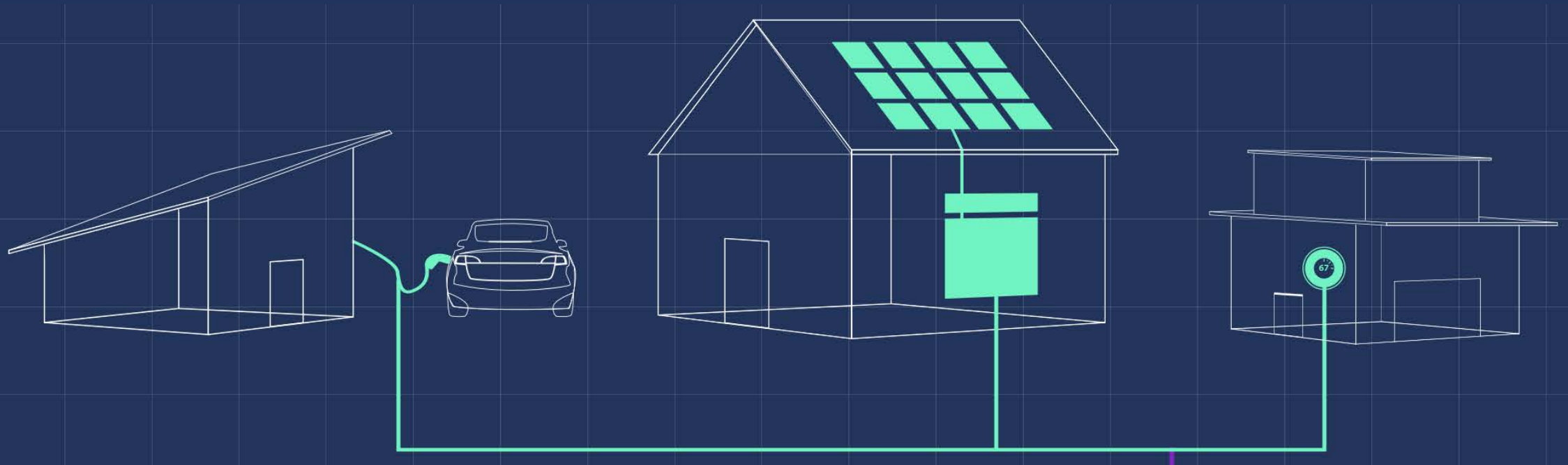
# Virtual Power Plants for Co-ops

## *Unlocking Benefits and Leveraging Federal Funding*

**August 2nd, 2023**
**10am – 12pm MDT**



# Today's session

## OBJECTIVES

- Introduce VP3 & VPPs to cooperatives and utilities
- Hear about VPP opportunities and challenges from other cooperative leaders
- Learn about the benefits and considerations for new and existing federal funding opportunities that can advance VPP projects

## AGENDA

- Welcome
- Part 1: Presentations
  - What are VPPs?
  - Guest Speakers
  - Leveraging Federal Funding for VPPs
- Part 1 Q&A through chat window
- Part 2: Discussion & Break-outs
  - Informal Q&A
  - Break-outs: VP3 Members & Co-ops

# Workshop Guidelines

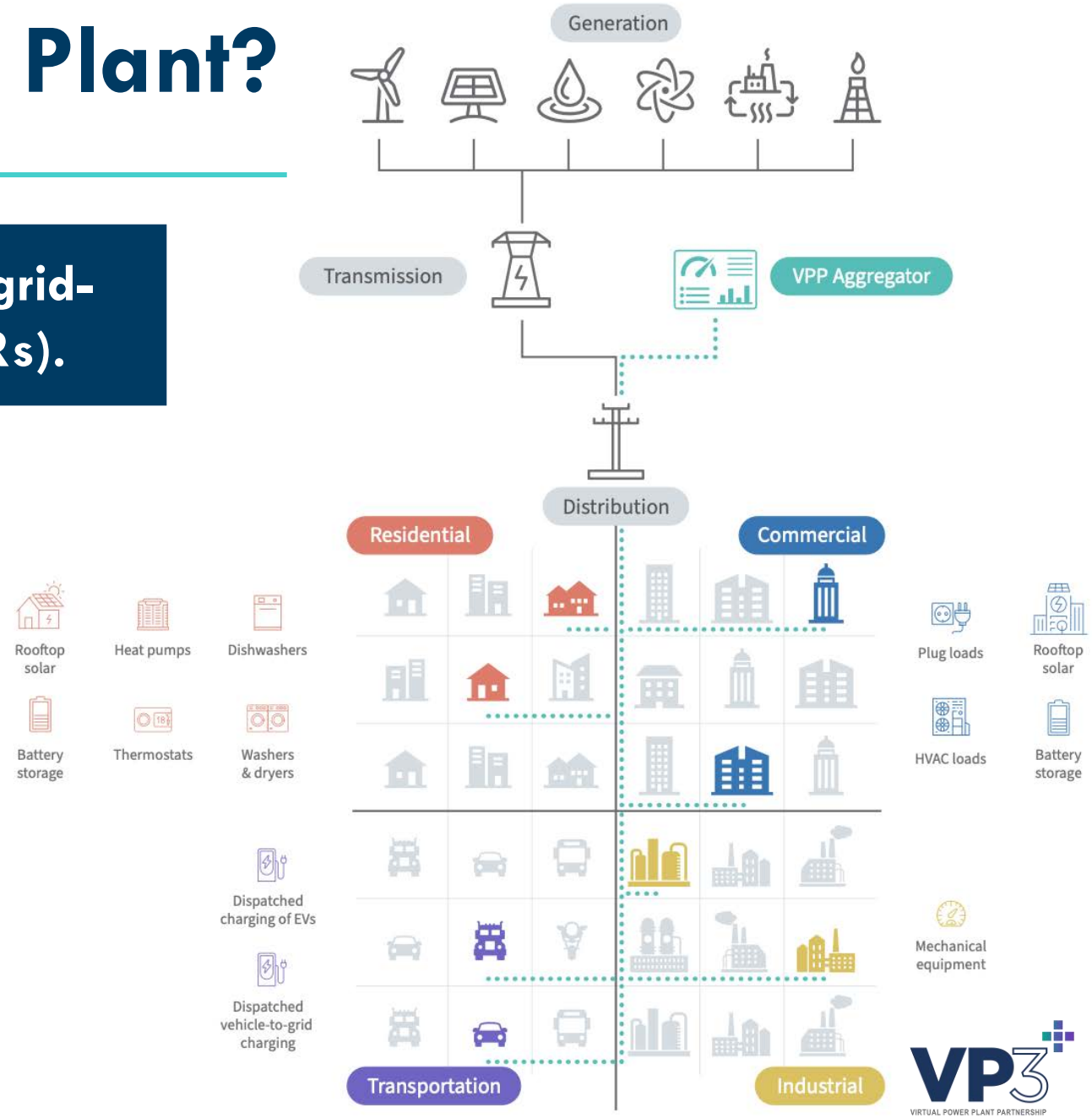
- Participants are muted during the presentations and Part 1 Q&A
- Use the chat window to share info – and ask questions!
- Thoughtful dialogue & clarifying questions are encouraged.
- Make connections with the experts in the room!
- …but don’t exchange confidential commercial information.

# Part 1: What are VPPs and why are they helpful to co-ops?

# What is a Virtual Power Plant?

**A virtual power plant is an aggregation of grid-integrated distributed energy resources (DERs).**

- **DERs:** single assets at or near homes and businesses (EVs and charging, batteries, heat pumps, thermostats, plug loads, HVAC loads, solar PV, etc.) or their combined participation as a whole building
- **Aggregation:** devices are aggregated, and in some models, controlled by a grid operator
- **Grid-integrated:** VPPs provide value to and interact with the grid and markets



# VPPs are already providing value to households, businesses, and society.

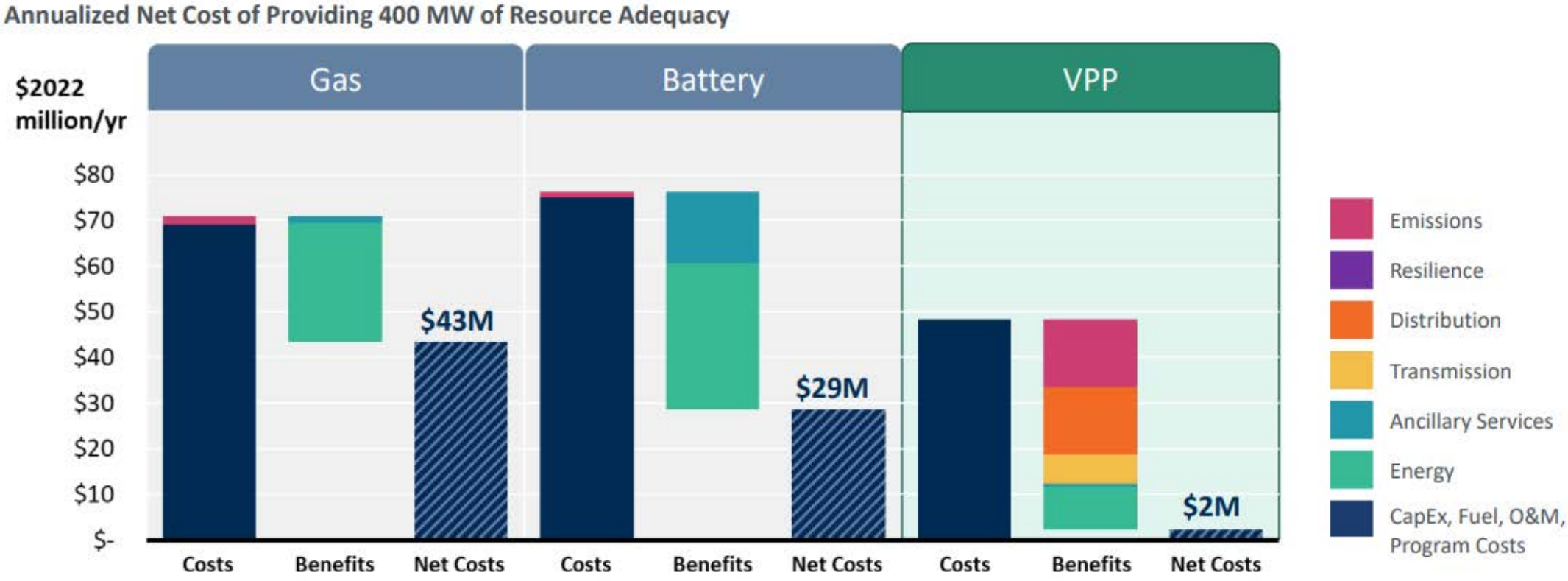
VPP BENEFITS

| | |
|---|---|
| **RELIABILITY** | Enhance grid resilience. By 2030, VPPs could reduce U.S. peak-coincident demand by **60 GW**. |
| **AFFORDABILITY** | Reduce annual power sector expenditures by **$17 billion** in 2030. |
| **DECARBONIZATION** | Minimize the dispatch of highly polluting power plants, driving a greener power supply. |
| **ELECTRIFICATION** | Provide revenue streams to incentivize electrification and help avoid grid bottlenecks. |
| **HEALTH AND EQUITY** | Decrease reliance on gas-fired "peaker" plants, which disproportionately impact people of color and low-income community health. |
| **CONSUMER EMPOWERMENT** | Enable consumers to play an active role in shaping the way energy is used in society. |



VP3
VIRTUAL POWER PLANT PARTNERSHIP

# VPPs can provide the same resource adequacy at a significant discount relative to alternatives.




***RMI estimated that 60 GW of VPPs could be deployed nationally by 2030. At that scale, VPPs would save $15 to $35 billion in resource costs relative to the alternatives over 10 years … plus $20 billion in societal benefits***



*Real Reliability: The Value of Virtual Power,* Brattle Group

# VPPs provide grid services necessary to the evolving power system beyond resource adequacy.

| Power System Evolution | Additional Grid Service Required | VPPs Offer Needed Grid Services to Co-ops |
|---|---|---|
|  Fossil Retirement and Renewable Integration | Capacity; Ancillary services [reserves, frequency, ramping, etc.] | Great River Energy added more than **140MW** to the MISO capacity market with a VPP in 2023 |
|  Electrification | Resource adequacy, Energy, T&D capacity/deferral | Holy Cross Energy has managed EVs, residential batteries, and flexibility tariffs to harness DERS |
|  Extreme Weather | Resilience | NRECA Microgrid Consortium |

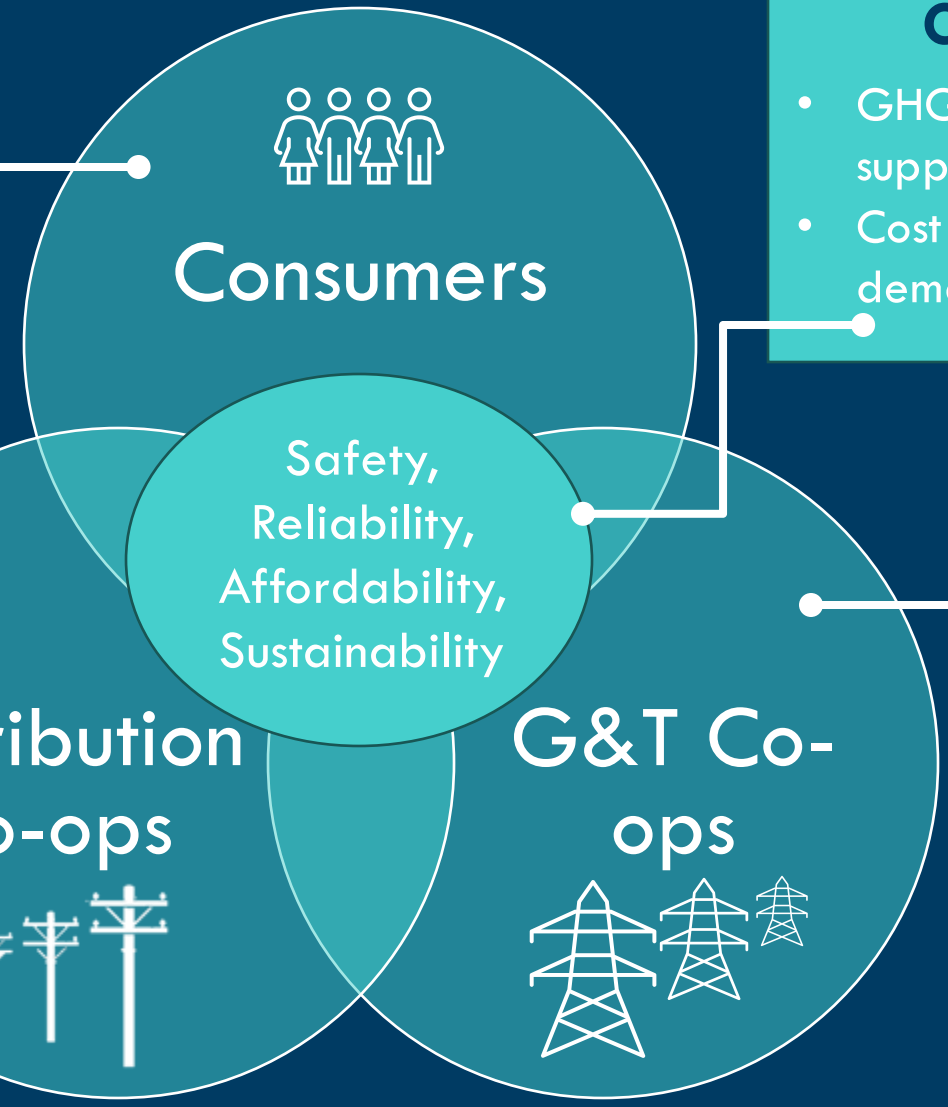
# VPPs provide innovative opportunities across the cooperative community.

## Consumer Benefits

- Weather resilience
- Direct participation in the cooperative system

## Community Benefits

- GHG reduction through cleaner supply and avoided infrastructure
- Cost savings from lower peak demand and member compensation




## Distribution Co-op Benefits

- Net load management
- Decreased demand
- Operational flexibility

## G&T Co-ops Benefits

- Frequency Regulation
- Resource adequacy - increased renewables adoption by shifting demand

# Cooperative Presentations

## Bryan Hannegan, Holy Cross Energy

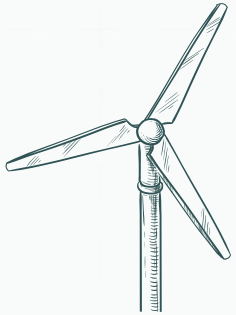
## Cyril Brunner, Vermont Electric Cooperative


# Virtual Power Plants (VPPs) in a Clean Energy Future

Bryan Hannegan – August 2, 2023

# Holy Cross Energy is leading the responsible transition to a clean energy future

**Holy Cross Energy (HCE) provides safe, reliable, affordable and sustainable energy and services that improve the quality of life for our members and their communities.**



*In 2022, 50% of our power supply came from wind, solar, biomass and hydroelectric power, as well as coal mine methane recovery.*

**Founded in 1939, we serve more than 46,000 members in scenic Western Colorado with:**

- **265 MW Peak Demand**
- **3,100 Miles Distribution Lines**
- **120 Miles Transmission Lines**
- **165 Employees**

# Our Journey to 100% Clean Energy

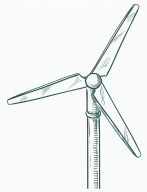
**These actions will allow HCE to achieve its vision of:**

- 100% carbon-free power supply by 2030
- Carbon-neutral or better across the enterprise by 2035

in a way that ***does not sacrifice affordability, safety, or reliability*** for the sake of sustainability.

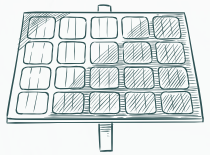
## Energy Efficiency

Obtain an additional 0.25% per year in reduction of electric sales from existing uses.



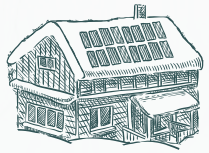
## Cleaner Wholesale Power

Incorporate new, clean, dispatchable resources into HCE's power supply mix.



## Local Clean Energy Resources

Continue our existing agreements for energy from local biomass, hydro, solar, & coal mine methane projects



## Distributed Energy Resources

Support installation of at least 4 MW per year of new rooftop solar systems.

## Smart Electrification

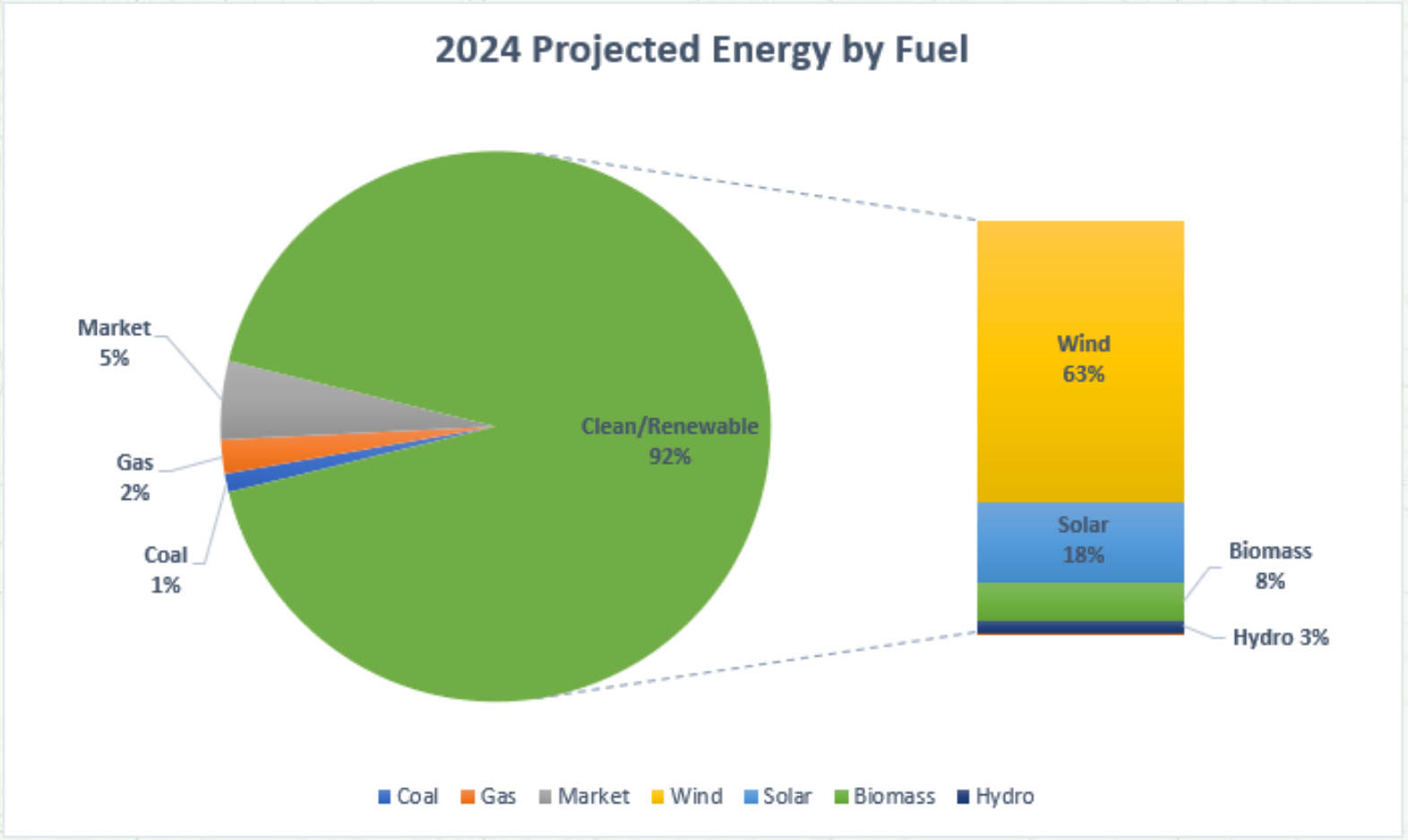
Encourage the expanded use of electricity for transportation, building heating and cooling, and industrial processes.

# HCE is Supporting Renewable Energy

**New Resources Developed or Under Contract:**

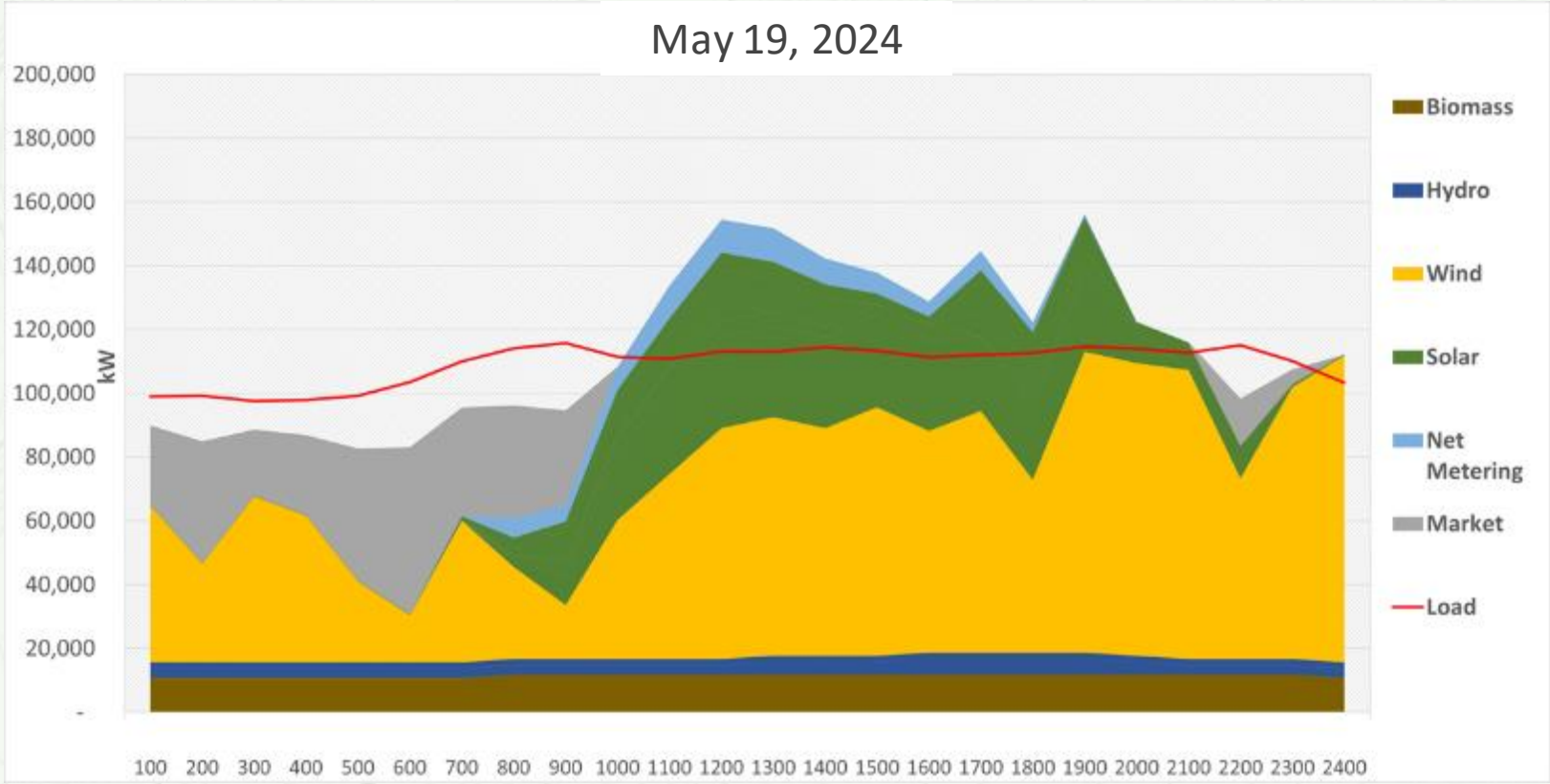
**Eastern Colorado**
- 150 MW wind
- 30 MW solar

**HCE Service Area**
- 5 MW solar
- 4.5 MW hydro
- 4.5 MW/15 MWh solar+storage
- 10 MW/20 MWh solar+storage
- 10 MW/20 MWh solar+storage



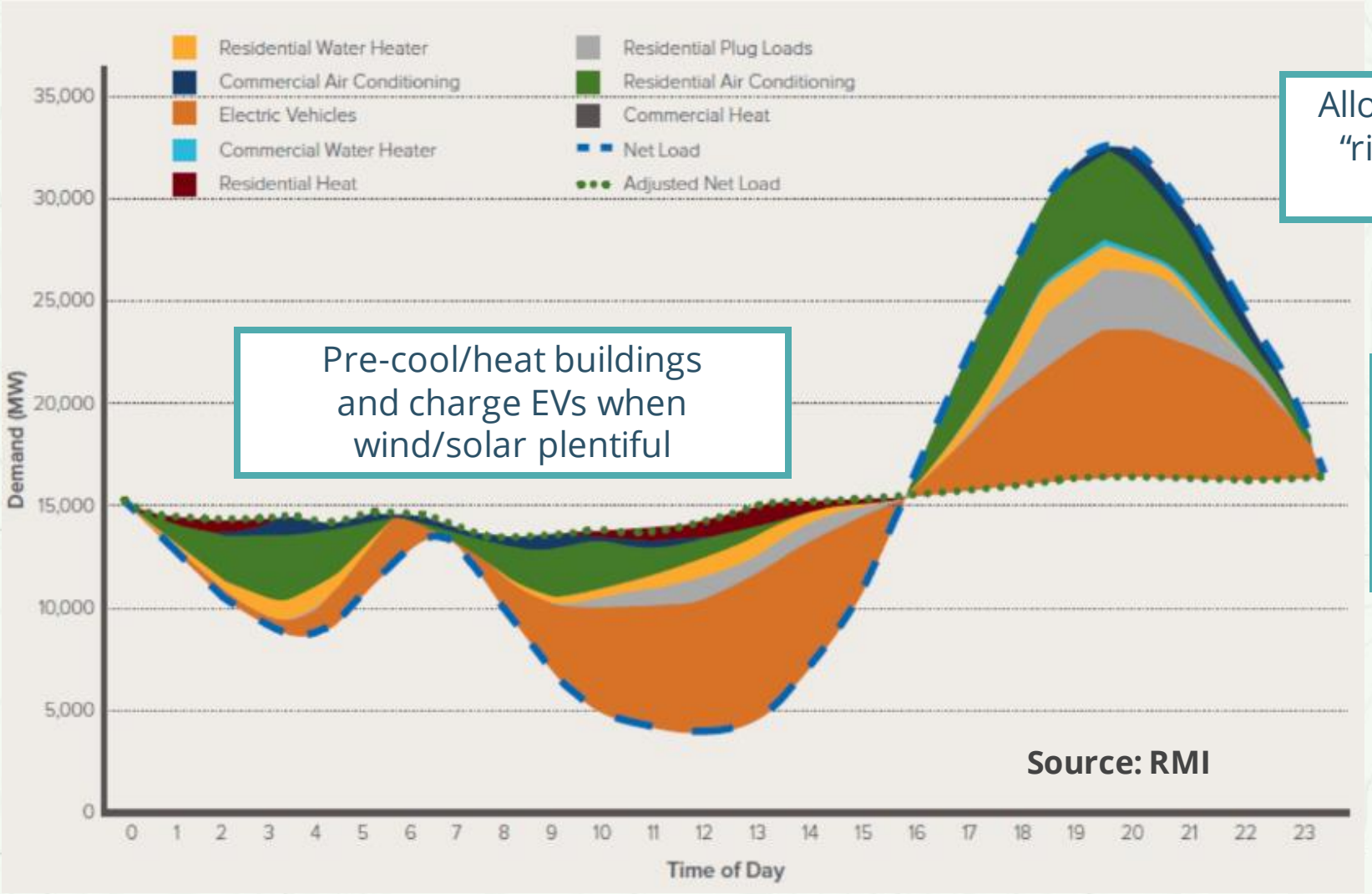
# Implications of High Renewables

- At high % of renewables, the variability of wind and solar is often mismatched with electric demand
- This means higher costs to store or curtail the excess energy during midday
- New renewables need to be paired with storage and/or flexible loads to avoid making this challenge worse



# DERs Provide Needed Flexibility

**Virtual Power Plants (VPPs) are simply coordinated sets of Distributed Energy Resources (DERs)**

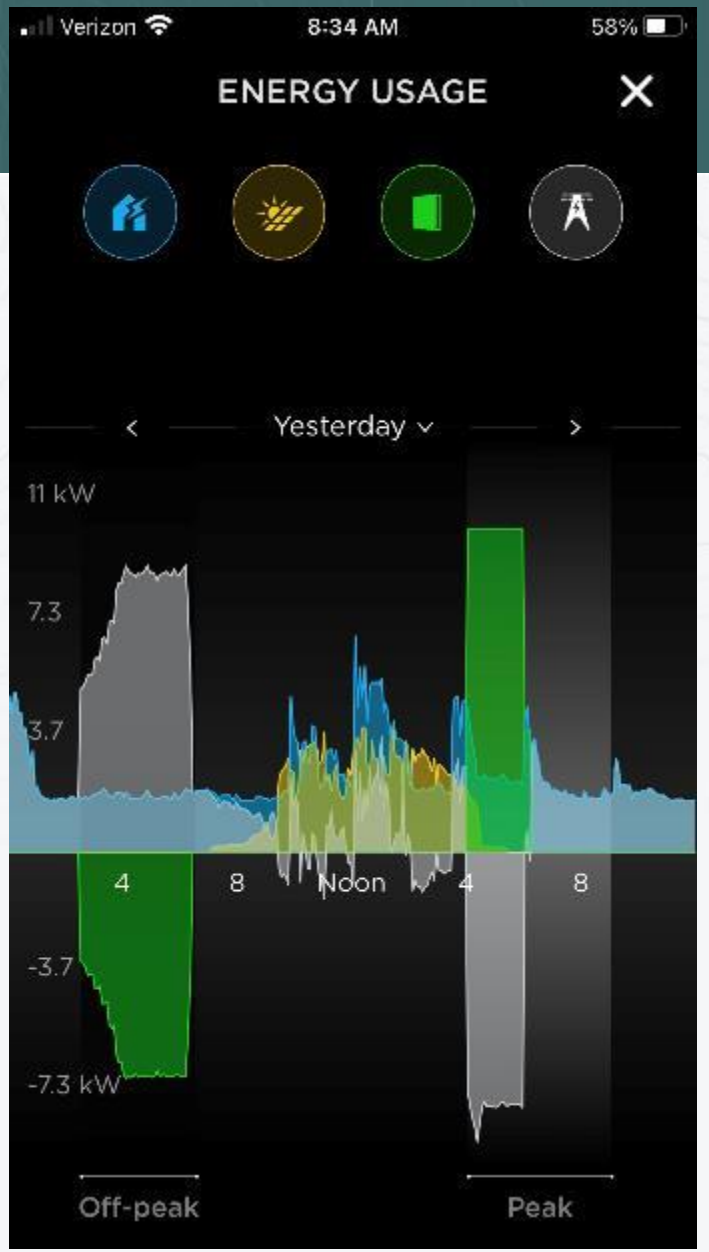



Pre-cool/heat buildings and charge EVs when wind/solar plentiful

Allow building to "ride through" peak

Discharge from batteries to address PM solar ramp (incl. V2G)

# “Power+” Energy Storage


**Pilot program in 2022 and 2023: 5 MW/15 MWh BTM storage**

Combines DER Service Agreement & Distribution Flexibility tariff

Target consumer cost: $30-40/month for 10 years

**Initial install at HCE HQ avoided**

**12 interruptions/290 outage minutes in Q4 2020 alone!**

# “Electrify Your Ride” EV Programs

## Program Elements

FREE L2 EV chargers to every residential (limit 2) or commercial (limit 4) member

DER Service Agreement avoids up-front installation costs

Community DC fast charging supported by $150k upgrades and engineering support

Transit and school buses supported with TOU rates, no demand charge, on-site solar

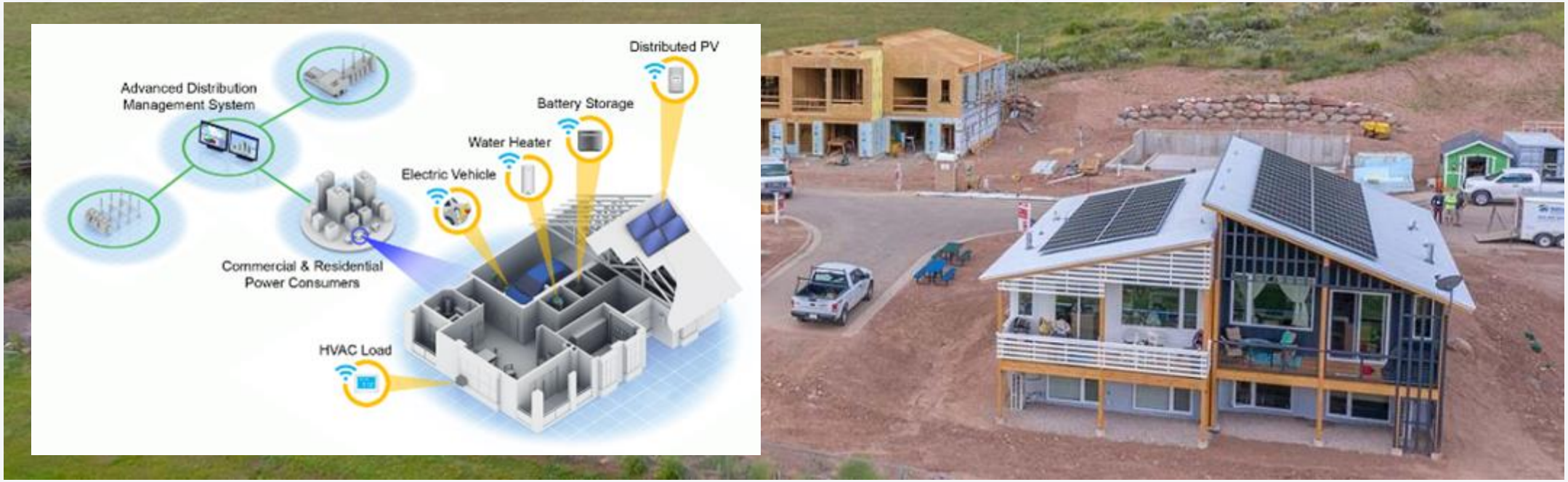

174 Home Charging Ports, 59 Commercial Charging Ports,
5 DC Fast Chargers, 8 Transit Buses in 2020

# “Basalt Vista” Affordable Housing Project

- Habitat for Humanity, Pitkin County, Basalt School District
- 27 homes for teachers and local service workers
- Designed net-zero energy with *all electric* construction
- Adjacent to Lake Christine Fire affected area
- Cost-shared partnership with NREL and DOE Office of Electricity
- Demonstrate value of DERs to consumer *and* grid

**<u>Four</u> homes with controllable loads**

- 8kW rooftop solar PV
- Battery storage
- L2 EV charging
- Heat pump water heater
- Air source heat pump



# Aspen Airport Microgrid Project

**Vision** Create a regionally resilient and 100% clean energy system that balances production, storage and distribution across four distinct public facilities, generates additional clean energy to the community and create a model for net-zero, resilient public facilities across the state.

**Why** Lake Christine Fire exposed significant vulnerabilities in our public infrastructure This project seeks to build resiliency for these core services, while simultaneously building a clean energy system for some of the highest energy consumers in the County.


## Who

- Aspen Pitkin County Airport
- Roaring Fork Transportation Authority
- Pitkin County Public Works
- Holy Cross Energy electric system from Brush Creek Park n' Ride to the Aspen Substation.

# Current Rate and Program Options

### Distributed Energy Resource Service Agreement

- Low interest on-bill payments for DERs and related costs

### Distribution Flexibility

- Credit for allowing utility option to manage behind-the-meter DER assets

### Peak Time Payback

- Credit for voluntary reduction in consumption during forecasted peak event

### GreenUp

- Dynamic Renewable Pricing
- Credit for voluntary *increase* in consumption during forecasted "oversupply" events

### Time of Use

- Optional rate structure to encourage load shifting
- 24c/kWh on-peak (4-9 pm); 6c/kWh off-peak

### PuRE

Purchase 100% Renewable Energy

- Green pricing program to enable members to choose 100% renewable energy

# Implications for Future Rate Designs

| Membership Fee (fixed $/month) | Peak Demand Charge ($/kW/month) | Delivery Charge ($/kWh delivered) | Energy Charge ($/kWh) | WeCARE program fee (2% of bill) |
|---|---|---|---|---|
| • Billing & collection<br>• Member service<br>• Community programs<br>• Shared services & overhead | • Capacity / Resource Adequacy<br>• Transmission Capacity | • Transmission delivery<br>• Distribution delivery<br>• Patronage capital | • Energy supply | • Member programs |

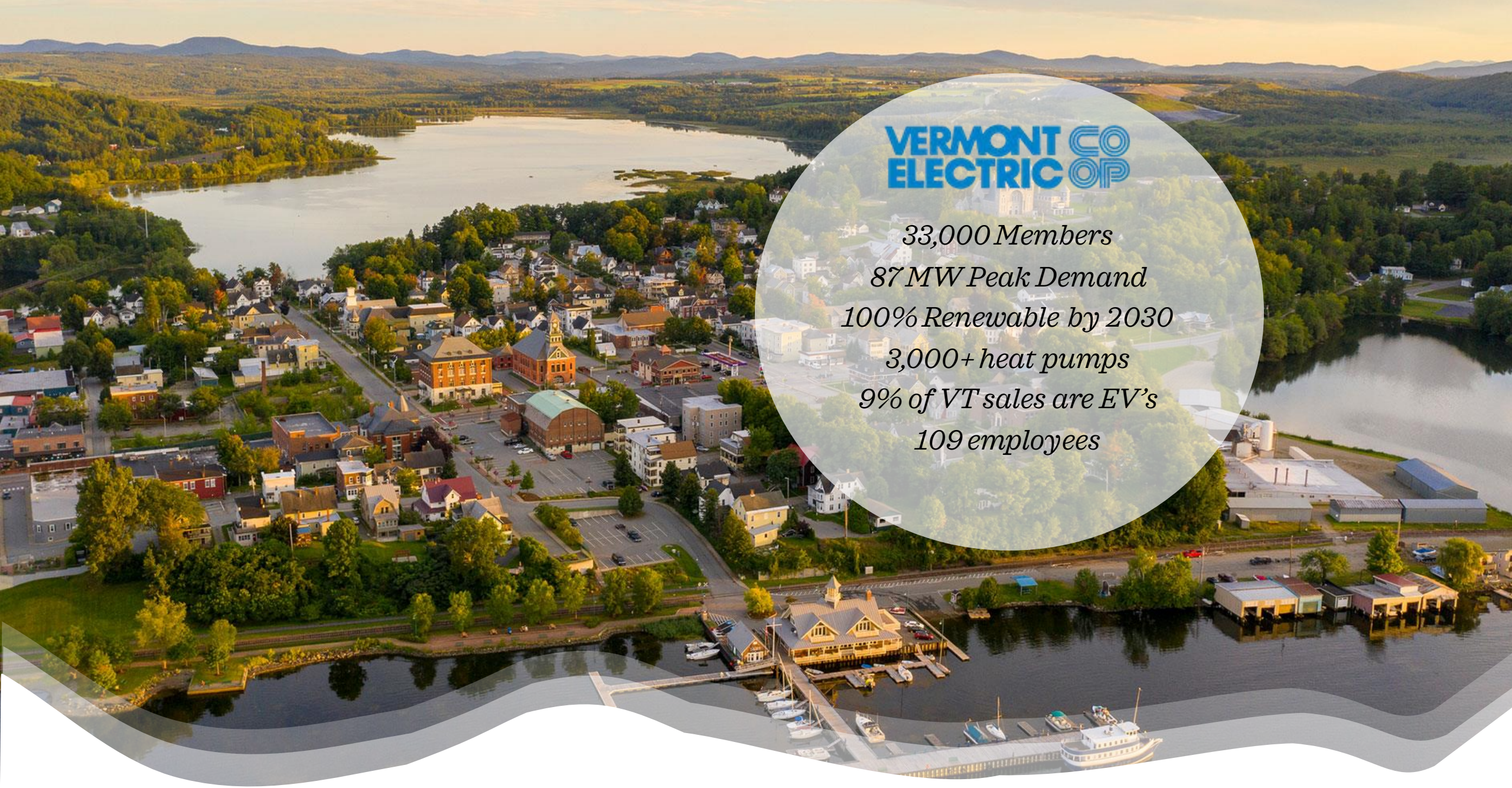
Separation of delivery charges allows utility to foster self-generation, VPPs

# Join us on our Clean Energy Journey

## For more information –

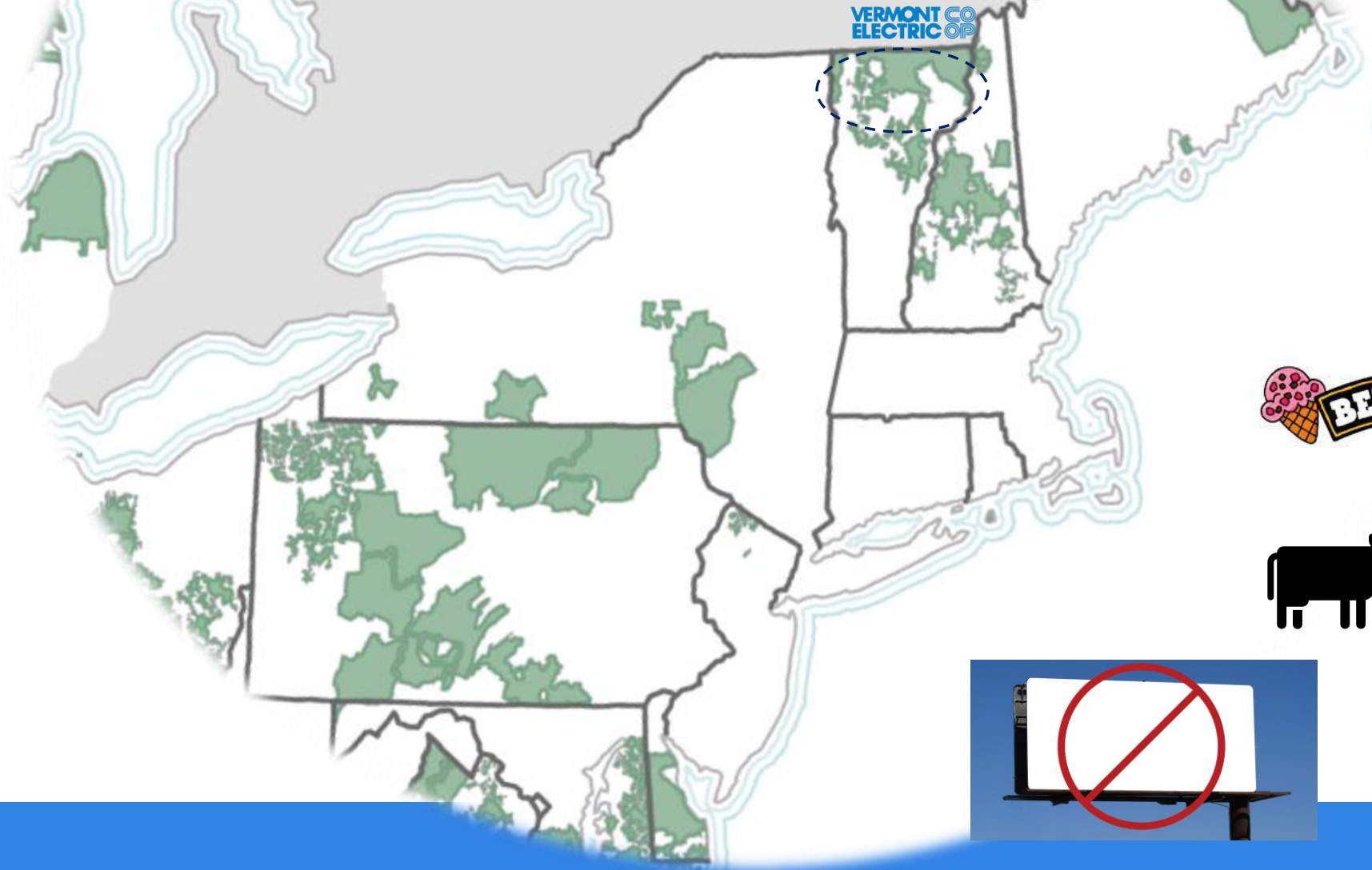
www.holycross.com
Follow us on Twitter & Facebook

Bryan Hannegan
President and Chief Executive Officer
LinkedIn - bhannegan



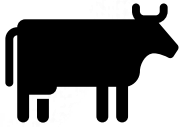

Founded in 1938, Vermont Electric Cooperative is lighting the path to affordable clean energy, together.

# Where is VEC and Vermont ???




vermont electric power company
VELCO


BEN & JERRY'S

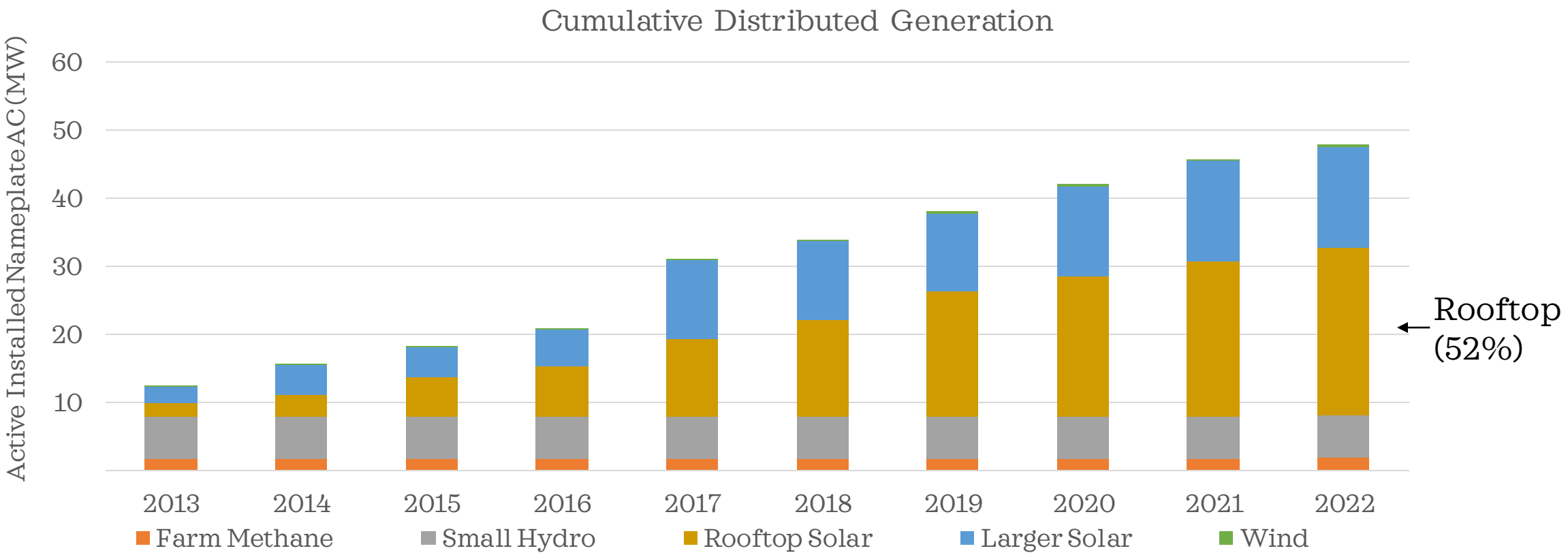






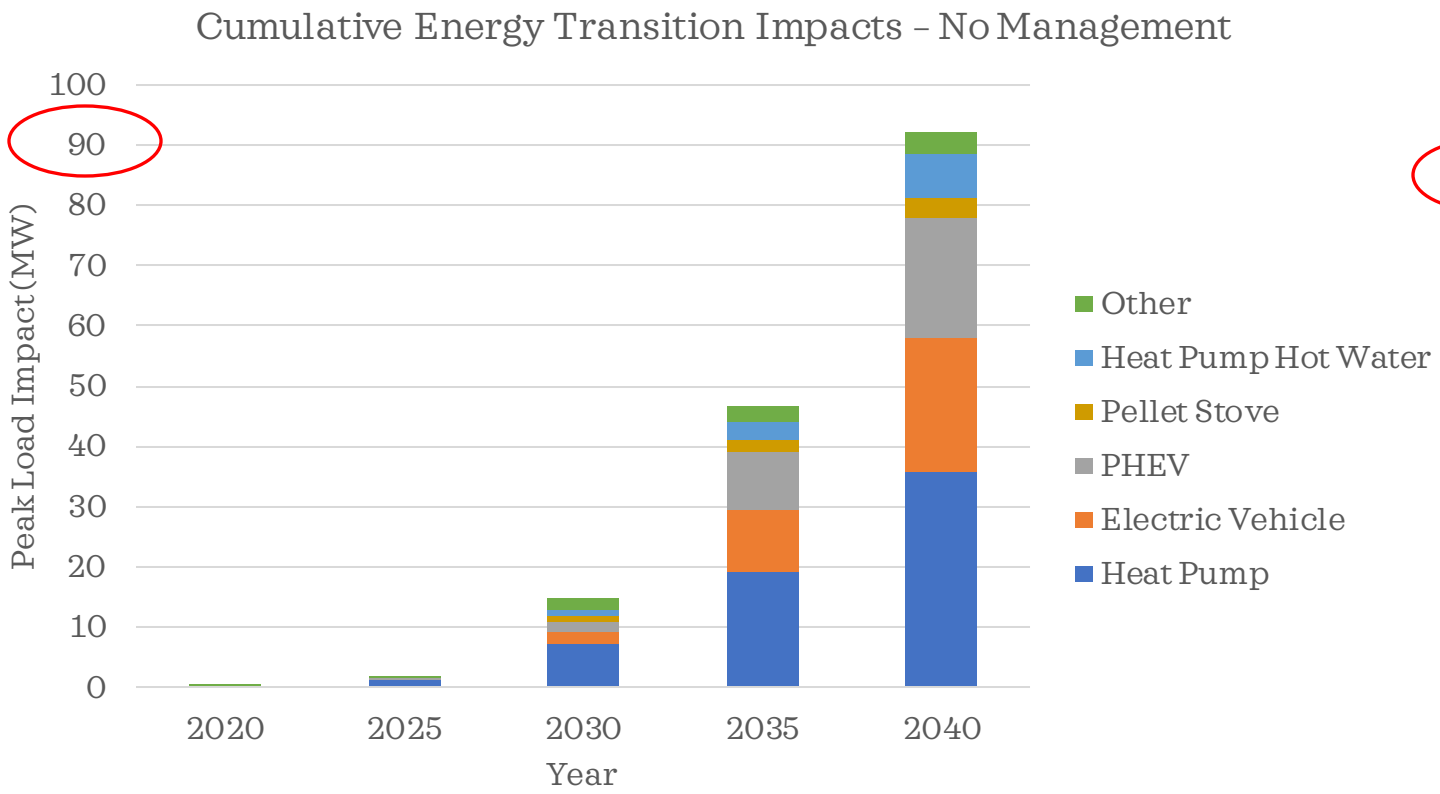
VERMONT CO ELECTRIC OP

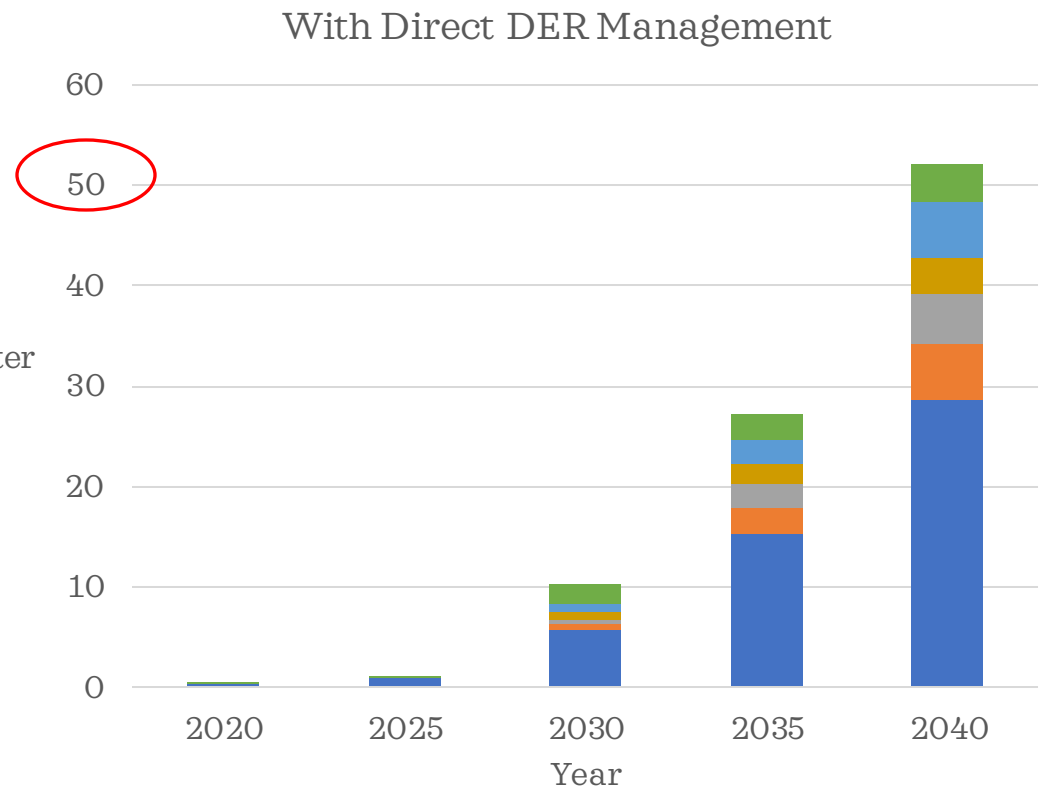
# What kind of growth are we seeing?




- 7th per capita in the USA for solar growth
- VEC Peak Load – 87 MW at 7PM
- Spring and Fall Peak midday loads around 34 MW
- Several substations with reverse flow

# Transportation and Heating




- ~3% of members are installing a heat pump annually
- EV installations are doubling annually
- Projections under current load management programs, 2040 would only be ~50 MW
- 30-40% of distribution transformers, lines and substations would be overloaded by 2040 without load management

# VEC Flexible Load Programs and Pilots

**Free Level 2 Charger (ChargePoint/Flo)**

**Free Distribution Transformer Upgrade**

**$8/month bill credit**

**Telematics Pilot**

- ~100 chargers actively managed
- ~90 chargers using scheduled charging
- < 10 opt outs since program began in 2019

**Bring your Own Battery (Tesla/Sonnen/ Generac)**

**$6.40/month/kW bill credit**

**1 MW / 4 MWH Utility Scale Battery**

**3 MW / 12 MWH under construction**

- ~100 batteries actively managed
- Dispatched 40 hours per month (4-6 times on average)
- VEC monitors weather in advance of dispatch

**Beat the Peak**

- ~400 members enrolled
- No monetary incentive
- Members receive an email communication (3-4 times) for annual ISONE peak

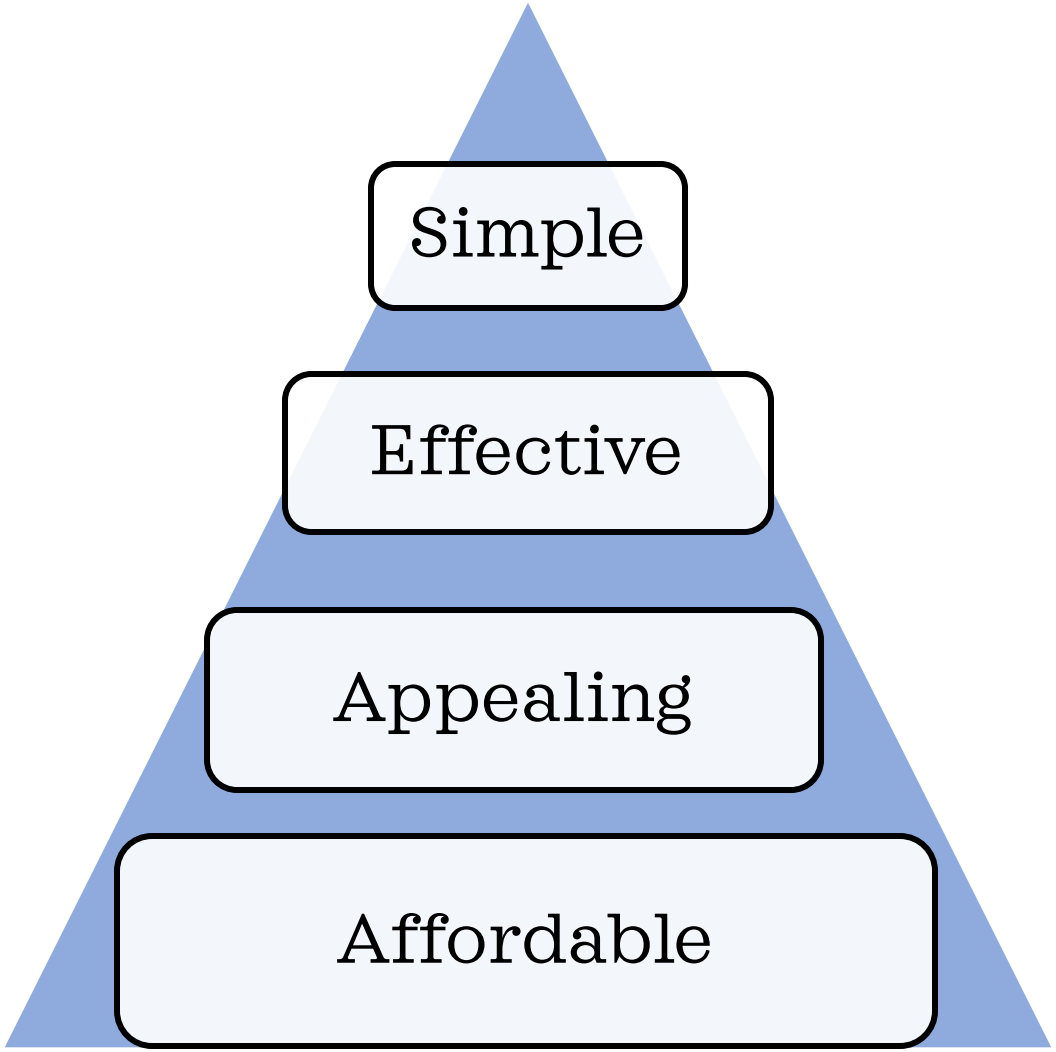
**C&I Building Management (Dynamic Organics)**

**$4-5/month/kW bill credit**

- Pilot focused on ski area hotel and ice rink
- 250-300kW of reduction
- 12 Vermont Peaks and 1 ISONE Peak

**Hopefully Soon**

# Building Blocks of a Successful Program

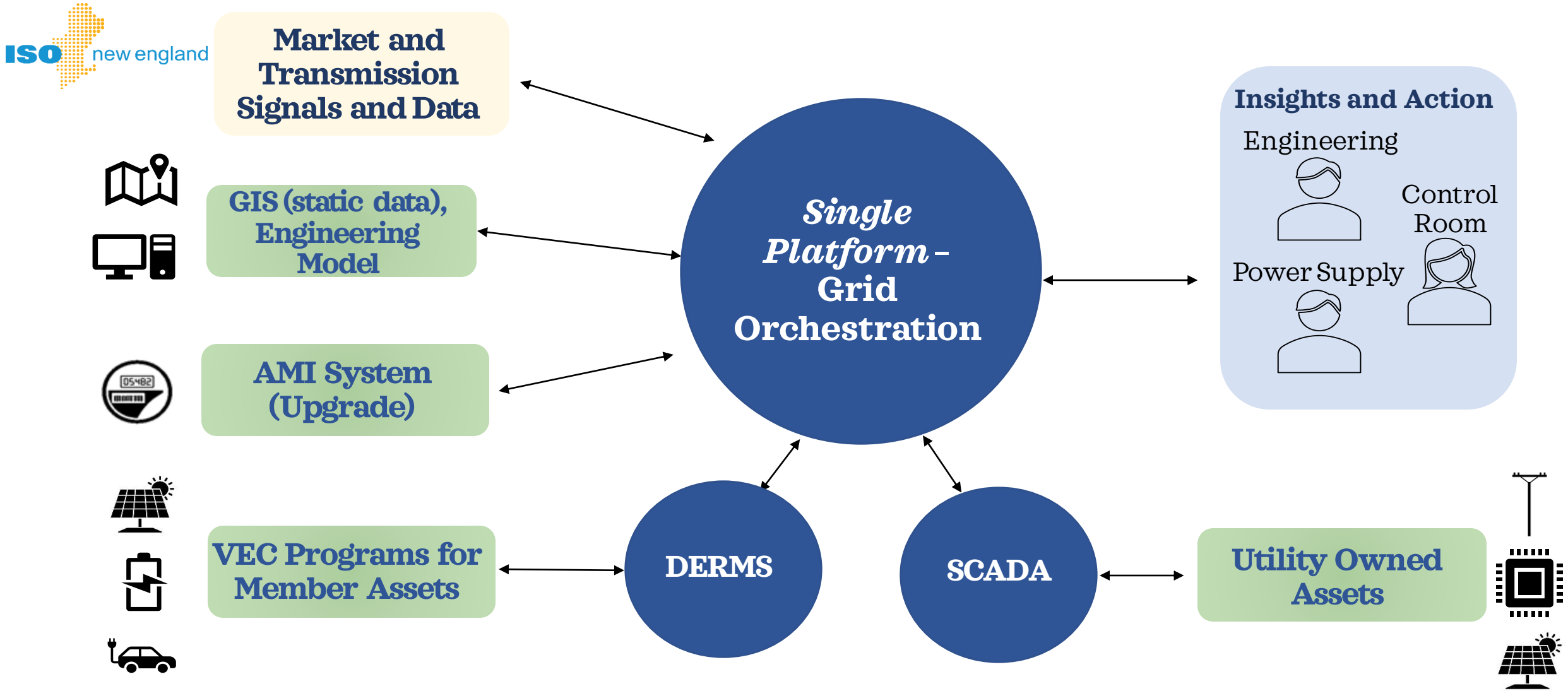



- Communications built-in (API)
- Device Enrollment needs to be easy!

- Device uptime
- Infrastructure upgrade elimination or deferral

- Limited member action/impact to members lives
- Is the incentive valuable enough?

- <6 year ROI
- Peak value projection




Utilize a common platform to identify grid constraints and dispatch assets to eliminate/defer infrastructure upgrades

# The Challenges and Opportunities

## Challenges

- Per OEM device integration $$$
- Low device quantities right now - longer ROI
- Cross functional skills (power supply, engineering, operations, member services) required
- Trusting vendors and longevity
- Cybersecurity

## Opportunities

- Defer or eliminate infrastructure upgrades
- Aggregators (telematics)
- More partnerships with members
- Peak reduction
- Enabling the transition to more renewables
- Partnerships with utilities and vendors
- Nimble, curious, willing to experiment

# Part 2: Leveraging Federal Funding for VPPs

The Guardian, 2022

# IRA is a game changer for both RE development AND balance sheets…but there are many opportunities to navigate!

**Empowering Rural America New ERA Program**
USDA Rural Development U.S. DEPARTMENT OF AGRICULTURE
$9.7 B

**Greenhouse Gas Reduction Fund**
EPA United States Environmental Protection Agency
$27 B

**Rural Energy for America Program**
USDA Rural Development U.S. DEPARTMENT OF AGRICULTURE
Rolling

**Powering Affordable Clean Energy PACE Program**
$1 B
USDA Rural Development U.S. DEPARTMENT OF AGRICULTURE

**Rural Energy Savings Program**
$75 M
USDA Rural Development U.S. DEPARTMENT OF AGRICULTURE

**TITLE 17 CLEAN ENERGY FINANCING PROGRAM**
Energy Infrastructure Reinvestment (EIR)
LPO Loan Programs Office
$250 B

No cap

**DIRECT PAY THROUGH THE INFLATION REDUCTION ACT**
U.S. DEPARTMENT OF THE TREASURY

*Treasury has changed the name to "Elective Pay" since release

# The federal government is the final source of information on the use of IRA programs

- New ERA and others: Respective federal agencies have released guidance, will continue posting clarifications
- Elective Pay Tax Credits: Treasury has released guidance, but is still receiving comments

*Information in the presentation is current as of August 1, 2023*

# We believe New ERA and Elective Pay are best positioned to support VPPs for co-ops

Big Opportunity - $9.7 B New ERA, no cap set for tax credits

Good Timing - New ERA by Sept 15, tax credits when claimed

New ERA grant can support future debt

Per USDA, tax credits can fulfill equity portion for New ERA loan

# New ERA, a $9.7 billion USDA program specifically calls out VPPs, offers financing flexibility, and involves a non-binding LOI

*Ownership and use are the keys to determining what is eligible as a zero-emission system. The products and equipment must be owned by the utility and contribute to the utility achieving its GHG reductions. Utility-owned products and equipment, including software and hardware and devices that the utility owns for demand side management purposes, could be eligible for funding as a "zero-emission system" under the NOFO, even if a consumer could use the utility-owned device…..*

- *A utility-owned smart thermostat in a residential unit….*
- *Virtual power plants that consist of equipment owned by the utility…*
- *Electric buses that are owned by the utility and used by the utility as a storage device…*
- *A utility deployed, owned, and maintained network of solar panels located at customer locations….*

USDA Rural Development
U.S. DEPARTMENT OF AGRICULTURE

## Key Opportunity

New ERA offers grants to cover up to 25% project cost. Loans can then come from RUS or other sources.

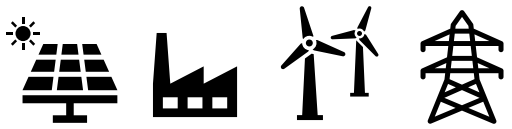
Letters of intent are non-binding!

# Eligible Applicants and Applicant Categories

## Eligible Applicants

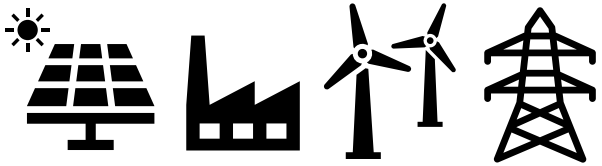
- Existing or former USDA Rural Utilities Service (RUS) borrowers
- Borrowers of the former Rural Electrification Administration
- Rural electric cooperatives that serve predominantly rural areas
- Wholly or jointly owned subsidiaries of rural electric cooperatives

## Three Applicant Categories to Balance Competition



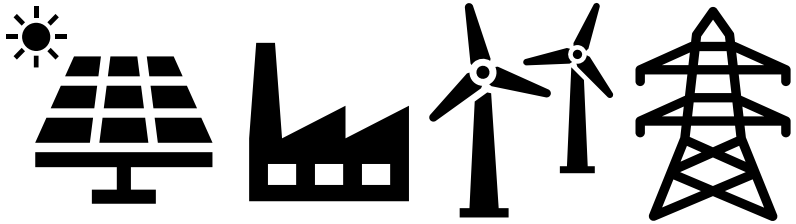
Total Utility Plant **equal to or less than $200 million.**

USDA estimates this category will use **~20%** of New ERA funds.



Total Utility Plant **over $200 million but under $500 million.**

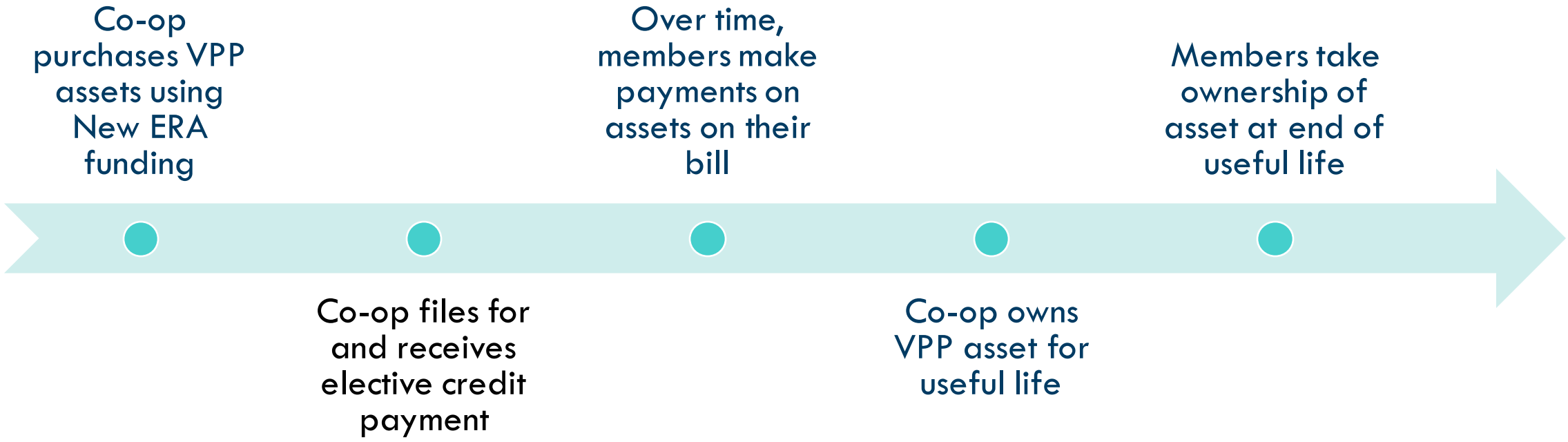
USDA estimates this category will use **~20%** of New ERA funds.



Total Utility Plant **equal to or over $500 million.**

USDA estimates this category will use **~60%** of New ERA funds.

# Balancing Co-op ability to claim credits + grants with VPP asset ownership for Co-op members




**Guardrails:**
To receive the full tax credit benefit, the cooperative must own the asset for its financially-defined useful life.

# A note on competitive VPP applications for New ERA

| Characteristic | Number of points |
|---|---|
| Annual tons of carbon dioxide equivalent ($CO_2e$) reduced (from generation resources owned or purchased)* | Up to 30 points |
| Annual tons of $CO_2e$ avoided | Up to 10 points |
| Percentage difference in renewable or zero-emission energy in the energy mix (from generation resources owned and purchased) | Up to 10 points |
| Percentage decrease in the carbon intensity of the energy mix (from generation resources owned and purchased) | Up to 10 points |

**Additional considerations:** ambitious project goals, investment in Distressed and Disadvantaged communities, geographic distribution of funds, and long-term system resiliency, reliability, and affordability for customers.

*Note: USDA will look for greatest reduction in cost-per-unit measure of GHGs, for efficient use of New ERA funds.

# Tax-exempt organizations can now claim tax credits for renewable energy projects, unlocking huge financial benefits


State, local, and Tribal governments, publicly-owned utilities, non-profits, and electric cooperatives **couldn't previously monetize tax credits because they don't have tax liability.**

They had to partner with a third-party entity who could utilize the tax credit.

Now, elective pay tax credits address these financial and logistical challenges and allow **organizations to receive a direct payment and pass on those benefits to their members.**

# The Investment Tax Credit could cover 30% - 70% of a project's cost, and the Production Tax Credit is substantial, too!

**Up to 70% Investment Tax Credit (ITC)**

30% base ITC (w/Prevailing Wages) + 10% for Domestic Content +

10% for Energy Communities + 10% for Low Income Tract + 10% for Fed. subsidized housing

**Production Tax Credit (PTC) starts at $27.5/MWh** (w/Prevailing Wage)

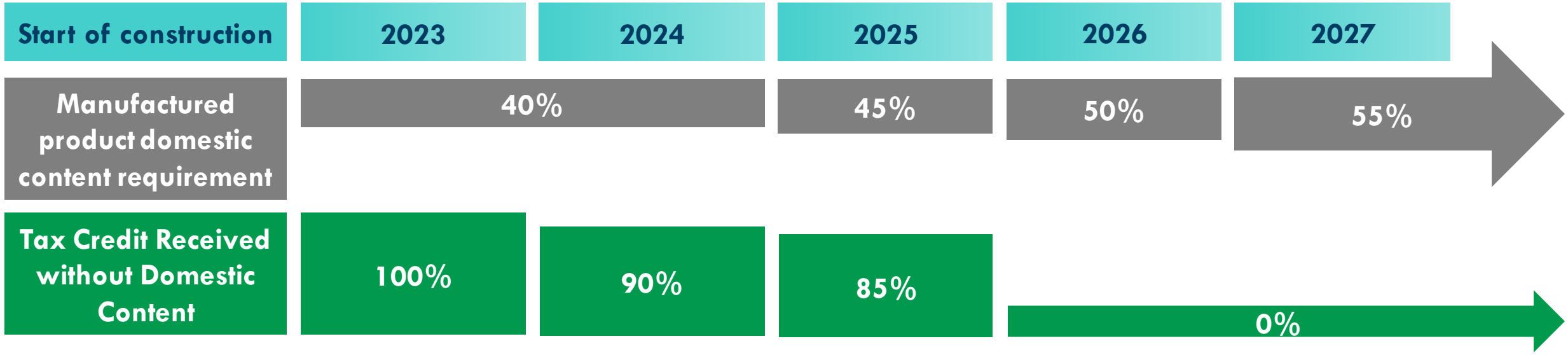
- Domestic content and energy community adders stack
- Credit is earned for 10 years (inflation adjusted)

✓**Storage ITC** allows co-ops to further increase system reliability

**Caveat:** ITCs will be realized at the end of Year 1 in a project's life, so may require bridge financing

✓**Solar PTC** optionality provides important benefit if there is a good solar resource available

# Elective pay tax credits must meet increasing domestic content requirements, so start soon




- Start of construction triggers a 4-year safe harbor – a project that starts construction in 2023 **would not need to start operations until the end of 2027**
- Phaseout can be waived if domestic content material is unavailable or raises costs by more than 25%

# Tax credits can fund many VPP technologies

## List of tax credits and their eligibility under the Inflation Reduction Act

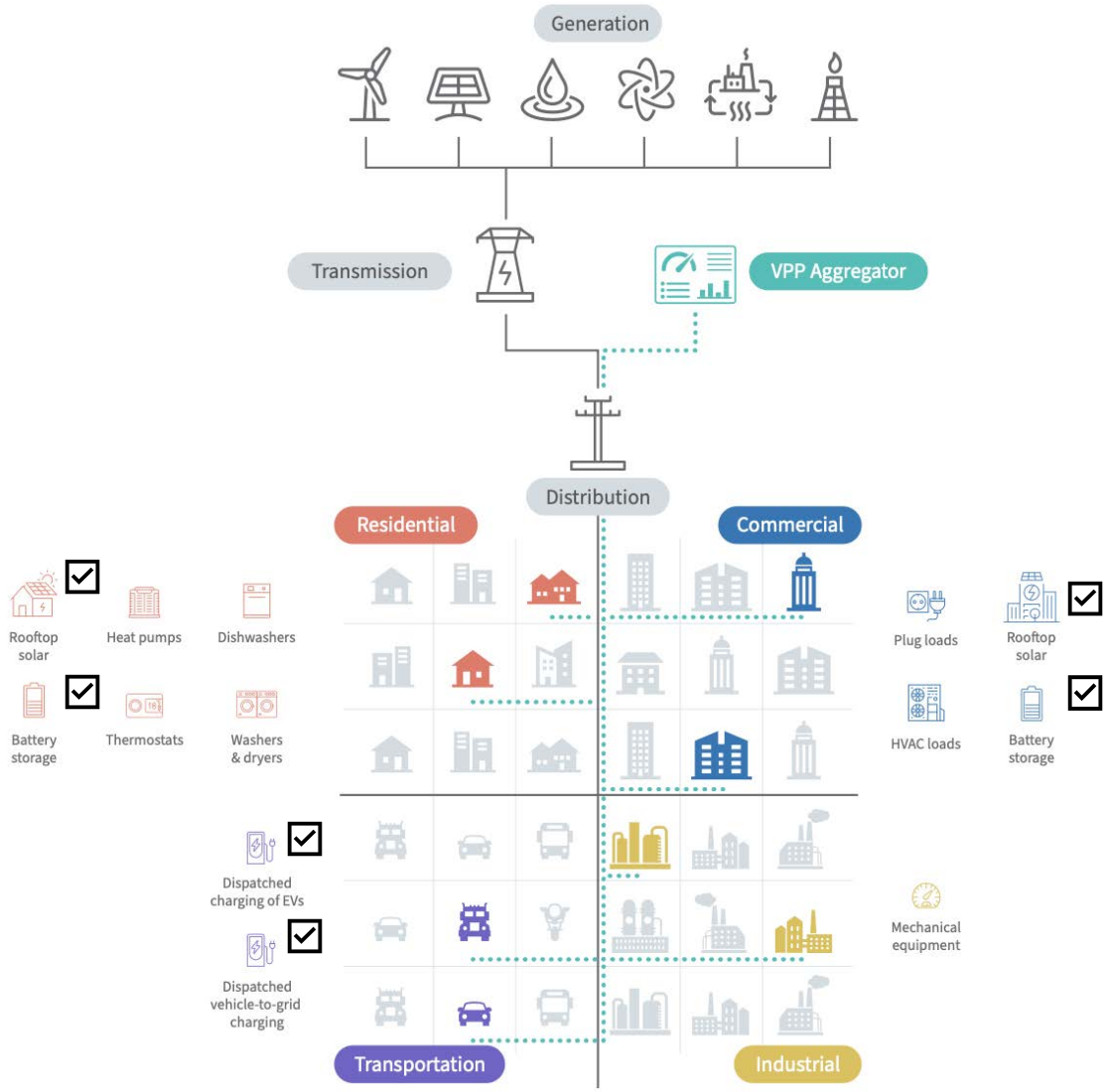
**Electricity** **Fuels** **Vehicles** **Manufacturing**

| | | Eligible for transferability | Eligible for direct pay |
|---|---|---|---|
| 45, 45Y | Clean electricity production tax credit | ✓ | ✓ |
| 48, 48E | Clean electricity investment tax credit | ✓ | ✓ |
| 45U | Zero-emission nuclear power production credit | ✓ | ✓ |
| 45Q | Credit for carbon oxide sequestration* | ✓ | ✓ |
| 45Z | Clean fuel production credit | ✓ | ✓ |
| 45V | Clean hydrogen production tax credit* | ✓ | ✓ |
| 30C | Alternative fuel vehicle refueling property credit | ✓ | ✓ |
| 45W | Credit for qualified commercial clean vehicles | N/A | ✓ |
| 48C | Advanced energy project credit | ✓ | ✓ |
| 45X | Advanced manufacturing production credit* | ✓ | ✓ |

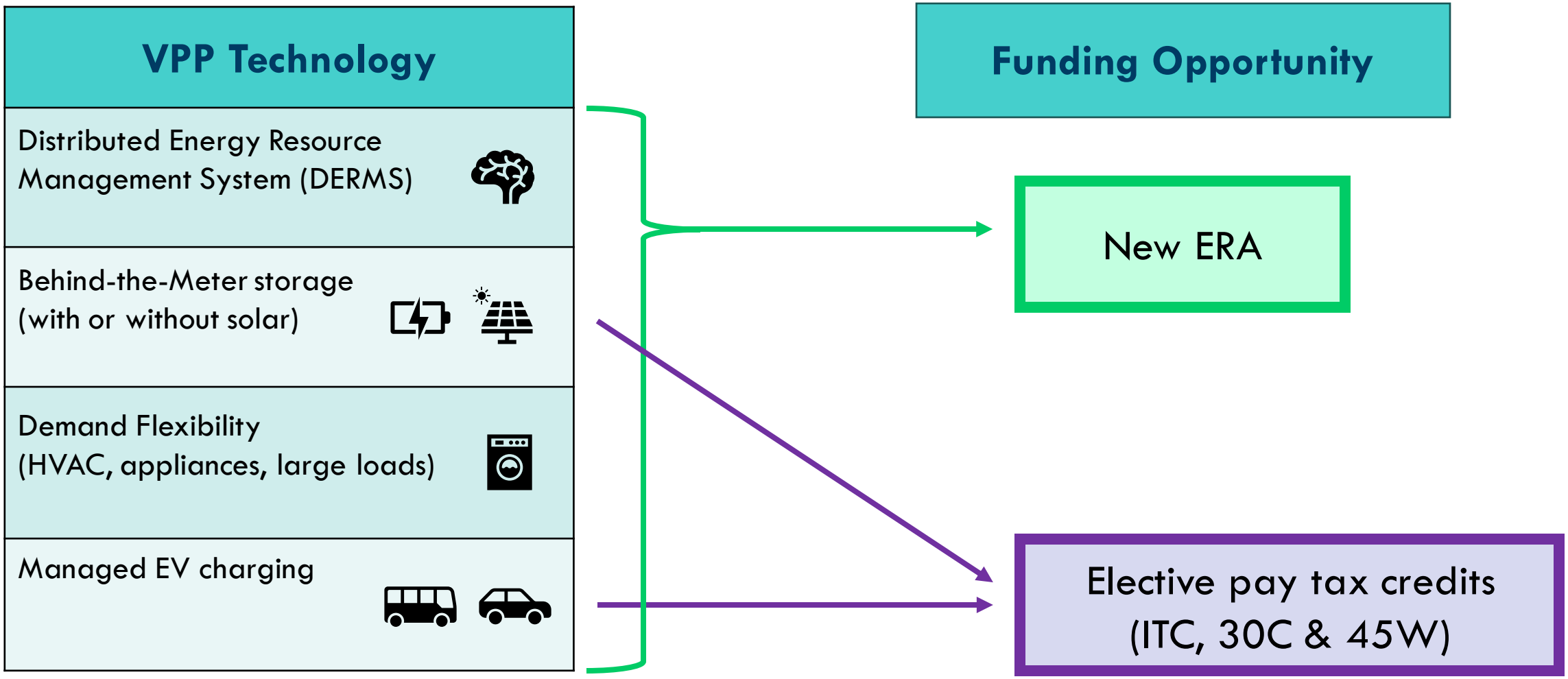
** Note: Direct payments for these credits are available to taxable entities for five years.*

Source: Source: Legal Information Institute, "26 U.S. Code § 6417 - Elective payment of applicable credits," available at https://www.law.cornell.edu/uscode/text/26/6417 (last accessed May 2023).

Table: Center for American Progress



# Matching VPP technologies with funding opportunities



# Takeaways

1. **Apply to New ERA by September 15 for VPPs and more projects.** A short Letter of Intent is the first step towards significant funding opportunities.

- Three-page project description and ambition
- Completed emission reduction model provided by USDA

2. Tax credits also help fund VPPs and, when combined with New ERA, **could cover the majority of a project's cost.** Proactive development is key.

3. RMI can provide one-on-one support on financial structuring to New ERA applicants – **please reach out to us if you would like to discuss financing strategies in more detail.**

# Close and Opportunities for Future Engagement

# Report-Outs from Break-Out Groups

## Report-Out:

In 1 minute or less please share:

What are 2-3 takeaways or observations from your break-out group?

Raise your hand when you're "on deck" for report-out so we can unmute you to share-out.

**Report-Out Order:**

| Room | RMI Facilitator |
|---|---|
| 1 | Connor |
| 2 | Michael |
| 3 | Tyler |
| 4 | Kristine |
| 5 | Sam |
| 6 | Zach |
| 7 | Mary |

# Next Steps and Resources

**Next Steps:**

1) Learn more
   - Follow-up slides and recording
2) Connect to advance solutions
   - Member directory
3) Share your ideas and feedback
   - Post-workshop survey

## Contact and Website

**VP3**
Mary (mary.tobin@rmi.org)

VP3.io

**RMI New ERA Implementation Support**
Michael (mliebman@rmi.org)

rmi.org/our-work/electricity/financing-energy-community-and-grid-transformation/

VP3

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# Thank You!