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Docket Number: 25-EPIC-01

Sonoma Clean Power Authority Electric Program Investment Charge 2026â€“2030 (EPIC 5) Research Concept Proposal Form (2 of 2)

Additional submitted attachment is included below.

Sonoma Clean Power

431 E Street
Santa Rosa, CA 95404

sonomacleanpower.org

August 8, 2025

California Energy Commission
715 P Street
Sacramento, CA 95814

Docket No.: 25-EPIC-01

Re: Sonoma Clean Power Authority Electric Program Investment Charge 2026–2030 (EPIC 5) Research Concept Proposal Form (2 of 2)

Dear California Energy Commission,

Sonoma Clean Power Authority (SCP) is pleased to submit the following Research Concept Proposal Form supporting the California Energy Commission's (CEC) Electric Program Investment Charge 2026 – 2030 (EPIC 5) Investment Plan program efforts. This file is the second of two Research Concept Proposal Forms submitted by SCP.

SCP is the public power provider for Sonoma and Mendocino counties, serving a population of about a half-million. SCP is dedicated to expanding our renewable portfolio while advancing energy sector decarbonization and enabling equitable access to clean, renewable, and reliable power for all our customers.

SCP believes that the Strategic Goals identified in the EPIC 5 Investment Plan offer significant opportunities to lead innovation and research and advance technologies to support ratepayers throughout the state. These efforts are increasingly essential as Californians face increased affordability, reliability, and resilience challenges alongside increased climate risks. Concepts guided by EPIC 5 Strategic Goals will provide invaluable research and pilot projects designing unique, scalable approaches to support decarbonization and affordability.

Thank you for your time and consideration. Please feel free to contact me with any questions.

Sincerely,

Adam Jorge
Senior Decarbonization Policy Manager
ajorge@sonomacleanpower.org
(707) 293-6230

APPENDIX A – Sonoma Clean Power Authority EPIC 5 Research Concept Proposal Form (2 of 2)

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

Adam Jorge
Senior Decarbonization Policy Manager
ajorge@sonomacleanpower.org
(707) 293-6230

2. *Please provide the name of the contact person's organization or affiliation:*

Sonoma Clean Power Authority (SCP)

3. *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?*

"Unlocking Neighborhood Scale Decarbonization through Leveraging the Benefits of Load Flexibility and In Front of the Meter (FTM) and Behind the Meter (BTM) Distributed Energy Resources"

This concept aims to leverage the value proposition underpinning virtual power plants and load flexibility to implement neighborhood-scale decarbonization supportive of California's climate and energy policy goals. Deployment would be focused in areas where customers face high switching costs and disproportionately high energy burden.

This concept would:

- Deploy coordinated LSE-managed FTM and BTM storage and generation resource fleets to electrify neighborhoods and mitigate customer energy bills in support of decarbonization goals.
- Leverage prior experiences, research, and learnings to scale-up community decarbonization efforts in one or more neighborhoods.
- Utilize interdisciplinary/mixed methods to site projects within disadvantaged/low-income, rural and/or other priority communities facing high energy burden or disproportionally affecting factors.
- Conduct in-depth analyses of total energy, economic and non-energy impact benefits surrounding the project.
- Develop an alternative rate structure analysis investigating how: (1) the spread between peak and off-peak affects behavior, (2) which alternative rate structures could be designed/applied in regions with highly flexible load, and (3) what degree of cost savings participants would potentially see, measured by a "shadow rate" designed to apply alternative cost structures to usage patterns.

EPIC funds are needed to support implementation at-scale in one or more communities. Potential uses include acquisition and installation of FTM and BTM assets/infrastructure, subcontracting for economic and/or social science consultants, modeling emissions reductions and climate benefits, conducting outreach, engagement, and education actions, and more.

4. *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 past decade has provided load serving entities (LSEs) with rich data in understanding load flexibility, customer behavior, and barriers to electrification and decarbonization. Load flexibility offers direct benefits to LSEs and to ratepayers alike through reduced costs and increased electric system reliability; many customers find additional affordability benefits through participation in virtual power plant (VPP) and/or demand response (DR) programs.

Load flexibility is increasingly important to ensure system right-sizing, enable cost reductions, and ensure reliability. This need has led to a statewide load shift goal of 7,000 MW by 2030. Currently, customers participating in load flexibility/demand response programs receive financial benefits that are not available to everyone. The proposed increase in total load flexibility simultaneously offers significant opportunities to reduce costs and emissions while fostering resilience and climate adaption in California communities.

Coordinated LSE deployment of FTM and BTM generation and storage resources offers opportunities to leverage the cost-saving benefits of FTM resources (i.e. energy sales, lower procurement costs, and resource adequacy obligation) and BTM resources (i.e. customer incentives, payouts, and rewards resulting from VPP and DR program participation) to foster widespread community decarbonization. FTM resources allow for scalable load flexibility, grid reliability, and islanding capability for resilience purposes; the interconnection and management of FTM resources by an LSE also means that much more low-cost renewable energy is immediately available to the grid. Pairing FTM resource management with strategic deployment of BTM resources provides opportunities to deliver both system-wide and individual customer cost reductions where and when they are most needed. Simultaneous deployment of BTM resources also facilitates greater inclusion of households outside of dense urban settings without requiring whole-home electrification to participate.

Importantly, this approach lowers barriers to participation for those who do not wish to fully electrify, while simultaneously fostering energy resilience and load shifting in low-income, disadvantaged community, rural community and/or residences with high energy burden, low electric reliability, and/or critical needs, such as use of wells for drinking water or dependence on electric service for medical needs.

Cost benefits of load flexibility can be optimized through paired FTM and BTM resource management. Several key opportunities can be seen in the following examples:

- LSE-owned, operated, and managed FTM paired generation and storage serving priority areas. FTM resources can be managed daily and optimized for cost, carbon, and/or reliability to foster increased electric system confidence in areas and encourage full electrification.
- Deploying aggregated BTM solar and storage systems paired with smart devices in residential, commercial, and/or industrial sites. These resources can be managed daily to deliver cost savings and carbon reductions and can additionally serve as VPP fleet resources during times of grid stress.
- Targeted in-neighborhood EV fleet electrification and bidirectional charging capabilities to reduce local greenhouse gas emissions and noise pollution. Fleet vehicles will be integrated into the LSE VPP program to enable low-cost and low-carbon intensity managed charging and managed discharge into grid at critical/high value times and events.
- Dual use agrivoltaics with paired solar and storage at existing grazing/agriculture operations. Rural regions of the state offer significant opportunity for such projects, which reduce water intensity in distressed water basin areas, provide resilience benefits (e.g. shade) to livestock, and provide a VPP resource for the grid to utilize during peak hours in rural communities.

Affordability, reliability, and scalability each represent current barriers to achieving California's statutory energy and climate goals. By leveraging LSE-operated VPP and load flexibility programs to provide cost-saving load management for customers, coordinated FTM and BTM resource deployment then can be strategically deployed to incentivize voluntary electrification within neighborhoods/zones by reducing customer energy bills and reducing/eliminating device, technology and fuels switching costs. SCP believes this to be key to unlocking zonal-regional scale energy transitions while saving money for ratepayers throughout the process.

5. *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?*

SCP would anticipate the following outcomes:

- Significant ratepayer benefits associated with coordinated deployment of FTM and BTM resources.
- Significant emissions reductions based on renewable resource and paired storage deployment, neighborhood-scale daily load management optimizing dispatch of low-carbon electricity, and avoided air quality and carbon reductions from reduced fleet vehicle emissions.
- Increased electric system reliability metrics in rural regions through islanding capability provided by both FTM resource and BTM resource management.

- Potential proof of concept useful for long term natural gas system planning, if reduced electric service costs encourage neighborhoods or large sections of regions convert to electric-only service.
- Expanded community support for electrification based on decreased costs and increased reliability.

This concept would deliver research findings on reduced system costs, energy affordability benefits, emissions reductions, and potential scalability of decarbonization programs leveraging managed FTM and BTM resources. Additionally, the “shadow rate” assessment and alternative rate design component of this study offers insights into the social and functional viability of alternative rate structures for future projects. The concept would also improve customer safety by ensuring dependable electric service across emergency and non-emergency conditions, especially within vulnerable communities.

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

Potential metrics would include:

- Megawatts of flexible load deployed
- Scale of decarbonization enabled (e.g. number of households/meters converted to all electric, number of program participants, number of appliances replaced)
- Emissions avoided
- Savings to ratepayers & incentives/rewards issued
- Energy burden reduction
- Changes to regional/localized reliability indices
- Social metrics (e.g. willingness to electrify, confidence in grid service)
- Non-energy impacts for communities and individuals

7. *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.*

The following citations and reference materials are useful in understanding the value proposition, technical potential, market barriers and various benefits of the proposed concept:

- B. Speetles, E. Lockhart, and A. Warren, “Virtual Power Plants and Energy Justice,” National Renewable Energy Laboratory (NREL), Golden, CO (United States), NREL/TP-7A40-86607, Oct. 2023. doi: 10.2172/2008456.
- N. Naval and J. M. Yusta, “Virtual power plant models and electricity markets - A review,” Renewable and Sustainable Energy Reviews, vol. 149, p. 111393, Oct. 2021, doi: 10.1016/j.rser.2021.111393.
- N. Linck, J. S. Rice, F. Hossfeld, S. Rose, A. Stein, and B. Tarekegne, “One-size-fits-all? Top-down U.S. approach to equitable decarbonization does not fully address state and community-scale

perspectives," The Electricity Journal, vol. 37, no. 6, p. 107415, Jul. 2024, doi: 10.1016/j.tej.2024.107415.

- P. Asmus, "Microgrids, Virtual Power Plants and Our Distributed Energy Future," The Electricity Journal, vol. 23, no. 10, pp. 72–82, Dec. 2010, doi: 10.1016/j.tej.2010.11.001.
- Rivera-Marín, D. Alfonso-Solar, C. Vargas-Salgado, and S. Català-Mortes, "Methodology for estimating the decarbonization potential at the neighborhood level in an urban area: Application to La Carrasca in Valencia city - Spain," Journal of Cleaner Production, vol. 417, p. 138087, Sep. 2023, doi: 10.1016/j.jclepro.2023.138087.
- K. Brehm, M. Land, A. McEvoy, L. Shwisberg, and A. Weschler, "Meeting Summer Peaks: The Need for Virtual Power Plants".
- Diana, M. Ash, and J. K. Boyce, "Just decarbonization? Environmental inequality, air quality, and the clean energy transition," Industrial and Corporate Change, vol. 32, no. 2, pp. 304–316, Apr. 2023, doi: 10.1093/icc/dtad010.
- Brockway, Gas Planning and Reliability in California. 2021. doi: 10.13140/RG.2.2.34271.18082.
- K. Sun, P. Kusumah, W. Zhang, M. Wei, and T. Hong, "Exploring Decarbonization and Clean Energy Pathways for Disadvantaged Communities in California," in Proceedings of the 5th International Conference on Building Energy and Environment, L. L. Wang, H. Ge, Z. J. Zhai, D. Qi, M. Ouf, C. Sun, and D. Wang, Eds., Singapore: Springer Nature, 2023, pp. 2515–2525. doi: 10.1007/978-981-19-9822-5_270.
- Marinescu, O. Gomis-Bellmunt, F. Dörfler, H. Schulte, and L. Sigrist, "Dynamic Virtual Power Plant: A New Concept for Grid Integration of Renewable Energy Sources," IEEE Access, vol. 10, pp. 104980–104995, 2022, doi: 10.1109/ACCESS.2022.3205731.
- S. Zwickl-Bernhard and H. Auer, "Demystifying natural gas distribution grid decommissioning: An open-source approach to local deep decarbonization of urban neighborhoods," Energy, vol. 238, p. 121805, Jan. 2022, doi: 10.1016/j.energy.2021.121805.
- M. Kahn, "Benefit-Cost Analysis of Targeted Electrification and Gas Decommissioning in California." Energy and Environmental Economics (E3), Dec. 2023. Available: https://www.ethree.com/wp-content/uploads/2023/12/E3_Benefit-Cost-Analysis-of-Targeted-Electrification-and-Gas-Decommissioning-in-California.pdf
- S. M. Nosratabadi, R.-A. Hooshmand, and E. Gholipour, "A comprehensive review on microgrid and virtual power plant concepts employed for distributed energy resources scheduling in power systems," Renewable and Sustainable Energy Reviews, vol. 67, pp. 341–363, Jan. 2017, doi: 10.1016/j.rser.2016.09.025.

8. *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.

This concept supports each of the five Strategic Goals in the following ways:

a. Transportation Electrification: Through the deployment of V2X technologies and incentivization of low-cost, low-carbon intensity managed charging supported by LSE VPP program infrastructure.

b. Distributed Energy Resource Integration: Through coordinated, paired deployment of FTM and aggregated BTM distributed energy resources/assets in one or more communities.

c. Building Decarbonization: Through managed dispatch of FTM and BTM resources that reduce the carbon intensity of power consumed by buildings. Reduced costs of power service would be expected to foster increased electrification.

d. Achieving 100 Percent Net-Zero Carbon Emissions and the Coordinated Role of Gas: This proposal acknowledges the role that gas plays in the current energy system, and aims to leverage cost-reducing and electric system reliability benefits of FTM and BTM load flexibility to evaluate the viability of neighborhood scale decarbonization, both in terms of social barriers and economic value. The “shadow rate” component of the study would model potential bill impacts of full electrification and various time of use scenarios measured against natural gas bills.

e. Climate Adaptation: Through the deployment of resources supporting increased grid reliability, improving affordability and expanding access to efficient zero emission technologies in vulnerable populations to bolster resilience in the face of changing climate and the increasing number of natural disasters and extreme weather events.