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Saving Money and Supporting the Grid: How IRA Home Energy Rebates Enable Virtual Power Plants

June 13, 2024

RMI – Energy. Transformed.

- **Welcome | RMI and the Flex Coalition**
  - Avery McEvoy, Senior Associate, VP3 | RMI
  - David Hunter, Ph.D., Director | The Flex Coalition
- **Panelist opening remarks**
  - Carmen Best, Chief Policy Officer | Recurve
  - Kara Saul Rinaldi, President and CEO | AnnDyl Policy Group
  - Commissioner Stacey Paradis | Illinois Commerce Commission
  - Commissioner J. Andrew McAllister | California Energy Commission
- **Moderated discussion**
- **Closing remarks**

Webinar Logistics

- Slides and this recording will be posted to RMI's website
- Please use the Q&A function to submit your questions to inform the moderated discussion

RMI | VP3 Overview

VIRTUAL POWER PLANT PARTNERSHIP

Quick Poll!

Q1: How much do VPPs show up in your day-to-day work?

Daily
Weekly
Monthly
Quarterly
I'm new!

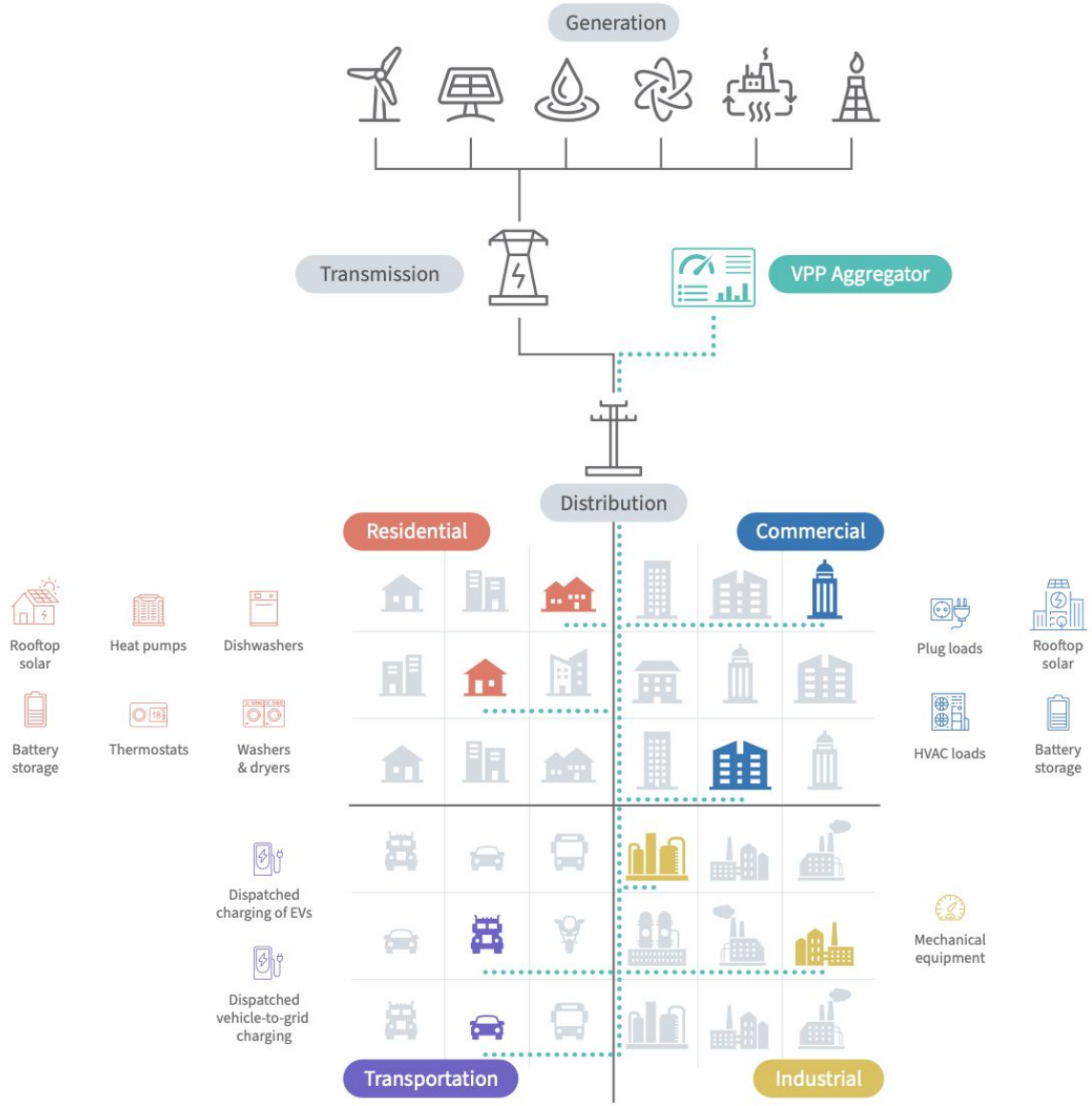
Q2: How familiar are you with the IRA home energy rebates?

Very familiar
Somewhat familiar
I'm new!

What is a Virtual Power Plant?

A virtual power plant (VPP) is an aggregation of grid-integrated, distributed energy resources* (DERs) that can balance electrical loads & provide utility-scale & utility-grade grid services.

*** Distributed energy resources (DERs)** include equipment located on or near the site of end-use that can provide electricity demand flexibility, electricity generation, storage, or other energy services at a small scale (sub-utility scale) and are typically connected to the lower-voltage distribution grid.



Sources: Definitions: Adapted from the DOE *Pathways to Commercial Liftoff: Virtual Power Plants*, 2023
Infographic: RMI *Virtual Power Plants, Real Benefits*, 2023

In 2023, RMI launched the Virtual Power Plant Partnership (VP3) to address key barriers and drive VPP market growth

ABOUT

An initiative housed within RMI and funded by industry leaders spanning the automotive, building, energy service, and software sectors

MISSION

To catalyze industry and change the necessary policies, regulations, and market rules for VPPs to scale in ways that benefit communities and society

RESOURCES

WEBSITE → VP3.io

INSIGHT BRIEF → Download Here

VPP POLICY PRINCIPLES → Download Here

VPP CASE STUDY FLIPBOOK → Download Here

MEMBERS

CPower, CAMUS, ELEXITY, elexsys CLEAN ENERGY, UNLEASHED, EnergyHub, Ford, gm, KRAKEN, leap, nrg, olivine, perlstreet, qcells, RECURVE, Renew Home, sonnen, SPAN, SUNRUN, switchDin, uplight, Utilidata, voltus

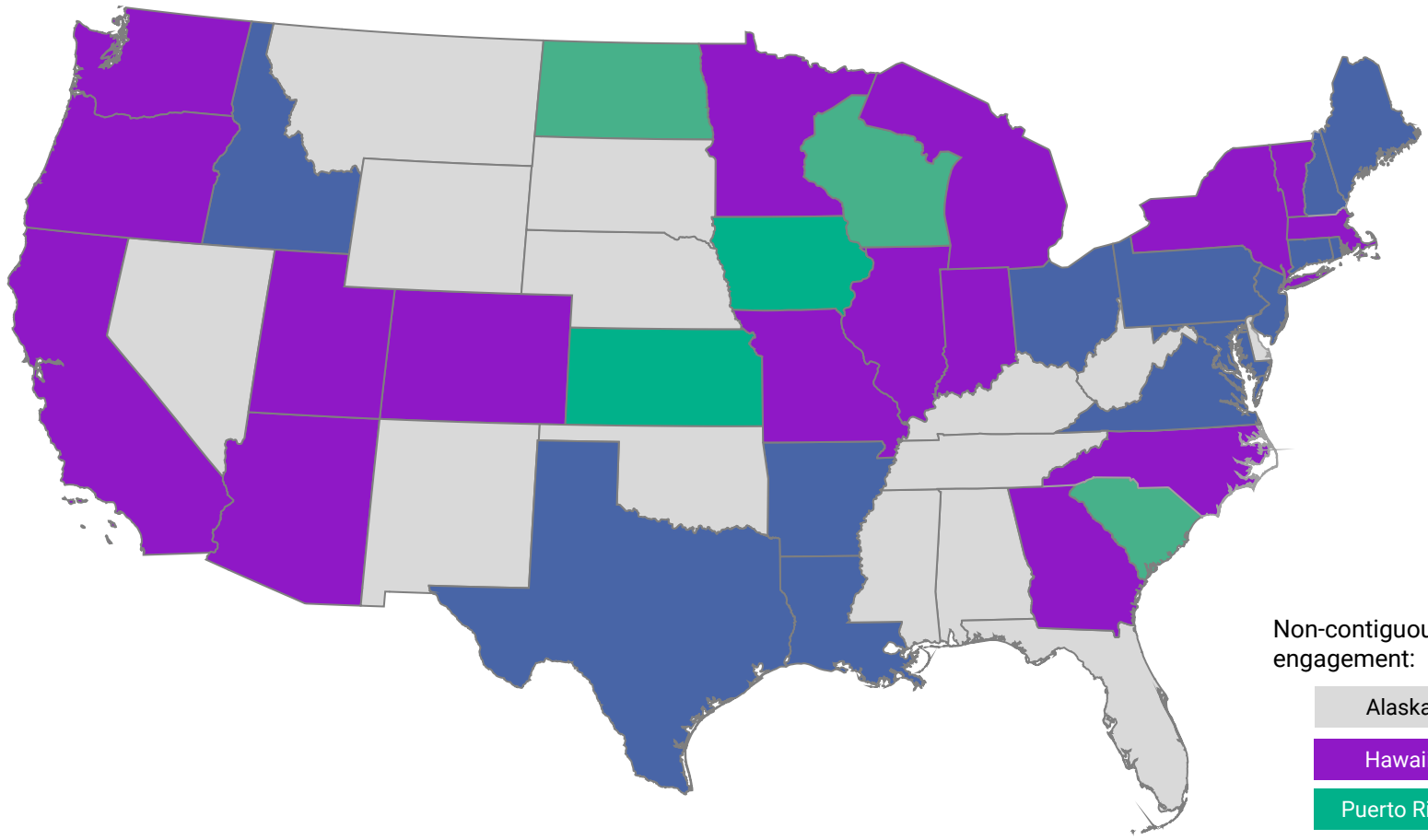
*Initial funding of the VP3 effort was made possible by General Motors and Google Nest.

VP3 engages regulators, utilities, policymakers, and market operators around the US to discuss how VPPs can be leveraged to achieve affordability, reliability, and decarbonization outcomes

Decision-Maker Engagement

- Regulator
- Utility
- Regulator & Utility

*Includes decision-makers who attended VP3 workshops, luncheons, webinars, convenings, or who engaged in one-on-one calls with VP3 staff.



Federally, we've engaged with & educated:

White House Climate Policy Office
White House Council of Environmental Quality
General Services Administration
U.S. Congressional staff and others…

Flex Coalition Overview

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A project of smart on smart

Members

SPAN
ecobee
sunrun
CLEAResult
piclo
UTILITYAPI
Sealed
aesc
NORTHERN PACIFIC POWER SYSTEMS
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RECURVE SHAPE THE FUTURE OF ENERGY
ENPHASE
GRIDPOINT
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derapi
FRANKLIN ENERGY
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Renew Home
EnergyHub
BLOC POWER
lunar energy
leap
BAKER ELECTRIC HOME ENERGY
Energy Solutions
Quilt
Arcadia
BRIGHT POWER
GENERAC GRID SERVICES

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The Flex Coalition provides educational support for policies that advance **performance-based demand flexibility** to enable markets for Virtual Power Plants (VPPs) as a grid resource, and is dedicated to educating policymakers and stakeholders on the benefits of VPPs as a tool for promoting grid reliability, greenhouse gas reduction, and energy equity.

HOMES Rebates, Measured Savings and VPPs

Kara Saul Rinaldi
AnnDyl Policy Group
June 13, 2024

Inflation Reduction Act set the stage for measured energy savings in HOMES

- Signed into law August 16, 2022
- DOE Guidance July/October 2023
- Split HOPE for HOMES Act
  - HOPE = Contractor Training Grants (TREC)
  - HOMES = Measured and Modeled Performance Energy Savings Rebate
  - HEAR = Home Electrification and Appliance Rebates

Home Owners Manage Energy Savings (HOMES) A.K.A Home Efficiency

- **$4.3 billion for HOMES, a performance-based, energy savings rebate program**
- Formula-set, State Energy Office Directed. Both **single- and multi-family homes** are eligible
- More savings = More Rebate; Both **single- and multi-family homes** are eligible
- **Cap:** incentive cannot exceed 50% of the project cost (80% for Low-Moderate Income, though could be higher at the request to DOE)

- **Can use either a ”measured” or a ”modeled” approach**
  - **Measured: payments are based on actual measured savings**
  - **Modeled: payments are based on estimated savings from modeled predictions**

The Measured Approach and Time, Location, and GHG Considerations

- The measured savings approach ensures that states only provide rebates for actual, verified energy savings
  - **Homeowners and contractors receive an up-front rebate**; risk is borne by the aggregator
  - There is a strong incentives for **high-quality installations**, as projects that underperform will cost aggregators
- **States must provide a plan to "value savings based on time, location, or greenhouse gas emissions" (TLGHG)**
  - Allows states to customize their program to **align with state energy policy** and climate goals
  - **Helps achieve improved grid reliability and flexibility** benefits based on time and location factors
  - Gives states tools to align rebate payments with **emissions reduction goals** by incentivizing energy savings from higher emission sources

IRA HOMES Measured program incentivizes on a per-kWh-equiv basis –

- Payment rate is **calculated per kWh / kWh-E saved**, equal to $2,000 for a 20% reduction of energy use for the average home in the state ($4000 for LMI, higher with DOE approval)
- Payments are made based on the **measured savings and the payable rate per kWh at the portfolio level.**
- **Minimum:** the portfolio of homes must achieve at least 15% energy savings. The aggregator received the rebate (per kWhe saved from baseline portfolio)
- **Open-Source Advanced M&V**

Examples from DOE Calculator:

1 kwh = 0.034 Therm

Market-rate project (TX SFH)

$$\text{Incentive rate} = \frac{\$2{,}000}{(20\%) * (21{,}701\ \text{kWhe})} = \$0.46 / \text{kWhe}$$

State-Specific Data for Texas

Average site energy use*		
Energy Type	**Single Family**	**Multi family**
Electric	14664 kWh	8289 kWh
Natural Gas	224 Therm	48 Therm
Propane	18 gallons	2 gallons
Fuel Oil	124 gallons	10 gallons

Measured Incentive Payment Rate (by energy type, dwelling type, and income level)				
	Single Family		**Multi Family**	
Energy Type	Market	LMI	Market	LMI
Electric ($/kWh)	**0.46**	**0.92**	**1.02**	**2.04**
Natural Gas ($/Therm)	**13.51**	**27.01**	**29.90**	**59.80**
Propane ($/gallon)	**12.36**	**24.72**	**27.36**	**54.72**
Fuel Oil ($/gallon)	**20.23**	**40.45**	**44.78**	**89.56**

(1 Therm=29.3 kWhe)

Turning Measured Savings into VPPs by Weighting Value Certain Hours

- Increase payment during peak grid demand (e.g. using TOU periods) to distribute value
- TLGHG multipliers may be different for low-income and market rate; market rate may be capped by statutory $2,000/20% savings values, while low-income ($4,000/20%) can be increased with DOE approval (e.g. $8,000/20%).
- ALTERNATIVE: Use an adder for GHG reduction hours
- By increasing some values and decreasing other, the average rates remains 20% savings = $2,000 (Market Rate)

Step #1: Calculate Weighted Average Rates	Hours	Relative Value	Convert to Weighted Rate	Weighted Rate ($ / kWhe)
Summer Morning Peak	488	20x		$0.90
Summer Evening Peak	726	100x		$4.49
Remaining Hours	7,546	1x		$0.04
Total	**8,760**			**Average rate = $0.46**

Market Rate Example:

20% Average Savings = $2,000

When energy savings are distributed evenly (on average)…

Example TX SFH – 20% Savings (Weatherization + AC/ER)					
Fuel	Time Period	Hours	Energy Savings	Payment Rate $ / kWhe	Incentive
Electric	Peak Morning:	488 (5.5%)	242 kWh (5.5%)	$0.90	$217
	Peak Evening:	726 (8.3%)	360 kWh (8.3%)	$4.49	$1,615
	Off-Peak:	7,540 (86.1%)	3,739 kWh (86.1%)	$0.04	$168
Total:		**8,760 (100%)**	**4,340 kWh**		**$2,000**

…most of the incentive is for avoided peak kWh…

… and the payment still equals $2,000 / 20%

HOMES Rebate and VPPs

- Aggregators have the opportunity to utilize smart technology, smart appliances, to incentivize TLGHG savings and ensure predicted savings meet actual savings AND meet grid needs and curb peak load.

- Measured savings values the flexibility of a building to be managed to meet grid needs. By moving and aggregating this energy consumption and savings, it can support a Virtual Powerplant by providing many of the same energy services (capacity, energy, ancillary services) as a traditional power plant.

Thank You

Kara Saul Rinaldi
President & CEO
AnnDyl Policy Group

202.276.1773
kara@anndyl.com

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Panel Discussion

David Hunter, Ph.D.
Director
The Flex Coalition
Moderator

Carmen Best
Chief Policy Officer
Recurve
Panelist

Kara Saul Rinaldi
CEO and President
AnnDyl Policy Group
Panelist

Stacey Paradis
Commissioner
Illinois Commerce Commission
Panelist

Andrew McAllister
Commissioner
California Energy Commission
Panelist

Resources

- Flex Coalition Measured Savings Policy Page
- RMI Home Efficiency Rebate Program Implementation Guidance for States
- RMI Home Electrification Rebate Program Implementation Guidance for States
- RMI Gaps and Barriers to Stacking Federal, State, and Local Incentives
- RMI VPP Policy Principles
- RMI VPP Flipbook
- DOE Report | Commercial Liftoff for VPPs
- Brattle Report | Real Reliability, the Value of Virtual Power

Post-Webinar Q&A Follow-Up (1 of 2)

Panelists provided answers to remaining Q&A after the event concluded. Please see responses below.

Question	Answer
Please comment on the supply and demands of jobs for these funded initiatives and optimization opportunities.	The TREC Program is $200M, provided to states to support workforce needs to support the rebate programs. This includes OJT and training support.
When you are looking at VPPs in the Midwest. Do you see them as a distribution system resource or is there greater interest in using it in MISO?	There are opportunities for VPPs in both. Utilities could use them in their portfolio plans, but there is also a great opportunity in RTOs. That being said, at least MISO and even PJM need a lot of education on VPPs and the ability to reduce load on demand, track savings, and evaluate the benefits.
If I understand correctly, the prime focus on these programs is on reducing demand in the highest periods (where usually TOU rates are focused) rather than shifting demand to times when supply is cheapest and may be plentiful due to renewables on the grid (a "time of renewables" focus), which may conflict with a TOU focus. Is that correct?	There needs to be an absolute savings of energy to receive the rebate. But you can focus that savings to peak times by valuing those savings higher. So a few hours at peak is worth more than non-peak.
Is there an open source regarding the data that relates demand flexibility/policy with the feedback/impact?	Data access really depends on jurisdiction. We are typically operating within data systems that can have secure access for service providers so they can see their performance and use that feedback. It's typically also available to program administrators as well. An interesting example is TECH Clean California that shares progress information publicly: https://techcleanca.com/public-data/

Post-Webinar Q&A Follow-Up (2 of 2)

Panelists provided answers to remaining Q&A after the event concluded. Please see responses below.

Question	Answer
How can renters get rebates directly for portable space heating heat pumps when only contractors get the rebate and do not need to install so will not interact with those wanting/needing portables so low income renters can benefit?	The HOMES rebates can only go to building owners. But landlords who take the upgrades are required to maintain rents for 2 years. The HEAR program allows renters to make purchases of heat pump clothes dryers and electric cooking products (fuel switching from gas). Contractors do not get either rebate, they are point of sale to purchaser.
How can regulators value VPP contributions? What are the initial thoughts about this in your view?	For states that have EE and RE utility programs, PSCs can build off the current EM&V in place in their states. The challenge still for most of the PSCs in the Midwest is valuation is tied to only energy savings; there is still work to be done to start including societal savings.
Follow up on payment mechanics: Are there two different payment streams - One directly to homeowners and another for aggregators?	The rebate will be taken off the cost of the project and reimbursed by the state energy office (to the contractor or aggregator).
Does 20% refer to load shifted or only to 20% saving of the annual energy consumption by a home? Some load shifting techniques can cause a net increase in energy usage, but benefit from energy price arbitrage.	20% savings of the annual energy consumption by the average home in the state. That is how you calculate the per kWhe savings. Once you have made that calculation, policymakers can incentivize certain hours over others.

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Thank you!

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