

Grid Benefits from Home Energy Rebates

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3/15/24



ENERGY TECHNOLOGIES AREA
BERKELEY LAB

Part 1

Grid Benefits Introduction



Why include grid benefits in your Market Transformation Plan?

*“Enable new business models in partnership with **private capital** to **monetize grid benefits** through vehicles such as **FERC order 2222, demand management, and virtual power plants (VPP).**” [\[1\]](#)*

In essence: identify mechanism for “Additional and Continued Investment” to help defray the cost of home upgrades

Open to Interpretation



“Monetize” for whom

- Customers
- Grid entities
- Aggregators
- Other players



What counts as “Private capital”

- Incentives from investor owned utilities
- Investments on DER installations



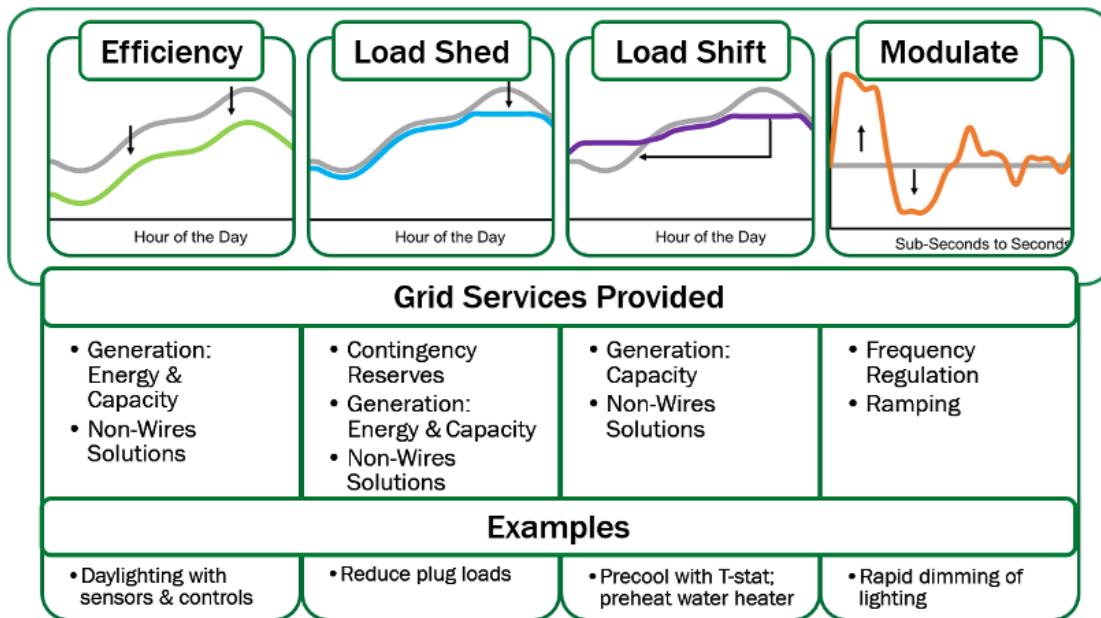
“Grid benefit”

- Reliability (peak load, ramping)
- Decarbonization (shift load)
- Affordability (bill savings)
- Infrastructure upgrade deferral

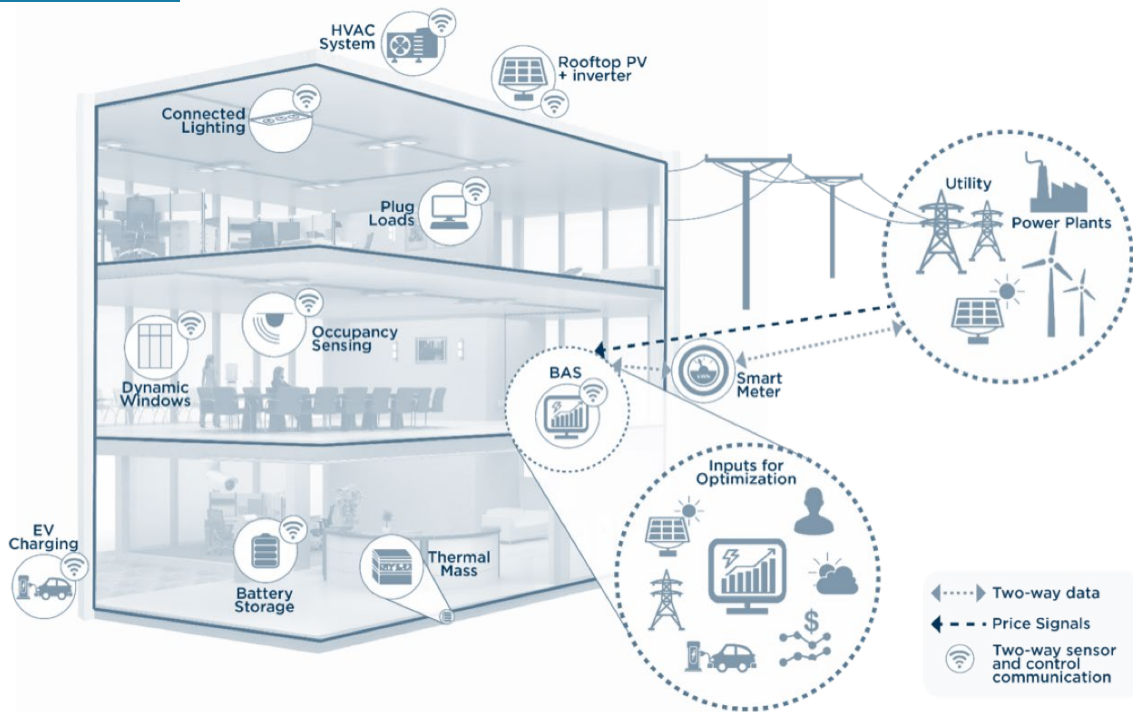
What is Demand Management?

= Energy Efficiency + Demand Flexibility

Buildings can provide grid services through 4 demand management modes.



Grid-interactive Efficient Buildings (GEB)



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What is FERC 2222?

*“The Federal Energy Regulatory Commission (FERC) issued Order No. 2222 in 2020, with updates in 2021. The main goal is to better enable **distributed energy resources (DERs)** to participate in the **electricity markets** run by regional grid operators.”*

DERs Include [\[1\]](#):

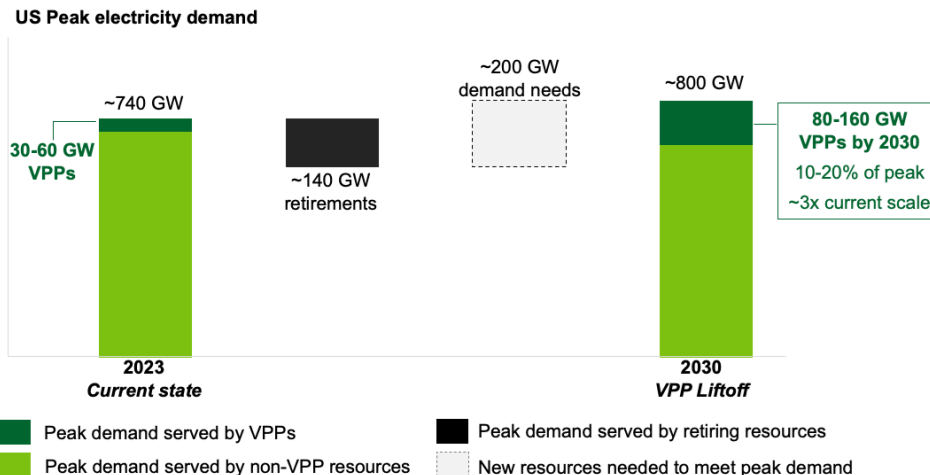


What is virtual power plants (VPP)?

“VPPs are *aggregations of DERs* such as smart appliances, rooftop solar with batteries, EVs and chargers, and commercial and industrial loads that can balance electricity demand and supply and provide **grid services** like a traditional power plant.”

DOE's Pathway to VPP Commercial Liftoff [1]:

- + 1. Expand distributed energy resource adoption with equitable benefits.
- + 2. Simplify VPP enrollment.
- + 3. Increase standardization in VPP operations.
- + 4. Integrate into utility planning and incentives.
- + 5. Integrate into wholesale markets



Part 2

Grid Benefits Implementation Options and Considerations



Two Efficiency & Electrification Rebate Pathways ^[*]

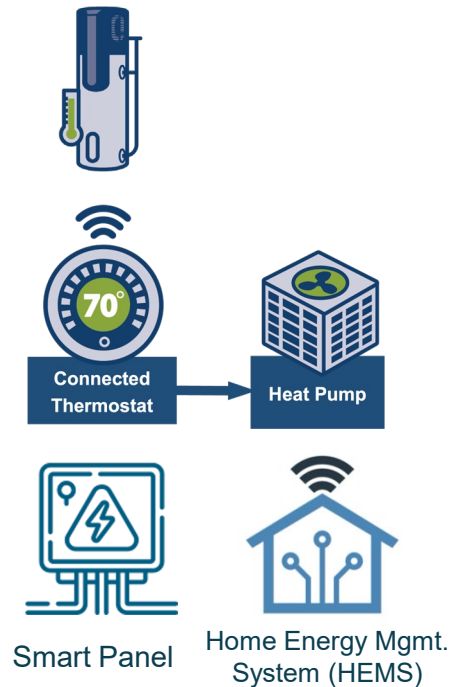
(1) Whole-House Rebate

Performance-based: modeled or measured savings %

(2) Electric Appliances Rebate

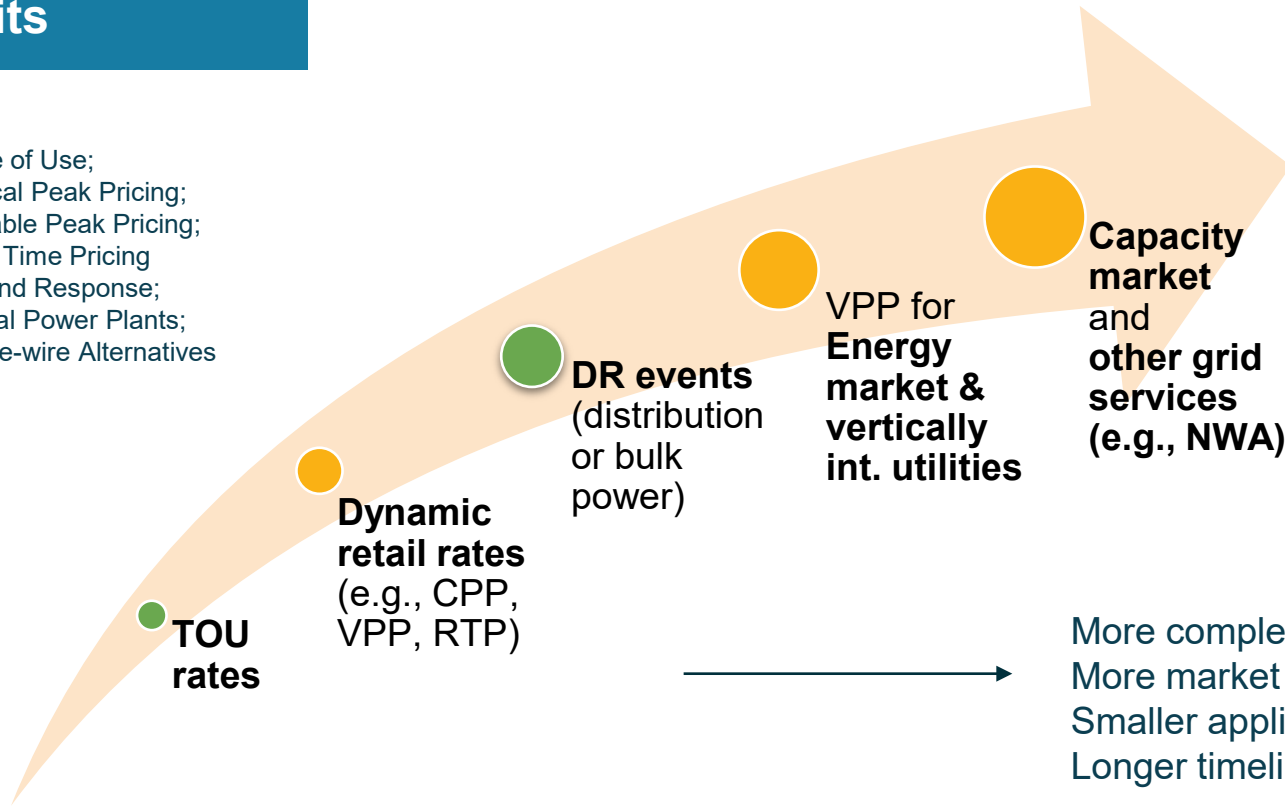
- Heat pump water heater
- Heat pump for space heating and cooling
- Electric stove, cooktop, range, or oven
- Heat pump clothes dryer
- **Electrical load service center upgrade**
- Insulation, air sealing, and ventilation
- Electric wiring
- Installation

Candidate Grid-interactive Technologies



Options for Monetizing Grid Benefits

TOU - Time of Use;
CPP - Critical Peak Pricing;
VPP - Variable Peak Pricing;
RTP - Real Time Pricing
DR - Demand Response;
VPP - Virtual Power Plants;
NWA - None-wire Alternatives



Which option(s) are right for your state?

Depends on your state's grid situation.

Regional Transmission Organizations (RTOs) & Independent System Operators (ISOs)



- CAISO
- SPP
- ERCOT
- MISO
- PJM
- NYISO
- ISO-NE

First step is to identify regulatory construct, existing tariffs and programs in your state:

- **Bulk Power Systems:** Wholesale Markets (RTOs and ISOs) vs. Vertically-integrated Utilities (e.g., Southern Company, Duke Energy, Pacificorp)
- **Distribution Systems:** Retail tariffs and Demand Response programs regulated by the state
- **Energy Efficiency Programs:** Run by local distribution utility or statewide implementers (Energy Trust of Oregon, NYSERDA, etc.) or regional implementer (e.g., TVA or BPA)



How do DERs participate in wholesale markets?

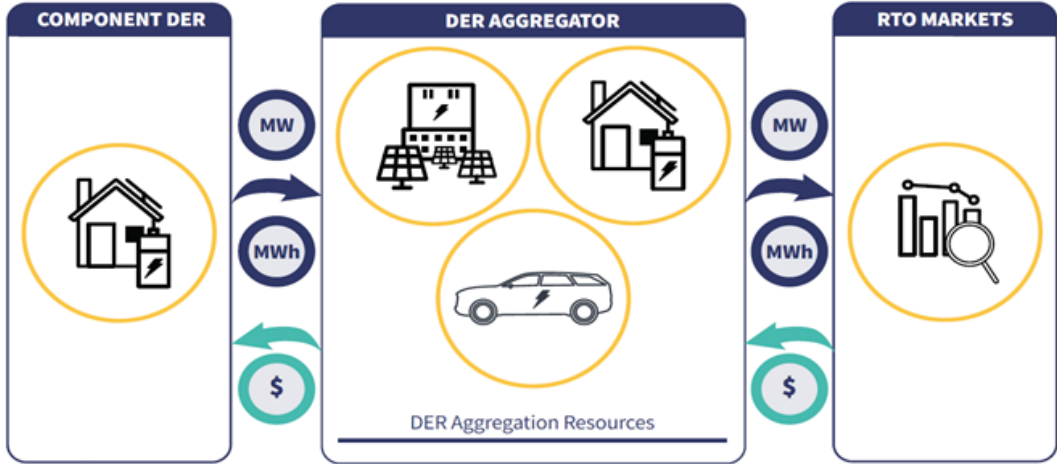
Through aggregation - VPP model

Types of electricity markets:

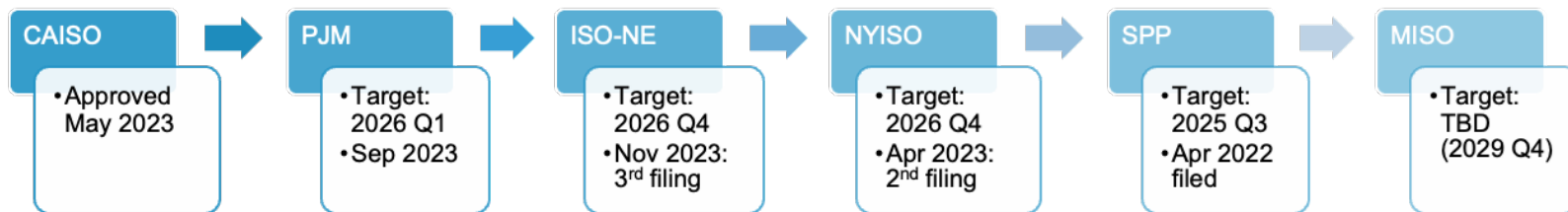
Energy market. Day-ahead and Real-time energy markets.

Ancillary Services market. Spinning and non-spinning reserves; contingency reserves; frequency regulation.

Capacity market. Long-term investment; resource adequacy value (available in some RTOs/ISOs)



FERC 2222 Implementation Status



Summary

Balance near-term and long-term strategies

Focus on “easy wins”

- Coordinate with utility EE and electrification program rebates;
- Customer bill savings from TOU rates;
- Tap available utility DR program and technology incentives;
- Identify dynamic retail rates and VPP programs offered by your utilities

Monitor

- FERC order 2222 compliance filing status
- DOE’s VPP Commercial Liftoff effort
- Building codes (e.g., CA JA13)

Partnership with utilities and PUC



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