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Beyond Generation: Considerations for Microgrid Tariffs

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Project Overview

- **Goal:** Provide states and utilities with practical guidance in designing economic tariffs that allow microgrids to sell grid services.
- **Current Practice:** Although, utilities and commissions across the U.S. have tariffs and incentives for some services provided by inverter-based resources generally, only two states have microgrid-specific tariffs in force.
- **Why PNNL:** PNNL has a unique background in grid modernization and battery storage regulation.
- **Innovation:** There are few examples for how to evaluate grid services outside of wholesale markets. We capture those examples and suggest a distribution level approach that considers a simplified view of evaluation objectives.
- **Impact**: Microgrids navigate rates and rules meant for single-site generation and inverter-based resources, which has limited their economic viability. If microgrids can be enabled and valued, battery-enabled designs may be uniquely positioned to support large loads, provide large-scale grid services, and participate in wholesale markets.
- **Alignment/Supports strategic pathways:** Microgrids are uniquely capable of delivering goals to stabilize the grid, optimize resources, and grow flexibility.

Microgrid Tariff Turf

Problem

Tariffs can be a means for aligning private resilience objectives with utility reliability objectives, but no state has yet developed tariffs that allow microgrids to operate on multiple properties or sell grid services.

Precedent

Only two states have microgrid-specific tariffs in force:

- California's Community Microgrid Enablement Tariff
- Hawaii's Microgrid Services Tariff

Unfortunately, both cases simply enable microgrids to interconnect and have yet to reach a point of policy maturity that includes rates, incentives, and goals. Storage-specific tariffs are similarly immature.

Emerging Trends

Despite a lack of precedent, limited activity in some states to develop rules for microgrid operations provides foundational principles:

- Definitions for microgrid territory boundaries
- Criteria for design, operation, and participation
- Incentive program design
- Rate rules for participating customers
- Interconnection considerations for exit fees, self-supply fast tracking, and sizing rules

Microgrid Tariff Applications

Without microgrid specific tariffs, developers are responsible for navigating the complexity of tariffs, their applications to specific circumstances, timelines, and regulatory requirements built for single property designs or aggregations.

Microgrid tariffs should ideally cover authorization *and* compensation.

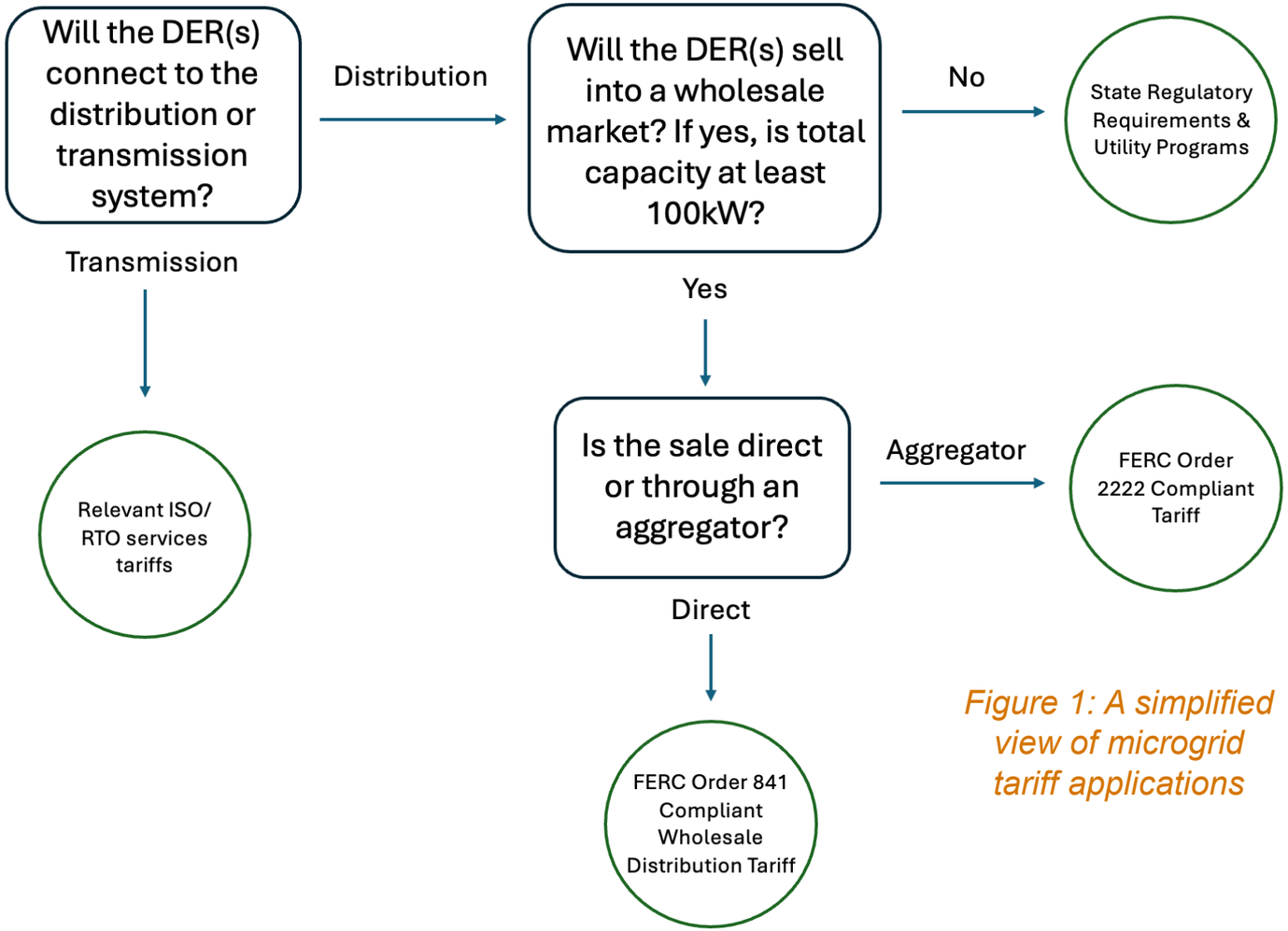


Figure 1: A simplified view of microgrid tariff applications

State Microgrid Tariff Examples

CA and HI (Rule 30) are the only states to formalize microgrid tariffs and both have followed a similar path:

- Phase 1: Authorization – Focused on microgrid definitions, program parameters, and qualifications.
  - HI Microgrid Participant Bill of Rights
  - Neither approach enabled multi-property/community configurations or resolved right-of-way issues
  - Standby charges were suspended by CPUC and dismissed by HI for microgrid customers
- Phase 2: Compensation – Intended to focus on grid service valuation but have stalled.
  - Included suggested exploration of resilience, capacity, and ancillary services.
  - HI SB143 requires microgrid exemption from "utility" designations
  - CA's Avoided Cost Calculator is up for revision in 2026

NY and MA have published generalized DER valuation approaches:

- Shared objectives related to; reducing outages and system costs, integrating DERs, and improving workforce/asset mgmt.
  - Both found value for grid services, non-wire and bridge-to-wires options, as well as deferral of infrastructure investments.
- NYREV (stacked DER-focused bill credit program) values energy, capacity, environmental benefits, demand reduction, and locational system relief.
  - Microgrid value was diminished by locational focus on single-properties, but a landlord-tenant exemption opened doors for apartment buildings.
  - Demand response program voltage gains exceeded expectations
  - Distribution System Platform failed primarily because utilities wanted to participate and the circuit-level voltage data needed for valuation is not available
  - NY utilities proposed microgrid values for improving reliability, efficiency, quality, and power delivery.

Grid Service Definitions

Once the details and parameters of participation is clear, valuation of grid services is the next priority. Designing economic tariffs that compensate microgrids for their services involves three elements:

(1) Identifying the support and services that microgrids can provide

(2) Determining which of those services already have compensation mechanisms

(3) Assigning values to the remaining services

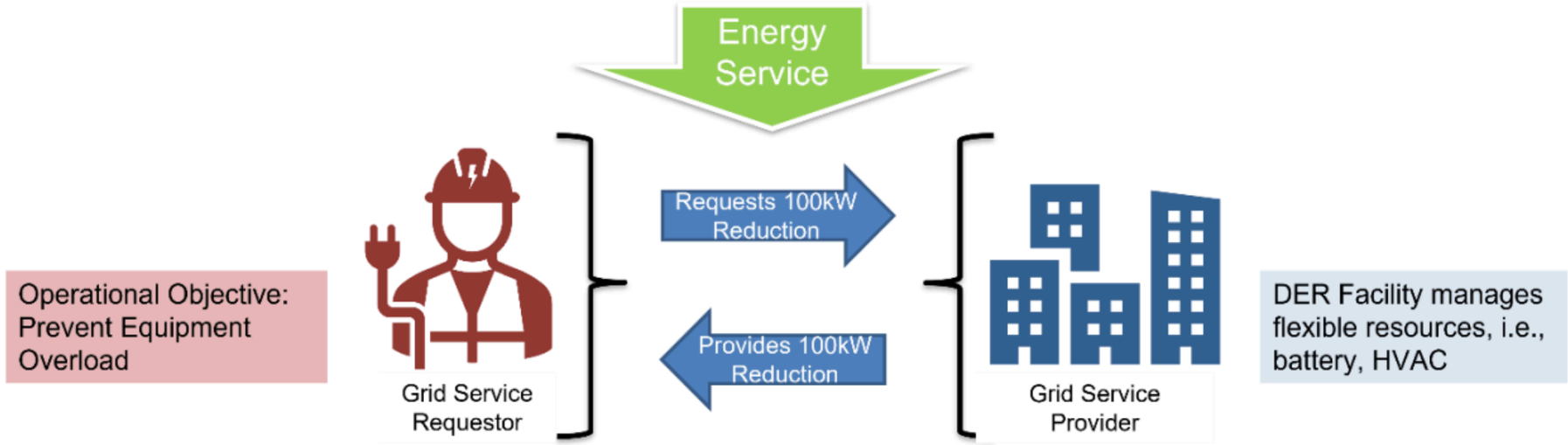


Figure 3: Energy services provide a bridge between utility needs and private assets (Source: PNNL/Kolln, 2023)

Valuing Microgrid Benefits

Outside of markets, determining the value of grid services requires the use of various grid modeling tools:

- **Capacity expansion model:** Used to identify the portfolio of generation resources and load management programs that will most cost-effectively and reliably meet future demand
- **Effective load carrying capability analysis**: A variation on capacity expansion modeling that focuses on identifying the value of generation capacity when the grid is strained
- **Production cost model**: simulates grid operations over a defined period (usually a year) to study how the portfolio of generation resources will be dispatched to meet demand
- **Power flow model**: an engineering model that simulates how electricity moves through the transmission and/or distribution system

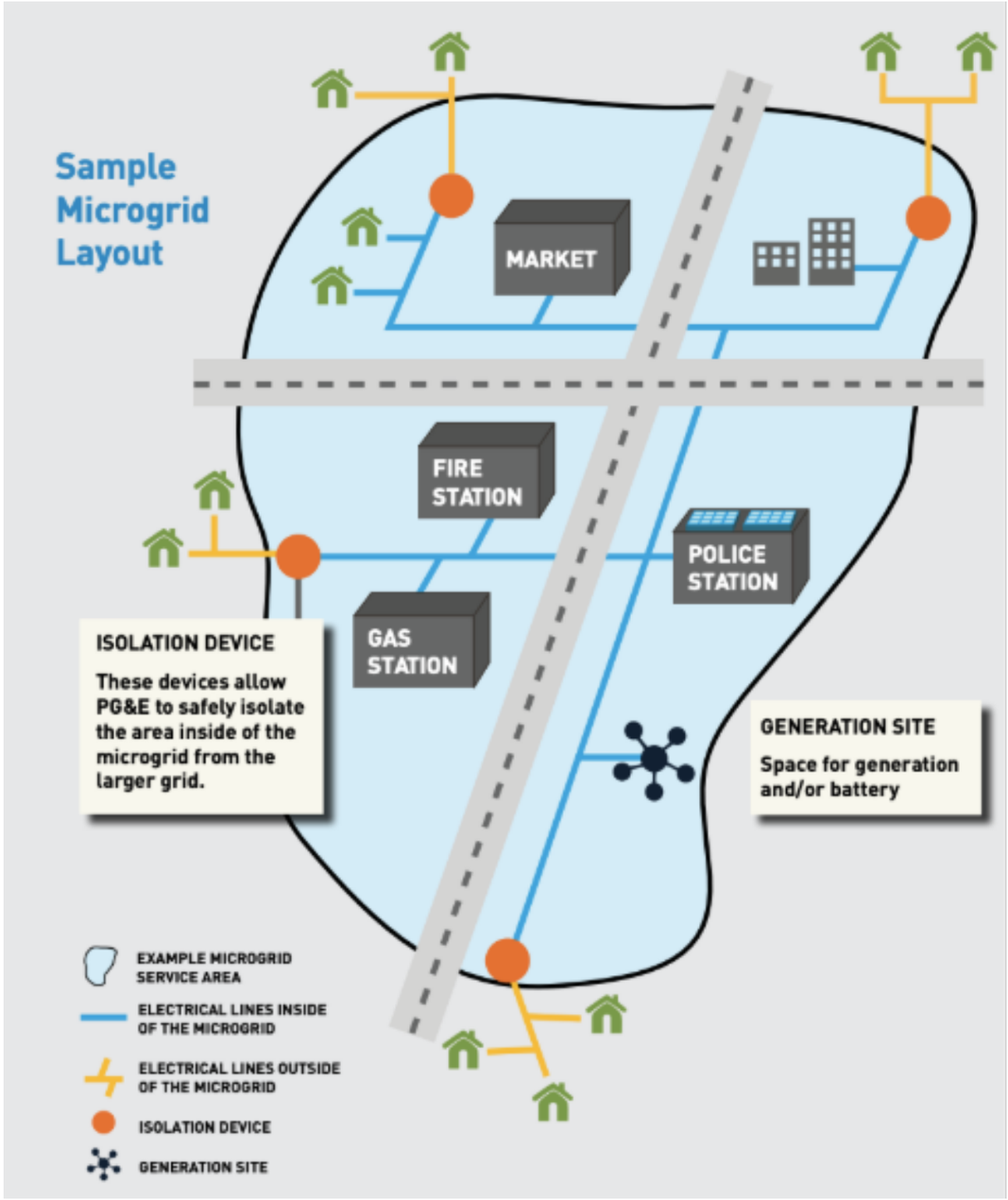
Table 1: Grid Service Objectives and Evaluation Approaches

Operational Objective	Performance Evaluation
Peak Shaving	Capacity expansion model, effective load carrying capability analysis, capacity auction results
Load Shaping	Production cost model
Frequency Regulation	Power flow model, production cost model
Spinning/ Contingency Reserves	Production cost model
Voltage Management	Power cost model

Conclusion

In summary, this paper provides the following observations for regulators to consider while endeavoring to design and value microgrid specific tariffs:

- Interconnection requirements that will unleash certified utility-interactive and grid-support capabilities
- Matching grid constraints to service objectives that can be valued within grid service programs
- Sizing microgrids and aggregation programs based on distribution and transmission system needs
- Compensation at the aggregated level and rate protection at the customer level
- Designing tariffs in terms of grid needs rather than resource types to maintain flexibility in design and operations



Source: Pacific Gas & Electric's depiction of a community microgrid in their Microgrid Incentive Program Handbook.

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Thank you

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