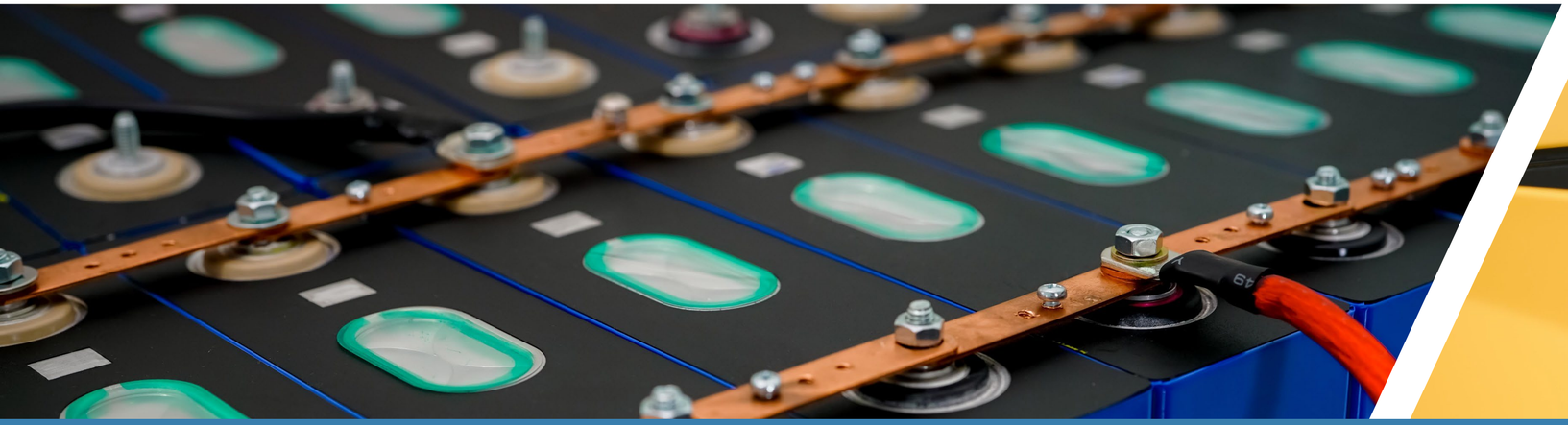
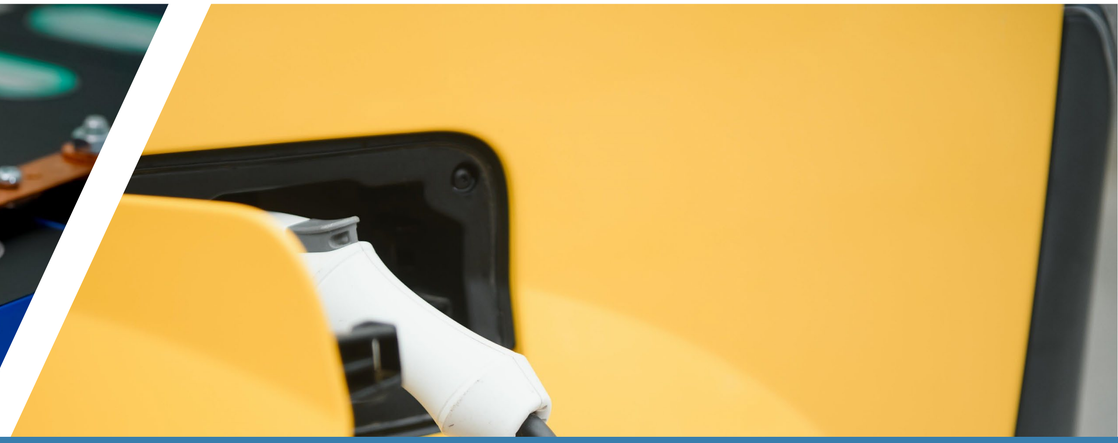
# EPIC STRATEGIC OBJECTIVES WORKSHOP PROCESS

## In-Person Technical Working Group Meetings – April 2024





This program is funded by California utility customers under the auspices of the California Public Utilities Commission

CALIFORNIA PUBLIC UTILITIES COMMISSION

# EPIC Strategic Objectives Technical Working Groups

CALIFORNIA PUBLIC UTILITIES COMMISSION

April 2024

I. Welcome, Introduction, and Gaps Presentation

II. Breakout Session 1, prioritize Gaps

III. Report Out and Group Discussion

IV. Lunch

V. Breakout Session 2, identify Strategic Objectives

VI. Report Out and Group Discussion

VII. Break

VIII. Breakout Session 3, refine Strategic Objectives and identify related Uniform Impact Analysis Framework

IX. Report Out and Group Discussion

# EPIC STRATEGIC OBJECTIVES PROCESS SCHEDULE

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| Working Group Meeting | When | Where |
|---|---|---|
| Impact Analysis Framework and Metrics Kickoff | April 2, 2024 | Virtual workshop |
| Transportation Electrification #1 | April 10, 2024 | In-Person: CPUC Offices San Francisco |
| Building Decarbonization #1 | April 11, 2024 | In-Person: CPUC Offices San Francisco |
| Getting to 100% Net-Zero Carbon... #1 | April 12, 2024 | In-Person: CPUC Offices San Francisco |
| Distributed Energy Resource Integration #1 | April 30, 2024 | In-Person: San Diego Foundation |
| Climate Adaptation #1 | May 1, 2024 | In-Person: San Diego Foundation |
| Transportation Electrification #2 | May 2024 | Virtual Technical Working Group |
| Building Decarbonization #2 | May 2024 | Virtual Technical Working Group |
| Getting to 100% Net-Zero Carbon... #2 | May 2024 | Virtual Technical Working Group |
| Distributed Energy Resource Integration #2 | May 2024 | Virtual Technical Working Group |
| Climate Adaptation #2 | May 2024 | Virtual Technical Working Group |
| Wrap-Up Workshop | June 2024 | Hybrid Workshop |

# STRATEGIC OBJECTIVES SUPPORT EPIC STRATEGIC GOALS (D.24-03-007)

CALIFORNIA PUBLIC UTILITIES COMMISSION

| | |
|---|---|
| Transportation Electrification | The Electric Program Investment Charge (EPIC) Program will invest in research, development, and demonstration (RD&D) that supports the planning, integration, scaling, and commercialization of innovation that promotes the state's climate goals to: (1) transition all medium- and heavy-duty vehicles in the state to zero-emission vehicles (ZEV) by 2045; (2) realize 100 percent ZEV in-state new car sales by 2035; and (3) significantly reduce pollution from the transportation sector in disadvantaged, low-income, Environmental and Social Justice (ESJ), and tribal communities, and Environmental Protection Agency non-attainment air districts as soon as possible, by addressing identified gaps for this goal. |
| Building Decarbonization | EPIC will invest in the rapid acceleration of comprehensive, cost-effective, and equitable building decarbonization technologies and strategies to help achieve the state's goal to be carbon neutral by 2045 economy-wide, including achieving and sustaining a three percent annual building electrification retrofit rate (3.6 percent for affordable housing) by and beyond 2030, by addressing identified gaps for this goal. |
| Achieving 100% Net-Zero Carbon Emissions and The Coordinated Role Of Gas | EPIC will seek to identify cost-effective opportunities for reaching the "last 10%" of the state's goal to be carbon neutral by 2045 economy-wide, through investment in California-specific strategies for hard-to-decarbonize energy-consuming sectors that could be decarbonized through electrification and coordination with other California RD&D programs to align investments and activities for emerging strategies, by addressing identified gaps for this goal. |
| DER Integration | EPIC will invest in the cost-effective integration of high penetrations of distributed energy resources to support the state's goal to achieve a renewable and zero-carbon power sector by 2045, in part by building on the state's goal to deploy 7,000 megawatts of flexible load by 2030, by addressing identified gaps for this goal. |
| Climate Adaptation | EPIC Plans will seek to identify cost-effective, targeted research opportunities for improving grid resiliency and stability, particularly for adaptability of and impacts on ESJ and tribal communities during severe weather events, including preventing and mitigating the effects of wildfires, floods, and other climate-driven events; hardening the grid and improving resiliency especially in the most remote grid edge locations; reducing the number of customers experiencing long-duration outages; and reducing the duration of these outages, by addressing identified gaps for this goal. |

# Technical Working Group Workplan

CALIFORNIA PUBLIC UTILITIES COMMISSION

**BREAKOUT 1**

Prioritize gaps

Discuss role of EPIC in overcoming gaps, and investment timeframe

REPORT OUT

**BREAKOUT 2**

Identify possible big impact outcomes, target dates, strategies, considerations, and paths to market to overcome GAPS

REPORT OUT

**BREAKOUT 3**

Refine draft Strategic Objectives and identify ways to measure if successful

REPORT OUT

**VIRTUAL SESSIONS**

Stakeholder feedback and comment on draft Strategic Objectives

# Electric Program Investment Charge (EPIC)

## EPIC Strategic Objectives and Uniform Impact Analysis Framework

Strategic Objectives Technical Working Groups
April 10-12, 2024

**California Public Utilities Commission (CPUC)**
Energy Division, Climate and Equity Initiatives Section
Fredric Beck, Senior Analyst

California Public Utilities Commission

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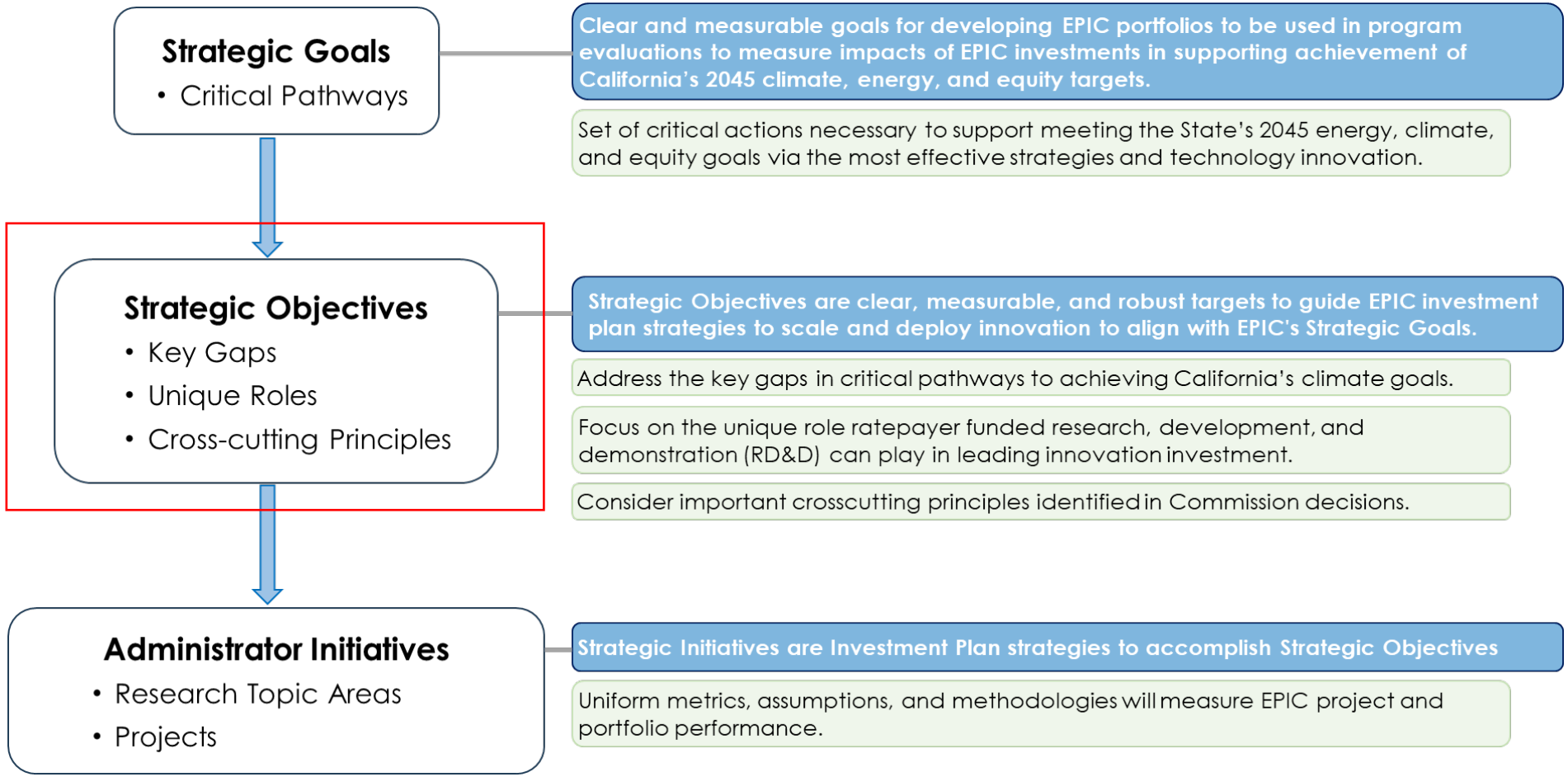
# Strategic Objectives - Criteria for Success

**Implementing the Commission's guidance ensures EPIC administrators can clearly demonstrate that ratepayers' investment of billions of dollars in innovation is making a difference in achieving a cleaner, more equitable and affordable future and California's 2045 zero carbon climate goals.**

- **Criteria 1: Incorporating Key Components in Formulating Measurable Targets**
- **Criteria 2: Demonstrating Ratepayer Benefit in Pursuit of State Policy Goals**
- **Criteria 3: Considering Cross-Cutting Principles from Strategic Goals**
- **Criteria 4: Incorporating EPIC's Foundational Principles for a Uniform Impact Analysis Framework**
- **Criteria 5: Aligning Proposed Strategic Objectives with CPUC Proceedings**

# Criteria 1: Incorporating Key Components in Formulating Measurable Targets

**Strategic Objectives are clear, measurable, and robust targets to guide EPIC investment plan strategies to scale and deploy innovation to align with EPIC's Strategic Goals.**



# Criteria 2: Demonstrating Ratepayer Benefit in Pursuit of State Policy Goals

**To bring greater focus to the EPIC Program and improve transparency, D.21-11-028 reiterates that EPIC Projects must show ratepayer benefit to prove they have met the guiding principle of EPIC. The 2021 decision adopts five ratepayer benefit definitions.**

| Ratepayer Benefit | Ratepayer Benefit Definition |
|---|---|
| **Improve Safety** | EPIC innovations should improve the safety of operation of California's electric system in the face of climate change, wildfire, and emerging challenges. |
| **Increase Reliability** | EPIC innovations should increase the reliability of California's electric system while continuing to decarbonize California's electric power supply. |
| **Increase Affordability** | EPIC innovations should fund electric sector technologies and approaches that lower California electric rates and ratepayer costs and help enable the equitable adoption of clean energy technologies. |
| **Improve Environmental Sustainability** | EPIC innovations should continue to reduce GHG emissions, criteria pollutant emissions, and the overall environmental impacts of California's electric system, including land and water use. |
| **Improve Equity** | EPIC innovations should increasingly support, benefit, and engage disadvantaged vulnerable California communities. |

# Criteria 3: Considering Strategic Goal Cross-Cutting Principles

**In D.24-03-007, the Commission endorsed principles* providing guidelines for assessing proposed Strategic Objectives for EPIC 5 to ensure important cross-cutting issues identified in the Strategic Goals workshops are considered in the Strategic Objectives technical working groups.**

- **Principles for Equity in RD&D Strategies**
  - **Prioritization:** Prioritize investments and measure impacts on the most vulnerable communities.
  - **Engagement:** Develop deeper and ongoing engagement with DVCs.
  - **Metrics:** Develop clear and measurable metrics for assessing the impact of RD&D investment in DVCs.
  - **Outreach:** Enable better integration and coordination with local communities throughout the entire RD&D process.
- **Principles for Emerging Strategies**
  - **Equity:** Develop EPIC RD&D strategies and equity guideposts to achieve the last 10% of the 100% carbon free grid.
  - **Innovation Gaps:** Undertake research where there are gaps in emerging strategies to inform opportunities for innovation.
  - **Cost:** Prioritize RD&D that can significantly reduce ratepayer costs.
- **Principles for Safety (including Cybersecurity) Strategies**
  - **Uncertainty:** Take situational uncertainty into account, including extreme weather and cyberthreats.
  - **Coordination:** Assess the unique role EPIC could play in advancing cybersecurity standards and protocols.

*See Nov. 20, 2023, Ruling in R.19-10-005 issuing the Staff Proposal and Request for Input on Strategic Goals for Electric Program Investment Charge (EPIC) Program for complete principles.

# Criteria 4: Incorporating EPIC's Foundational Principles for a Uniform Impact Analysis Framework

**D.23-04-042 adopted foundational principles for development of a uniform impact analysis framework to comply with D.21-11-028.* The principles include:**

- Demonstrating Ratepayer Benefit
- Scalable and Replicable Innovation
- Quantifying Net Impacts
- Accurate Attribution
- Consistent and Transparent Methodology
- Building on Existing Metrics
- Consistent Data and Assumptions
- Direct, Indirect, and Induced Impact Reporting
- Iterative Process



*See Appendix A for the complete set of foundational principles.

# Criteria 5: Aligning Proposed Strategic Objectives with CPUC Proceedings

| Strategic Goal | Proceeding | Description |
|---|---|---|
| **1. Transportation Electrification** | R.23-12-008 | Transportation Electrification Policy and Infrastructure |
| | R.22-07-005 | Advance Demand Flexibility Through Electric Rates |
| | R.18-12-006 | Development of Rates and Infrastructure for Vehicle Electrification |
| **2. Distributed Energy Resource Integration** | R.24-01-017 | California Renewables Portfolio Standard Program |
| | R.22-11-013 | Distributed Energy Resource Program Cost-Effectiveness Issues, Data Access and Use, and Equipment Performance Standards |
| | R.22-07-005 | Advance Demand Flexibility Through Electric Rates |
| | R.21-06-017 | Modernize the Electric Grid for a High Distributed Energy Resources Future |
| | R.20-05-003 | Continue Electric Integrated Resource Planning and Related Procurement Processes |
| | R.19-09-009 | Microgrids Pursuant to Senate Bill 1339 and Resiliency Strategies |
| | R.18-07-003 | California Renewables Portfolio Standard Program |
| | R.17-07-007 | Streamlining Interconnection of Distributed Energy Resources and Improvements to Rule 21 |
| **3. Building Decarbonization** | R.22-07-005 | Advance Demand Flexibility Through Electric Rates |
| | R.19-01-011 | Building Decarbonization |
| **4. Net Zero Carbon** | R.20-05-003 | Continue Electric Integrated Resource Planning and Related Procurement Processes |
| | R.20-01-007 | Long-Term Gas System Planning |
| **5. Climate Adaptation** | R.18-04-019 | Strategies and Guidance for Climate Change Adaptation |

# APPENDICES

A. Foundational Principles for Development of a Uniform Impact Analysis Framework to Comply with Decision (D.) 21-11-028

B. EPIC Strategic Goals and Objectives are Defined by Pathways, Gaps, Roles, and Outcomes

## Appendix A
## Foundational Principles for Development of a Uniform Impact Analysis Framework to Comply with Decision (D.) 21-11-028

This document outlines the Commission's expectations of Electric Program Investment Charge (EPIC) administrators in developing and implementing a uniform impact analysis framework and metrics, enabling the evaluation and tracking of the impacts of all EPIC projects, in compliance with D.21-11-028, Ordering Paragraph 12. These foundational principles include:

### Purpose

- The mandatory guiding principle of EPIC is to provide ratepayer benefits as related to California's electric system.[1]
- The EPIC impacts analysis framework should provide EPIC administrators with a uniform methodology to demonstrate with data the realized and potential impacts to ratepayers from EPIC research, development, and demonstration (RD&D) investment.

### Overarching Principles

- In general, each EPIC project should offer a reasonable probability of providing benefits to ratepayers and expenditures on projects which have a low probability for success should be minimized,[2] and the EPIC portfolio as a whole should demonstrably benefit ratepayers.
- While in some cases, a targeted group of ratepayers may benefit from an individual project's output, EPIC investments should result in scalable and replicable innovations that prioritize solutions to address California's energy and climate goals.
- Accurate and precise EPIC project and program impacts reporting is paramount to inform policy, decision-making, and formulating EPIC strategic goals. Therefore, impacts resulting from the analytical framework must be defensible and not overstated.
- Clear and transparent methods are necessary to calculate past, current, and future EPIC impacts based on published data and reasonable assumptions, such that any party can take the data and assumptions and apply the methodology to recreate the results. Without such foundation, it will be difficult to calculate quantitative impacts of EPIC innovations that lack the market or deployment

[1] D.12-05-037.

[2] Pub. Util. Code § 740.1(a) and (b).





history to have readily available sufficient data for impacts analysis or project future impacts of pre-commercial innovations.

### Net Impacts

- Realized ratepayer benefits must be demonstrated by the incremental, value-added impact of EPIC innovation.
  - For example, if a ratepayer spends $20 to save $30, the ratepayer impact realized is the net $10 savings, not the gross $30 impact. Thus, the metric by which EPIC investments should be evaluated is *net*, not gross, impacts.
- Net impacts are required to calculate project or program benefit-cost ratios and rates of return on ratepayer investment.

### Attribution

- To understand the impact of EPIC accurately and precisely, and therefore, inform continuance or improvements in EPIC strategic goals and strategic objectives, administrators should demonstrate to the CPUC what impacts have or are forecasted to occur that would not have otherwise occurred without EPIC investment (i.e., only these impacts should be attributed to EPIC.)
- The portion of the observed change that is only due to EPIC investment must be documented with data, and a set of reasonable and acceptable rules for determining the share of credit attributed to EPIC developed, including attribution for the value of cost-shared, matching, or leveraged funding.
- Comparable scenarios should be used to estimate when the market would have produced an innovation had EPIC funding not been available. Where innovation would have eventually occurred without EPIC, impacts should be based on the acceleration in the time to market readiness of the innovation, rather than the lifetime of the technology itself.
  - For example, if a deployed EPIC innovation provides impacts for 20 years between 2025 and 2045, and it is determined the innovation would have occurred and been deployed without EPIC in 2030, then the period of market acceleration due to EPIC is five years and EPIC impacts are calculated only for that 5-year period.

### Methods

- Administrators should use or adapt existing accepted methodologies where possible for efficiencies of resources, time, cost, and effort.[3]

[3] Including for example, but not limited to, the following works and other works by their respective authors: An Investigation of Innovative Energy Technologies Entering the Market between 2009-2015, Enabled by EERE-funded R&D. PNNL-31895. Pacific Northwest National Laboratories. August 2021; Metrics for an Equitable and Just Energy System. Pacific Northwest National Laboratories. June 2021; Evaluating Realized Impacts of DOE/EERE R&D Programs -

- The methodology used to calculate impacts should be grounded in theory (i.e., if funding startup is seen as beneficial, data documentation and impact demonstration of this strategy should be provided).
- Impacts evaluation may involve expert elicitation. Clearly and succinctly framing questions is required to guide experts in obtaining pertinent data.

**Metrics**

- D.13-11-025, Attachment 4 provides a list of impacts (*Metrics and Potential Areas of Measurement)* proposed by the EPIC administrators and approved by the CPUC, which can serve as the basis for discussion of metrics. The list includes 10 impact metric categories and 59 potential areas of measurement. The decision allows creation of new, project-specific impact metrics to consider for revisions.
- Because units of measure have not been defined for many of these metrics, additional definitions are required for uniform impact reporting. This impact metrics list may be modified and updated based on new information and must be used consistently across all administrators.

**Assumptions**

- To the extent possible, administrators should use the same core data set for basic assumptions, such as the emissions profile of peak power in each service area. If administrators do not use the same data set, they should provide rationale for why not.
- While market penetration assumptions may vary by innovation, the method by which these assumptions are arrived should be consistent.

**Impact Reporting**

- For clarity of impacts on different economic sectors, direct, indirect, and induced impacts should be disaggregated in reporting.

**Iterative Process**

- Guidelines may be revised and clarified as the EPIC Impacts Analysis Framework is developed to achieve the goals and principles outlined above.

**(END OF APPENDIX A)**

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Standard Impact Evaluation Method. DOE/EE-1117. August 2014; A Framework for Evaluating R&D Impacts and Supply Chain Dynamics Early in a Product Life Cycle. DOE/EE-1096. June 2014; A Proposed Methodology to Determine the Leverage Impacts of Technology Deployment Programs. James L. Wolf. Prepared for US DOE/EERE. June 2008; Impact Evaluation Framework for Technology Deployment Programs. Sandia National Laboratories. Prepared for US DOE/EERE. July 2007; and Prospective Evaluation of Applied Energy Research and Development at DOE (Phase Two). National Research Council. The National Academies Press. 2007.

# Appendix B. EPIC Strategic Goals and Objectives are Defined by Pathways, Gaps, Roles, and Outcomes

| | |
|---|---|
| **Critical Pathways** | Set of critical actions necessary to support meeting the State's 2045 energy, climate, and equity goals via the most effective strategies and technology innovation |
| **Key Gaps** | Key challenges for achieving zero carbon goals and how RD&D should be prioritized to address opportunities and barriers more quickly along critical pathways |
| **Unique Roles** | The best-positioned stakeholders (ratepayers, state, federal, academic, private sector) to lead innovation investment addressing identified gaps, including through coordination and collaboration |
| **Desired Outcomes** | Clear, measurable, and reasonable targets for developing EPIC portfolios and used in program evaluations to measure impacts of EPIC in supporting achievement of California's 2045 goals |

**EPIC Strategic Objectives Solve Key Challenges to Produce Desired Outcomes**

# TRANSPORTATION ELECTRIFICATION



The Electric Program Investment Charge (EPIC) Program will invest in research, development, and demonstration (RD&D) that supports the planning, integration, scaling, and commercialization of innovation that promotes the state's climate goals to:

(1) transition all medium- and heavy-duty vehicles in the state to zero-emission vehicles (ZEV) by 2045;
(2) realize 100 percent ZEV in-state new car sales by 2035; and
(3) significantly reduce pollution from the transportation sector in disadvantaged, low-income, Environmental and Social Justice (ESJ), and tribal communities, and Environmental Protection Agency non-attainment air districts as soon as possible, by addressing identified gaps for this goal.

# TRANSPORTATION ELECTRIFICATION

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| Increasing Equitable Access to Transportation Electrification Benefits | Reducing Capital Costs for Charging Equipment | Managing Bulk System or Zonal Loads of Charging | Managing Concentrations of Charging Loads on the Distribution System |
|---|---|---|---|
| Lack of availability of affordable public or shared charging infrastructure | High costs of electric vehicle charging infrastructure for light-, medium-, and heavy-duty electric vehicles | Misalignment between electric vehicle loads and intermittent renewable energy production | Lack of advanced planning for grid needs |
| Lack of opportunities for disadvantaged, low-income, ESJ, and tribal communities to directly benefit from electric vehicle adoption | High costs of infrastructure for electrifying public transit to benefit DVC and nonattainment communities by mitigating pollution | Lack of robust and uniform data sharing, testing, certification, and cybersecurity protocols for transportation electrification | High costs related to charger interconnection and grid upgrades for areas with high concentrations of electric vehicle charging infrastructure and/or low grid capacity |
| | Lack of uniform standards and protocols for interconnection, system design, and communication among grid-connected devices, including smart meters, smart inverters, and internet-of-things (IoT) technology | Lack of capability to leverage optimized charging, bidirectional charging, and V2X for grid services. | Incomplete understanding of consumer decision-making behavior related to challenges of electric vehicles adoption |
| | | | Long timelines for grid upgrades to accommodate EV charging infrastructure, particularly for fleets |

# BUILDING DECARBONIZATION

CALIFORNIA PUBLIC UTILITIES COMMISSION

| Speeding and Enabling Residential Retrofits | Coordinating at a Community Scale | Understanding and Prioritizing Energy Burden, Improving Air Quality and Building Safety | Flexible Load | Commercial and Industrial Building Retrofits |
|---|---|---|---|---|
| High upfront costs of electrification retrofits | Increasing share of gas infrastructure costs accruing to those not able to afford electric retrofits | Lack of energy burden, air quality, and safety metrics for building decarbonization efforts | Lack of understanding of customer behavior in technology adoption and demand flexibility | Lack of low-cost automation and sensing solutions for commercial buildings |
| Lack of whole home retrofit approaches for low-income retrofits | Lack of advanced planning, including city planning, for grid needs | High energy burden levels for low-income customers as compared to national and State averages, and increasing electric rates | Need for advanced modeling and forecasting to better account for demand flexibility potential | Commercial and industrial buildings often have higher energy demand and unique end uses that make electrification and decarbonization more difficult |
| Inability of renters to make large-scale, permanent upgrades in tenant-occupied buildings, and risks of increased rent burdens and loss of affordable housing | Complex coordination needed to transition entire neighborhoods from gas to decarbonized buildings | Lack of coordinating between decarbonization, energy efficiency, and DER investments lead to higher costs | High cost of grid upgrades associated with new, unmanaged electric load | Split incentives are a barrier to the deployment of energy efficiency and DER measures in buildings |
| Lack of standardized retrofit packages and difficulty for consumers in coordinating among different decarbonization incentives and financing opportunities to understand how to fit them together to complement each other to reduce decarbonization cost | | High costs for health and safety upgrades, mitigation for pre-electrification/pre-weatherization barriers in older existing buildings | Lack of flexible load capacity from building electric use | |

# BUILDING DECARBONIZATION

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|---|---|---|---|---|
| Long lead and installation times for electrification retrofits, in comparison to emergency equipment replacement timeline needs | | | | |
| Lack of standardization and complex and demanding building codes, permitting, and interconnection processes | | | | |
| Inability to easily share data across systems needed to plan for, develop, interconnect; and optimize building retrofits | | | | |
| High cost of panel and wiring upgrades for older residences | | | | |

# ACHIEVING 100% NET-ZERO CARBON EMISSIONS AND THE COORDINATED ROLE OF GAS

CALIFORNIA PUBLIC UTILITIES COMMISSION

| Identifying Climate and Local Pollutant Impacts of New Generation and Storage Technology | Addressing Intermittency and Increasing Flexibility to Achieve a Carbon-Free Power Sector | Technology Innovation for Hard-to-Decarbonize Processes | Electricity system coordination with gas decommissioning |
|---|---|---|---|
| Lack of information on high production and life-cycle costs of “green” electrolytic hydrogen | Lack of coordination between grid operators in the western region in order to integrate new large-scale renewable resources, including offshore wind | Lack of clear pathways to economically decarbonize 100% of hard-to-decarbonize activities through electrification with no increase in air, water, and land pollutants by 2045 | Lack of a coordinated, statewide program to substitute non-pipeline alternatives for gas system repair and replacement projects where technically feasible |
| Lack of opportunities for disadvantaged, low-income, and ESJ communities and tribes to be readily included in the discussions and decision-making process on emerging generation and storage technology adoption, including discussion of potential impacts on public health | Uncertain impacts from significant changes in energy demand patterns due to electrification | Electrification of high-heat processes creates additional stress on the electric grid locally, and regionally in high-adoption scenarios | Lack of coordination and collaboration among EPIC and other gas and electric RD&D program investments on the common goal of decarbonization and right-sizing energy infrastructure and ratepayer affordability |
| Lack of independent studies on appropriate, cost-effective roles and lifecycle costs and impacts of emerging technologies, including floating OSW, enhanced geothermal, biomass conversion, and clean renewable hydrogen in achieving carbon neutrality | Long timelines for renewable energy, storage, and transmission development may not match timelines for electricity demand changes | | Lack of understanding on the potential to transition entire neighborhoods from gas to geothermal heating and cooling, particularly in warm climates |

# Technical Working Group Workplan

CALIFORNIA PUBLIC UTILITIES COMMISSION

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