

DER Integration Framework: Regulatory Innovation for DER Compensation and Cost Allocation

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Matt McDonnell, Current Energy Group

Ron Nelson, Current Energy Group

Natalie Mims Frick, Berkeley Lab



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Agenda

- Welcome and Housekeeping
- Distributed Energy Resource (DER) Integration Framework: Overview
- Grid Services Tariff
- Export Tariff
- Implementation Considerations
- Question + Answer Session



Housekeeping

- All participants are muted.
- If you have a comment or question, please use the Q&A box.
- The webinar is being recorded.
- The report is available on Berkeley Lab's website. The recording and slides will be posted there in 2-3 days. <https://emp.lbl.gov/publications/distributed-energy-resource-der>
- When it is available, we will send the link to the recording and slides to everyone registered for the webinar.



Speakers



Matt McDonnell,
Current Energy Group



Ron Nelson,
Current Energy Group



Distributed Energy Resource (DER) Integration Framework

Regulatory Innovation for DER Compensation and Cost
Allocation

Matt McDonnell¹, Ron Nelson¹, and Natalie Mims Frick

¹Current Energy Group

January 2025



Report is available at
<https://emp.lbl.gov/publications/distributed-energy-resource-der>



DER Integration Framework: Overview

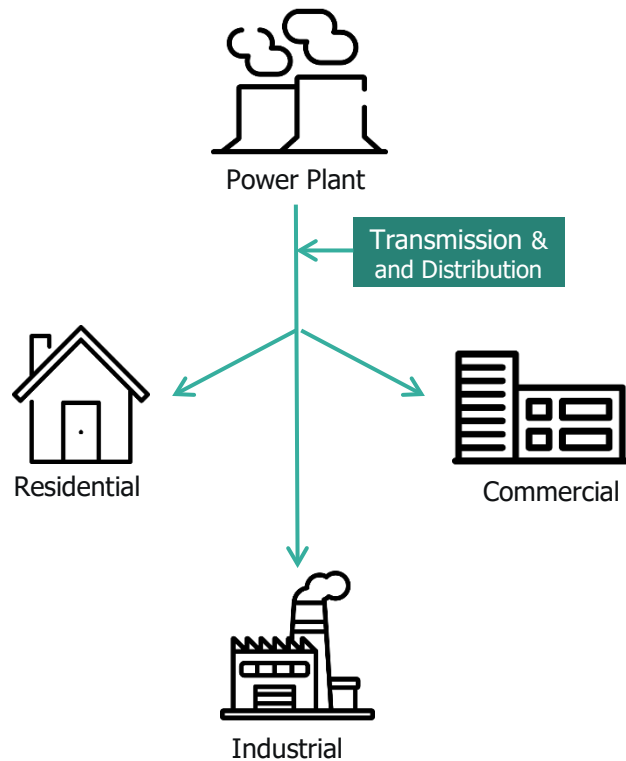


Introduction + Background

Ratemaking frameworks need to evolve to reflect a two-way electricity system

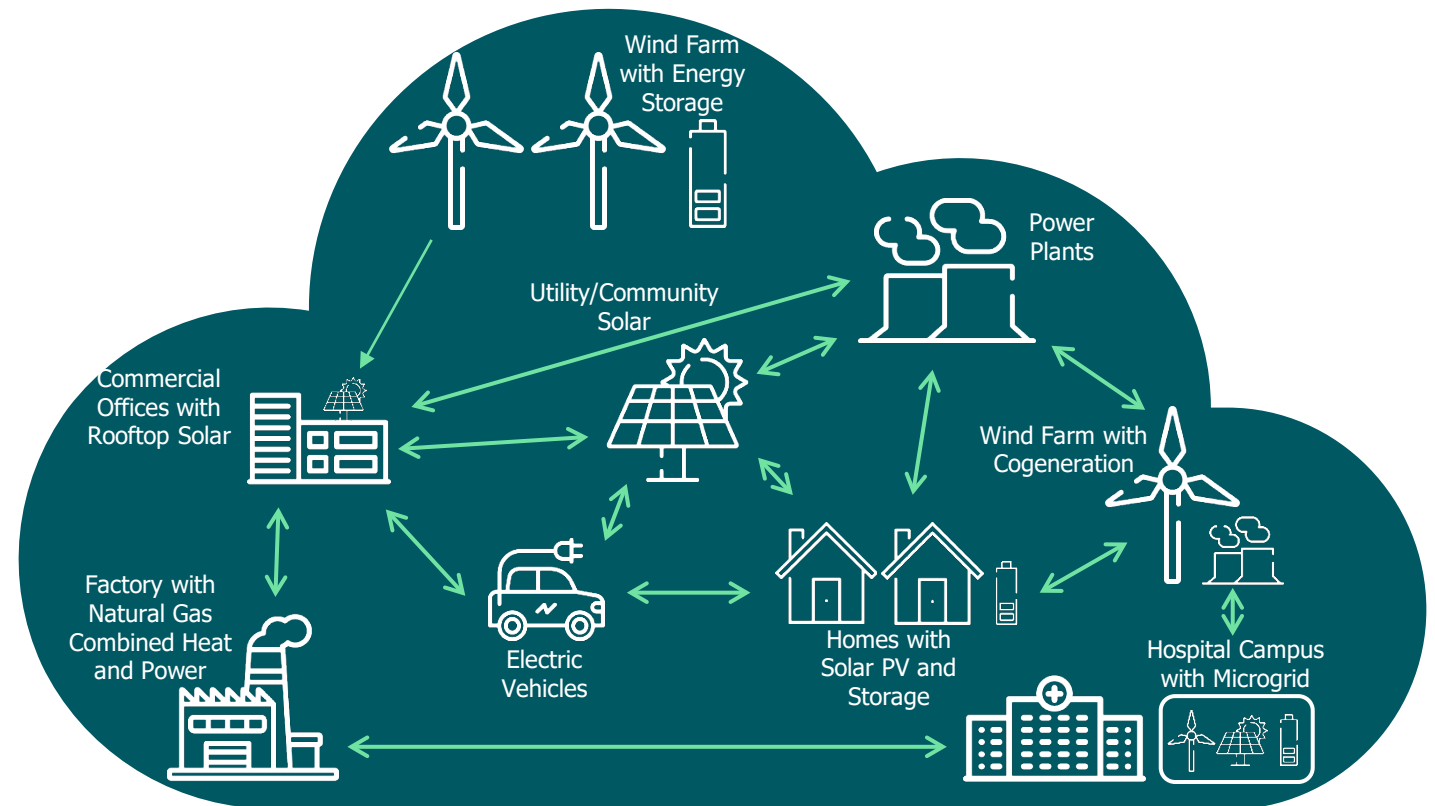
PAST: Traditional Power Grid

Central, One-Way Power System



TODAY: The Energy Transition

Distributed, Cleaner, Two-Way Power Flows





Approach

- To inform the development of the **DER Integration Framework**, we conducted numerous **interviews** with **industry stakeholders**, including **utilities**, **DER developers**, and **regulators**.
- We also conducting a **cross-cutting literature review** to identify gaps in traditional DER compensation and cost allocation approaches.

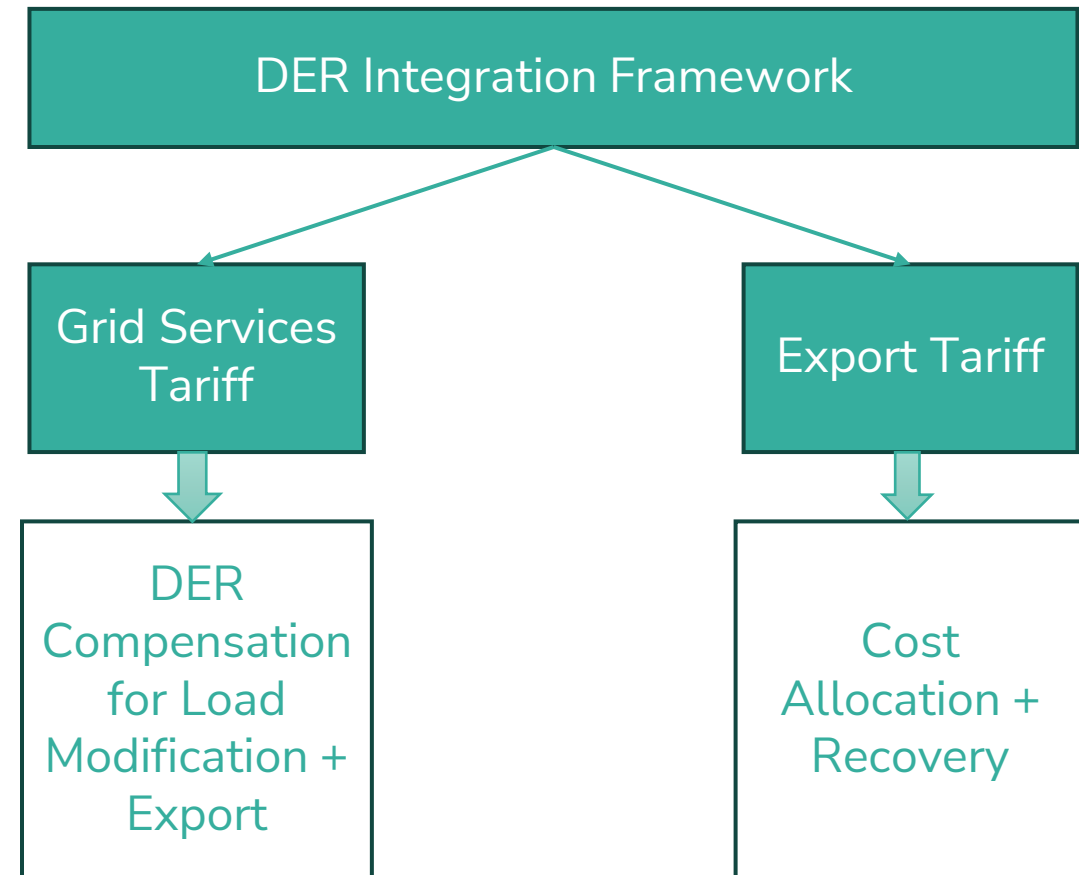


DER Integration Framework

Introduction + Conceptual Structure

Two primary elements to DER integration within ratemaking structure:

1. **Compensation** for services provided to the grid
2. **Allocation and recovery of costs** for interconnection and use of the grid for export



Grid Services Tariff

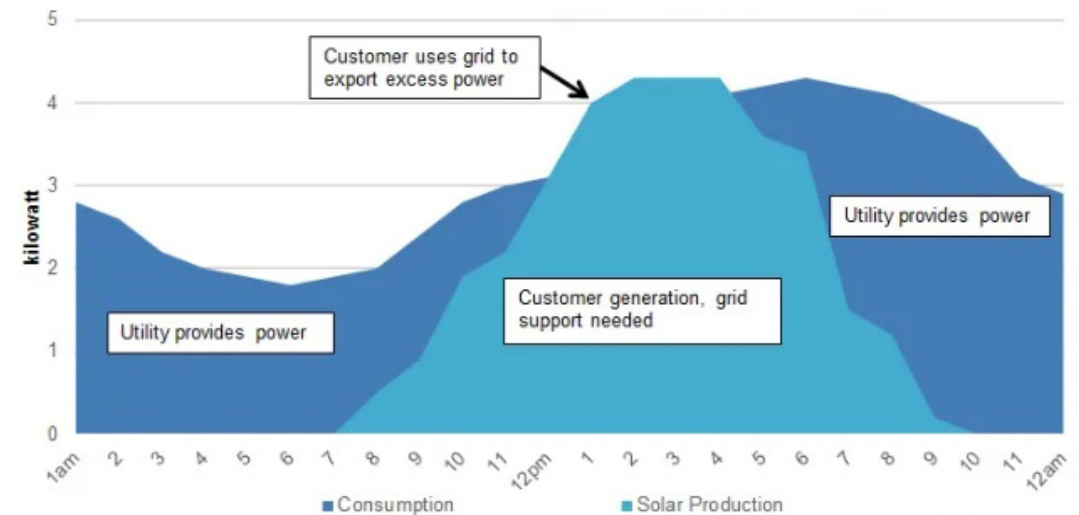
A dynamic and scalable approach to DER compensation.



Traditional DER Compensation

Current limitations with net energy metering (NEM) at scale

- Insufficient incentives to align individual behavior with grid needs
- No recognition of additional grid services that could be provided (e.g., capacity)





Grid Services Tariff

What is a Grid Services Tariff?

- A **grid services tariff** is an approach to **DER compensation** that focuses on the value of grid services provided to the electricity system.
 - E.g., time-differentiated energy export; reserve
- **Align incentives with system needs** to reward grid-supportive behavior.
- **Facilitate VPP business model innovation** by enabling custom bundling of grid services.

Grid Services Tariff			
	Overnight	Daytime	Evening Peak
Energy (\$/kWh)	\$0.14/kWh	\$0.10/kWh	\$0.23/kWh
Reserve (\$/kW)	\$30/kW		

An illustrative example of a grid services tariff.



Grid Services Tariff

Opportunities from a Grid Services Approach

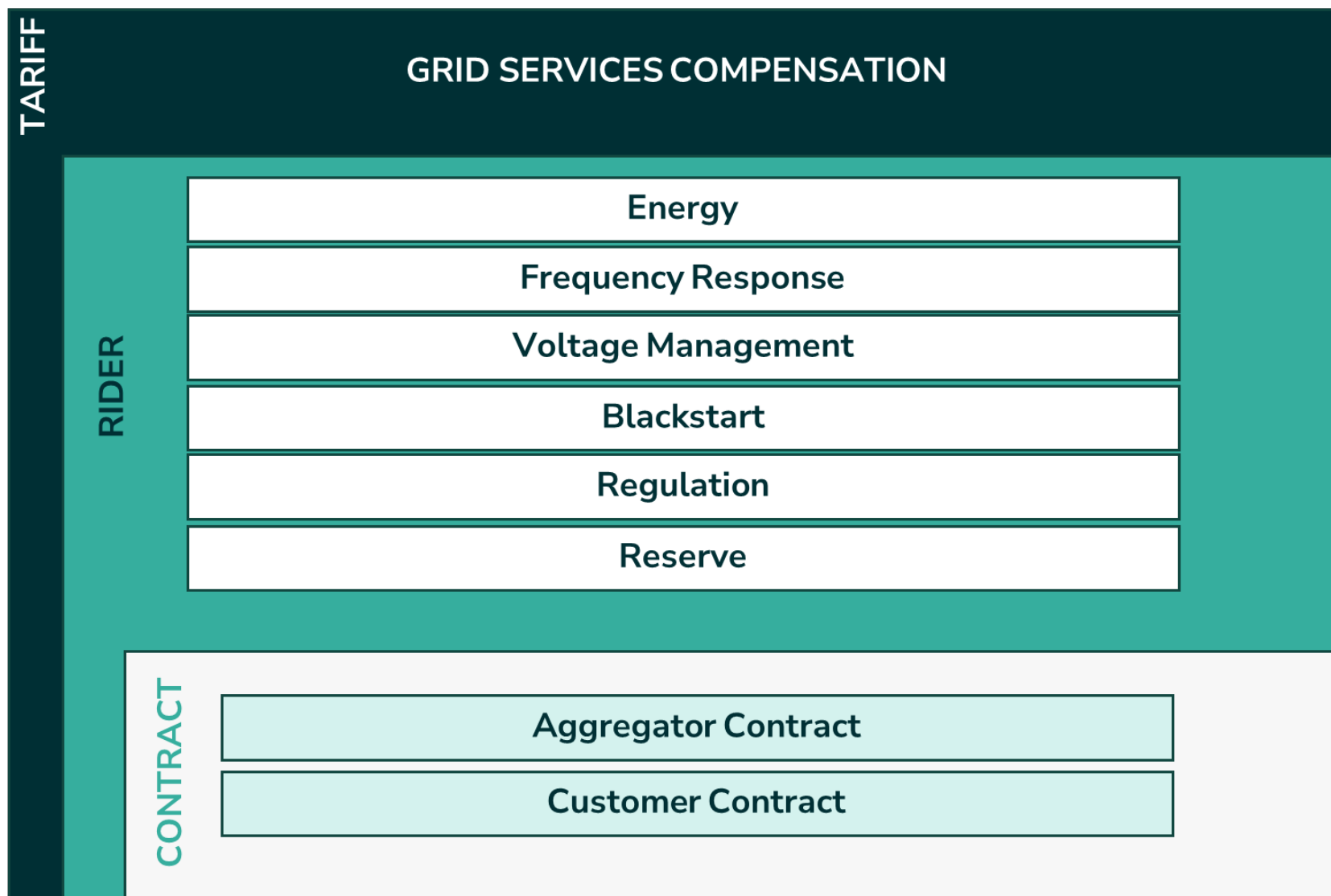
Cost-effectiveness + Affordability. Incent behaviors that align with grid needs; ensure DER operates as reliable, grid-supporting resources at scale.

Technology Neutrality. Foster innovation by creating a performance-based marketplace for grid services; enable compensation tied to service delivery rather than specific technology used.

Standard Business Model for Aggregators. Standardized approach to DER compensation across jurisdictions could allow DER aggregations or Virtual Power Plants (VPPs) to monetize value provided to the grid in a repeatable and scalable manner.

Integration into System Planning + Operations. Unbundled grid service approach could enable better integration of DERs into grid planning and system operations.

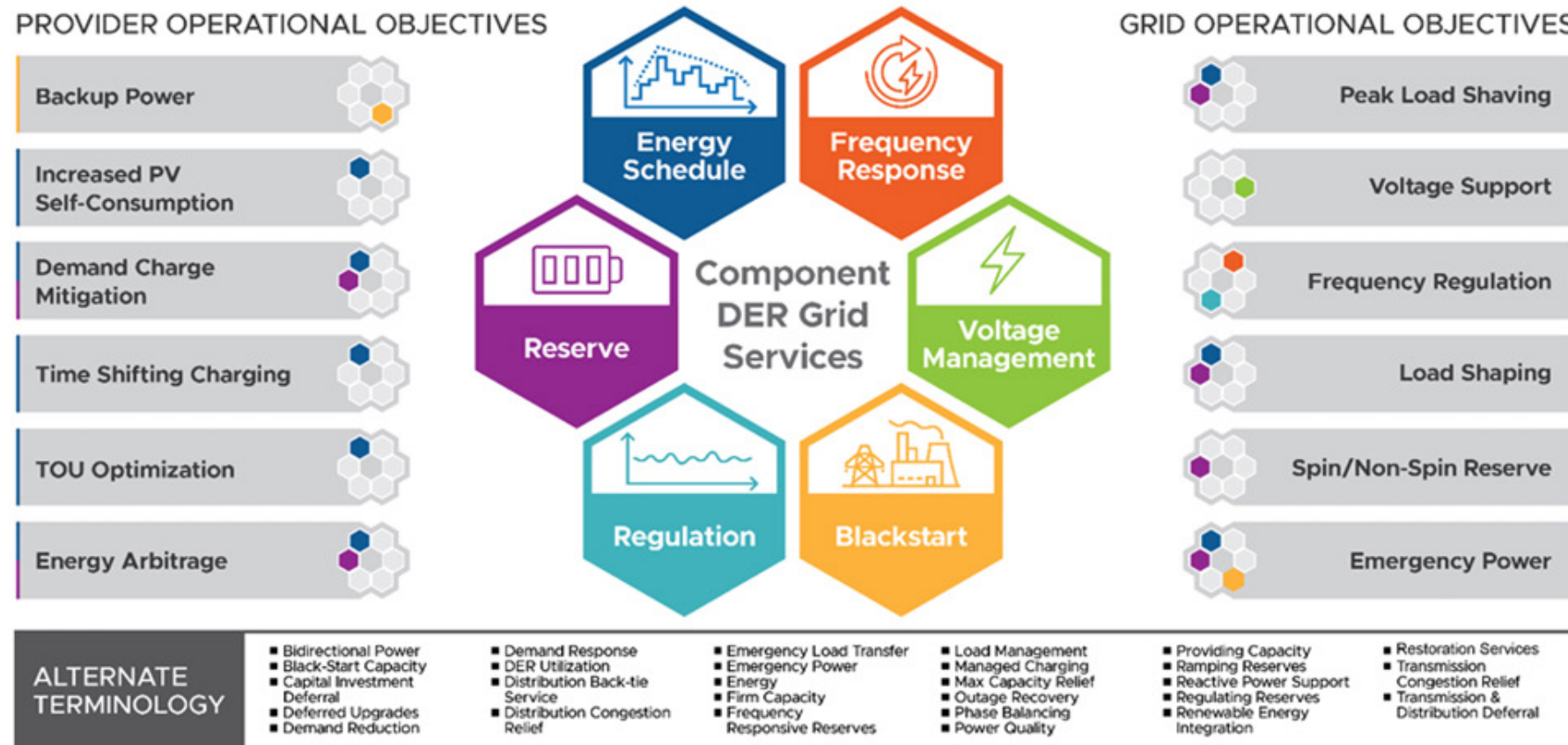
Grid Services Tariff: Overview + Structure





Standard Grid Service Definitions

Common terms and definitions of grid services support standardization at grid edge

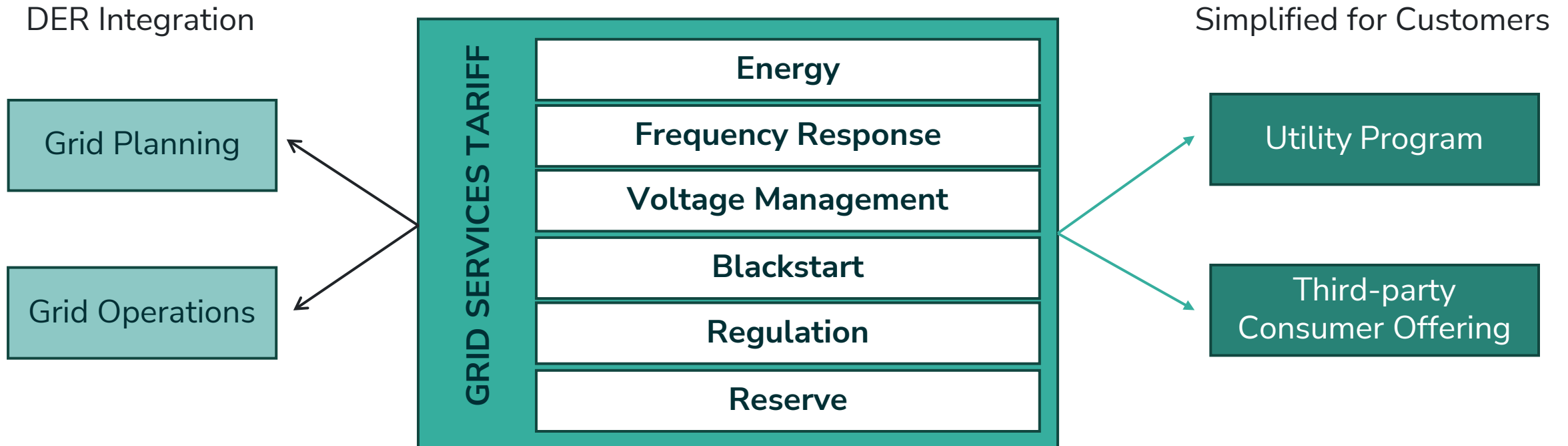


Source: PNNL (2023). "Common Grid Services Terms and Definitions Report."



Grid Services Tariff

Platform for innovation and DER integration into planning and operations



Export Tariff

Applying import rate design approaches to export.



Traditional DER Cost Allocation

Challenges with Causer Pays Cost Allocation

Free Ridership. Interconnecting DER that do not trigger capacity upgrades contribute nothing to past or future system upgrades.

Connecting to the Grid is Expensive. DERs relatively minor upgrades could lower interconnection costs for export if considerations were integrated into broader planning processes.

Interconnection Delays. Uncertainty in interconnection costs leads to speculative applications and uneconomic projects failing to interconnect, forming lengthy queues.

Operationalizing Flexible Interconnection. Equitable and efficient price signals are needed to incentivize, scale and make connecting to the system more cost effective.

Inability to Proactively Plan for Export. Relatively minor upgrades could lower interconnection cost for export if considerations were folded into broader planning processes.

Misaligned Incentive for Interconnection. Utilities experience revenue erosion from interconnecting DER; cost for DER to interconnect is not always correlated with DER export capacity or system costs.



Export Tariff Framework

What is an Export Tariff?

- An **export tariff** is a contractual agreement for DER operating on the distribution system that enables **cost allocation and recovery** for exported related impacts (e.g., capacity upgrades, new monitoring and control systems)
- **Align DER cost allocation with traditional ratemaking principles** and cost-of-service modeling
- **Reflect a bidirectional ratemaking structure** that services both import and export



Export Tariff Example

Conceptual Framework

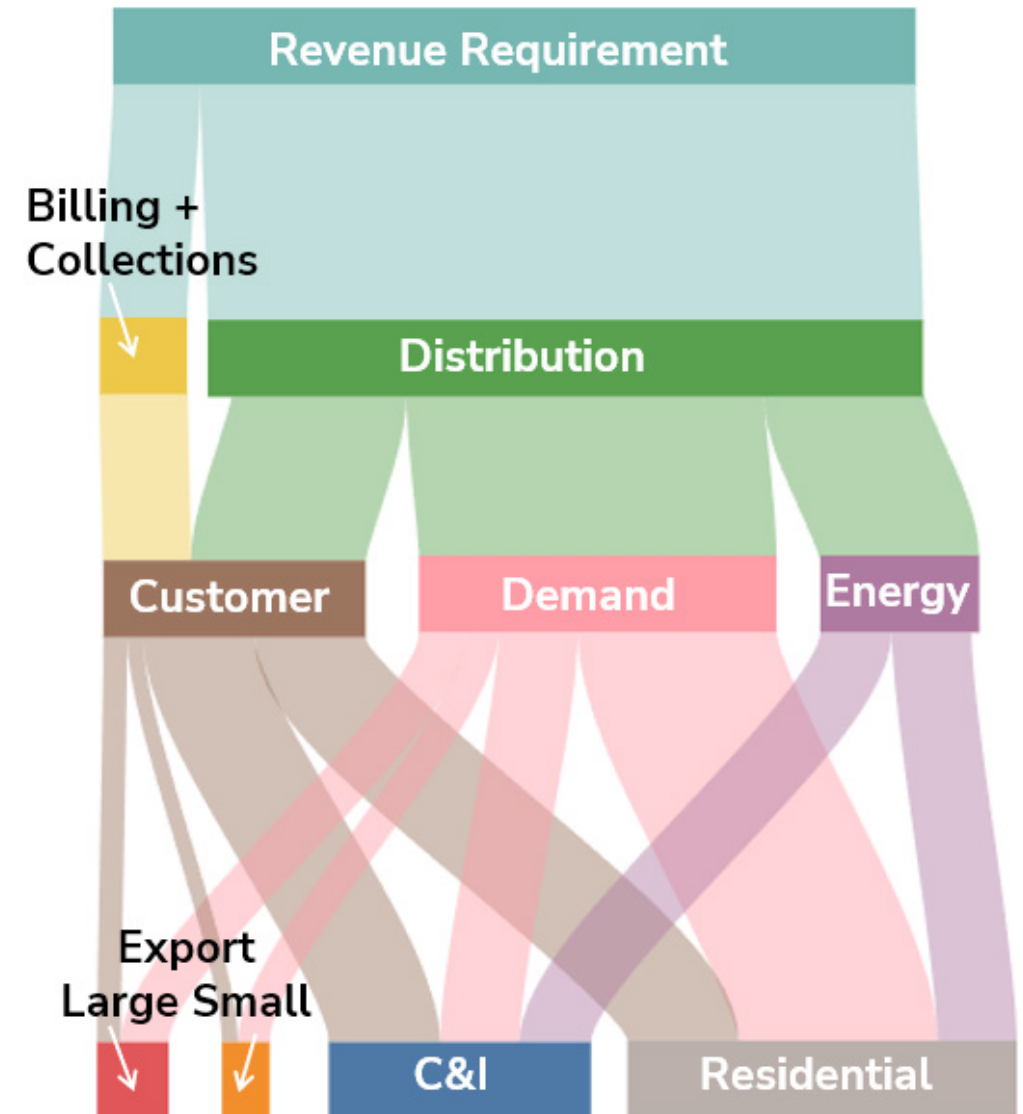
	Applicable time	Consumption Charge	Export Reward/Charge
Peak import period	2pm - 8pm everyday	Peak charge 25.37 c/kWh	Reward equal to -25.37 c/kWh
Solar soak period	10am-2pm everyday	Off-peak charge 3.77 c/kWh	Off-peak charge 1.85 c/kWh
Off-peak	8pm to 10am everyday	Off-peak charge 3.77 c/kWh	
Fixed charge		Fixed charge 48.72 c/day	



Export Tariff Benefits

Cost Allocation

- Cost allocation differs significantly for load and export
- Applying ratemaking principles can more equitably and efficiently integrate exporting facilities
- Once costs are allocated to export classes, rates can be designed to recovery costs

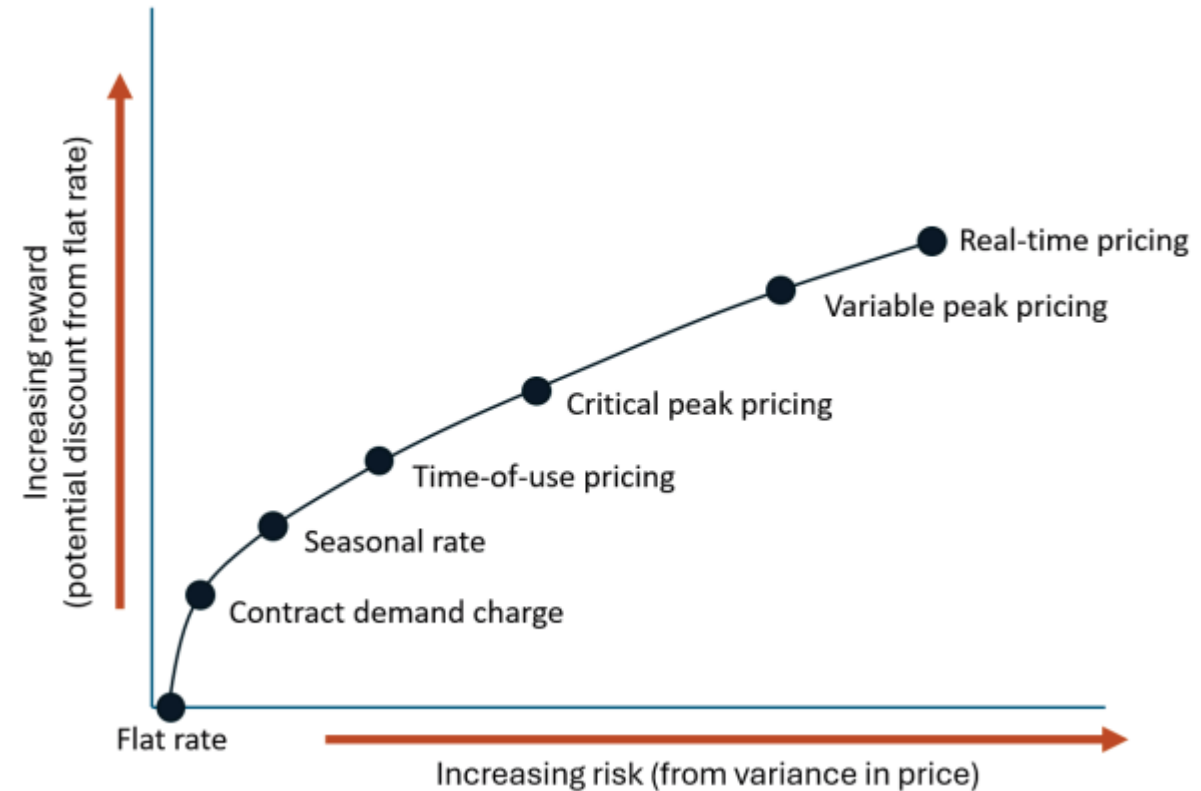




Export Tariff Benefits

Improved Price Signals (Cost Recovery)

- Ongoing use of system charges creates an opportunity for more effective and innovative pricing options
- Cost causation should be relied upon to develop price signals that minimize system costs
- Recover costs over a longer period (20-50 years vs. upfront at connection)

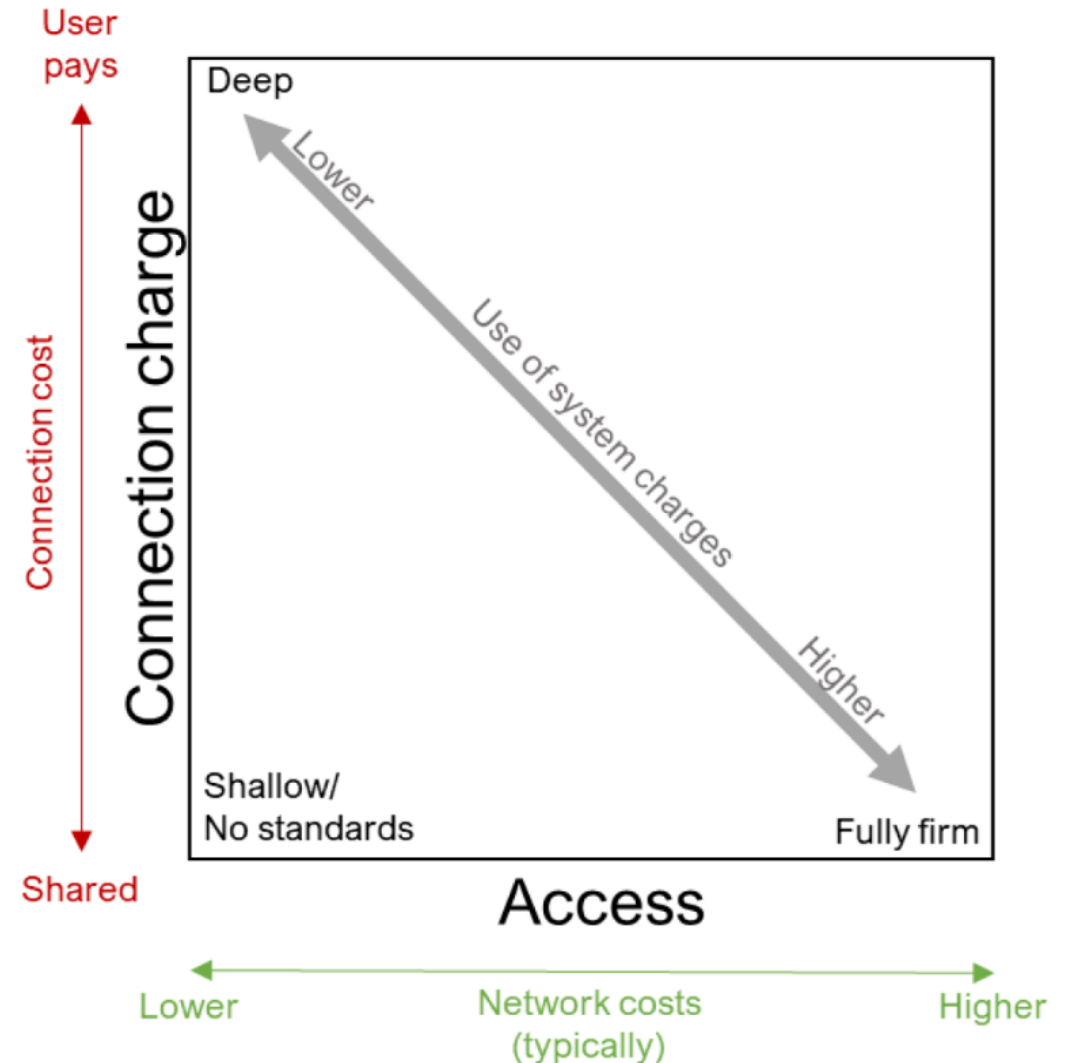




Export Tariff Benefits

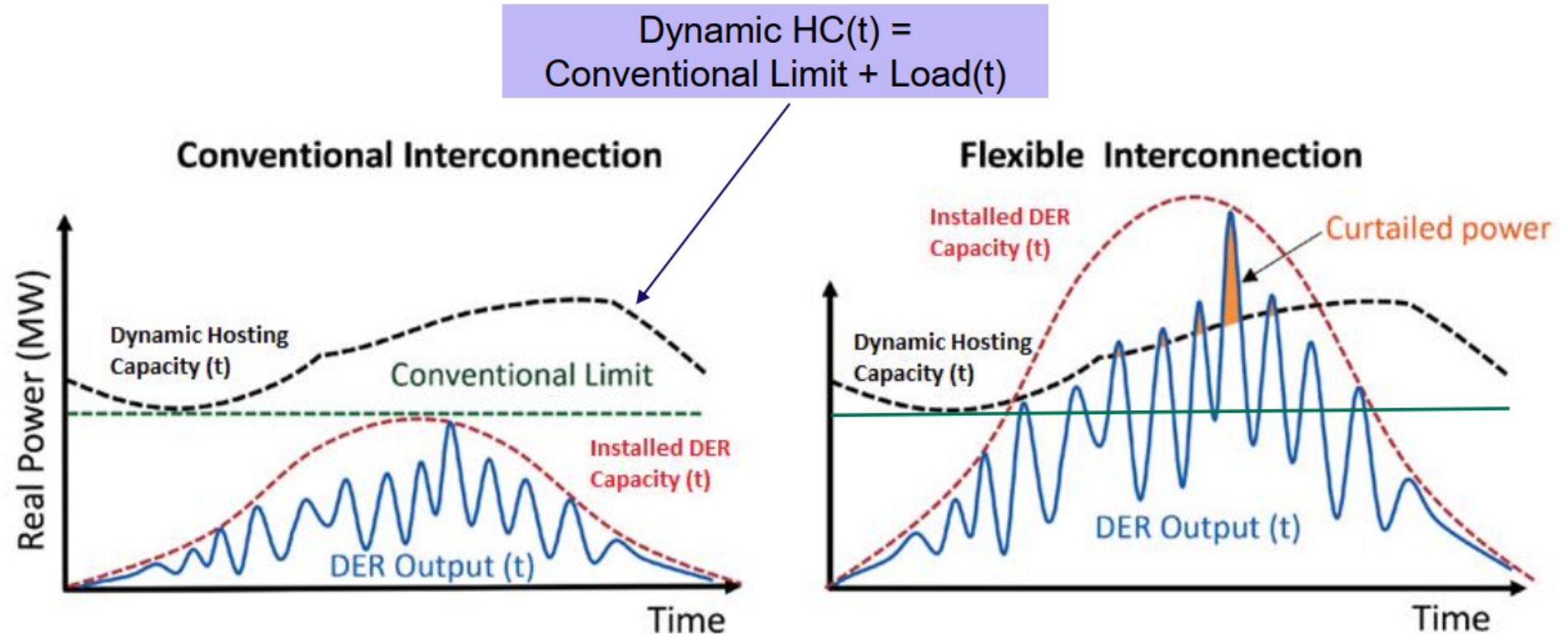
Connections

- Connection charges differ significantly for load and export
 - Export tariffs could create more standardized connection options
- Flexible connections can allow less costly connections for export, but price signals are needed that do not exist





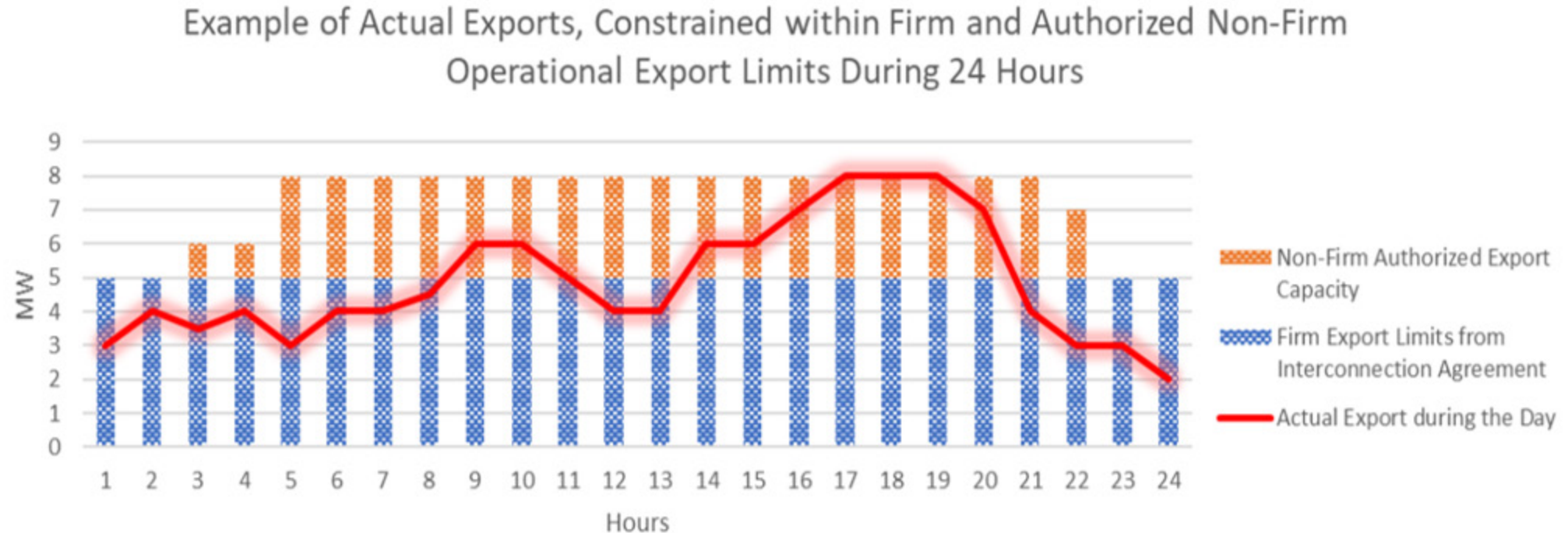
Flexible Interconnection



- Flexible connections can greatly increase the utilization of the distribution network for both load and export
- To scale flexible connections, more certainty around potential curtailment is needed as well as service options for customers outside of constrained areas



Firm and Non-Firm Export Tariffs



- Export tariffs can create a paradigm with firm and non-firm rate options
- Using a rate option could embed non-firm capacity that goes beyond “a bridge to wires” because non-firm rates can be offered to all facilities, not just those in constrained areas



Bi-directional Planning and Forecasts



Export tariffs can create an obligation for utilities to integrate export requirements into “traditional” processes



Flexible connections/non-firm distribution capacity tariffs have benefits that can be integrated into forecasting and planning



Increased focus on co-optimization and prioritization



Align utility incentives with improving export services

+ Utilities earn returns on rate-based investments to improve export capability

The current framework provides no incentive to the utility to expand hosting capacity when customers fund hosting capacity upgrades at interconnection.



Export Tariffs provide utilities a return for planned infrastructure hosting capacity investments which become part of the utility's rate base.

+ Utilities receive revenue from exporters

Under current cost allocation utilities lose revenue from DER that provide grid services.



Export Tariffs create continued revenue from exporters, as exporting DER pay recurring fees based on their ongoing use of the grid to export.

+ Utilities receive prudence review of their system plans

Current cost allocation provides little oversight of interconnection upgrades and cost impacts.



Export Tariffs integrate hosting capacity upgrades into the system planning process. Utilities demonstrate prudent investment to receive recovery.

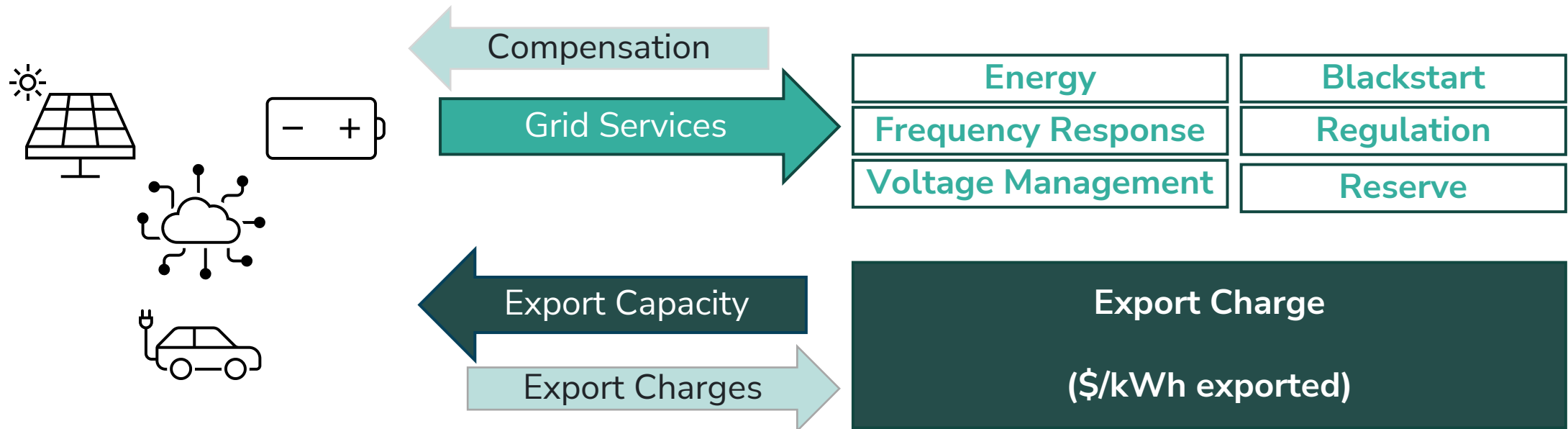
Implementation Considerations

Grid Services Tariff + Export Tariff



DER Integration Framework

Pulling the Pieces Together: An Illustrative Template





Questions States Can Ask

Grid Services Tariff

- What is the level of DER maturity in the system? Is energy export compensation established independently of the retail rate? Is export compensated in a time-differentiated manner?
- With FERC 2222 and other DER compensation opportunities, how can we guard against risks of “double counting”? Can we be more precise when defining component grid services?
- How can DER be better integrated into utility operations and planning?
- Do existing compensation schemes adequately incent DER-enabled system flexibility?

Export Tariff

- Where is the state on integrating DER and hosting capacity issues? How much is currently being spent on export-related issues?
- When it comes to DER and claims of cross-subsidization (cost shift), have costs and benefits been sufficiently defined and isolated to adequately assess the costs and equitably allocate them?
- Can a DER cost allocation or recovery approach help us understand how much ratepayers are paying for the consideration of hosting capacity?

Questions?



Contacts

Matt McDonnell, Current Energy Group, mmcdonnell@currentenergy.group

Ron Nelson, Current Energy Group, rnelson@currentenergy.group

Natalie Mims Frick, Berkeley Lab, nfrick@lbl.gov

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