

Enabling affordable load growth through advanced planning and operating capabilities

INITIATIVE DESCRIPTION

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- Peak demand is projected to rise 20 to 40% by 2040, and meeting it with conventional upgrades alone would cost tens of billions on timelines too slow to keep pace, so this initiative builds the capabilities to absorb that growth without proportional build-out, more quickly and at lower cost.
- This advances SO 12 by raising circuit and feeder capacity utilization, cutting peak loads, and dynamically optimizing feeder operations to defer costly upgrades, prioritizing circuits serving DAC and low-income tracts.
- It identifies where capacity and coordination can substitute for upgrades, extracts more usable capacity from existing assets, and coordinates DERs, EVs, and flexible load against the constraints that remain.
- This combination is most effective because SO 12's levers are interdependent: more robust planning tools improve feeder targeting, while novel asset utilization technologies support upgrade deferral but more fully optimize available capacity when paired with usable, grid-edge flexible load, and load orchestration cannot replace upgrades unless planners can value it at the point of decision.

PROPOSED INITIATIVE BUDGET	\$23,280,000
% OF TOTAL BUDGET (excl. admin & overhead)	25.75%
# OF RESEARCH TOPIC AREAS	3

ALIGNMENT SUMMARY

STRATEGIC OBJECTIVE ALIGNMENT

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“To support ratepayer affordability, the EPIC Program will accelerate innovation, demonstration, and deployment of innovative and replicable methods to increase the capacity utilization rate of circuits/feeders and reduce circuit and feeder peak loads, and/or dynamically optimize other feeder/circuit operations in order to avoid or defer costly grid upgrades, through the coordination of DERs, EVs, flexible load, and grid intelligence, with a focus on circuits serving Disadvantaged and Vulnerable Communities where increased adoption of zero-emission technologies can increase equitable benefits.”

This initiative identifies where capacity and coordination can substitute for upgrades, extracts more usable capacity from existing assets, and coordinates DERs, EVs, and flexible load against the constraints that remain, together raising utilization, cutting peak load, and deferring costly upgrades on the feeders serving DVCs.

CPUC ALIGNMENT

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- High DER future (R.21-06-017) emphasizes strengthening scenario planning, distribution forecasting, and integrated-planning transparency and is evaluating near-term challenges associated with increasing DER adoption, including grid visibility, flexible connections, and operational tools to manage a more dynamic system.
- Deployment-based DER flexibility valuation data refines the avoided cost methodology addressed in IDER (R.14-10-003), and validated capabilities to deliver additional capacity in existing footprints safely and reliably informs the 10-year grid modernization vision for future GRC filings.
- Potential solutions to be tested are pre-commercial and must be proven in live utility conditions before entering operations or rate base, and the deliverables are open, transferable frameworks rather than proprietary products.

2.1 Smart planning tools to holistically optimize upgrades across the system

SO 12: Optimizing Feeder / Circuit Operations

(Secondary) SO 3: Smart Planning Tools for New Load and Clean Resources

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START	2027
OUTPUTS	2028-2030
MARKET READY	2029-2032

WHAT PROBLEM ARE WE SOLVING?

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Planning inputs sit in siloed systems, and planners cannot plan on the secondary system or factor asset utilization, asset health, or localized climate impacts into their decisions. Evaluating alternatives to wires upgrades remains bespoke and time-intensive, so opportunities to serve new load through higher circuit utilization or coordination of DERs, EVs, and flexible load go unidentified at the point of investment decision. Closing this gap makes SO 12's methods replicable and well-targeted, since utilization and coordination defer costly upgrades only if planners can see and value them, and it complements SO 3 by sharpening the forecasting those decisions depend on.

ALIGNMENT SUMMARY

WHAT IS THE DISTINCT RESEARCH APPROACH?

- Consolidates siloed data and applies AI to iteratively improve data quality, while advancing forecasting of how electrification, new large loads, and EV adoption reshape behind-the-meter load and demand flexibility.
- Extends planning onto the secondary system and brings capacity analysis, asset utilization, individual asset health, and localized climate impacts into the planning process.
- Automates evaluation beyond bespoke analyses so planners can rapidly test scenarios across wires upgrades, non-wires alternatives, demand flexibility, DER orchestration, and novel engineering configurations, with a holistic view spanning asset management, grid hardening, and system planning.
- Gaps Addressed p. 46

HOW WILL YOU KNOW YOU ARE SUCCESSFUL?

- Enhanced data, forecasting models, and analytics that surface emerging constraints earlier and widen the set of interventions planners can evaluate.
- Enhancements applied in planning processes, producing optimization that reduces T&D investment.
- Improved capital efficiency, fewer stranded assets, and higher T&D utilization as planning directs investment to generate the greatest reliability and affordability benefit.
- **Primary outcome:** Planning that targets capital to highest-value investments while deferring conventional upgrades. **Metrics:** Avoided upgrade costs from planning tool-identified NWAs and demand flexibility, reduction in forecasting error.
- Metrics and Impact Assessment p. 47

HOW WILL YOU COORDINATE?

- CEC may develop new data sharing frameworks, scenario modeling and forecasting tools, while IOUs would run demonstration and validation of tools in utility planning settings with utility data (Coordination p.48)
- PG&E will align with other IOUs to run parallel projects that focus on different applications or different technologies to address gaps in forecasting and holistic planning tools. (Coordination p. 48)
- Builds on EPIC 4.08, which established foundations for evaluating non-wires alternatives and demand flexibility against traditional upgrades, expanding the solution set to novel engineering configurations, and EPIC 4.33, extending its AI-enabled bundling of system needs to factor asset maintenance and replacement into planning outputs (Leveraging Past RD&D p. 46-47).

2.2 Solutions to optimize the cost and scope of grid upgrades

WHAT PROBLEM ARE WE SOLVING? Page(s) #49-50

Peak demand is projected to rise 20 to 40% by 2040, requiring \$23 to \$31 billion of distribution investment. Operators lack the real-time visibility and control to run circuits near their true limits, so capacity utilization stays low and avoidable upgrades are triggered, and they cannot see how much utilization an individual asset absorbs without affecting its health. Unavoidable upgrades still depend on new rights-of-way and time-intensive construction. Closing these gaps is what lets PG&E safely raise utilization rates and dynamically optimize feeder operations to avoid or defer costly upgrades.

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MARKET READY	2029-2035

ALIGNMENT SUMMARY

WHAT IS THE DISTINCT RESEARCH APPROACH?	HOW WILL YOU KNOW YOU ARE SUCCESSFUL?	HOW WILL YOU COORDINATE?
- Integrates sensing, unified data infrastructure, advanced power flow control, and topology optimization with decision-support systems so operators can manage the system dynamically within existing limits as headroom declines. - Advances asset-level health monitoring and intelligence that reveals an individual asset's condition and operational capacity in real time, rather than inferring it from static ratings. - Demonstrates alternative technologies and construction methods that deliver additional capacity within PG&E's existing footprint and rights-of-way on accelerated timelines, including strategic conversion from alternating current to direct current lines. - Gaps Addressed pp. 49-50	- Demonstrated tools and methodologies that establish the technical and economic case for alternatives to conventional upgrades, integrated into monitoring, control, and planning workflows to generate outputs that inform future GRC filings. - Measurable deferral and avoidance of conventional capacity upgrades, reduced peak loading on constrained circuits, and higher load factor across T&D assets. - Scaled hardware deployment, novel construction methods, and right-of-way optimization for higher asset utilization and a smaller infrastructure footprint required. Primary outcome: More usable capacity from existing assets and rights-of-way, deferring or avoiding conventional upgrades. Metrics: Avoided and deferred upgrade costs and change in load factor on circuits where utilization tools are deployed. - Metrics and Impact Assessment pp. 50-51	- PG&E will collaborate with CEC and IOUs through joint or complementary projects demonstrating new grid management sensing and control solutions, asset health monitoring improvements, and new, cost-efficient construction methods. (Collaboration p. 51) - Collaboration may include IOU technical advisory on CEC-funded early-stage lab testing of power control systems, with later staged TD&D projects led by IOUs to validate the technology in the field and integrate with utility systems. (Collaboration p. 51) - This RTA builds on EPIC 4.05 Dynamic Line Rating, EPIC 4.32 Asset Utilization, and non-EPIC advanced high-capacity conductor pilot efforts. (Leveraging Past RD&D p. 50)

2.3 Enabling orchestration of flexible resources and a framework for valuing flexibility

WHAT PROBLEM ARE WE SOLVING?

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By 2030 PG&E aims to enable 1GW of flexible, dispatchable load across EVs, DERs, and new loads. PG&E lacks the asset-level visibility and controls to predict asset behavior and detect grid stress against system thresholds in real time, and the industry lacks the infrastructure to orchestrate them at scale and an evidence-based framework for valuing DER flexibility (SO 11). Without that foundation, PG&E cannot plan or dispatch distribution-sited flexibility as a firm resource, leaving it unavailable to provide localized capacity, voltage support, and ramping to defer upstream upgrades (SO12).

SO 12: Optimizing Feeder / Circuit Operations

(Secondary) SO 11: Providing Data Input into a Value of DER Framework

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MARKET READY	2029-2035

ALIGNMENT SUMMARY

WHAT IS THE DISTINCT RESEARCH APPROACH?

- Develops real-time, asset-level modeling and forecasting of customer-sited asset and aggregator behavior, plus communication and control frameworks that translate disparate grid data into actionable signals through existing PG&E platforms.
- Demonstrates coordination built on industry-standard implementation, scaling IEEE 2030.5 across devices, OEMs, and utility-side infrastructure to move PG&E from today's device-by-device approach to system-wide orchestration across DER types and BTM and FTM resources.
- Develops a valuation methodology grounded in real-world outcomes that values resources as a portfolio across distribution, transmission, and generation, rather than in isolation.
- Gaps Addressed p. 52

HOW WILL YOU KNOW YOU ARE SUCCESSFUL?

- Demonstrated orchestration performance across resource types and feeder conditions, with measured load factor change and reliability of dispatch under real operating constraints.
- Validated valuation framework that lets planners count flexibility against specific deferred upgrades, with transferable results to other IOUs and proceedings.
- Orchestration adopted in standard planning, sustaining higher utilization and reducing the upgrade investment load growth would otherwise require.
- **Primary outcome:** Orchestrated flexible resources dispatchable as firm grid assets, deferring conventional upgrades. **Metrics:** Progress toward 1GW of flexible dispatchable load, Avoided or deferred distribution infrastructure cost.
- Metrics and Impact Assessment pp. 53-54

HOW WILL YOU COORDINATE?

- Administrators will coordinate to identify potential joint, parallel or sequenced projects on interoperability standards, DER and V2X orchestration, or valuation frameworks to avoid duplication. (Coordination p. 54)
- As an example, CEC and IOUs could develop a coordinated V2X or DER orchestration project where CEC funds technology vendor work and IOUs host demonstrations and support relevant system integration (Coordination p. 54)
- Builds on EPIC 4.29 (T-Flex), pairing forecasting and customer load-modification signaling with flexible service agreements, EPIC 4.09B's circuit-level coordination of aggregated DERs, and on the non-EPIC Flex Connect program; DSO orchestration as a bridging solution for energization is coordinated with RTA 6.2 (Leveraging Past RD&D p. 53)