

Harnessing the Value of Transportation Electrification for Ratepayers

Overcoming Barriers to EV Benefits in DVCs

INITIATIVE DESCRIPTION

Pages 23-27

- Accelerate technology and policy innovation that drives continued momentum on EV adoption while enabling more strategic integration of EVs with the grid.
- Aligns with Strategic Objective 2 by focusing on innovations that both increase equitable access to transportation electrification and support ratepayer affordability as EV adoption continues to scale.
- Together, the RTAs intend to help enable a future where 1) EV load can be shifted en masse to beneficial times in a reliable way, 2) bidirectional EV charging provides additional value as a distributed energy storage resource, and 3) strategic electrification of emerging transportation end uses extends benefits to broader customer and vehicle segments.

PROPOSED INITIATIVE BUDGET	\$109M
% OF TOTAL BUDGET (excl. admin & overhead)	15%
# OF RESEARCH TOPIC AREAS	3

ALIGNMENT SUMMARY

STRATEGIC OBJECTIVE ALIGNMENT

Pages 24-25

Accelerate innovation, demonstration, and innovative approaches to deployment to overcome obstacles to equitable transportation electrification benefits (including alleviation of pollution, bridging transportation access, and addressing energy burden) in Disadvantaged and Vulnerable Communities, low-income communities, and non-attainment air districts.

This initiative intends to support innovations that help overcome obstacles to expanding equitable transportation electrification and increase the value of EV adoption for both participating customers and ratepayers broadly.

CPUC ALIGNMENT

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- Transportation electrification and vehicle-grid integration (VGI) are key opportunities to put downward pressure on electricity rates.
- CPUC proceedings are exploring VGI strategy, proactive planning, flexible service connections, DER orchestration, V2X interconnection, and future demand response and electric rate designs.
- Research outputs can improve EV demand forecasts, inform decisions around program design and investment in utility integration capabilities, generate lessons learned around customer behavior, and reduce costs of technology implementations.
- Other transportation electrification programs focus on incentives and deployment, rather than RD&D.

Scaling Managed Charging as a Grid Resource

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WHAT PROBLEM ARE WE SOLVING?

Pages 28-32

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START	2027
OUTPUTS	2028 – 2032
MARKET READY	2030 – 2035

Unmanaged EV load growth could drive up costs and exacerbate adoption barriers in capacity constrained areas and priority communities. Managed charging and flexible service connections (FSC) can reduce peak load and increase utilization of available grid capacity to serve EV chargers, avoiding infrastructure upgrade costs and delays. Gaps preventing scale-up of these solutions include limited distribution-level visibility, data quality and interoperability, and participation from harder-to-reach customers.

ALIGNMENT SUMMARY

WHAT IS THE DISTINCT RESEARCH APPROACH?	HOW WILL YOU KNOW YOU ARE SUCCESSFUL?	HOW WILL YOU COORDINATE?
• Improve data quality, control capabilities, and interoperability of EV telematics, EVSEs, and other technologies that facilitate managed charging and/or FSCs. (pp. 28 – 29) • Validate dynamic, non-bridging strategies such as FSCs across diverse EV customer types and operating conditions. (pp. 28 – 29) • Better quantify the value of managed charging and FSCs to refine the business case for at-scale deployment. (pp. 28 – 29) • Study and test out approaches for expanding managed charging and FSC participation among harder-to-reach customers. (pp. 28 – 29)	• Gap is reduced between theoretical and verified performance of managed charging and advanced FSCs, enabling reliable and predictive EV load orchestration. (pp. 30 – 31) • Managed charging and advanced FSC participation scales with participation from diverse customers, including multifamily homes, fleets, public stations, and customers in DVCs. (pp. 30 – 31) • Reduced peak load and avoided grid investments, shorter energization timelines, increased enrollment and flexible capacity contribution in priority areas. (pp. 30 – 31)	• Coordinate with IOUs on research that complements near-term managed charging programs and static flexible connection offerings, including enrollment barriers in priority areas. (p. 30) • Jointly test interoperability and data exchange among devices, aggregators, and utility systems. (p. 30) • Build on EPC-24-023 feeder-level orchestration, EPC-24-026 transformer-level load management, GFO-25-301 FSC demonstrations, and IOU pilots. (p. 30)

Reducing Barriers to Beneficial Bidirectional Charging

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WHAT PROBLEM ARE WE SOLVING? Pages 32-36

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START	2027
OUTPUTS	2028 – 2032
MARKET READY	2030 – 2035

Bidirectional capable vehicles and chargers are entering the market and creating an opportunity to use EVs as distributed energy storage resources. Vehicle-to-everything (V2X) can reduce peak demand, improve resilience, and avoid costlier investments in utility-scale storage, transmission, and distribution capacity. High equipment and installation costs, limited interoperable products, complex interconnection processes, and unclear compensation mechanisms are barriers to expanding access to V2X – and the resultant benefits - beyond early adopters.

ALIGNMENT SUMMARY

WHAT IS THE DISTINCT RESEARCH APPROACH?	HOW WILL YOU KNOW YOU ARE SUCCESSFUL?	HOW WILL YOU COORDINATE?
• Advance technologies that help expand access to emerging V2X systems, simplify installations, reduce costs, and improve customer experience. (pp. 32 – 33) • Develop V2X systems that more seamlessly integrate with different combinations of DERs. (pp. 32 – 33) • Develop tools to support upfront site-specific V2X planning decisions based on estimated cost-benefit, among other analyses. (pp. 32 – 33) • Validate performance and reliability of V2X equipment and aggregator response to grid signals and compensation models. (pp. 32 – 33)	• Broader adoption of V2X in priority areas supported by improved technology integrations and customer experience. (pp. 34 – 35) • Demand response, rate design, and DER orchestration frameworks evolve in ways that operationalize beneficial bidirectional charging. (pp. 34 – 35) • Avoided costs attributed to V2X, number of V2X systems interconnected in priority areas, and participant cost savings and benefits, including revenue and resilience value, are realized. (pp. 34 – 35)	• Coordinate with IOUs on potential joint demonstrations that validate V2X performance in utility territories and inform statewide deployment approaches. (p. 34) • Engage partners such as CPUC, CAISO, CCAs, manufacturers, aggregators, and communities in projects that simulate future V2X deployment conditions, validate actual grid value, and test compensation models. (p. 34) • Build on EPIC 4 projects (GFO-21-303, GFO-23-306, GFO-24-302) demonstrating V2X use cases such as backup power and distribution-aware orchestration. (p. 34)

Strategic Electrification of Emerging Transportation End Uses

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WHAT PROBLEM ARE WE SOLVING? Pages 36-39

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START	2027
OUTPUTS	2028 – 2032
MARKET READY	2030 – 2035

EV adoption to date has been concentrated in the light-duty on-road vehicle segment, where certain types of customers, such as high-income homeowners, have disproportionately higher adoption rates. Innovations are needed to simplify access to EV charging for emerging customer types (ex. rural, tribal, low-income, renters) and expand beneficial transportation electrification to emerging vehicle segments (ex. MDHD, ports, off-road). Ratepayers will benefit if this expanded electrification materializes alongside timely and right-sized grid investments.

ALIGNMENT SUMMARY

WHAT IS THE DISTINCT RESEARCH APPROACH?	HOW WILL YOU KNOW YOU ARE SUCCESSFUL?	HOW WILL YOU COORDINATE?
• Evaluate load profiles, charging behavior, and expected geographic locations of emerging electrified transportation end uses and explore innovative approaches for grid integration. (pp. 36 – 37) • Advance technologies that enable higher capacity and more efficient power flow to support multi-MW charging on a smaller footprint. (pp. 36 – 37) • Develop and demonstrate novel charging technologies, such as wireless charging, mobile charging, and chargers in the public right-of-way that can enhance accessibility and meet unique needs. (pp. 36 – 37)	• Grid planning is informed by a better understanding of load attributes and VGI opportunities from emerging electrified transportation end uses. (p. 38) • Commercialized innovations lead to lower-cost transportation electrification in rural areas, multifamily homes, and DVCs, as well as across light-, medium-, and heavy-duty vehicle segments. (p. 38) • Cost and time to energize EV chargers for emerging end uses are reduced, additional emission reductions are realized from expanded electrification. (p. 38)	• Depending on IOU needs and resources, coordinate to share data and research findings that may inform grid planning. (pp. 37 – 38) • De-risk early-stage technology development by safely demonstrating in real-world environments and feeding outputs into IOU coordination and use where applicable. (pp. 37 – 38) • Build on and advance EPIC projects on mobile charging for construction equipment (EPC-24-031), corridor charging for trucks (EPC-21-010), and curbside charging (EPC-25-019). (pp. 37 – 38)