus for restructured electric utilities. In the former, utilities own and operate generation, transmission, and distribution assets. Vertically integrated utilities may own and operate microgrids in their service territory, with costs to be recovered from customers via rates. In the latter, utilities own and operate distribution (and in some cases, transmission) networks; however, generation is opened to independent power producers bidding into competitive power markets operated by an independent system operator (ISO) or regional transmission operator (RTO). The ownership and operation of microgrids is subject to competition, and electric distribution utilities in restructured environments may be formally prohibited from owning and / or operating parts or all of a microgrid. Still, regulated utilities own the distribution network in either scenario, and any microgrid distributing electricity from one customer to another, across a public right-of-way, requires the use of utility-owned, PUC-regulated distribution infrastructure and must coordinate with the distribution utility. This issue is commonly identified as a barrier to multi-customer microgrids; regulated utilities and PUCs are responsible for the safety of the distribution network and require some level of visibility and / or control over distribution-connected resources. Single-customer or campus microgrids can generally interconnect without use of utility infrastructure.

Consumer-owned utilities, such as municipal utilities or rural cooperatives, are generally not regulated by PUCs. This means they might have different challenges and opportunities associated with microgrids. For example, some rural cooperatives might have limitations on how much electricity they can self-generate through existing contracts with power producers. Others have a limited customer base which reduces the amount of financial costs they can absorb. In addition, they may need to educate their members on the benefits and costs associated with different types of microgrids (e.g., single-customer, campus, multi-customer). For those consumer-owned utilities serving rural areas, though, microgrids may provide greater benefits by defraying costs associated with transmission line upgrades or the installation of new lines. Rural areas that are served with an islandable community microgrid provide additional resilience benefits for areas that are at higher risk of outage in the absence of a microgrid. In many states, State Energy Offices have a close relationship with consumer-owned utilities and can support them in overcoming potential challenges to implementing microgrid programs (Farrell, 2019).

A. Legislative Activity

While State Energy Offices can provide policy and programmatic pathways and PUCs can provide regulatory pathways for microgrids, legislative activity often underpins these efforts through appropriations, requirements, or standards. Governors and legislatures often direct State Energy Offices to conduct studies or analyses to inform additional executive orders or legislative actions in support of microgrids. While these are not the only options to move microgrid policies and programs forward, it is an important area to consider given the prevalence of legislative interest. According to the National Council of State Legislatures (NCSL), there are 21 states and one territory (Puerto Rico) with substantive microgrid laws or laws that at least mention microgrids (Shea, 2022). NCSL's Microgrids: State Policies to Bolster Energy Resilience outlines specific legislative actions that can be taken to encourage development of microgrids, including:

- Setting a standard statewide microgrid definition;
- Appropriating funding for a grant, pilot, or technical assistance program;
- Establishing a state green or resilience bank to fund projects, such as microgrids;
- Establishing interconnection, standardization, and microgrid tariffs; and

- Integrating considerations of microgrids into other state policies, such as adding microgrids as qualifying projects under Commercial Property Assessed Clean Energy or C-PACE (Shea, 2022).

Such legislative activity can play a critical role in shaping the work of State Energy Offices and PUCs as it may require the State Energy Office to set up a grant program or require the PUC to establish a microgrid tariff or undertake a proceeding to streamline or improve microgrid regulations. The state legislature, State Energy Office, and PUC can also work together through information sharing forums on the benefits of microgrids for different use cases and potential barriers to deployment. This can provide an understanding of what action is needed and how it can be addressed through policy or regulatory action, and whether and how legislation can support such actions. In addition, legislation can establish a state-specific microgrid definition, support methodologies to value the resilience benefits of microgrids, and codify the incorporation of equity considerations in state microgrid programs.

California Senate Bill (SB) 1339, enacted in 2018, is a representative example of how legislation can shape state activity regarding microgrids. SB 1339 directs the California Public Utilities Commission (CPUC) to take action with consultation of the California Energy Commission (CEC) and California Independent System Operator (CAISO) and identifies key issues holding back microgrid commercialization in the state. Challenges include addressing how microgrids can play a role in implementing policy goals, how microgrids operate in the current California regulatory framework, and how microgrids support California's policies to integrate a high concentration of DERs on the grid (California Legislative Information, 2018). The legislation also defines what a microgrid is within the larger state energy system, which is helpful in designing programs and determining what kinds of projects would be impacted by the legislation. The CPUC, with the consultation of the CEC and the CAISO, were directed to take several actions through SB 1339, including developing microgrid service standards, reducing barriers to deployment, forming a working group, and creating a standard that helps to streamline the interconnection process.

Since the bill was signed into law, the CPUC has initiated new rulemaking to determine how to approach the responsibilities outlined in the law, explored further in Section V. The CPUC has also organized a resiliency and microgrids working group to look at issues such as standby charges, multi-property microgrid tariff, and the value of resiliency (CPUC, 2021). Most importantly, as a result of the legislation, California has established a microgrid tariff and a microgrid incentive program, discussed in more detail in Section V. In 2022, additional legislation was passed to support the CEC in funding microgrids across the state. The CEC Distributed Electricity Backup Assets Program is accepting applications for projects, including microgrids, that provide load reduction and back-up generation to support the electric grid during outages and other extreme events (CEC, n.d.). Additional CEC programs that provide significant opportunities for microgrid developers and provide resources that encourage utility customers and communities to invest in microgrids include the CEC Long Duration Energy Storage Program, Demand Side Grid Support Program, Clean Energy Reliability Investment Plan, Food Production Investment Program, and Industrial Decarbonization and Improvement of Grid Operations Program.

In addition to California, several other state microgrid programs and regulatory initiatives are in place. In June 2022, **Colorado** passed significant legislation that advances microgrid deployment in the state. HB 22-1249 requires the Colorado Energy Office, with support from the Colorado Department of Local Affairs and Colorado Resiliency Office, to develop an electric grid resilience and reliability roadmap. The roadmap must include information on potential legislative, administration, statutory, or rule changes regarding microgrids and outline key factors related to safety, development, maintenance, and deployment; metrics for evaluating cost and benefits; financial and technical support; and stakeholder outreach opportunities (Colorado General Assembly, 2022a). The roadmap will also need to examine the potential of microgrids for improving resilience and reliability and identify critical facilities where projects could be sited. The final roadmap will need to be shared with the Colorado Public Utilities Commission.

A second piece of legislation in Colorado, HB 22-1013 (the Microgrids for Community Resilience Grant Program), appropriates $3.5 million to the Colorado Department of Local Affairs and the Colorado Energy Office for rural electric cooperatives and municipal utilities to develop microgrids in areas at risk from natural disasters (Colorado General Assembly, 2022b).

In **Oregon**, the Oregon Community Renewable Energy Grant Program, which provides grants for planning and developing resilient clean energy projects, including microgrids, was developed as a result of Oregon HB 2021. The legislation appropriated $50 million in funding to the Oregon Department of Energy to establish the program. There is also legislation moving through the Oregon State Legislature, HB 3378, that would require the Oregon Department of Energy, with the PUC, to study and submit findings on the development and adoption of microgrid systems and use of microgrid systems for increasing electric grid and energy resilience (Oregon Legislative Assembly, 2023).

Legislative activity can put in place standards or appropriations that lead to significant investments in state microgrid projects. In 2021, the **North Carolina** State Legislature passed SB 509, which creates a revenue fund for the North Carolina Department of Environmental Quality's (NC DEQ) State Energy Office to, among other initiatives, provide technical assistance to support communities in conducting a needs assessment of prospective clean energy microgrids to address resilience needs. The technical assistance will include support for designing the projects, addressing permitting and siting challenges, and understanding the potential financing options (North Carolina General Assembly, 2021).

State leadership may also establish a goal regarding how much electricity should come from renewable sources by a certain date and specify what percentage of that electricity should come from DERs such as microgrids. The **Vermont** Renewable Energy Standard was established through legislation and requires that the state obtain 10 percent of its energy from distributed generation by 2023 (NCSL, 2021). These decisions can have direct implications for the State Energy Office and PUC and can lead to programmatic, policy, or regulatory actions related to microgrids.

It is also important to consider the role State Energy Offices and Governors can play in influencing and moving legislation forward. Many State Energy Offices are responsible for advising the Governor on energy issues; and developing comprehensive state energy plans, energy security plans, and roadmaps to meet resilience and clean energy goals that can lead to legislative action. For example, in the Connecticut state energy plan, the **Connecticut** Department of Energy and Environmental Protection specifically outlined their efforts to advocate for legislation that was supportive of community microgrids (Rickerson, 2022).

In **Washington**, when Governor Jay Inslee took office in 2013, he encouraged the state legislature to approve funds for a Clean Energy Fund with support from the Washington Department of Commerce. The Clean Energy Fund provided funds to grid modernization projects, including microgrids. The NASEO-NARUC Microgrids State Working Group also provides a platform for states to discuss potential policy recommendations to facilitate legislation.

Microgrid programs, policies, and regulation also may advance without legislative activity. Examples include the Public Service Commission of **Wisconsin**'s Office of Energy Innovation's Critical Infrastructure Microgrid and Community Resilience Center Pilot Grant Program (CIMCRC) and the **New Jersey** Town Center Distributed Energy Resources (TCDER) Microgrid program. CIMCRC was funded through the U.S. State Energy Program administered by the U.S. Department of Energy and was developed through recommendations from Wisconsin State Energy Office staff regarding the importance of proactive resilience planning (Wisconsin PSC, 2021). The New Jersey Board of Public Utilities initiated the TCDER microgrid program after Superstorm Sandy wreaked havoc on the state's electricity grid, with funds coming from the New Jersey Clean Energy Program budget. Additional examples are explored throughout this framework. In 2022, the North Carolina DEQ embarked on a state-wide effort to engage stakeholders and collect data useful to identify potential sites for resilience projects

that foster equitable decisions and improve underserved communities. Results from this project highlight the value of combining various datasets to gain greater insights into potential areas for resilience investments, like microgrids, to address these siting challenges and to better understand solutions. As part of the project, the Smart Electric Power Alliance (SEPA) developed a mapping tool to enable users to view all of the data layers used in analysis on the same map to gain a solid understanding of how data can be used to define resilience needs (Smart Electric Power Alliance and NC DEQ, 2022)

B. State Microgrid Policies and Programs

Legislative activities often lead to the appropriation of funds to State Energy Office-led microgrid grant or incentive programs or State Energy Office-led roadmaps, feasibility studies, or data collections on critical facilities and other relevant information. State Energy Offices frequently lead these statewide activities as they can convene stakeholders and analyze information from investor- and consumer-owned utilities, the private sector, local governments, and communities to determine beneficial investments for the state. Roadmaps, feasibility studies, and data collections may be conducted to determine ideal locations for siting microgrids in a state and to explore factors such as cost, energy source(s), inclusion of battery storage, and engineering design. They can also lay out challenges that may arise when deploying microgrids and outline the regulatory and policy structure that is in place, including potential cost considerations for the project and the viability of project completion. State Energy Offices may also look at potential community impacts or environmental justice / equity benefits, outline the state's priorities regarding microgrid development, such as supporting decarbonization goals or increasing resilience at critical facilities, and identify the key stakeholders who should be involved in and consulted throughout the process.

An example of a State Energy Office-led program is the **Wisconsin** Office of Energy Innovation's Critical Infrastructure Microgrids and Community Resilience Centers (CIMCRC) Pilot Grant program. This initiative awarded grants to 15 entities to conduct feasibility studies at critical locations across the state (Wisconsin PSC, n.d.). Recipients included tribal governments, utilities, the University of Wisconsin system, municipalities, and nonprofit groups (Wisconsin PSC, n.d.). Feasibility studies provide an opportunity to gather information prior to investing funds in the design and development of a project. Another example is the Kentucky "Regional Microgrids for Resilience" study conducted by SEPA and led by the **Kentucky** Office of Energy Policy. The study collected data on several key factors including population demographics, critical infrastructure facilities, natural hazards, and utility / electricity data such as power plants in the region, transmission lines, electric service areas, and reliability metrics (Smart Electric Power Alliance, 2021).

C. Microgrid Regulatory Landscape

By defining a microgrid and its subcategories, PUCs can specify what conditions microgrid operators must meet and under what circumstances - if any - a microgrid meets the definition of a public utility subject to full rate regulation. In the **District of Columbia** (District), the D.C. Public Service Commission in Order No. 21172 issued a Notice of Proposed Rulemaking RM-48-2022-01 that establishes rules governing microgrids development in the District. The proposed rules provide microgrid development classifications, requirements, codes and standards. Under the proposed rules, multiple customer microgrids in the District are considered a public utility under District law and would be required to obtain a certificate of public convenience and be subject to the same cost-of-service rate regulation framework as an investor-owned utility.

Multiple PUCs have also advanced microgrid regulation through rate recovery for energy and services provided by microgrids. One goal of rate regulation is the avoidance of cost-shifting: when a customer is required to pay for a service they do not use or benefit from. Microgrids present challenges to the process by which PUCs typically set rates by bringing up questions about who benefits from microgrids during both blue sky days and energy emergencies, and thus who should pay for both fixed and variable costs of a microgrid. When a microgrid is in island mode during an outage or energy emergency and only provides service to the load

within its footprint, the value of service that microgrid is providing is unavailable to ratepayers outside of that footprint. Therefore, ratepayer compensation for the microgrid's service can represent a form of cost-shifting because the energy it provides is only available to those loads within its footprint rather than the entire rate base. PUCs across the country have engaged in discussions and decisions about the proper cost allocation for microgrids, with many PUCs seeking further data to compare the costs and benefits of microgrids to other reliability and resilience investments such as additional generation, transmission, or distribution capacity or grid hardening practices.

III. Shared PUC and State Energy Office Needs

A. Stakeholder Engagement

A critical component of developing a state microgrid policy or program is stakeholder outreach and engagement. A state microgrid program or policy will impact multiple stakeholders, and it is important to get their feedback, hear concerns, and address challenges prior to the actual application process or implementation of a program. The actual steps that should be taken to develop a stakeholder engagement process will be outlined in further detail within the State Energy Office and PUC program development sections, but this section will provide some background on key considerations and strategies relevant to both State Energy Offices and PUCs. Project success can often hinge on whether enough stakeholder engagement was conducted.

Each State Energy Office and PUC will approach stakeholder outreach and engagement differently, depending on a variety of considerations including how they define disadvantaged communities, the location of critical facilities, their ultimate goal for the microgrid program, and their unique state circumstances and practices. To determine what the key considerations should be, some states have started by releasing a Request for Information (RFI). A public RFI would be an opportunity for not only developers, investor- and consumer-owned utilities, and engineers to provide feedback, but for the general public to share insights into what their concerns are or suggestions for how the program could be made more accessible. Input from customers and communities regarding uncertainties and objectives related to microgrids, as well as information on specific resilience needs, can assist the State Energy Office or PUC in structuring the program or regulatory initiative to address these needs.

The RFI should be widely publicized with information shared in both online forums and at in-person events. It can also lead to valuable feedback and information on how to develop definitions or specific terms early in the program's development. For example, in 2021, the **Rhode Island** Office of Energy Resources released an RFI regarding the development of a municipal microgrid program. A particular emphasis was placed on receiving comments that define the public benefit of a microgrid, as required in the program design. The public benefit component was explained as the potential to provide back-up power to facilities supporting first responders or facilities that support food resources for the community, among other potential criteria (Rhode Island OER, 2021). Rhode Island is using feedback gathered from the RFI to modify and finalize their program structure and criteria.

States understand the importance of holding stakeholder events to gather information and hear concerns. Key stakeholders included in these forums may include community members, community-based organizations, consultants, local businesses, local government representatives, utilities, and other interested parties. State Energy Offices and PUCs hosting these events may wish to determine who the relevant stakeholders are in advance and target them to ensure a diversity of voices are in the room. States can reduce the risk of concerns being brought up post-program implementation by mapping out the stakeholders in advance and ensuring that all of the relevant stakeholders are present for the discussion. For additional resources, NASEO, NARUC, and the National Governors Association (NGA) have released several guides that can provide information to states on State Approaches to Equitable Distributed Energy Resource Deployment, Participation in Decision Making, Energy Justice Metrics, and Customer Affordability and Arrearages.

Public comment and stakeholder roundtable events should be held at different times throughout the day to provide the greatest number of opportunities for the relevant stakeholders to attend. If the State Energy Office or PUC is hosting the event, they should also coordinate with other state agencies who can provide support and relevant information. These joint events can also reduce the burden on communities by only requesting their attendance at one event. For example, the state economic development agency may provide information on workforce opportunities and job training that will accompany the microgrid program rollout. The state emergency management agency can provide information on how the microgrids funded through the program may support emergency response efforts during an energy emergency such as a blackout. Establishing these

relationships with other state agencies can streamline the program development process and help determine whether any additional legislation, policy, or regulatory action is needed.

The **West Virginia** Office of Energy (WVOE) engaged SEPA to provide support in developing their "Regional Microgrids for Resilience" study. As part of the study, two stakeholder meetings were held with a goal of not only engaging key stakeholders and sharing information on the project, but also obtaining feedback on certain study components including site selection suitability criteria and additional data sources that could be explored (Smart Electric Power Alliance, 2022). Stakeholders that participated in these meetings included the Sierra Club West Virginia Chapter, the West Virginia Public Service Commission, and the West Virginia Emergency Management Agency. These meetings resulted in critical determinations that impacted the overall results of the study: hospitals and military installations were not included in the final study due to a consensus on prioritizing critical facilities without existing backup generation for siting microgrids (Smart Electric Power Alliance, 2022).

These stakeholder events can also be an opportunity to discuss potential public-private partnerships or other funding opportunities to boost the grants available from the state. There may also be interest in developing a project team who can meet more regularly throughout the development of the program and provide direct feedback and support. For example, the **Massachusetts** Clean Energy Center released an RFI to identify interested parties who wanted to participate in or provide services to a microgrid team applying for a funding opportunity (MassCEC, 2022). Interested groups included energy companies, consultants, municipal organizations, power providers, and software designers. Including community representation on these teams is also critical to maintaining local buy-in and having a direct connection to hear and address community concerns as they arise.

While microgrid experts are important, actively engaging with the communities, including key energy and environmental justice organizations, is also a critical part of the process. This can be done in several targeted ways beyond just hosting public comment periods. For example, the **Oregon** Department of Energy established an Advisory Committee to support the development of their Community Renewable Energy Grant Program, which provides funds for projects including microgrids. The Advisory Committee has several responsibilities including establishing program equity metrics, adopting a methodology to identify qualifying communities, and supporting statewide community outreach efforts. The Committee includes utility representatives, a tribal emergency manager, county commissioners, engineers, energy justice organizations, emergency managers, a resilience officer, and representatives from the U.S. Department of Energy (DOE) (Oregon DOE, n.d.).

B. Technical Assistance

Given the complexities of microgrid programs, policies, and regulation, State Energy Offices and PUCs may need outside technical assistance, given the relative newness of microgrid programs. Technical assistance opportunities may be available through grants from state and federal agencies or the private sector, including grants to bring on additional staff or to facilitate information sharing. Local utilities may also be available to provide technical support. For example, the **Alaska** Microgrid Group brings together experts from different electric cooperatives across the state to provide technical assistance related to energy resource assessments, microgrid system design, policy conceptualization and analysis, and project management services (Alaska, n.d.) For states with a green bank, such as **Connecticut**, there may be resources available for technical assistance provided through the bank or one of the bank's programs.

For certain projects, retaining an outside organization as a contractor, based on a thorough, competitive RFP process, may be a good option. This contractor can provide support in developing a roadmap for the state or in conducting feasibility studies to identify prime locations for potential microgrids. These outside organizations can also help the state catalog critical facilities that could benefit from a microgrid. Additionally, outside expertise can help determine the best technical approach for a critical facility microgrid and whether a

single-site microgrid or cluster of critical facilities may be best suited for a front-of-meter microgrid. There are various methods of defining critical infrastructure, and states may not have the time, staff, or financial resources to conduct a statewide effort to identify and collect data on all potential locations.

States may also look to technical information being provided by the National Laboratories and U.S. Department of Energy. Across the country, National Laboratories are working to develop microgrid technologies to meet different needs and developing resources and tools to be used by states and developers. This can be particularly useful for topical areas that may be in the early stages of RD&D, such as the intersection of electric vehicles and microgrids. Idaho National Laboratory (INL) is working on fast-charging station microgrids to address some of the challenges associated with charging capacity. These microgrids will be made up of high-power electric vehicle chargers, local generation from solar photovoltaic systems, and battery storage (Palmer, 2021). As INL develops these projects, they can serve as a model for states looking to explore similar opportunities. The National Renewable Energy Laboratory's (NREL) REopt web tool is used to optimize the siting and operation of microgrids, and there is a public version of the tool available. At Sandia National Laboratory, the 2022 Microgrid Conceptual Design Guidebook can be used to look at site-specific vulnerabilities and design microgrids to meet energy resilience needs (Broderick, 2022). Sandia has also developed a tool called ReNCAT, which further optimizes microgrid siting by looking at equity considerations in the form of a social burden index (Wachtel 2022). Similarly, Lawrence Berkeley National Laboratory has developed a Distributed Energy Resources Customer Adoption Model (DER-CAM) microgrid feasibility and planning decision-support tool.

Once a program has been implemented or applications released, the State Energy Office may serve as the hub, offering technical assistance to potential applicants or support for conducting feasibility studies. The State Energy Office could host technical workshops, which can serve as educational opportunities for applicants and bring in key stakeholders who will need to be involved in the process, such as utility representatives who can address concerns including how the interconnection process will be facilitated. This technical assistance may be especially valuable to applicants from disadvantaged communities, community-based entrepreneurs, minority-owned businesses, rural or small communities, or early-stage companies.

Cybersecurity for microgrids is another potential topic for technical assistance. Along with extreme weather events and intentional physical attacks on grid infrastructure, cyberattacks may cause widespread, long-duration outages with devastating impacts. DERs, including DERs that are microgrids, are vulnerable to cyberattacks, particularly given that they rely on numerous Internet-connected components and may be owned, operated, or maintained by unregulated entities such as private customers. State Energy Offices and PUCs were early to recognize the importance of cybersecurity, but have faced challenges incorporating cybersecurity planning and preparedness into existing processes. Further, high demand from investor- and consumer-owned utilities, consulting firms, and other state and federal agencies for cybersecurity experts has made it difficult for State Energy Offices and PUCs to build a reliable pipeline of in-house cybersecurity expertise.

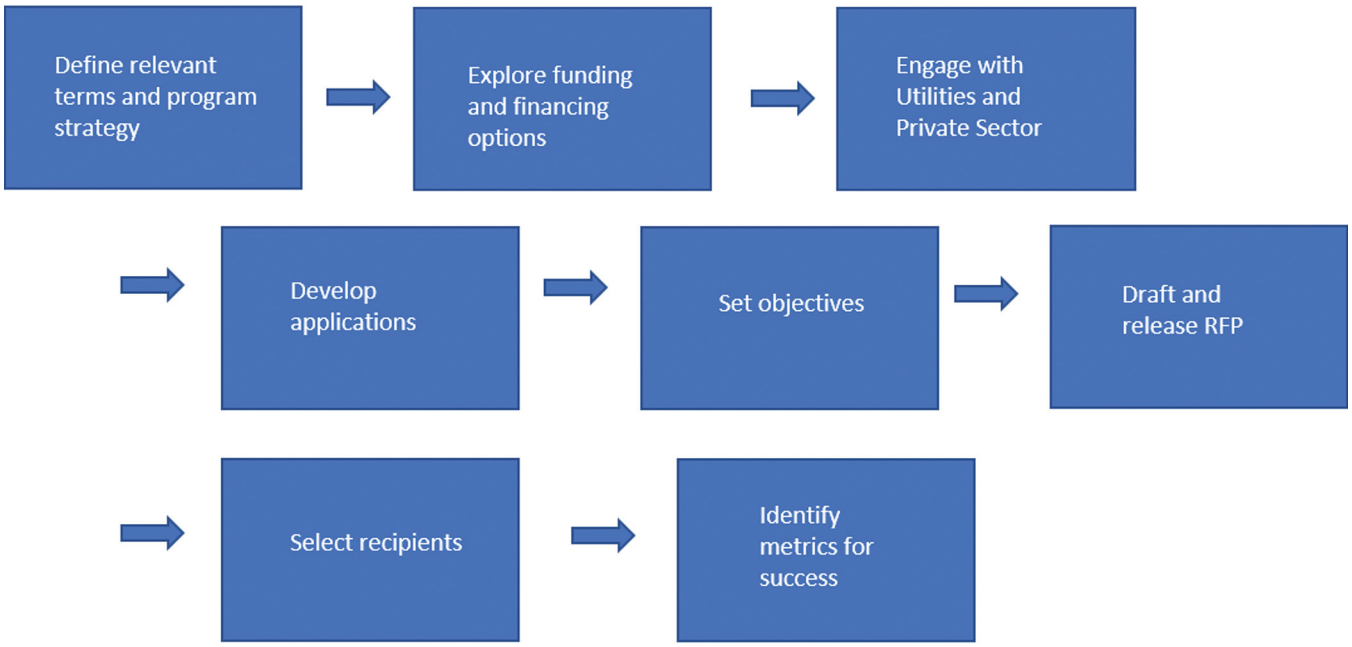
The National Laboratories, DOE, NASEO, and NARUC have developed resources to assist State Energy Offices and PUCs in improving the cybersecurity of critical infrastructure and the energy grid. NREL, for example, manages several initiatives to develop cybersecurity standards for DERs, including an effort with the Institute of Electrical and Electronics Engineers (IEEE) and Underwriters Laboratories, Inc. (UL) to revise existing standards for DERs and DER hardware to improve cybersecurity (NREL, 2022). NARUC hosts a suite of cybersecurity resources for PUCs on its website, funded by DOE's Office of Cybersecurity, Energy Security, and Emergency Response (CESER). NARUC has developed a comprehensive set of resources, collectively called the "Cybersecurity Manual", to help PUCs gather and evaluate information from utilities about their cybersecurity risk management practices. These resources include overarching guidance on developing a commission strategy to implement their own cybersecurity practices, as well as question and assessment tools for utilities to assess their own cybersecurity risk profile. These tools are applicable to investor-owned utilities, as well as smaller third-party energy suppliers, such as microgrid developers. NASEO and NARUC collectively

lead the Cybersecurity Advisory Team for State Solar (CATSS) initiative to help mitigate cybersecurity risks associated with solar energy. The initiative brings together State Energy Offices, PUCS, and private sector representatives to share challenges and opportunities around solar cybersecurity and to develop tools that can serve as actionable resources for states as they engage in public-private partnerships and develop policies, programs, and regulations to support these efforts.

IV. State Energy Offices: Steps for Developing a State Microgrid Policy or Program

This section highlights some of the steps and key considerations State Energy Offices could follow to develop their own state microgrid policy or program, recognizing that these steps may not be applicable to all State Energy Offices and can be adjusted to fit the structure and goals of each state. Many of these steps are modeled after successful and established state microgrid programs, which can provide lessons learned and background on potential challenges that might arise in the development process.

Figure 1: Example - State Energy Office Steps for Developing a Microgrid Program



A. Defining Relevant Terms and Program Strategy

The first step when developing a microgrid policy or program should be to define several key terms including microgrid, hybrid/multi-customer microgrid, and mobile microgrid. This can be done through legislation, regulation, a state roadmap, or in the initial program description. It is important that a definition is accepted state-wide; coordination between the State Energy Offices and other relevant state agencies such as PUCs and State Emergency Management Agencies might be needed to come to a consensus. Many State Energy Offices utilize the DOE definition of "[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" (Ton & Smith, 2012). For those State Energy Offices who are looking for a more specific definition or one that more closely aligns with their program goals, they can adjust the DOE definition or develop a new one. There may be instances where a State Energy Office is only looking to fund fully-islanded projects or microgrids at critical facilities. All of this can be clarified and expanded upon in a state-wide definition. Two examples of how states have defined microgrids themselves are outlined below in **Table 1**.

Table 1: Example Definitions

California	A microgrid means an interconnected system of loads and energy resources, including, but not limited to, distributed energy resources, energy storage, demand response tools, or other management, forecasting, and analytical tools, appropriately sized to meet customer needs, within a clearly-defined electrical boundary that can act as a single, controllable entity, and can connect to, disconnect from, or run in parallel with, larger portions of the electrical grid, or can be managed and isolated to withstand larger disturbances and maintain electrical supply to connected critical infrastructure (California Legislative Information, 2018).
New Jersey	A Town Center Distributed Energy Resources (TCDER) Microgrid…is a cluster of critical facilities within a municipal boundary that may also operate as shelter for the public during and after an emergency event or provide services that are essential to function during and after an emergency situation. The critical facilities are to be connected to a single or a series of DER technologies that can operate while isolated and islanded from the main grid due to a power outage (NJBPU, n.d.)

Hybrid or multi-customer microgrids are currently rare and lack the capabilities for wide-spread commercial deployment. According to a Boston University study, these microgrids can be defined as "microgrids that provide multiple energy consumers the ability to self-supply electricity during grid outages while continuing to leverage the existing power grid during the majority of the time…" (Boston, 2018). Mobile microgrids are portable and often feature the "plug-and-play" model that allows them to be installed quickly (Siemens, n.d.). The **Iowa** Economic Development Authority provided funding to a mobile microgrid initiated by the Iowa National Guard made up of solar panels and lithium-ion batteries on a large shipping container. The microgrid is designed to be shipped on truck, train, or ship and can be up and running in only a couple of hours (Maloney, 2020).

Once State Energy Offices have determined the focus and definition for their microgrid program, they can look at the program structure and strategy. Legislative action may dictate the scope, structure and goals of the program. Some goals could include expanded access to microgrids in underserved communities, enhanced resilience for critical facilities, reduced energy costs, reduced grid congestion, expanded renewable energy, or exploration of innovative workforce and /educational opportunities.

The following excerpts of program descriptions for the Resilient **Maryland** Program, led by the Maryland Energy Administration (MEA), and for the Town Center Microgrid Program, led by the **New Jersey** Board of Public Utilities (BPU), which also serves as the State Energy Office, provide different examples of how to characterize a description. For MEA, the program's purpose was kept general to incorporate projects beyond microgrids, while New Jersey BPU focused on the impetus for the program. Both provide concise information to potential applicants on program goals.

> **Program Purpose:** Resilient Maryland is provided to help organizations identify potential ways to incorporate DERs into organizational energy management plans that improve resilience and sustainability, reduce energy burden, and safeguard essential infrastructure, services, and businesses from prolonged power outages. In its FY22 year, the program is seeking projects that pursue creative solutions, incorporate innovation, explore potentially replicable and scalable project models, and enhance energy equity to Maryland communities experiencing vulnerabilities and challenges (Maryland Energy Administration, n.d.).
>
> **Program Description:** The New Jersey Board of Public Utilities (NJBPU) initiated the TCDER Microgrid program as a result of Superstorm Sandy. Our State learned that further measures are needed to help New Jersey become more resilient, particularly with respect to critical facilities (NJBPU, n.d.)

State Energy Offices should then consider their approach to the actual program development by asking questions such as: How much specific technical information will the applications need to provide? Will technical assistance be provided by the state to applicants? Will the program fund feasibility studies or actual project deployment or both? What are the funding and financing options for the program? Who will have authority for the program within the office? These questions will be explored in more detail below.

B. Funding and Financing Options

According to a 2018 NREL study, the average cost for a campus or institutional microgrid is $3 million, for a commercial or industrial microgrid $4 million, and for a community-owned microgrid $2 million (Giraldez, Flores-Espino, MacAlpine, and Asmus, 2018). Costs can be impacted by the type of generation being used to power the microgrid, the use case for the microgrid, the location of the microgrid, and the design process. As a result, State Energy Offices, PUCs, and project developers will be looking for different financial mechanisms to support the development and deployment of these projects, as well as the ability to draw lessons out of funded projects to facilitate the implementation of similar projects in the future to provide increased benefits at lower costs to ratepayers and/or taxpayers. In **California**, for example, the CEC has provided ratepayer funding to support the development of 65 microgrids statewide in the past decade through its research programs. Through these projects, the CEC has advanced the science of microgrids and worked to address market barriers to deployment that will benefit electricity ratepayers.

The financial mechanisms available to customers procuring microgrids are varied. They can include private, state, and federal funding and financing tools to facilitate all or part of the project RD&D costs. Costs to consider include conducting a feasibility study, engineering and design needs, and construction, operation, and long-term maintenance of the microgrid. State Energy Office-facilitated grant programs may provide full support for project completion or focus on just one of these mechanisms. Since certain funding may only be applicable to one part of a project, it is crucial for microgrid customers (e.g., municipalities, commercial and industrial customers, critical facilities, and others) to be aware of the full portfolio of options.

Funding a State Microgrid Program

In addition to the funding opportunities outlined above, State Energy Offices setting up a State Microgrid Grant Program will also need to consider how this program can be funded. While it is important for State Energy Offices to understand the potential opportunities available for funding microgrid project RD&D, there are also funding streams available to fund the development of a microgrid program. As discussed earlier, funds can be appropriated to the State Energy Office through the State Legislature for setting up a program. Funds appropriated to the State Energy Office through the legislature will usually provide specific information on the goals of the program, how much funding is available over a certain period of time, and other criteria that may be required such as developing a state resilience roadmap to coincide with program development.

- The newly created **Colorado** Microgrids for Community Resilience Program was funded through HB22-1013, and it limits applications to municipal-owned utilities and rural electric cooperatives. Funds can also be appropriated to the State Energy Office through the annual or biennial state budget and be used to set up microgrid programs.
- Governors can also pass an Executive Order that leads to a grant program being created. The **Massachusetts** Executive Office of Energy and Environmental Affairs created a Municipal Vulnerability Preparedness grant program in 2017 in response to Executive Order 569 by Governor Charlie Baker.
- Other State Energy Offices, such as the **Rhode Island** Office of Energy Resources, have utilized funds from the Regional Greenhouse Gas Initiative (RGGI) to set up a grant program for microgrids through the state's carbon dioxide allowance proceeds (RI OER, n.d.).

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The U.S. State Energy Program (SEP), administered by the U.S. Department of Energy, can be utilized to support microgrid programs and policy efforts.

- The **Wisconsin** Office of Energy Innovation utilized SEP to fund the microgrid feasibility studies through their state microgrid program.
- The **Kentucky** Office of Energy Policy and West Virginia Office of Energy both used SEP funds to hire a contractor to develop state microgrid studies.

Additional federal funding opportunities include BRIC, HMGP, and CDBG for disaster relief (explored in more detail below). States can utilize the funds from these programs to fund project buildout and scoping. These programs emphasize the resilience benefits of microgrids and are available for states to apply for.

Potential Funding Sources for a Microgrid Project

In addition to the described State Microgrid Grant program, additional options exist to support the financing of specific microgrid projects. These options are explored in depth in the NASEO-NARUC paper Private, State, and Federal Funding and Financing Options to Enable Resilient, Affordable, and Clean Microgrids but a brief overview is included below to provide some context to this framework.

Public-Private Partnerships

Public-private partnerships such as energy-as-a-service, energy savings performance contracts, and Commercial Property Assessed Clean Energy (C-PACE) loans are one financing model available for microgrids. These are opportunities to form a joint investment between public sector and private sector partners to boost the amount of capital available for a certain project. In October 2022, the Brookville Smart Energy Depot opened in Silver Spring, **Maryland**. The project utilizes a 6.5-megawatt solar powered microgrid to charge up 70 buses and was developed through a public-private partnership between the Montgomery County Department of General Services (DGS) and AlphaStruxure. MEA also provided a $300,000 grant from its Public Facility Solar Grant Program to support the project (MEA, 2021). AlphaStruxture provides energy-as-a-service, which means they design, finance, construct, own, and operate the microgrid and receive revenue generated from the microgrid as compensation (Cramer, 2021). According to MEA, this model will reduce risk to the county through avoidance of certain budget impacts and upfront costs (MEA, 2021).

Federal Funding

Federal funding opportunities include the Federal Emergency Management Agency's (FEMA) Building Resilient Infrastructure and Communities (BRIC) program, FEMA's Hazard Mitigation Grant Program (HMGP), and the U.S. Department of Housing and Urban Development's (HUD) Community Development Block Grants for disaster relief (CDBG-DR). These funding sources might be augmented by state funding sources. The NY Prize Microgrid program run by the **New York** State Energy Research and Development Authority (NYSERDA) and the Governor's Office of Storm Recovery (GOSR), for example, provided funds to local communities, businesses, and utilities to design and develop microgrids across the state. When identifying potential awardees, NYSERDA and GOSR looked at which projects were also eligible for CDBG-DR funds. For those projects that are eligible due to work with private utilities, location, natural disaster impacts (and other criteria), GOSR and NYSERDA worked to provide funding, including up to $20 million of CDBG-DR funds for construction.

The BRIC program awards grants to state governments, Tribes, and local governments to support projects that improve resilience capabilities and reduce the risk of disaster damage. In Fiscal Year 2021, 788 sub-applications were submitted across every state and territory, with 53 projects from 19 states selected for further review (FEMA, 2022). One of these projects, from the state of New Jersey, will turn a community center into a resilience hub. The center will be equipped with a solar array and microgrid for power resilience among other measures to better protect the community from flooding damage and other repercussions (FEMA, 2022).

More information on the BRIC program and other federal funding can be found in the NASEO-NARUC Private, State, and Federal Funding and Financing Options to Enable Resilient, Affordable, and Clean Microgrids report, and NASEO's *State Action Guide for Energy Resilience Projects* Technical Guide and Quick Guide.

In November 2021, the Infrastructure Investment and Jobs Act (IIJA, also known as the Bipartisan Infrastructure Law) was signed into law and several of the resulting programs provide funding opportunities to support the development of microgrids. While many of the programs are still being set up and are time-limited, State Energy Offices should be aware of opportunities to apply for relevant programs and how the implementation process will work. They may also need to be prepared to coordinate with other state agencies, local governments, and investor-and consumer-owned utilities on implementing the funding. Some examples of relevant programs within IIJA include some opportunities under the Grid Resilience and Innovative Partnerships (GRIP) program, the Energy Improvements in Rural or Remote Areas (ERA) program, and the Clean Energy Demonstration Program on Current and Former Mine Land (CEML). The GRIP program can support microgrid deployment for enhancing adaptive system capacity during disruptive events from electric grid operators, electricity storage operators, electricity generators, transmission owner or operators, distribution providers, and fuel suppliers (U.S. DOE, 2022). The ERA program has released an RFI on the program which has a goal of supporting innovative energy projects in rural or remote areas including developing microgrids. IIJA also includes section 40101(d) which outlines potential resilience investments eligible through a state, tribal, or territorial formula grant program, including the use or construction of DERs, such as microgrids to enhance system adaptive capacity during disruptive events. Importantly, no new electricity generation qualifies under 40101(d) but all other components of a microgrid are eligible for funding. CEML is looking to fund microgrids sited on mining sites.

In addition, in August 2022, the Inflation Reduction Act (IRA) was signed into law, which provides credits and incentives to support microgrid deployment. These include the Advanced Manufacturing Production Credit, Production Tax Credit, and Investment Tax Credit (ITC). Under the ITC, an additional bonus credit for microgrids located on Indigenous land or in areas serving low-income communities is available (Cooper, 2022). The Greenhouse Gas Reduction fund, led by the Environmental Protection Agency (EPA), may also potentially be utilized for microgrid projects. The EPA has released a Request for Information (RFI) on the program, but initial information suggests that clean energy microgrids (not supported by any kind of greenhouse gas emitting back-up) may be eligible for some of the funds. $27 billion will be provided by the EPA to provide grants for projects, such as funding distributed technologies in low-income and disadvantaged communities and other projects that help to reduce or avoid greenhouse gas emissions (U.S. EPA, 2022).

State Financing Programs

State funding and financing programs include revolving loan funds, grant and incentive programs, state-supported green banks, green bonds, competitive grants, and utility rate recovery. These are outlined in more detail in Table 2 below. State grant programs may also require the applicant to provide a certain amount of cost-share or matching funds, especially if a project is estimated to go over a certain price. Cost matching is also usually required to cover a certain percentage of a project's cost that will not be covered by federal funds.

Table 2: State Funding and Financing Programs (Cramer, 2021)

Funding / Financing Model	Advantages	Challenge	Applicable Phase	Existing Model in Operation
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 • David-Bacon, Buy-American, and ARRA reporting provisions apply to loan funds capitalized with ARRA funds	• Feasibility study • Engineering design • Construction • Operation	Washington Clean Energy Fund Microgrid
Grant and Incentive Programs	• Available for all stages of the microgrid development process • Especially useful for the feasibility study and design stages before revenue streams are identified	• Grant programs limited by amount of money appropriated by legislature or agency; non-replenishable otherwise	• Feasibility study • Engineering design • Construction • Operation	New Jersey Town Center Microgrids
State-Supported Green Banks	• Ability to lend and provide "gap financing" for larger microgrid projects	• Limited to those states that have already established Green Banks	• Construction • Operation	Connecticut Green Bank Microgrid Financing Program
Green Bonds	• Take advantage of state / local governments' ability to borrow to finance projects	• Relatively novel solution for microgrid; not many examples for state/local governments to emulate	• Construction • Operation	Camden County, New Jersey Microgrid
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	• Feasibility study • Engineering design • Construction • Operation	NY Prize Microgrid Competition
Utility Rate Recovery	• Utility owns and operates microgrid. Can reduce issues surrounding right-of-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 beneficiaries	• Engineering design • Construction • Operation	Commonwealth Edison Bronzeville Microgrid and Duke Energy Hot Springs Microgrid

C. Engaging with Investor- and Consumer-Owned Utilities and the Private Sector

When developing a state microgrid program, State Energy Offices can utilize their relationships with local governments, investor- and consumer-owned utilities, and the private sector. These key stakeholders can provide insights into their needs and challenges associated with microgrid development and help make program applications stronger and more accessible. State Energy Offices are uniquely positioned to maintain these relationships and develop programs with their support. Consumer-owned utilities (such as municipal utilities and rural electric cooperatives) often do not have the same resources as larger, investor-owned utilities and might experience unique challenges related to adding additional renewable generation, resiliency, cost, transmission build-out, and financial and staff capacity constraints. Often, the customer base for these utilities is spread out over remote or rural areas. Municipalities are also often dealing with resiliency issues at critical facilities and could benefit from state funding to reinforce these locations. Several existing state programs, specifically target municipalities and consumer-owned utilities, and can serve as models for other states. The **Rhode Island** Office of Energy Resources developed a report, Resilient Microgrids for Rhode Island Critical Services, that specifically looks at how microgrids can support municipalities. In addition, the **Colorado** Microgrids for Community Resilience Program, targeting municipal-owned utilities and rural electric cooperatives, also utilizes a state developed Climate and Social Vulnerabilities Mapping Tool (guidance can be found here) for municipal-owned utilities and cooperatives so they can better understand their vulnerabilities and opportunities for microgrids that address, among other items, climate and environmental justice concerns.

Regarding the private sector, State Energy Offices should reach out to DER providers, engineers, developers, and other relevant players to determine what technologies they are able to provide and what the potential costs and benefits would be for a project. This can also be an opportunity to explore potential public-private partnership models (see Section B for more information). The private sector can also provide insights into the current market and how future projects will be impacted by market changes. Innovative companies may also be interested in engaging with State Energy Offices developing programs that will incentivize private sector investment in microgrid research, development, deployment, and commercialization (NASEO, n.d.)

D. Developing Applications

Programs will usually involve a competitive application process to determine who will receive funds, for how much, and for what kinds of projects. Sample applications will be included in the annex for reference, but some key items to keep in mind will be explored here. The State Energy Office staff responsible for developing the application should first consider putting out a Request for Information (RFI). This will be an opportunity for key stakeholders to provide input into the program structure and application process. This is especially important for ensuring that the program application process is fair and accessible to all, as community groups or other interested parties can express concerns about cost match or application timelines that can be addressed before the final Funding Opportunity Announcement (FOA) or Request for Proposals (RFP) is released. The **Rhode Island** Office of Energy Resources released an RFI prior to program development to get input on criteria for applicants and other relevant information (see Section III.A above for more details). This reduces the potential for a top-down approach with little to no stakeholder engagement. A deadline should be set for how long the comment period will be open and a public webinar can also be held to provide clarity on the RFI and share potential questions the state would like to see addressed in stakeholder responses. Rhode Island hosted a webinar that walked through the RFI and provided an opportunity for potentially interested applicants to ask questions (Rhode Island OER, 2021).

With most states looking to incorporate equity into their broader office and program structure this will also need to trickle down to the application process for grant programs such as a microgrid program. For example, the **Oregon** Department of Energy's Community Renewable Energy Grant Program made clear that priority would be given to applicants from communities of color, low-income communities, Tribes, rural areas, and other underserved groups. Applications should be accessible to Tribes, low-to-moderate income

communities, non-English speakers, and other vulnerable groups. States can utilize their own tools and data to define disadvantaged communities and ensure the proper outreach and resources are available to these communities. Resources can include application assistance forums with translators and other support and a clearly laid out instruction guide. The **Connecticut** Department of Energy and Environmental Protection (DEEP) included comprehensive instructions for applicants to read to ensure that no incomplete applications were submitted by mistake or due to lack of experience applying for state funding.

The goals for the program should be clear in the application so that potential applicants can best cater their projects to the program purpose and needs of the state. For example, potential goals can include enhanced resilience, electric grid services (i.e., preventing energy loss and load management), supporting critical infrastructure, integrating DERs, supporting municipalities needs, and/or decreasing greenhouse gas and particulate matter emissions. State Energy Offices can determine which of these criteria are the most important and require potential projects to address one or more of them. There also may be a targeted audience for applications, which should be clearly articulated on the program website and all accompanying materials. The **Colorado** Energy Office and Department of Local Affairs have released application guidance on their microgrid program. These materials not only emphasize that eligible applicants are limited to cooperative electric associations and municipally-owned utilities, but clarify that "proposed microgrid project(s)/plans must serve one or more eligible rural communities located within the applicant's service territory" and that the communities must be dealing with risk from extreme weather/climate, infrastructure, or socio-economic or environmental justice concerns (Colorado Department of Local Affairs, 2022). Potential projects also need to improve the resilience of a "community anchor institution," such as a school or hospital, and projects with less of a reliance on fossil fuel-based generation will be prioritized. The application provides a clear definition of what constitutes a rural community and "community anchor institution."

State Energy Offices are also encouraged to develop a supplemental application instruction guide and Frequently Asked Questions (FAQ) document. These will serve as important resources for potential applicants as they navigate the application process. It will also provide insights to underrepresented groups interested in applying who might not have experience in applying for a state grant. In the FAQ, potential questions include whether cost matches are required, what partnerships are allowed, and whether certain projects would qualify based on the program description. The **Connecticut** DEEP updated the FAQ documents on their website several times when their Microgrid Grant Program was open for applications. An example can be found here which demonstrates the large volume and variety of questions that a State Energy Office may expect to receive. As Connecticut did, these FAQ pages should be shared on the program website and be updated frequently. In addition to these resources, State Energy Offices could also consider developing a fillable template for applicants to enter data on their proposed project and determine if it aligns with the goals. These templates can also serve to help applicants determine potential financing avenues and see how bringing in cash or in-kind match would improve or expand the project's viability.

E. Setting Objectives

Microgrid projects cover a wide range of applications and locations in the state and should support site-specific and state-wide goals. These projects can be an opportunity to test innovative microgrid configurations or DER portfolios, such as co-locating electric vehicle chargers and microgrids. Certain programs will only fund feasibility studies, while others will finance the entire process. Potential project locations for feasibility studies and final projects include military installations, hospitals, water/wastewater facilities, communications infrastructure, schools, transportation facilities, emergency centers, and local government buildings. There can also be considerations made for awarding a diversity of projects that will provide backup support to different communities and locations. Awards may also be given for full project construction or for feasibility studies.

When states are deciding whether to focus a program on only feasibility studies or full project development, there are a few items to consider. Funding feasibility studies may minimize the risk of project failure or incompletion down the road. Some of the items applicants could be expected to study and collect data on include energy use/cost, hazard vulnerabilities, projected benefits of the microgrid, stakeholder engagement, identification of critical facilities, load profiles, energy burden, sizing, duration, fuel supply, and potential deployment and location sites. Grantees may not have had the resources to collect this information without the funding from the state, so it sets them up for better success when actual development and deployment commences. States may also review the outcomes of the feasibility studies to determine whether to fund full development of a project or not. This can be made clear in the upfront feasibility study application, or it can be made clear that the funds are for feasibility studies only and that construction costs will not ever be available. This makes grantees aware that they should be exploring other funding options. In addition, a program may be set up to award two different grants over a staggered timeline. For example, the **Colorado** Microgrids for Community Resilience Grant Program opened grants for planning in February 2023 and grants for implementation and construction will open in Spring 2023. Technical assistance will be provided for both options. Some example activities eligible under the planning/feasibility studies include developing an action plan and roadmap, evaluating existing infrastructure vulnerability, engaging with communities to identify their needs, and establishing a community's potential based on scale, size, and cost. For the implementation and construction grants, new microgrid facilities will be funded, and specific eligible elements include energy storage, microgrid controller, and vehicle-to-grid projects (Colorado Department of Local Affairs, 2022). These are draft guidelines, but provide examples other states could replicate. When not funding feasibility studies, states may require more technical information in the upfront application to support the actual feasibility of a project to ensure it is shovel ready.

F. Drafting and Releasing Request for Proposals (RFP)

After an application has been finalized and a program is ready to launch, State Energy Offices will need to draft and release a Request for Proposals (RFP) or Funding Opportunity Announcement (FOA). Some examples will be linked in **Appendix A: Further Reading**. These RFPs and FOAs cover a wide range of necessary and detailed information including eligibility requirements, program parameters, selection criteria, deadlines, required forms and materials, and other relevant details. Information that may be covered in the RFP or FOA would also include key definitions, projects that will be considered, the review process, submission instructions, and how much funding will be available. The Resilient **Maryland** program run by the Maryland Energy Administration contains an overview of all the information needed to be included in a project proposal within their FOA, such as a description of each part of the microgrid project development and how it will be funded and a detailed budget for what the applicant is looking to be reimbursed for. States may also require letters of support to be submitted with the application, as the **Wisconsin** Office of Energy Innovation did (Wisconsin PSC, 2021). Applicants were required to submit letters of support for a feasibility study of a potential microgrid in the state from the local distribution utility and participating facilities (Wisconsin PSC, n.d.).

These RFPs and FOAs should be announced on social media and shared on the State Energy Office's website. The State Energy Office should also have a running database of relevant contacts to share RFPs and FOAs with ranging from private sector stakeholders to community-based organizations, depending on the eligible applicants. There can also be efforts made to ensure Tribes, disadvantaged communities, consumer-owned utilities, and local governments have the necessary materials and resources to complete the application. For example, allowing it to be submitted in paper form or translating the application instructions into other languages can make it more accessible. The application should have a fillable template for applicants with clear instructions to eliminate confusion. States should also determine how much technical information they will want included in the application. For example, the **Connecticut** DEEP required applicants to submit information such as details on the microgrid controller and load management plan and data on how the

microgrid will withstand extreme weather events. The technical data required can differ depending on the goals of the program or how much information the state would like to have on hand before selecting recipients of the funds. In round one of their solicitation, the only round that required project feasibility assessments, Connecticut DEEP also limited applications to their program to those who had already submitted a project feasibility application and been given the green light to move ahead. They also provided feedback to those municipalities who were not given the go ahead on what would make a stronger proposal in the future. Staggering applications and requiring a shorter feasibility application or concept paper first can reduce some of the burden on communities and local governments by not requiring them to fill out a full application that has no chance of receiving full support. In addition, local governments may need longer timelines for application development and feasibility studies. The Rhode Island Office of Energy Resources outlined some of the reasons, which include prolonged processes for decision making, procurement, and energy/facility capital improvement project development, and longer administration processes (Celtic Energy, n.d.)

G. Selecting Recipients

When selecting recipients after the FOA or RFP has been released, there are a variety of different strategies to consider. These State Energy Office grant programs are usually competitive programs with applicants selected based on their application and how it aligns with the considerations of the review committee and necessary criteria. A review committee should be set up to provide support during program development and implementation and be given clear responsibilities, such as establishing program metrics, determining the program purpose and qualifying projects, and helping to engage potential applicants across the state. The State Energy Office could reach out to potential committee members directly or put out a request for interested parties. The ultimate goal is to have a committee that will bring different perspectives to the application review process and provide insights that the State Energy Office might not have. Potential committee members can include representatives from Tribes, investor- and consumer-owned utilities, local governments, emergency managers, developers, community members, and more.

A ranking scale can be used to rate proposals based on how they align with the program goals and numbers awarded by each member of the review committee. Potential considerations can include equity metrics, which include the number of communities that will be served by the microgrid, jobs created, the resilience benefits of the project, and how much stakeholder engagement and partnerships were facilitated with local communities. Other potential metrics include resilience benefits, such as hours of service provided during a power outage. States can develop an evaluation form that highlights the criteria being reviewed, how a certain score can be achieved, and the final score. For example, an application review committee may look at what the resilience potential of a project is and rank it from 1-5. In December 2022, the **Oregon** Department of Energy released the funding opportunity announcements (FOA) for round two of their Community Renewable Energy Grant Program. Oregon included a competitive review criteria chart in the FOA which looked at items such as strength of the planning project team, location of the project within a community, use of an equity framework to guide development, prior investments in energy efficiency at the project location, and more. Each item was given a numerical score, and applicants would be ranked on the competitive review scores and recommendations from the review committee.

Applicants should be made aware of a timeline for application announcements and be given an approximate deadline for when award notifications will be shared. When announcing the recipients of the Community Renewable Energy Grant Program, the Oregon Department of Energy shared that 68 applications had been received and 21 projects were selected. The review committee looked at project feasibility and strength, equity considerations, cost savings, economic development, and other criteria in the process. They also shared a timeline on their website with details on when announcements would be made (Oregon Department of Energy, 2022).

H. Next Steps and Metrics for Success

State Energy Offices should be prepared to provide continued support and engagement with their awardees. The **Oregon** Department of Energy, after announcing program awardees, outlined their next steps which included finalizing performance agreements and releasing an initial batch of funds (Oregon Department of Energy, 2022). The process for awarding grants may differ from state to state, but announcements should be made publicly and, if possible, efforts should be made to notify applicants who were not selected in advance. State Energy Offices can also provide feedback on these applications and encourage applicants to apply for future rounds of funding. State Energy Offices may also wish to explore cybersecurity concerns with the awardees and provide resources to mitigate potential threats (explored in more detail in the technical assistance section above).

Metrics for success of a project are varied, but a state should be aware of their goals and timeline for the project. This will help mitigate delays or funding concerns in advance. For example, DOE's program goals include "...developing commercial-scale microgrid systems (capacity of less than 10 MW) capable of reducing outage time of required loads by more than 98% at a cost comparable to non-integrated baseline solutions while reducing emissions by more than 20% and improving system energy efficiencies by more than 20% by 2020," (U.S. DOE, n.d.). This goal provided DOE with actionable metrics to track program success. The **Maryland** Energy Administration requests that grant recipients submit monthly progress reports that include a milestone completion checklist, description of progress on the project, hours worked, and schedule progress (MEA, n.d.) By collecting these reports monthly, it allows MEA to see what potential challenges have arisen and the plan to address them before the project has gotten too far along. Feedback collected from grantees also allows MEA to see what changes should be made for future iterations of the program.

I. Mapping a State Energy Office Microgrid Program

A comprehensive example of a State Energy Office microgrid program is included below to illustrate the different steps involved throughout the entire process from the enabling legislation to awarding grants.

Table 3: Connecticut Microgrid Grant and Loan Program – Pilot Program

Enabling Legislation: Substitute Senate Bill No. 23 Public Act No. 12-148 In 2012, the state of Connecticut passed An Act Enhancing Emergency Preparedness and Response which, in part, directed the Connecticut State Energy Office and the Department of Energy and Environmental Protection (DEEP) to establish a microgrid grant and loan pilot program.
Primary Objectives: DEEP was responsible for establishing a microgrid grant and loan pilot program to support local distributed energy generation for critical facilities. The loans and grants were to be used for supporting the cost of design, engineering services, and interconnection infrastructure for the microgrid. Critical facilities were defined as hospitals, police stations, fire stations, water treatment plants, sewage treatment plants, public shelters or correctional facilities, any commercial area of a municipality, a municipal center, as identified by the chief elected official of any municipality, or any other facility or area identified by DEEP. According to DEEP: "The purpose of the Program is to solicit proposals to build microgrids in order to support critical facilities during times of electricity grid outages. The Program was developed in response to the Governor's Two Storm Panel's recommendation regarding the use of microgrids as a method for minimizing the impacts to critical infrastructure associated with emergencies, natural disasters, and other events, which cause the larger electricity grid to lose power (CT DEEP, 2013). This chart will walk through steps that were taken in the pilot round of the program. Not all of these steps were replicated in future rounds, as DEEP incorporated lessons learned to improve the process.

State Energy Office Key Actions Timeline:
August 2012: CT DEEP issued a Request for Information (RFI) regarding the program requirements and selection criteria. The RFI outlined specific questions DEEP wanted feedback on and included information on the proposed program criteria. Some of the questions included in the RFI:

1. What do you consider to be critical facilities? This response can be general in nature and not specific to one municipality or other location in which a microgrid may be located.
2. This question is posed to developers. Provide examples of Microgrid projects that you have been involved with. Identify the Microgrid configuration and if the Microgrid project repurposed or reconfigured existing DG or if it was a completely new project.
3. The Microgrid Program grants and loans may be used to provide assistance to recipients for the cost of design, engineering services and interconnection infrastructure for any such Microgrid. There are many options to fund the cost of generation: Energy service agreement, CHP Program, LREC Program – fuel cells, Connecticut Innovations – R&D costs, PACE - Clean Energy Application Centers – technical assistance, and Possible federal money – if grants or loans are available. Are you aware of any other funding sources to support the cost of the project? What are they?

September 2012: CT DEEP hosted a stakeholder meeting in-person at their offices. The meeting provided an opportunity for interested program applicants to ask questions and for DEEP to gather additional information to help shape the program criteria, structure, and requirements. The meeting brought together municipalities and developers.

November 2012: CT DEEP released a project feasibility application (PFA) to conduct an initial evaluation of proposals. These proposals came from municipalities, electric distribution companies, municipal electric utilities, and more. Applicants who submitted a PFA were given notice on whether they were selected to move forward with a full application or not. For those who were not selected, they were provided an opportunity to request feedback from CT DEEP on their proposal.

CT DEEP also put out a request for legal briefs in November 2012. Questions they were seeking feedback on prior to the release of the full Request for Proposals (RFP) were:

1. Can the dedicated line and other distribution facilities connecting the generator and the Critical Facilities be designed, built, owned and maintained by a non-utility party?
2. Can the generator provide power to the Critical Facilities owned by an entity(ies) other than owner of the generation resources through a purchase power agreement?

April 2013: CT DEEP released a Request for Proposals for the microgrid grant and loan pilot program. Applications were limited to those who had gotten a positive response to their PFA. Applicants were given until June 2013 to submit applications. Materials that needed to be within the proposals included a layout diagram, one-line electrical diagram, microgrid controller functionality logic diagram, and other key information (see full proposal pp. 3-6).

June 2013: Proposals were received from multiple municipalities and various organizations.

July 2013: Awards were granted to five municipalities and two universities. All the projects are completed and operational.

The program has since gone through three additional rounds since the pilot with only two projects remaining under construction. The Connecticut Green Bank Microgrid Financing Program has also been used for the most recent round of microgrid proposals.

V. Public Utility Commissions: Steps for Developing State Microgrid Regulations

Microgrids are combinations of generation, storage, load management, and advanced controls, representing novel areas for state PUCs to regulate. A paramount consideration for PUCs is safety of the electric distribution system with affordability, resource adequacy, and system reliability. Increasingly, equity considerations are factored into state utility regulatory decisions. PUCs are charged with balancing these priorities while being responsive to disaster recovery, emergency preparedness, and other public policy goals, including clean energy objectives, specified in statutes or executive orders.

As a starting point, PUCs should assess any existing regulatory barriers to microgrids and consider possible steps to mitigate those barriers. Existing language in utility rules or state code may inadvertently prevent the deployment of microgrids. A common example is the definition of a public utility, which generally includes any entity selling electricity to an external customer, or rules prohibiting non-utilities from distributing electricity across rights-of-way, i.e., from one customer to another. Maine statute created an exception for microgrids from the definition of a public utility to facilitate the development of microgrids for projects that meet certain characteristics, in addition to the PUC finding that the microgrid is within the public interest:

> "(1) The proposed new microgrid will serve a total load of no more than 10 megawatts, except that the commission may approve no more than 2 new microgrids that each serve a load greater than 10 megawatts but no more than 25 megawatts;
>
> (2) The proposed new microgrid is located in the service territory of a transmission and distribution utility with more than 50,000 customers;
>
> (3) The distributed energy resources for the new microgrid meet the applicable portfolio requirements in section 3210, subsections 3, 3-A, 3-B and 3-C;
>
> (4) Any distributed energy resources constructed after the effective date of this subsection for the new microgrid are a renewable capacity resource as defined in section 3210, subsection 2, paragraph B-3 or a renewable resource as defined in section 3210, subsection 2, paragraph C;
>
> (5) The person proposing the new microgrid demonstrates that the person has secured the financial capacity to operate the proposed new microgrid;
>
> (6) The person proposing the new microgrid demonstrates that the person has secured the technical capability to operate the proposed new microgrid;
>
> (7) There is a contractual relationship between the proposed new microgrid operator and consumers within the area to be served by the proposed new microgrid; and
>
> (8) The proposed new microgrid will not negatively affect the reliability and security of the electric grid." (Maine Revised Statutes §3351)

California Public Utilities Code Section 218(b) prevents any entity other than an electric utility from distributing electricity generated at one property to three or more neighboring properties, or any property not adjacent to the generation site. This language was cited by the city of Berkeley as a barrier to building a solar PV and storage microgrid that would send electricity to multiple buildings that were not located next to each other. According to the CPUC, section 218 "serves an important public purpose, in assuring fair and reasonable rates, safe and reliable electricity available to all" (Tse, 2021). Through the CPUC's SB 1339 implementation proceeding, several parties submitted comments favoring amendments of Section 218(b) to allow unregulated entities to provide unregulated electric utility service from microgrids, which were generally opposed by regulated utilities and the Coalition of California Utility Employees (Coalition of California Utility Employees,

2021 and Sustainable Systems Research Foundation, 2021). Amendments to Section 218(b) would require state legislation to change the law, which has not happened at time of writing.

Sunnova Community Microgrids California, LLC, a microgrid developer, petitioned the CPUC in September 2022 for a certificate of public convenience and necessity (CPCN) to act as a "micro-utility" in building and operating microgrids to serve multiple private customers in accordance with multiple sections of California Public Utilities Code, including Section 2780, which defines micro-utility as "any electrical corporation that is regulated by the Commission organized for the purpose of providing sole-source generation, distribution, and sale of electricity exclusively to a customer base of fewer than 2,000 customers." In February 2023, an administrative law judge proposed granting the Public Advocates Office's motion to dismiss Sunnova's petition due to Sunnova seeking unauthorized exemptions and failing to provide regulators with adequate information; the CPUC dismissed Sunnova's petition in April 2023 (CPUC, 2023).

It is important to note that bilateral procurement agreements between microgrids and distribution utilities are permissible under current regulations. In 2022, the CPUC affirmed the authority of San Diego Gas & Electric to obtain up to 6 megawatts of electricity and grid reliability services from a microgrid owned by and sited at Marine Corps Air Station (MCAS) Miramar during generation shortfalls, paying the base for power and grid services with funds generated from electricity ratepayers. This arrangement is permissible under General Order 96-B, Rule 9.2.3 under the CPUC's Rules of Practice and Procedure, allowing utilities to sign tariff agreements with governmental entities (Wood, 2022). MCAS Miramar successfully provided electricity to approximately 3,000 homes in San Diego to avoid broader outages during hot weather conditions in August 2022 that constrained the electricity grid (Marine Corps Installations Command, 2022).

PUCs may also be interested in assessing the benefits and costs of different types of microgrids to determine whether (a) such projects are in the public interest and (b) how costs should be recovered. The New Jersey BPU developed a list of benefits provided and taken by microgrids with regards to the distribution system (Winka, 2016):

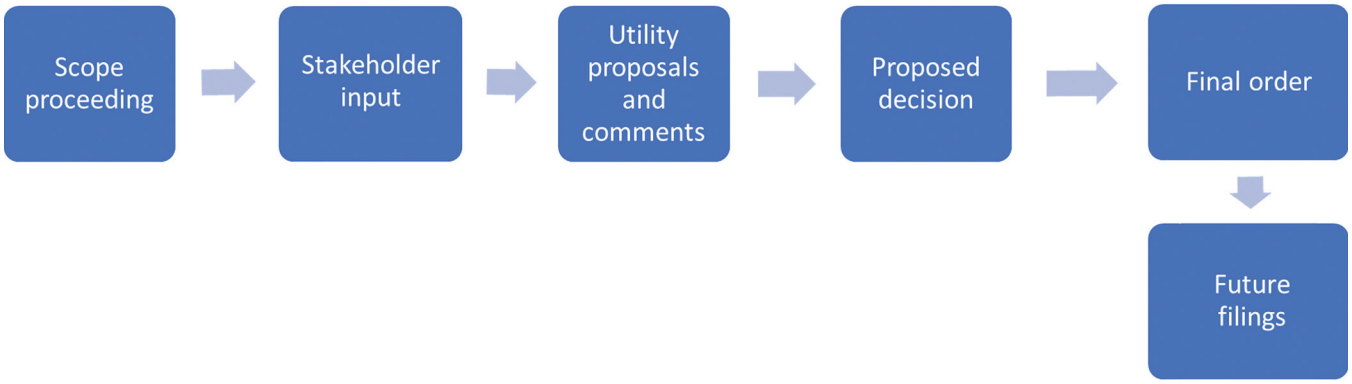
Benefits Microgrids Provide to the Grid	**Benefits Microgrids Receive from the Grid**
Produce electric and thermal energy for customers; provide ancillary services and reduce peak demand	Require energy from the grid when microgrid is not operating
May defer related investments in distribution system upgrades	May defer, but not fully avoid, distribution and / or transmission upgrades
Improve the efficiency of energy production and delivery	May increase or reduce environmental impacts during peak demand, depending on generation source and grid mix
Reduce outages to enhance resilience and reliability	May reduce resilience and reliability if not properly managed

Compared to one or multiple DERs without controls to enable islanding during an outage, microgrids may be more costly than simply installing traditional DERs. Additionally, microgrids may face long interconnection timelines or other costly project delays that impact the cost-benefit calculus for deploying a microgrid project. There may also be difficulty in agreeing upon or calculating the value of lost load or other related resilience metrics by which to value the microgrid project, making it difficult to specifically determine when a microgrid project meets standards for the cost-benefit ratio and/or regulatory performance requirements.

A regulatory process typically unfolds over the following steps (Figure 2), beginning with the passage of legislation requiring regulatory action on the part of the PUC.

1. Commission issues an order specifying scope of the proceeding, which may identify:
   a. Objectives and prioritization of issues
   b. Procedural schedule
   c. Assignment of commissioners, commission staff, administrative law judges (ALJ), and other resources to specific roles
   d. Establishment of working groups to make technical and policy recommendations
2. Commission holds public workshops or conferences to gather stakeholder input
3. Utilities file proposals as directed by the commission
   a. Stakeholders file comments
   b. Utilities file reply comments
4. ALJ, commission staff, working groups, or commissioner(s) issue proposed decision for public review and comment
   a. Stakeholders and utilities file comments
5. Commission votes to approve a final order, which may direct utilities to make future filings to the commission

Figure 2: Example Regulatory Process



Multi-phase or track proceedings may move through this process multiple times as different regulatory questions are considered.

New legislation may not always be required as existing statutes may provide authority for a PUC to initiate a microgrid-related proceeding. For example, in the State of Illinois, ComEd under the statutory authority from Illinois Public Utilities Act (PUA), filed a petition with the Illinois Commerce Commission (ICC) in 2017 for approval of a distribution microgrid demonstration project and study in the Bronzeville community located in Chicago. The ICC approved the demonstration project and study to explore the value and use of microgrids for DER integration, coordinated grid operations, and overall grid benefits to customers, which allowed for subsequent regulatory proceedings. Commissions can consider opportunities to utilize their existing regulatory authority in statute to encourage microgrid deployment absent new legislative authorities.

A. Scoping a Proceeding

As a first step, PUCs begin by reviewing statutory language and considering what actions or steps the PUC is required to take in order to achieve the legislative intent. While it is possible for such actions to be taken in an existing docket, such as grid modernization, resilience, or DER integration proceeding, some PUCs have opted to open new dockets to explore microgrid regulatory questions in response to legislation. Opening a

new docket requires the commission to vote to approve an order containing the scope of the proceeding. Such an order contains citations of the statutes being addressed, specifying the source of the PUC's authority to open a proceeding. In 2018, the **Hawaii** Legislature passed Act 200 "Relating to Resiliency" directing the Hawaii PUC to establish a microgrids services tariff to encourage and facilitate the development and use of energy resilient microgrids. The Hawaii PUC was charged with developing a microgrid services tariff to expediently integrate resilient and renewable energy into the grid by encouraging the development of microgrids. Priorities for the program include islanding of microgrids during extreme events and outages to improve grid resiliency, standardizing interconnection language to facilitate broader adoption of microgrids, and exploring multiple market opportunities for customers to pursue microgrid projects. The Hawaii PUC opened an investigatory docket (Order No. 2018-0163) to investigate establishment of a microgrid services tariff and initiate scoping the proceeding.

Orders may also contain background material, such as additional relevant legislation or executive orders, general policy goals, other relevant regulatory proceedings, and contextual information, such as assessments and recommendations produced by the PUC or State Energy Office. Orders often conclude with a formal statement of the opening of a new docket, named parties (i.e., regulated utilities), issues to be addressed, and an invitation for stakeholders to file motions to participate in the proceeding, and a procedural timeline. Orders to open a proceeding may or may not be subject to public comment; typically, the scope of a proceeding (whether an element of the order to open a proceeding, or a separate order or memorandum) is available for review and comment.

Orders to open proceedings may include a preliminary schedule specifying deadlines around public workshops, interim or proposed decisions, and initial or reply comments. Timelines may be high-level, beginning with quarters or months rather than specific dates, with deadlines spelled out in greater detail as the PUC moves through the proceeding. The Hawaii PUC issued Order No. 35884 which scheduled technical conferences to identify critical issues to address during the microgrid services proceeding and set deadlines for opening and reply briefs. Procedural schedules are often revisited and changed during a proceeding as commissioners and staff develop an improved understanding of the complexity of issues within scope and how united or diverse the perspectives of named parties and stakeholders might be. For example, the Hawaii PUC issued Order No. 36514 establishing a procedural schedule to convene two working groups to consider a variety of key issues identified in its previous Order No. 36481. The order also set expectations for working group participation and scheduled regular status updates from each working group to the commission.

Regulatory initiatives often unfold over between one to five years, depending on these same factors.

B. Stakeholder Input

After opening a proceeding, PUCs begin gathering information on which to base an eventual decision. Information-gathering can occur through three main pathways:

- **Technical/informational workshops:** PUCs may hold public workshops to give named parties and intervenors opportunities to make remarks to commissioners and staff. PUCs develop agendas and invite stakeholders to share presentations to the PUC and fellow stakeholders.
- **Written comments:** Named parties and intervenors can file written comments with factual information or recommendations to the PUC. The PUC may put forth specific questions or topics where information from market participants, such as technical reports, case studies, expert testimony, or other types of information, would be helpful.
- **Technical working groups:** The PUC may recommend the creation of working groups to explore particular topics within the scope of the rulemaking. Working groups can hold meetings over a set time period and conclude with a summary report to commissioners. Stakeholders can self-select into working

groups that fit their areas of expertise and / or priorities for the proceeding. Stakeholders may include regulated utilities, consumer advocates, trade associations, advocacy groups, municipalities, and others. While the PUC may specify what types of stakeholders it wishes to participate in working groups, with the exception of regulated utilities, PUCs cannot require non-regulated entities to dedicate resources to regulatory processes.

While some state PUCs have opened proceedings dedicated entirely to microgrids, such as California and Hawaii, others have found ways to incorporate microgrids into broader grid modernization or DER integration proceedings. It should be noted that even in these broader proceedings, PUCs can benefit themselves and stakeholders by setting clear boundaries around the issues up for debate and where regulators are seeking input or recommendations from stakeholders given other open or anticipated proceedings. For example, the **District of Columbia**'s initiative to Modernize the Energy Delivery System for Increased Sustainability (MEDSIS) worked in two phases to identify technologies and policies to aid in policy goals around grid modernization and clean energy, with microgrids playing a major role. In phase 1, the DC Public Service Commission (DC PSC) held technical workshops and town hall meetings, issued a staff report identifying regulatory barriers to grid modernization and developing a framework for the initiative, and set forth a vision statement and guiding principles. In phase 2, the DC PSC hired SEPA to facilitate six working groups: (1) data and information access and alignment, (2) non-wires alternatives to grid investments, (3) rate design, (4) customer impacts, (5) microgrids, and (6) pilot projects (DC PSC, n.d.). The microgrids working group aimed to address microgrid development by examining microgrid costs and benefits and providing recommendations on ownership, operation, standards, and implementation.

Following the conclusion of the second phase with a final working group report submitted to the PSC on May 31, 2019, PSC staff issued a proposed order in August 2019 opening the next phase of grid modernization work in DC, known as PowerPath. The proposed order summarized the findings of the microgrids working group, noting: "Because of the vast differences in types of microgrids, as well as the current statutory framework of the Commission, microgrid regulation presents the most controversial and challenging subject for this Commission." The report further stated that a pending case before the PSC (Formal Case No. 1163) was expected to provide more clarity on the scope of the PSC's jurisdiction over microgrids and whether they act within the definition of a public utility according to DC Code §§ 34-301, 34-207, and 34-214, making further discussion of microgrid-related issues under the MEDSIS proceeding premature (DC PSC, 2019). In Formal Case No. 1163, which is still active as of November 2022, the PSC proposed classifying multi-customer / multi-meter microgrids as electric companies subject to regulatory authority, meaning such microgrids would be required to apply for certificates of public convenience and necessity and receive PSC approval for rates (DC PSC, 2022).

As priorities like environmental justice, energy equity, and prioritizing historically underserved communities become more important focal points for many PUCs, regulators should also consider the diversity of stakeholders and their ability to meaningfully participate in proceedings. Sixteen states have authorized intervenor compensation programs, which reimburse individuals or groups for the costs of their involvement in regulatory proceedings (NARUC, 2022). An order opening a proceeding may contain language specifying the availability of intervenor compensation for the docket and directing potential recipients to resources outlining eligibility rules and application procedures (CPUC, 2019).

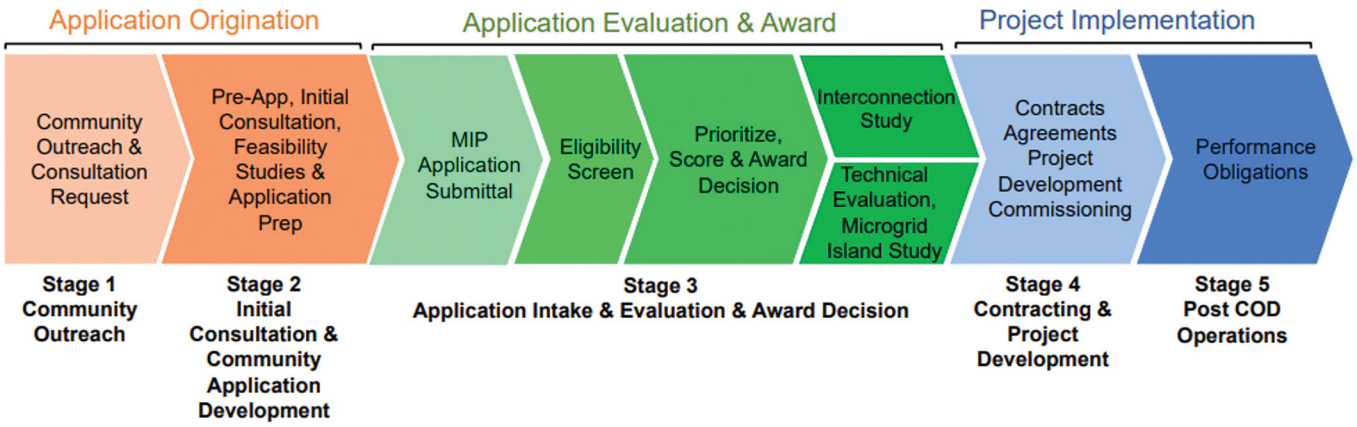
Another element for PUCs to consider during stakeholder input processes is the method of facilitation for working groups, should the PUC pursue that route. A 2021 NARUC report on stakeholder engagement provides a decision-making framework for PUCs to choose optimal engagement strategies, covering scope, facilitation approach, engagement approach, meeting format, timeline, and engagement outcomes and follow-up actions. A review of PUC proceedings in 11 states provides examples of varying approaches to these components, summarizes emerging best practices, and suggests questions for PUCs to consider in choosing paths forward to build trust and consensus and achieve objectives (McAdams, 2021).

C. Utility Proposals

Proceedings may require that named parties (generally the PUC-regulated investor-owned utilities) file proposals for review and comment by intervenors and regulators. Proposals have a review and comment period; named parties may also submit reply comments in response to intervenor comments. For microgrid regulations, utility proposals may cover tariffs, sample operator requirements, interconnection agreements or sample microgrid designs, and implementation plans.

In California's microgrids and resilience proceeding, the state's three investor-owned utilities developed a proposed implementation plan (**Figure 3**) for a Microgrid Incentive Program (MIP), authorized by CPUC decision D.21-01-018 in January 2021, and presented it for stakeholder comment in December 2021. The CPUC envisioned the MIP as a $200 million program "to support the critical needs of vulnerable communities impacted by grid outages and to test new technologies or regulatory approaches to inform future action" (CPUC, 2021). The utilities' proposal included summaries of input received during public workshops, an overview of the utilities' preferred process to develop qualifying microgrids via the MIP, eligibility criteria, evaluation scoring procedures, and areas for further discussion or clarification by the CPUC (CPUC, 2021).

Figure 3: California Regulated Utilities' MIP Proposal – Process Overview



ComEd, the investor-owned electric utility servicing Northern Illinois, including the city of Chicago, filed a petition in 2017 to the **Illinois** Commerce Commission (ICC) to support a demonstration project and study of a community microgrid in a neighborhood in Chicago. The project's stated purpose was to generate real world planning and operational experience regarding the interconnection of microgrids with DER, clustering of utility and private microgrids, and grid operation considerations, studied over a 10-year period. ComEd stated the proposed configuration of the project in the Bronzeville neighborhood will support a mix of residential, commercial, and small industrial customers. The project was funded in part by two grants from the U.S. Department of Energy (DOE) to research, develop, and test an advanced microgrid controller and design and deploy solar and battery storage technology within the microgrid.

The following year, the ICC issued Order No. 17-0331 approving ComEd's proposal to study its demonstration project with the Bronzeville community microgrid. The order stipulated ComEd propose several robust metrics designed for detailed analysis of the impacts, benefits, and costs of the project for siting microgrids to maximize community benefits. ComEd will ultimately propose the following asset performance metrics: a solar forecasting algorithm accuracy metric to measure solar output within the project zone, a redundant sources of electricity metric to ensure continuous operation if a primary source of power within the project experiences an interruption, and a distribution redundancy and automated restoration metric to enable automated power restoration using redundant paths for distribution of electricity. Other key metrics measure the project's islanding capabilities and the number of customers connected at each segment of the distribution feeder within the project zone. Finally, two metrics for local job creation and community outreach were included

to measure relatively intangible co-benefits to the community, a specific public policy goal the ICC wanted quantified as part of the cost-benefit analysis for the Bronzeville microgrids project. ComEd's filing for metrics illustrates a PUC's regulatory authority to track system performance with routine data reporting.

D. Proposed Decisions

Taking into account the scope of the proceeding, procedural timeline, and stakeholder input, either an assigned administrative law judge, PUC staff, working groups, or an assigned commissioner may release a proposed decision for public comment before a final vote by the PUC is taken. Proposed decisions review the issues before the PUC, reproduce the procedural timeline, summarize comments received during the proceeding, offer findings of fact, and contain orders with next steps, such as approving or denying particular utility programs; requiring utilities to file tariff, reports, or other documents; or other steps for named parties.

For example, in February 2021, **Hawaii**'s Microgrid Tariff Working Group submitted proposed edits to Hawaiian Electric Company's proposed microgrid services tariff applying to "customer microgrids," in which customer-owned infrastructure supplies electricity during an outage, and "hybrid microgrids," in which customer-owned and utility-owned infrastructure is used to generate and distribute electricity during an outage (Chang, Aramaki, and Asano, 2021). Based on the PUC's initial list of 11 topics on which to build consensus and consider revisions, the proposed revisions formed the backbone of the PUC's May 2021 order implementing a microgrid services tariff.

The **DC** PSC in Order No. 21172 issued a Notice of Proposed Rulemaking RM-48-2022-01 that proposed establishing rules governing microgrids development in the District of Columbia. The proposed rules provide the classifications, requirements, codes and standards for microgrid development. The order also noted that the Commission would consider establishing a tariff structure to enable a microgrid to receive reasonable compensation for its value and directed regulated investor-owned utility Pepco to propose modifications to the current Standby Service to accommodate a distributed energy resource focus on microgrids.

Pepco filed its Application for Modification of the directive issued in DC PSC Order No. 21172 to propose modifications to the Standby Service (Schedule S) in its tariff to support development of microgrids. Pepco noted that Schedule S should be updated but that the deadline to update this in 30 days was unreasonable. Pepco noted that Schedule S should consider additional resilience benefits that microgrids bring to a distribution system, as well as accounting for reserving needed distribution capacity.

In response, the DC PSC ordered Order No. 21527 in agreement with Pepco's Application for Modification and directed Pepco to update its current Standby Service to accommodate a DER focus on microgrids on or before March 1, 2023.

E. Final Orders

As a final step, commissioners vote to approve a final order, representing either the conclusion of a process or the closure of one segment of a larger process. PUCs are generally comprised of three to seven appointed or elected commissioners.3 A majority of commissioners must vote to approve an order. As with proposed or draft orders, a final order includes background information, stakeholder comments, findings of fact, and the specific actions the PUC is taking. Commissioners may release concurring or dissenting opinions elaborating on their reasoning behind their vote for or against an order; these are at the discretion of individual commissioners.

Examples from PUCs in Hawaii (**Table 4**) and California (**Table 5**) follow to illustrate the regulatory process in action.

3 See https://www.naruc.org/about-naruc/regulatory-commissions/ for a directory of U.S. state and territory PUCs.

Table 4: Hawaii Microgrid Services Tariff

Enabling Legislation: Act 200 "Relating to Resiliency"
In 2018, the Hawaii Legislature passed Act 200 directing the Hawaii Public Utilities Commission (PUC) to establish a microgrids services tariff to encourage and facilitate the development and use of energy resilient microgrids.

Primary Objectives:
The Hawaii PUC was charged with developing a microgrid services tariff to expediently integrate resilient and renewable energy into the grid by encouraging the development of microgrids. Priorities for the program include islanding of microgrids during extreme events and outages to improve grid resiliency, standardizing interconnection language to facilitate broader adoption of microgrids, and exploring multiple market opportunities for customers to pursue microgrid projects.

State Commission Key Actions Timeline:
July 2018: The Hawaii PUC opened an investigatory docket (Docket No. 2018-0163) to investigate establishment of a microgrid services tariff. Hawaiian Electric Company, Inc. (HECO), Hawaii Electric Light Company, Inc. (HELCO), and Maui Electric Company, Limited (MECO) (collectively, Hawaiian Electric or HECO Companies), as well as the Hawaii Department of Commerce & Consumer Affairs, Division of Consumer Advocacy, were named as parties to the docket.

November 2018: The Hawaii PUC issued Order No. 35884 which scheduled technical conferences to identify critical issues to address during the proceeding and set deadlines for opening and reply briefs. Additionally, the order grants intervenor status to several interested groups, including Renewable Energy Action Coalition of Hawaii (REACH*), Distributed Energy Resources Council of Hawaii (DERC Hawaii), Life of the Land (LOL), Puna Pono Alliance (Puna Pono**), Microgrid Resources Coalition (MRC), Energy Island, Energy Freedom Coalition of America (EFCA**), and Ulupono Initiative, LLC (Ulupono). The Hawaii PUC's administrative rules allow for parties to participate in proceedings based on several factors, including statutory authority, financial interest, applicant interest in proceeding, the extent to which the applicant's interests do not overlap with existing parties, and the extent to which the applicant's interests will not unreasonably broaden the scope of issues under consideration or delay proceedings.

*REACH would subsequently withdraw from the proceeding in March 2019.

**Puna Pono & ECFA would subsequently withdraw from the proceeding in November 2019.

August 2019: The Hawaii PUC issued Order No. 36481 which established two working groups: (1) a Market Facilitation Working Group and (2) an Interconnection Standards Working Group to address issues identified in the order. The Market Facilitation Working Group was charged with developing actionable recommendations for the microgrid tariff language, proposed actions for existing DER programs, and potential new programs to facilitate microgrid development, and an Interconnections Standards Working Group charged with developing standardized language and requirements for interconnection and islanding/reconnection of microgrids. Working group membership was open to participants in the proceeding granted intervenor status by the Hawaii PUC. Participants from Hawaiian Electric and the Division of Consumer Advocacy served as co-chairs of both working groups, and other intervenors in the case were included as working group members. Intervenors and named participants from the initial commission order were identified as interested parties.

September 2019: The Hawaii PUC issued Order No. 36514 establishing a procedural schedule to convene working groups to consider a variety of key issues identified in Order No. 36481. The order also set expectations for working group participation and scheduled regular status updates from each working group to the commission.

(continued)

February 2020: The two working groups delivered their Phase 1 report in accordance with Order No. 36514, detailing key decisions around definitions of microgrids considered under the scope of the microgrids services tariff, and began to address compensation requirements for eligible microgrid projects.

February 2021: The two working groups delivered their 'Areas of Consensus' report that aligned commission and industry perspectives on advancement of the microgrids services tariff.

May 2021: The Hawaii PUC issued a Decision and Order No. 37786 approving the microgrids services tariff for Hawaiian Electric Company, Inc. The new tariff defines two types of microgrids:

- Customer microgrid where customer's infrastructure is exclusively used to supply all their own electricity needs during emergencies
- Hybrid in which a microgrid operator may combine utility-infrastructure and customer-infrastructure to supply electricity to microgrid members during an emergency

The commission also accepted a Microgrid Participants Bill of Rights submitted by the Division of Consumer Advocacy. The Microgrid Bill of Rights, modeled after an existing Community-Based Renewable Energy Subscribers Bill of Rights approved by the Hawaii commission in Docket No. 2015-0389, is designed to protect participants in the Microgrids Services programs. It lays out the basic ground rules participants can expect including rights to fair service, right to redress for poor services, right to reconsider, and the right to integrity (i.e., free from fraudulent services).

April 2022: The Hawaii PUC issued Order No. 38293 prioritizing issues for resolution in Phase 2 of the Docket, establishing the Working Group process for Phase 2, and setting an accompanying procedural schedule. The Phase 2 Working Group report is expected November 2022.

May/July 2022: The Phase 2 Working Groups met to discuss items identified in Order No. 38293.

November 2022: The Hawaii PUC issued Order No. 38710 suspending the procedural schedule set in Order No. 38293, accommodating working group requests for schedule extensions to address issues raised during status conferences in October 2022.

Significant Utility Filings:

March 2020: Hawaiian Electric submitted a draft microgrids services tariff, including a Hybrid Microgrid Operator Disclosure Checklist, Hybrid Microgrid Interconnection Agreement, and modifications to existing rules identifying sections in various existing DER tariffs that overlap with items under consideration for the microgrids services tariff.

February 2021: Hawaiian Electric submitted comments on Working Group Areas of Disagreement, noting that existing tariff structures for DERs potentially conflict with the proposed microgrids services tariff. The HECO Companies suggested a hybrid microgrid project size limit appropriate to existing Total Peak Demand criteria consistent with existing tariff structures.

May 2021: Hawaiian Electric submitted the Microgrids Services Tariff (Book 1 & Book 2) proposal that was ultimately adopted by commission decision and order.

Ongoing Issues Under Consideration:

A commission order on the microgrids services tariff is expected in 2023-2024, following completion of the Phase 2 Working Groups and consideration of their submitted reports. The commission acknowledged various issues had not been fully resolved and would be addressed in Phase 2 of proceedings around appropriate compensation for grid services, operation of microgrids to non-emergency situations, eligibility of certain ownership structures for the microgrids services tariff, various services fees, interactions with other dockets, consideration of societal and environmental value, and streamlining added generation applications.

Table 5: California Resiliency and Microgrids Proceeding

Enabling Legislation/Petition: SB 1339

In September 2018, California passed SB 1339 into law, directing the PUC "to facilitate the commercialization of microgrids for distribution customers of large electrical corporations" by undertaking a number of actions:

"(a) Develop microgrid service standards necessary to meet state and local permitting requirements.

(b) Without shifting costs between ratepayers, develop methods to reduce barriers for microgrid deployment.

(c) Develop guidelines that determine what impact studies are required for microgrids to connect to the electrical corporation grid.

(d) Without shifting costs between ratepayers, develop separate large electrical corporation rates and tariffs, as necessary, to support microgrids, while ensuring that system, public, and worker safety are given the highest priority. The separate rates and tariffs shall not compensate a customer for the use of diesel backup or natural gas generation, except as either of those sources is used pursuant to Section 41514.1 of the Health and Safety Code, or except for natural gas generation that is a distributed energy resource.

(e) Form a working group to codify standards and protocols needed to meet California electrical corporation and Independent System Operator microgrid requirements.

(f) Develop a standard for direct current metering in Electric Rule 21 to streamline the interconnection process and lower interconnection costs for direct current microgrid applications."

Primary Objectives:

In September 2019, the California Public Utilities Commission (CPUC) launched a multi-track proceeding and a Resiliency and Microgrids Working Group to convene discussion on microgrid commercialization.

Significant Utility Filings:

July 2021: PG&E filed an experimental Community Microgrids Enablement Tariff, which is a pathway for multi-property, multi-customer microgrids, approved by the CPUC, and governs the development of community microgrids.

December 2021: Pacific Gas & Electric Company, San Diego Gas & Electric Company, and Southern California Edison Company filed a proposed Microgrid Incentive Program Implementation Plan, following six stakeholder workshops held in July and August 2021. Specifically, the proposed $200 million plan aims to fund multi-customer clean energy microgrids supporting vulnerable populations impacted by grid outages.

State Commission Key Actions Timeline:

September 2019: The CPUC issued an Order Instituting Rulemaking regarding microgrids pursuant to SB 1339.

December 2019: Commissioner Genevieve Shiroma, as Assigned Commissioner for SB 1339 implementation, released a Scoping Memo containing three tracks: (1) deploy resiliency planning in areas prone to outages and wildfires in preparation for the summer 2020 season; (2) develop standards, protocols, guidelines, methods, rates, and tariffs to reduce barriers to microgrid deployment; and (3) consider ongoing implementation requirements and future resiliency planning processes. In August 2021 and December 2021, Tracks 4 and 5 were added to the proceeding, covering summer 2022 and summer

(continued)

2023 microgrid and resiliency solutions (Track 4, Phase 1); guiding principles and design of a Microgrid Incentive Program and microgrid multi-property tariff (Track 4 Phase 2); and methods to assess the value of resiliency (Track 5).

June 2020: The CPUC issued a Track 1 decision adopting short-term actions to accelerate microgrid deployment and resiliency solutions in advance of the summer 2020 season.

January 2021: The CPUC issued a Track 2 decision adopting tariffs, rates, and rules facilitating the commercialization of microgrids.

July 2021: The CPUC issued a Track 3 decision adopting a suspension of the capacity reservation component of the standby charge for eligible microgrid distributed technologies.

December 2021: The CPUC issued a Track 4, Phase 1 decision adopting microgrid and resiliency solutions to enhance reliability in summer 2022 and summer 2023.

July 2022: A CPUC Administrative Law Judge released a ruling requesting comment on CPUC staff's proposed Microgrid Incentive Program under Track 4, Phase 2. Comments and reply comments were submitted in August 2022. A proposed decision was released on February 9, 2023, and could be voted on by the Commission as soon as spring 2023.

Ongoing Issues Under Consideration:

According to the December 2021 Scoping Memo, Track 4, Phase 2 was expected to extend past November 2022. Track 5 was expected to begin in the second quarter of 2022 and extend through the first quarter of 2023.

Numerous policy and technical questions remain about the design and implementation of a multi-property, multi-customer microgrid tariff under Track 4, Phase 2, as outlined in a Resiliency and Microgrids Working Group discussion prompt. Questions were categorized under project characteristics, operational security and safety, ownership and operations, rules and regulations, application and study process, consumer protection, finances and compensation, and change management.

Multiple stakeholder workshops beginning in May 2022 and expected to continue through the end of 2023 will be continuing to explore issues associated with the value of resiliency. Discussions of these workshops are focused on the economic and equity impacts of power outages; definitions, metrics, tools, and methods to value resiliency; and improving grid planning processes.

VI. Conclusion

State Energy Offices and PUCs across the U.S. continue to work through microgrid programs and regulatory initiatives. Interest from policymakers in resilience investments, such as microgrids, remains high as cyber, physical, and climate-related threats to energy infrastructure continue to grow in magnitude, frequency, and impact. NASEO and NARUC expect sustained state-level activity on microgrids throughout all regions of the country.

The goal of this framework was to provide practical options and recommendations to State Energy Offices and PUCs on how to initiate and implement microgrid programs and regulations. Although examples from relevant state efforts are included throughout, this framework is far from an exhaustive list of state strategies, and it does not seek to recommend that any state follow the exact path of another.

In the future, NASEO and NARUC will continue to support State Energy Offices and PUCs in peer-sharing, problem-solving, and strategy development for microgrid programs and regulations. Stakeholders are encouraged to use this framework to understand the priorities, options, and challenges these state-level energy officials have regarding microgrids. Continued stakeholder engagement and technical assistance are critical to the success of future microgrid initiatives.

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Appendix A: Recommended Resources for Further Reading

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