MEMORANDUM

Pacific Northwest NATIONAL LABORATORY

Date:	**December 20, 2024**	Memo No.:	PNNL-37178
To:	**Caroline Moore, Oregon Public Utility Commission**	Project No.:	**82797**
From:	**Jed Jorgensen and Jason Eisdorfer**		
Subject:	**Work products from technical assistance regarding microgrids**		

Background

The Oregon Public Utility Commission (OPUC) requested technical assistance related to microgrid projects from the U.S. Department of Energy's (DOE's) Office of Energy Efficiency and Renewable Energy (EERE) and Office of Electricity (OE) State Technical Assistance Program. Technical assistance was provided by staff from the Pacific Northwest National Laboratory (PNNL).

The OPUC shared that Oregon's existing regulatory constructs enable individual customer, islandable, behind-the-meter microgrid installations. However, interest is growing in more complex microgrid projects, where multiple different customers could be served from a single microgrid installation. The OPUC is currently exploring whether existing statutes and regulations support such installations or create unintended barriers.

Against the backdrop of this interest in more complex microgrid projects, the OPUC requested support from PNNL to:

1. Identify statutory or regulatory barriers to more complex microgrid projects in Oregon.
2. Provide background on what other states have accomplished regarding more complex microgrids and the statutory and regulatory structures/frameworks that enabled that work.
3. Identify questions that may need to be resolved related to more complex microgrids that the OPUC could explore in one or more policy dockets or through implementation of a pilot project.

This memo explores each of these support areas through the following sections:

1. Microgrid archetypes
2. Background from other states
3. Identified barriers and regulatory considerations around microgrids
4. Questions and potential processes to explore frameworks for microgrid implementation
5. Considerations and questions for a hypothetical pilot project
6. References and publications which may be of interest for further reading

Microgrid archetypes

Microgrids can be developed and operated in a wide variety of ways to serve different purposes. In the microgrid literature, there are not yet settled, uniform definitions of microgrid types. The 2020 publication, "How to Design Multi-User Microgrid Tariffs" by the Smart Electric Power Alliance (SEPA) and Pacific Energy Institute (PEI) offers an archetype of microgrids which provides a greater level of detail than some other classification systems (de Martini et al. 2020). The text below is excerpted from the above publication, with light edits to make it more succinct:

- *Customer Microgrids - Customer or independently developed microgrids involving a single utility customer location. Customer microgrids may involve a single building or a commercial or institutional campus. The primary distinction is that the microgrid is wholly contained on a single customer's property using only non-utility infrastructure beyond the Point of Common Coupling (PCC).*
    - *Single Customer Microgrids - Customer or independently developed microgrids involving a single utility customer location with energy producing resources behind the customer's meter.*
        - *Unsynchronized Customer Microgrid - disconnects on grid outage via an isolation breaker and requires an "open transition" involving deenergizing all generation/storage units in the microgrid, and then closing the isolation breaker to reconnect to the utility grid.*
        - *Synchronizing Customer Microgrid - seamlessly islands on grid outage and reconnects via a synchronizing isolation breaker after the grid is restored.*
    - *Customer Microgrid with Tenants - another form of a customer microgrid that has multiple submetered tenants interconnected. This type of microgrid archetype may involve a commercial building, research park, apartment complex, or commercial retail mall. This type of multi-user microgrid does not use the utility grid behind the PCC to form the microgrid and provide the energy to the multiple tenants. The interconnection at the PCC may be unsynchronized or synchronized as described above.*
- *Utility Microgrid - a microgrid with local distributed resources developed, owned (or contracted) and operated by a utility to serve a community or specific critical facilities.*
- *Utility Partnership Microgrid - a microgrid developed and operated by a utility on their distribution system to serve a community or specific critical facilities that involves both utility resources (owned or contracted) and customer resources providing services.*
- *Remote Microgrid - a customer or multi-user microgrid that is not connected to the utility grid in normal mode and unable to connect to the utility grid.*
- *Virtual Microgrid - also known as a Virtual Power Plant (VPP), a set of aggregated resources that can provide energy and/or grid services under normal operating conditions. A VPP is not a microgrid unless there is a clear electrical boundary with a Point of Connection (POC) and the resources and loads are able to island consistent with the definition of a microgrid.*

In this document, the PEI archetypes are used when referring to different types of microgrids. Discussion is centered around Utility Microgrids and Utility Partnership Microgrids.

Background from other states

Microgrid statutes and policies remain relatively uncommon across the U.S. A 2022 report published by the Nation Conference of State Legislatures (NCSL) noted only five states plus the territory of Puerto Rico had substantive microgrid laws, though an additional 16 states reference microgrids (Shea 2022).

State statutes related to microgrids vary considerably in their scope:

- Some state statutes define microgrids for specific purposes or address statutory issues that may unintentionally inhibit microgrid development. A recent report from the National Association of State Energy Officials (NASEO) and National Association of Regulatory Utility Commissioners (NARUC) notes that the definition of a public utility can often prohibit development of non-utility owned and operated microgrids (Jones et al. 2023). The State of Maine faced this challenge, which the legislature addressed by creating an exception for microgrids (de Martini et al. 2020).
- Some states have used legislation to direct their public utility commissions to engage in processes to work through issues related to enabling microgrid development and deployment. California and Hawaii, explored more deeply below, developed comprehensive microgrid regulatory structures following the passage of state legislation.
- Some states have begun testing technical assistance and competitive grants and awards to support microgrids. New York, Connecticut, and Maryland are examples of states that have tread into the microgrid landscape testing competitive grants awards.

California

In 2018, the State of California passed Senate Bill No. 1339, making findings relating to the benefits of microgrids and directing the California Public Utilities Commission (CPUC) to take the following actions:

1. Develop microgrid service standards.
2. Without shifting costs between ratepayers, develop methods to reduce barriers for microgrid deployment.
3. Develop guidelines that determine what impact studies are required for microgrids to connect to the electrical corporation grid.
4. Without shifting costs between ratepayers, develop separate large electrical corporation rates and tariffs, as necessary, to support microgrids,
5. Form a working group to codify standards and protocols.
6. Develop a standard to streamline the interconnection process and lower interconnection costs.

A significant amount of activity followed this new law, including the CPUC issuing an order as part of rulemaking to implement the law (Rulemaking 19-09-009) and the filing of the Proposed Microgrid Incentive Program Implementation Plans of San Diego G&E, Pacific G&E, and Southern California Edison. This activity included numerous work groups, additional analysis, a pilot tariff, and more. The CPUC convened a Resiliency and Microgrid Working Group. The CPUC directed the three utilities to develop microgrid tariffs primarily to begin exploring concrete issues and as a place to house tariff options as they arise. In April of 2023, the CPUC approved rules for the above utilities to provide over $180 million in funds for projects under the Microgrid Incentive Program, with individual projects being eligible for up to $15 million in funding, and application processes launching at some utilities in 2024 (California Public Utilities Commission n.d.).

The CPUC recently issued an order adopting implementation rules for multi-property microgrid tariffs. (19-09-009, November 7, 2024). This 121-page order reviews much of the statutory and regulatory history of SB 1339 and the CPUC's effort to implement it culminating in "Track 5" focusing on the development of a multi-property microgrid tariff.

The principles for tariff development include:

- providing the terms and conditions of the relationship between the utility and the microgrid,
- aligning the microgrid with all CPUC policies,
- aligning the microgrid with existing electric service rules
- avoiding cross subsidization between participants and non-participants.

The CPUC rejected 7 microgrid stakeholder and utility tariff proposals because they were inconsistent with CPUC statutory responsibilities (including determination of just and reasonable rates) and the proposals called for unregulated third parties to control or operate the microgrids. The CPUC did adopt a ratepayer-oriented microgrid tariff supported by Public Advocates Office at the CPUC and directed the investor-owned utilities to refile a joint IOU tariff.

This order contained 92 Findings of Fact, 26 Findings of Law, and included substantial language changes to the joint IOU tariff with instructions to refile the tariff in 2 parts, in 30 days and within another 2 years.

This process indicates some of the complexities of a multi-property microgrid and the need to consider design elements, consistency with electric service requirements, and consistency with regulator statutory responsibilities.

The California path is notable for its statutory mandates and the resulting processes that played out over a significant period, allowing for many parties to spend time together, analyze the challenges together, and participate in various workgroups that were designed to problem solve. The presence of CPUC staff in these conversations was important as was a regulatory process driving toward a conclusion.

Hawaii

The State of Hawaii adopted Act 200 in 2018. The act identified microgrids as a significant tool in achieving a more resilient and cleaner energy system. As with California, Hawaii opted to take a collaborative approach to address regulatory, technical, and design issues prior to full implementation. The Hawaii Public Utilities Commission (HPUC) engaged stakeholders in a series of questions to help establish a tariff for Hawaiian Electric Company. The HPUC opened Docket 2018-0163 to explore the tariff, gathered stakeholders, and offered initial observations to focus the proceeding. A working group was formed to work on issues such as voluntary islanding scenarios, Distributed Energy Resource (DER) compensation, and technology requirements. In 2021, the HPUC approved a "Phase 1" tariff, setting definitions and creating interconnection processes for different types of microgrids. Work on a "Phase 2" proceeding continues through a working group, where the HPUC's stated objective is to "promote self-sufficiency and resilience among microgrid project operators and further streamline the Microgrid Services Tariffs" (Hawaii Public Utilities Commission 2023).

Identified barriers and regulatory considerations around microgrids

Oregon has an existing regulatory framework which enables Customer Microgrids as defined in the PEI archetype. Utility and Utility Partnership Microgrids do not share the same regulatory certainty as Customer Microgrids. This section explores some of the potential barriers and considerations related to Utility and Utility Partnership Microgrids. This is not an exhaustive review of all statutes, related case law, or rules which could impact such microgrid development. This overview is intended to simply identify the statutes that could come into play in a microgrid discussion. The Oregon Department of Justice should be consulted for a more detailed analysis.

Potential statutory barriers

While not explicitly prohibited in statute, existing statutes may pose challenges to the development or operation of Utility and Utility Partnership Microgrids. In all cases, the existing statutes which may seem like obstacles to microgrids have a history and intent to further other legitimate goals and largely existed before the development of microgrids.

- **ORS 758.405:** *The elimination and future prevention of duplication of utility facilities is a matter of statewide concern; and in order to promote the efficient and economic use and development and the safety of operation of utility services while providing adequate and reasonable service to all territories and customers affected thereby, it is necessary to regulate in the manner provided in ORS 758.400 (Definitions for ORS 758.015 and 758.400 to 758.475) to 758.475 (Fees) all persons and entities providing utility services.*
    - Considerations: This statute could be problematic for the development of Customer Microgrids with Tenants if a proposed microgrid would create duplicative infrastructure. For example, if the microgrid sponsors developed a physical distribution system alongside the existing utility system to expand microgrid functionality.
    - Further examination could investigate the statute's application in the case of either Utility Microgrids or Utility Partnership Microgrids that make use of utility distribution infrastructure to determine if there would be any "duplication of utility facilities." While a Utility or Utility Partnership Microgrid might require additional switching or other utility-owned or managed infrastructure to disconnect from the circuit, this infrastructure would not appear to be duplicative. The legal application here is dependent on the specific microgrid physical facilities.

- **ORS 757.325:** *(1) No public utility shall make or give undue or unreasonable preference or advantage to any particular person or locality, or shall subject any particular person or locality to any undue or unreasonable prejudice or disadvantage in any respect. (2) Any public utility violating this section is guilty of unjust discrimination.*
    - Considerations: It could be imagined that a utility might have to make certain microgrid investments on behalf of certain customers that are not a benefit to the system as a whole, thereby benefitting those customers and creating costs for other similarly situated customers. This might imply the need for a cost benefit calculation of the value of a microgrid to the system as a whole and the costs being borne by customers throughout the system.
    - Issues to be explored here would be a cost-benefit analysis that accounted for the value of microgrids and load shedding during periods of high prices or outage conditions, and the appropriate allocation of costs to microgrid participants and other customers.

- Additional issues to be explored might center around existing outage restoration planning and practices. In the case of priority restoration, hospitals or other emergency service providers may be prioritized for restoration. Priority restoration may not exist in state law, however it may be reasonable for communities to work with their utility in identifying locations that they wish to prioritize for restoration for the purposes of providing important services or government functions. Further thought might be given to the interplay of priority restoration and laws against nondiscriminatory ratemaking or service.
- Also to be explored would be an examination of a separate tariff for microgrids that accounted for cost responsibility, technical requirements, value of microgrid services to the system that could accrue to the microgrid customer, and the like, creating a separate class of customers that would not create undue discrimination with non-microgrid customers.

- **ORS 757.005*(1)(a)*** *As used in this chapter, except as provided in paragraph (b) of this subsection, "public utility" means:*
  - *(A) Any corporation, company, individual, association of individuals, or its lessees, trustees or receivers, that owns, operates, manages or controls all or a part of any plant or equipment in this state for the production, transmission, delivery or furnishing of heat, light, water or power, directly or indirectly to or for the public, whether or not such plant or equipment or part thereof is wholly within any town or city.* (Omitting additional sub-provisions.)
- **ORS 758.450:** *(2) Except as provided in subsection (4) of this section, no other person shall offer, construct or extend utility service in or into an allocated territory.*
  ORS 758.400: *(Definitions for ORS 758.015 and 758.400 to 758.475) - (3) "Utility service" means service provided by any equipment, plant or facility for the distribution of electricity to users or the distribution of natural or manufactured gas to consumers through a connected and interrelated distribution system. "Utility service" does not include service provided through or by the use of any equipment, plant or facilities for the production or transmission of electricity or gas which pass through or over but are not used to provide service in or do not terminate in an area allocated to another person providing a similar utility service.*
  - Considerations: State statutes define a utility as an entity that engages in certain activities, providing certain services, and thence coming under the regulatory authority of the state. In addition, the state has created utility service territories for regulatory purposes.
  - Further exploration could examine whether these statutes in conjunction with ORS 758.405 prevent any entity from engaging in the provision of regulated services to customers or installing their own duplicative infrastructure to create a microgrid, as such an action would make them into a regulated utility. Core to that examination would be a consideration of whether Utility Microgrids or Utility Partnership Microgrids may or may not be considered utilities if the incumbent utility would remain the electricity service provider.

Non-statutory considerations

There may be other barriers to the development or adoption of Utility or Utility Partnership Microgrids in the service territories of Oregon's regulated utilities.

- Cost allocation and protections for non-participating customers: If an investment cannot be said to provide some benefit to the system as a whole, most state statutory regimes disallow the allocation of costs to customers who do not receive a benefit from the investment. Other state legislatures that have addressed microgrids have included statutory language that prohibits or minimizes the "shifting of costs" among customers. This issue may need to be addressed by the

OPUC if, for example, a utility attempts to put microgrid investment costs in rate base that would impact the rates of all the utility's customers without a showing of a generalized system benefit. Alternatively, if individual projects pay for the one-time and ongoing utility system costs related to the development, installation, and operation of a Utility or Utility Partnership Microgrid it could alleviate this concern.

- Technological standards and operational considerations: As with all grid-connected equipment, maintaining human safety and system reliability are of paramount importance. Utilities may be legitimately concerned that microgrid design or operations could lead to reduced control over their system which they have an obligation to operate safely. Inappropriate design or engineering of a Utility or Utility Partnership Microgrid could create risks and impacts on utility operations, such as islanding without the utility's knowledge, potentially causing system damage or injuries. Microgrids developed and installed with autonomous switching might require less utility intervention during outage situations but may still require integration into grid engineering and outage restorage planning. Reasonable standardized technical requirements established with the concurrence of the utility might help address these issues.

- Liability and contractual considerations: The addition of new electric infrastructure in a Utility Microgrid or Utility Partnership Microgrid installation could create liability risks during regular grid operations and while the microgrid is operating during an outage. How these potential liability risks are assessed, mitigated, or managed may need to be investigated. For example, if a Utility Partnership Microgrid operation - or failure to operate - led to a loss of life or property, who would shoulder that burden? Contractual arrangements or other agreements between a utility and the microgrid customer or sponsor could be used to clarify how liabilities and other issues are managed.

- Utility participation: There do not appear to be any statutory or regulatory provisions that would preclude a utility from developing and operating a Utility Microgrid or Utility Partnership Microgrid. However, at present there may not be any mechanisms to compel a utility to participate in such a project. Absent any obligations around participating, it may be necessary to seek incentives to encourage utility engagement in a microgrid project. Positive financial incentives for the utility could be explored.

- Economic considerations: Utilities may have concerns that microgrid adoption could result in customers stopping use of their system or being served by another entity. The methods used to determine under what conditions a microgrid is implemented in Oregon could alleviate these concerns.

Additional regulatory considerations

A recent study, "Enabling Regulatory and Business Models for Broad Microgrid Deployment" identified microgrid regulatory considerations that must be addressed to clear the way for faster and easier development (Zinamen et al. 2022). While many aspects of a potential microgrid will be unique, including the geography, customers, usages, technical requirements, etc., there can be some standardization of regulatory considerations. These regulatory considerations may include:

- Policy Direction to Deploy Microgrids. Clear legislative or regulatory direction provides a signal to utilities that microgrid development is an important policy for the state and can help motivate

parties to engage with each other. Without such clear messaging, utilities, microgrid sponsors and regulators may lack a clear pathway forward. With that policy direction, a clear identification of roles, responsibilities, and opportunities can be described. With sufficient incentives and a clear regulatory path, both customers and utilities can negotiate in good faith and cooperate in model design. It is always preferred that policy direction come from the legislature, but with sufficient general authority, a regulator may be able to convey to the parties appropriate policy direction. Legislative or regulatory policy may need to provide direction for some or all of the following:

- Defining microgrid(s)
- Allowing for specific microgrid tariffs
- Allowing for some rate basing of costs
- Providing direction on valuing community and system benefits
- Clarifying roles of ownership and operation
- Establishing standards and protocols to meet utility technical requirements

In any of the elements above, the legislature could give general direction and authority to the OPUC to fill out the program definitions, remove limitations, establish rate and technical standards, and clarify roles.

- Microgrid Ownership and Operation. Different microgrid types may assume different ownership of various aspects of the infrastructure and assume different operational roles for the utility or a microgrid operator. Without clarifying legislation or regulatory direction, uncertainty may enter into who owns or can own microgrid components.

- Utility Ownership and Ability to Rate Base Capital Investment. To the extent a utility can build and own major microgrid components or is required to install infrastructure to enable private microgrid deployment, cost recovery becomes an issue. If significant capital investment is required, assigning those costs to only the microgrid participants could be quite expensive and may defeat the project. However, to put capital costs in rate base and spread costs to other customers would require an appropriate showing of benefit. Rate basing capital investment necessarily will mean allocating costs to microgrid participants and all other customers according to some customer/system benefit valuation.

- Definition of Resilience and Identification of Resilience Benefits. To the extent that a microgrid is envisioned to provide system resilience benefits, characterizing and valuing those benefits may be necessary to establish a rationale for investment and cost recovery from the microgrid customer or other customers in the context of a rate-based capital investment. Providing support for cost-recovery from non-microgrid-customers requires well-defined and credible valuation methods that are tailored to the specific utility system and the geographically-specific risks in the service territory. While resilience metrics have not yet been agreed to in the industry, an accepted characterization of resilience in Oregon could be a first step.

- Establishment of Tariffs. Customers of a microgrid will probably already be customers of the utility under a specific tariff. However, the services provided as a microgrid customer are different from the services in the underlying tariff and therefore could justify a separate tariff or

class. Each state utility regulator establishes customer classes and tariffs differently, but regulatory guidance brings clarity for the utility and customer. Tariffs may include rates of service from the utility and value of energy entering the grid from microgrid resources.

- Interconnection and Technology Standards. Identifying clear standards for interconnection can facilitate a relationship between the microgrid customer and the utility and reduce transaction costs. This might mean establishing interconnection requirements for distributed energy resources and control features specific to islanding functions of microgrids. Without clear standards, expectations, and mutual understanding, a utility could have an opportunity to overestimate interconnection costs and bring plans and conversations to an end.

- Role Definition. Generally, the microgrid operator, if not the utility, will not intend to become a regulated utility. However, it will be important to clarify roles and responsibilities amongst the microgrid sponsors, owners, operators and the utility, how important energy policy priorities are to be handled, such as consumer protection, system maintenance, energy equity, environmental directives and emission standards, and utility programs like net metering. Equally important are the operation roles including who makes the call to island a microgrid in advance of or during an emergency.

Questions and potential processes to explore frameworks for microgrid implementation

In its initial request to PNNL, the OPUC identified several questions regarding microgrids that may need to be addressed through future OPUC efforts. Additional questions were identified through this technical assistance work and have been added and categorized to support potential future work by the OPUC.

Statutory / Regulatory

- What type(s) of microgrid(s) should be encouraged?
- What statutory or regulatory barriers exist for the desired types of microgrids?
- What is needed to obtain utility participation in designing, constructing, facilitating, and/or operating a microgrid?

Legal / Contractual

- What legal or contractual structures are required for different types of microgrids?
- Do all entities that would be served by a microgrid need to agree to be served? How?
- Which entities can decide which sites get served with power by a microgrid during an outage?
- What contracts are needed between which parties?
- How are risks and liabilities associated with microgrid installation and operation managed or mitigated?
- What legal and service obligations does the microgrid operator owe customers during islanding?

Technology / Interconnection / Operation

- What are the engineering and interconnection requirements for a microgrid?
- Who is responsible for managing microgrid operations?

Costs and compensation

- What are the cost allocation methods?
- How can cost shifts between customers be reduced or eliminated?
- Who gets to decide the infrastructure/costs required for a microgrid?
- Who bears the cost for installing the infrastructure?
- What are the costs of integrating a microgrid and who pays those costs?
- Who pays for operations and maintenance of the microgrid infrastructure?
- What benefits does a microgrid provide the utility system that justifies broader cost allocation?
- Depending on the ownership, what compensation structures are needed for the generation or storage infrastructure employed by a microgrid during normal grid operations? What is needed during an outage when the microgrid is operating?

Process considerations

The OPUC could consider employing collaborative stakeholder processes to explore the questions identified above to reaching a shared understanding of regulatory challenges with more complex microgrids and explore solutions in an open and organized fashion. Such a process could include:

- A set of guiding principles.
- A set timeline.
- An open and transparent stakeholder process with opportunity for comment.
- A set list of objectives and deliverables.
- A robust role for OPUC staff.
- Clearly scoped work groups.

Additional detail is provided below.

Principles

Process participants frequently debate whether principles are needed. Principles are foundational propositions that provide the context for the development of a microgrid program. Principles offer the stakeholders an opportunity to work together to describe the context and the goal. By working through principles at the outset there is an opportunity to reduce suspicion and learn to work together. Ideally, principles should be organically derived. They can be sufficiently general enough to provide boundaries without taking positions. Here is a conceptual set as an example.

- Regulatory policies and approaches will protect existing physical infrastructure and recognize and protect core existing regulatory policies. These policies include just and reasonable rates, safety, resilience and reliability, energy equity, environmental integrity, utilities' ability to recover costs and earn a reasonable return on prudently incurred investments.
- Regulatory policies and approaches will not impinge upon statutory authorities and duties of the Commission or undermine statutory directives generally.

- Utility Microgrids and Utility Partnership Microgrids may provide feasible resilience opportunities to local communities and should be explored and considered by fairly valuing the proposed facilities benefits and costs.
- Regulatory policies and approaches should minimize the shifting of costs between ratepayers while recognizing the value of microgrids to participating customers, to non-participating customers who might benefit from continuation of emergency services in a geographic area, and to the utility's operation of its system.
- Regulatory policies and approaches will be designed so benefits and cost burdens are distributed in a manner that is equitable to customers and expand inclusion in underserved communities.
- Regulatory policies and approaches will support actions and investments that are economically and financially feasible.
- Regulatory policies and approaches will support the technical needs of the physical system and will not undermine safety or reliability either within the microgrid territory or elsewhere on the utility system.
- Regulatory policies and approaches will seek to standardize definitions and technical criteria, while recognizing the individual circumstances relating to each microgrid opportunity.
- A utility should have the opportunity to recover costs associated with its prudent system investments. Different ownership or multiple ownership models should be explored.
- Non-utility and utility investments should be fairly considered on equal footing. Third-party service providers, including microgrid developers, should not be unfairly discriminated against directly or indirectly by the utility.

Set Timelines

An investigation into principles and workgroups on substantive issues should be bound by time and subject matter. Having a set timeline, clear rules of engagement, and clear objectives is necessary to establish an expectation of a given product and does not allow any one party to delay the process. Participation and guidance from OPUC staff would be important.

Work Groups

Work groups should be established for all stakeholders to attend and offer ideas and critiques. OPUC staff should lead workshops and be present for discussions and presentations. Staff presence would lend both a sense of authority to the proceedings and an understanding of party position in action. The work groups could be scoped and organized organically to create a collaborative environment. The work groups should address some key areas.

1. Utility role and investment approach. Identify appropriate utility roles and investments. This will give confidence to the utilities and create inducement to actively participate in microgrid development. This issue will be tied to the standardization of resilience value methodologies. These methodologies are different issues and could be addressed separately, but they also are related to prudence and recovery of costs.
2. Standardize the measurement and valuation of resilience. Methodologies might look at the value of avoiding disruption to the individual customer, the larger economic impact, damage impacts, etc. These metrics can help identify the type of investment to allow a comparison of cost and value. Such a standardization might inform the most cost-effective approach to resilience infrastructure investments, including a determination of a utility system investment versus the

costs of a microgrid investment. Valuation should include examination of the community and system benefit streams of the microgrid's ability to island and include value of load reduction during times of disruption, benefits associated with the ability to black start, and benefits in the form of continuing emergency services for non-microgrid-participants.

3. The development of a microgrid customer tariff that recognizes identified statutory limitations and the additional services and benefits to customers located in a microgrid territory. This exercise could begin to explore example costs to the participant, which may depend on if or how the customers served by the microgrid are also paying for the microgrid, as well as utility and participant obligations, and any value from the microgrid back to the utility.
4. Establish guidelines defining roles of utility and microgrid operator and establish microgrid service standards (standards and protocols). This group could explore technical standards for interconnection, roles pertaining to operation and control of microgrid components and how they may differ from existing tariffs, and other contractual needs or responsibilities by each party. For example, OPUC staff have noted that under current tariffs and their associated compensation and contractual structures, utilities do not control the dispatch of storage on Qualifying Facility (QF) projects. This group could explore this potential issue as well as establish what it reasonably makes sense for the utility to own and do versus a microgrid developer.
5. Transparency in interconnection requirements and costs. This group could seek to establish a mutual understanding of interconnection requirements and costs. Topics could include exploring whether current interconnection processes are appropriate for considering complex microgrids, developing guidelines to determine appropriate sets of interconnection impact studies, standards to streamline the interconnection process, and methods to reduce barriers for microgrid development.

Tariffs

Alternatively, in addition to, or following a working group process, the OPUC could consider directing the utilities to produce draft tariffs that could apply to microgrid customers. By doing so the utility would be asked to think through what exactly it needs in terms of definition of roles, responsibilities, and rates. The component costs of each microgrid would be different, but a draft tariff could begin to pull apart the various operational and economic aspects of microgrid service. Draft tariffs could then be examined by stakeholders (perhaps in the work group format suggested earlier) to identify the many issues that must be addressed.

This process holds the prospect of getting into technical details, so it could be best to keep scoping at a high level. Concepts embedded into a direction to file a draft tariff could include:

1. Directing the utilities to file separate draft tariffs for customers who are served by a Utility Microgrid or Utility Partnership Microgrid. A microgrid customer in either case can be seen as part of a separate customer class with different cost assumptions than other non-microgrid customers.
2. Tariffs should standardize costs for service. For example, in a particular microgrid case the tariff would collect joint and common costs as customers of the larger utility service area, plus costs specific to the development of the microgrid, minus the value the microgrid provides to the utility system.

3. Tariffs may have to distinguish between infrastructure owners, depending on the microgrid type, i.e., who the component owner or operator is.
4. Where exact costs and benefits cannot be identified, tariffs should recognize the wider community resilience value of microgrids (or have a placeholder), and consider the interests of all utility customers, utility shareholders, microgrid community customers, and microgrid developers.
5. Work must be done on how to treat interstitial customers. Who is on the microgrid? How to serve customers in microgrid territory who are not microgrid customers?
6. The use of thermal assets and implications for decarbonization may need to be explored.
7. Work on tariff options: a single tariff; or a tariff that overlays on existing tariff; what to do with other optional tariffs such as net metering, stand-by charges, etc.
8. Work on whether statutory limitations will require utility ownership or if a Utility Partnership Microgrid pathway is possible.

Through stakeholder workgroups, the OPUC could also consider utility incentive programs and/or requirements for the utility to explore pro forma tariffs or economic solutions to interconnection.

1. The OPUC could direct utilities to propose an incentive program to fund Utility Microgrids or Utility Partnership Microgrids.
2. The OPUC could direct the utilities to propose a pro forma tariff that applies to microgrids that meet a set of reasonable technical criteria established by the utility as overseen by the OPUC. The working group could specify standards and protocols needed to meet utility microgrid requirements.
3. The OPUC could require IOUs to investigate low-cost ways of providing electrical isolation for backup power applications. Examine safety and reliability. Identify products or concepts that reduce the cost of electrical isolation for islanding purposes.

Considerations and questions for a pilot project

A pilot project can sometimes offer additional flexibility, potentially allowing the OPUC to explore regulatory challenges and test solutions or answer questions about complex microgrids. A pilot would need to be grounded in public process and have a clear design, rationale, timeline, and evaluation stage to justify cost allocations. A pilot could be monitored by participants in concurrent public stakeholder processes and be designed to answer specific questions raised in work group explorations. Many of the questions identified in the preceding section could be explored through a pilot project, however the siting, design, funding, or other characteristics of any particular project may limit the type of questions that can be answered. Said another way, while the OPUC and/or stakeholders could determine the universe of potential questions, it may not be possible to address every question for which an answer is desired through any one particular pilot project.

The OPUC could explore any proposed complex microgrid project to determine its attributes and the types of questions that could be explored if such a project were implemented as a pilot. Best practices would suggest that the pilot be fully defined, time-limited, size-limited, and designed in a way to answer specific questions within the context of the pilot's circumstances that can lead to a better understanding of complex microgrids and result in benefits to ratepayers over time.

Some potential attribute types that could be assessed by the OPUC in considering a pilot include:

- Customers to be served by the microgrid
- Generation and energy storage resources involved in the microgrid and their ownership
- Interconnection
- Energy sales
- Operation
- Costs and funding

As an example, consider a hypothetical utility partnership microgrid where multiple unrelated community-identified critical facilities in a reasonably small geographic area are interested in being served by generation and energy storage resources that they would own in the vicinity. In this example, assume the energy resources are interconnected to the utility grid and that the customers would like the utility to operate the microgrid. There are several unresolved considerations and questions that could be explored through such a pilot:

- Statutory considerations:
    - The issues raised in the statutory barriers section above may need to be explored by the Oregon Department of Justice to ensure legal compliance:
        - ORS 758.405 – "prevention of duplicative infrastructure": If a utility would own and operate the necessary switching, control, and protection infrastructure, it would not appear to be duplicative. Nevertheless, this may need to further legal consideration.
        - ORS 757.325 – "undue preference": The ability to add community identified critical facilities to a utility's priority restoration order may need to be considered against laws preventing discriminatory ratemaking or service. For the purposes of a pilot, it could be possible for a utility to integrate microgrid operation into its existing operational plans for power restoration.
        - ORS 757.005, 758.400, 758.450 – "definition of a utility": If the incumbent utility were to operate the microgrid infrastructure beyond the generation equipment it would appear that the microgrid sponsors would not become a utility under statute. Nonetheless, a legal determination may be needed.
        - Other statutory or regulatory issues could be found which require further legal consideration or remedy.
- Costs and cost-allocations for non-participating customers:
    - If the microgrid project were successful in obtaining grant funding it could limit up-front financial exposure to the utility and non-participating customers, reducing concerns related to potential cost-shifts. If not, these cost allocations would need to be explored.
    - On-going operational or maintenance costs to the utility related to the microgrid would need to be accounted for. A pilot could explore the scope of these types of costs and how they might be allocated and paid for between the utility or the microgrid project.
- Power sales, contracts, and liability related to energy generation and storage equipment:
    - Depending on the project, energy and capacity from the generation and storage equipment could be metered and sold under existing utility tariff options. However, existing tariffs and their associated contractual agreements may not account for

controlling the dispatch of energy storage or selling power during microgrid operations. Power sales considerations and agreements could be explored further through a pilot:

- Would new contractual language be needed between the utility and a microgrid developer to manage generation and energy storage equipment since it could be used during regular operations and during microgrid operation? Would contracts need to make clear that all energy metered and sold during microgrid operations would be equivalent to selling into the utility grid during normal operations?
- Would contracts need to be used to determine how liability is managed around microgrid equipment and operations? For a pilot, should all liability be borne by the developer of the microgrid? The customers served by the microgrid?
- A pilot, while maintaining energy purchases and sales at regular retail rates, could be used to explore the value of the energy resilience provided to the customers of the microgrid. In addition, the potential value of the microgrid equipment to all utility customers could be explored to determine if it exceeds the value(s) accounted for in the existing tariff(s).

The issues that could be explored through a project as a pilot could support the OPUC in answering some of the questions needed to create a standardized regulatory pathway for complex microgrid projects.

Reference and publications which may be of interest for further reading

The references below include bulleted annotations and additional publications that were identified which may be of interest to the OPUC as it considers how to move forward with microgrids in Oregon.

- California Public Utilities Commission. n.d. “Resiliency and Microgrids.” https://www.cpuc.ca.gov/resiliencyandmicrogrids Accessed December 19, 2024.

- California Public Utilities Commission. 2024. “Decision Adopting Implementation Rules for Multi-property Microgrid Tariffs and Other Matters”, Rulemaking 19-09-009, November 18, 2024. https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M546/K650/546650794.PDF

- de Martini, Paul et al. 2020. “How to Design Multi-User Microgrid Tariffs,” Smart Electric Power Alliance and Pacific Energy Institute. https://pacificenergyinstitute.org/wp-content/uploads/2020/08/SEPA-PEI-How-to-Design-Multi-User-Microgrid-Tariffs.pdf.
    - This document provides an overview of terminology and tariff considerations for multi-user microgrids, including work other states had done as of 2020.

- Hawaii Public Utilities Commission. 2023. “Microgrid Services Tariff.” https://puc.hawaii.gov/energy/microgrids/ Accessed December 19, 2024.

- Jones, Kelsey, et al. 2023. “State Microgrid Policy, Programmatic, and Regulatory Framework” National Association of State Energy Officials and National Association of Regulatory Utility Commissioners. https://www.naseo.org/data/sites/1/documents/publications/Final%20Microgrid%20Framework.pdf

    - This document includes discussion on state legislation and policies, including detailed examples from California and Hawaii. The section, “Public Utility Commissions: Steps for Developing State Microgrid Regulations” found on pages 28-34 may be of interest.

- Rickerson, Wilson, et al. 2022. “Valuing Resilience for Microgrids: Challenges, Innovative Approaches, and State Needs” National Association of State Energy Officials and National Association of Regulatory Utility Commissioners. https://www.naseo.org/data/sites/1/documents/publications/NARUC_Resilience_for_Microgrids_INTERACTIVE_021122.pdf
    - This document explores “bottom-up” and “economy wide” approaches to valuing resilience.

- Shea, Daniel. 2022. “Microgrids: State Policies to Bolster Energy Resilience.” The National Conference of State Legislatures. https://www.ncsl.org/energy/microgrids-state-policies-to-bolster-energy-resilience
    - This document includes summary information on other state microgrid policies and legislation.

- Verclas, Kirsten, et al. 2023. “Clean Energy Microgrids: Considerations for State Energy Offices and Public Utility Commissions to Increase Resilience, Reduce Emissions, and Improve Affordability” National Association of State Energy Officials and National Association of Regulatory Utility Commissioners. https://www.naseo.org/Data/Sites/1/documents/tk-news/clean-energy-microgrids_interactive.pdf
    - Pages 22-23 of this document include a discussion on “Adoption of Relevant Technical Standards” which may be of interest.

- Zinamen, Owen et al. 2022. “Enabling Regulatory and Business Models for Broad Microgrid Deployment.” National Renewable Energy Laboratory. https://www.nrel.gov/docs/fy23osti/84818.pdf
    - This document includes a section on, “Key Regulatory Considerations, Issues and Challenges for Major Microgrid Use Cases” found on pages 12-26.