

DOCKETED

Docket Number:	25-EPIC-01
Project Title:	Electric Program Investment Charge 2026–2030 Investment Plan (EPIC 5)
TN #:	265607
Document Title:	Mary-Ann Rau Comments - Economic and Climate Benefits of Adding Battery Storage to Residential Heat Pumps
Description:	N/A
Filer:	System
Organization:	Mary-Ann Rau
Submitter Role:	Public
Submission Date:	8/14/2025 8:29:23 PM
Docketed Date:	8/15/2025

Comment Received From: Mary-Ann Rau
Submitted On: 8/14/2025
Docket Number: 25-EPIC-01

Economic and Climate Benefits of Adding Battery Storage to Residential Heat Pumps

Additional submitted attachment is included below.

Electric Program Investment Charge 2026–2030 (EPIC 5) Research Concept Proposal Form

The California Energy Commission (CEC) is currently soliciting research concept ideas and other input for the Electric Program Investment Charge 2026–2030 (EPIC 5) Investment Plan. For those who would like to submit an idea for consideration, please complete this form and submit it to the CEC by **August 8, 2025**. More information about EPIC 5 is available below.

To submit the form, please visit the e-commenting link:

<https://efiling.energy.ca.gov/EComment/ECommentSelectProceeding.aspx> and select the Docket **25-EPIC-01**. Enter your contact information and then use the “choose file” button at the bottom of the page to upload and submit the completed form. Thank you in advance for your input.

Please provide the name, email, and phone number of the best person to contact should the CEC have additional questions regarding the research concept:

Name: Mary-Ann Rau

Email: maryann@merinoenergy.com

Phone number: 706-615-4376

Please provide the name of the contact person’s organization or affiliation:

Merino Energy

Please provide a brief description of the proposed concept that you would like the CEC to consider as part of the EPIC 5 Investment Plan. What is the purpose of the concept, and what would it seek to do? Why are EPIC funds needed to support the concept?

Merino Energy proposes a research study to evaluate the operational, grid, and public health benefits of pairing residential heat pump systems with portable battery storage. The study will quantify customer cost savings, improvements to utility system resilience, and the virtual power plant (VPP) generation potential of such configurations.

The project will focus on California households, including those in low-income communities, to assess how battery-enabled heat pumps perform during outages, reduce peak demand, and support public health during extreme weather events. EPIC funding will support field trials, energy modeling, and cost-benefit analyses to fill key data gaps.

In accordance with Senate Bill 96, please describe how the proposed concept will "lead to technological advancement and breakthroughs to overcome barriers that prevent the achievement of the state's statutory energy goals." For example, what technical and/or market barriers or customer pain points would the proposed concept address that would lead to increased adoption of clean energy technology or innovation? Where possible, please provide specific cost and performance targets that need to be met for increased industry and consumer acceptance. For scientific analysis and tools, provide more information on what data and information gaps the proposed concept would help fill, and which specific parties or end users would benefit from the results, and for what purpose(s)?

The proposed concept addresses the following barriers:

- **Resilience gap:** Electrified homes without storage cannot maintain thermal comfort during outages.
- **Cost uncertainty:** Limited real-world data on how load shifting with batteries impacts heat pump operating costs.
- **VPP integration:** Lack of performance data on battery + HVAC systems as dispatchable resources.

- **Equity gap:** Health and quality-of-life benefits for low-income households are under-measured.

Research questions:

1. How much does adding a portable battery to a heat pump system reduce annual operating costs?
2. How does battery integration improve household thermal comfort and safety during blackouts?
3. What public health benefits are associated with backup heating/cooling in extreme weather events?
4. What is the aggregate grid and VPP potential of battery-equipped heat pumps?

Targets:

- Customer cost savings: $\geq 15\%$ annual reduction in HVAC-related electricity costs through load shifting.
- Outage comfort: Maintain safe indoor temperatures (68–78°F) for ≥ 4 hours during outages.
- VPP potential: ≥ 1 kW dispatchable capacity per home during peak periods.

Please describe the anticipated outcomes if this research concept is successful, either fully or partially. For example, to what extent would the research reduce technology or ratepayer costs and/or increase performance to improve the overall value proposition of the technology? What is the potential of the innovation at scale? How will the innovation lead to ratepayer benefits in alignment with EPIC's guiding principles to improve safety, reliability, affordability, environmental sustainability, and equity?

Merino Energy anticipates the following outcomes:

- **Economic:** Quantified operating cost savings from optimized charging/discharging during TOU periods.
- **Grid benefits:** Reduced peak load and dispatchable VPP capacity to support grid stability.
- **Resilience:** Increased household safety and comfort during outages.
- **Public health:** Reduced risk of heat-related illness or cold exposure for vulnerable populations during blackouts.

At scale, widespread deployment of behind-the-meter batteries connected to smart heat pumps could yield hundreds of MW in dispatchable load flexibility and avoid significant CO₂ emissions through avoided peaker plant use.

Describe what quantitative or qualitative metrics or indicators would be used to evaluate the impacts of the proposed research concept.

- Change in annual HVAC operating cost (pre-/post-installation).
- Indoor temperature stability during simulated or actual outages.
- CO₂e emissions avoided per home per year.
- Aggregate dispatchable capacity in pilot homes.
- Customer-reported safety and comfort during outages.

Please provide references to any information provided in the form that supports the research concept's merits. This can include references to cost targets, technical potential, market barriers, equity benefits, etc.

1. CEC (2021). *Building Decarbonization Assessment*. CEC-500-2021-054.
<https://www.energy.ca.gov/publications/2021/california-building-decarbonization-assessment>
2. Wilson, E. J. H., Munankarmi, P., Less, B. D., Reyna, J. L., & Rothgeb, S. (2024). *Heat Pumps for All? - Distributions of the Costs and Benefits of Residential Air-Source Heat Pumps in the United States*. Joule, 8(4), 1000–1035. <https://doi.org/10.1016/j.joule.2024.01.022>
3. Gerke, B. F., Gallo, G., Smith, S. J., Liu, J., Alstone, P., Raghavan, S., Schwartz, P., Piette, M. A., Yin, R., & Stensson, S. (2020, July 14). *The California Demand Response Potential Study, Phase 3: Final Report on the Shift Resource through 2030*. Lawrence Berkeley National Laboratory. DOI: 10.20357/B7MS40. This report was prepared for the California Public Utilities Commission.

https://www.dret-ca.com/wp-content/uploads/2021/03/ca_dr_potential_study_-_phase_3_-_shift_-_final_report.pdf

The EPIC 5 Investment Plan must support at least one of five Strategic Goals:

- a. Transportation Electrification**
- b. Distributed Energy Resource Integration**
- c. Building Decarbonization**
- d. Achieving 100 Percent Net-Zero Carbon Emissions and the Coordinated Role of Gas**
- e. Climate Adaptation**

Please describe in as much detail as possible how your proposed concept would support these goals.

Our proposed concept addresses the following goals:

- **Building Decarbonization:** Enhances performance and resilience of electrified heating/cooling systems.
- **Distributed Energy Resource Integration:** Creates new aggregated demand flexibility resources.
- **Climate Adaptation:** Provides backup power for critical thermal comfort and health during extreme weather events.

About EPIC

The CEC is one of four EPIC administrators, funding research, development, and demonstrations of clean energy technologies and approaches that will benefit electricity ratepayers of California's three largest investor-owned electric utilities.

EPIC is funded by California utility customers under the auspices of the California Public Utilities Commission.

To learn more about EPIC, visit:

<https://www.energy.ca.gov/programs-and-topics/programs/electric-program-investment-charge-epic-program>

EPIC 5 documents and event notices will be posted to:

<https://www.energy.ca.gov/proceeding/electric-program-investment-charge-2026-2030-investment-plan-epic-5>

Subscribe to the EPIC mailing list to stay informed about future opportunities to inform the development of EPIC 5:

<https://public.govdelivery.com/accounts/CNRA/signup/31897>