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## **Staff Proposal and Request for Input on Strategic Goals for Electric Program Investment Charge (EPIC) Program**

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**Staff Proposal and Request for Input on Strategic Goals for  
Electric Program Investment Charge (EPIC) Program**  
*California Public Utilities Commission Staff Proposal*

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<sup>1</sup> The EPIC Strategic Goal Stakeholder Workshop Final Reports are attached to the *Administrative Law Judge’s Ruling Requesting Comments On Staff Proposal* as Attachment B.

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**Executive Summary**

California has ambitious goals to achieve net zero greenhouse gas (GHG) emissions no later than 2045 and achieve and maintain net negative GHG emissions thereafter.<sup>2</sup> California also aims to achieve 100% clean electricity retail sales from eligible renewable energy resources and zero-carbon resources by 2045.<sup>3</sup> Additionally, Goal 2 of the California Public Utilities Commission (CPUC) Environmental and Social Justice (ESJ) Action Plan is to increase investment in clean energy resources to benefit ESJ communities, especially to improve local air quality and public health.<sup>4</sup> This goal includes objectives specific to outreach and engagement, research and analysis, moving towards mutual eligibility and maximizing impact, addressing impacts in ESJ communities, and continued investment in ESJ communities.

This Energy Division (ED) staff proposal outlines four Electric Program Investment Charge (EPIC) Strategic Goals that should be used by the CPUC to guide development of EPIC Administrator Investment Plans that, when executed, will produce outcomes materially advancing achievement towards California's 2045 climate, clean energy, and equity goals. The EPIC program is funded by California utility customers under the auspices of the CPUC. The Strategic Goals described in this proposal are drawn from broad stakeholder input during the recent EPIC Strategic Goals public workshop process. This process was directed by CPUC Decision (D.)23-04-042 to inform CPUC guidance for developing measurable program-level EPIC Strategic Goals. These Strategic Goals are intended to leverage EPIC's unique position to align investments with key gaps in critical pathways necessary to meeting California's 2045 clean energy, climate, and equity goals. The EPIC workshops took place over six days, with 88 panelists and over 700 participants. The proposed Strategic Goals will inform an additional public stakeholder process to establish more detailed and nearer-term Strategic Objectives for the EPIC 5 (2026-2030) program cycle,<sup>5</sup> which will account for nearly \$1 billion of ratepayer investment in EPIC program research, development, and demonstration (RD&D).

To inform development of EPIC Strategic Goals, the workshop process, facilitated by the EPIC Policy + Innovation Coordination Group (PICG) project coordinator, gathered input on the following four core elements:

**Critical Pathways**, defined as the critical actions necessary to support meeting the State's 2045 zero carbon goals via the most effective strategies and technology innovation.

**Key Gaps**, defined as core challenges to achieving zero carbon goals and informing how RD&D should be prioritized to address opportunities and barriers more quickly along critical pathways.

**Unique Roles**, defined as identifying the best-positioned stakeholders (ratepayers, state, federal, private sector) to lead innovation investment in addressing identified gaps, including through coordination and collaboration.

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<sup>2</sup> AB 1279. Muratsuchi. The California Climate Crisis Act. 2022.

<sup>3</sup> SB 1020. Laird. Clean Energy, Jobs, and Affordability Act of 2022.

<sup>4</sup> CPUC Environmental and Social Justice Action Plan. Version 2.0. April 7, 2022. Available online at <https://www.cpuc.ca.gov/esjactionplan>

<sup>5</sup> As required by Decision (D.)23-04-042.

**Desired Outcomes**, defined as clear, measurable, and reasonable targets to be used by administrators in developing EPIC portfolios and used in program evaluations to measure how EPIC is supporting achievement of California’s 2045 zero carbon goals.

The PICG Project Coordinator produced reports for each workshop summarizing stakeholder input and key findings. These reports were circulated to all workshop speakers for review to ensure all statements were correctly captured. The workshop reports, along with video recordings of each workshop and all presentations at the workshop, form the basis from which Energy Division staff developed the proposed EPIC Strategic Goals.

**ES.1 Proposed EPIC Strategic Goals**

In Section 1 of this document, Energy Division staff propose Strategic Goals that should be used to guide development of EPIC portfolios for investment period 2026-2030 (EPIC 5). These Strategic Goals will be further translated into specific targets for EPIC project results in the subsequent Strategic Objectives process. The proposed Strategic Goals for the critical pathways encompassing grid modernization, the built environment, and evolving policy paradigms of electrification are summarized in Table ES1.

<b>Table ES-1. Proposed EPIC Strategic Goals</b>		
Strategic Goal 1	Transportation Electrification	EPIC will invest in research, development, and demonstration (RD&D) that supports the planning, integration, and 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 (ZEVs) by 2045; 2) realize 100% ZEV in-state new car sales by 2035; and 3) significantly reduce pollution from the transportation sector in disadvantaged, low-income, ESJ, and tribal communities and EPA non-attainment air districts as soon as possible, by addressing the gaps identified in Section 2.
Strategic Goal 2	Distributed Energy Resource Integration	EPIC will invest in the cost-effective integration of high penetrations of distributed energy resources (DER) 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 MW of flexible load by 2030, by addressing the gaps identified in Section 2.
Strategic Goal 3	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 3% annual building electrification retrofit rate (3.6% for affordable housing) by and beyond 2030, by addressing the gaps identified in Section 2.
Strategic Goal 4	Getting to 100% Net-Zero Carbon and the Coordinated Role of Gas	EPIC will seek to identify cost-effective opportunities for achieving the “last 10%” of reaching 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 while providing ratepayer benefits, and coordination with other California RD&D programs to align investments and activities for emerging strategies, by addressing the gaps identified in Section 2.

Additional crosscutting strategies identified in the workshops that are embedded in the articulation of the proposed Strategic Goals include 1) assuring equity in RD&D, 2) providing customer-focused solutions, 3) increasing reliability, 4) increasing resilience especially for low-income communities and

essential services, 5) seeking emerging strategies,<sup>6</sup> and 6) addressing safety (including cybersecurity). While crosscutting strategies of consumer engagement, reliability, and resilience are well integrated into the proposed Strategic Goals, equity in RD&D, emerging strategies, and cybersecurity deserve additional consideration due to the evolving policy and technology landscape. Additionally, workshop participant discussion highlighted overarching principles for Commission consideration in providing guidance for EPIC going forward. Section 3 proposes principles for developing strategic frameworks for Equity in RD&D, Emerging Strategies, Safety and Cybersecurity, and EPIC overall. These recommendations are built upon principles articulated during the robust workshop process and are intended to provide criteria to focus and evaluate investment in crosscutting pathways and EPIC overall.

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<sup>6</sup> The Strategic Goals Workshop on Emerging Strategies focused on strategies for a net zero future including clean renewable hydrogen, geothermal energy, floating offshore wind, biomass conversion, carbon management, and artificial intelligence.

## Section 1. Background

In D.23-04-042, the CPUC directed that program-wide goals be adopted to evaluate the progress of EPIC innovation investments and the extent to which EPIC investment plan portfolios maximize ratepayer benefits and impacts in achieving California's clean energy and climate goals. These goals aim to achieve net zero GHG emissions no later than 2045 and achieve and maintain net negative GHG emissions thereafter,<sup>7</sup> and to achieve 100% clean electricity retail sales from eligible renewable energy resources and zero-carbon resources by 2045.<sup>8</sup> Additionally, Goal 2 of the CPUC ESJ Action Plan is to increase investment in clean energy resources to benefit ESJ communities, especially to improve local air quality and public health.<sup>9</sup>

This ED staff proposal outlines four EPIC program-wide Strategic Goals that should be used by the CPUC to guide development of EPIC Administrator Investment Plans that, when executed, produce outcomes materially advancing achievement towards California's climate, clean energy, and equity goals. The decision builds on D.21-11-028 requiring EPIC Administrators to use a hierarchy of Strategic Objectives and Strategic Initiatives to explain and justify their EPIC investment plans.

From August 16, 2023, to September 20, 2023, the CPUC held five public stakeholder workshops to inform development of EPIC Strategic Goals for consideration by the Commission in its next guidance Decision for the EPIC 5 funding cycle (2026-2030). The first workshop identified and found agreement from participants on the following four critical pathways: 1) equity in RD&D; 2) grid modernization—including transportation electrification, DER integration, reliability, and resiliency; 3) the built environment—including customer-focused solutions, building decarbonization, electrification, and the coordinated role of gas; and 4) emerging strategies—focused on strategies for a net zero future including clean renewable hydrogen, geothermal energy, floating offshore wind, biomass conversion, carbon management, and artificial intelligence.

Final workshop reports summarizing key points and areas of general agreement or disagreement – along with workshop video recordings and presentations – form the basis from which ED staff developed the proposed EPIC Strategic Goals. The workshop reports are included as Appendix A of this document.

## Section 2. Proposed EPIC Strategic Goals

ED staff proposes four program-wide Strategic Goals for EPIC for consideration by the Commission. These goals are intended to focus EPIC 5 investments, provide a basis for measuring program progress, and produce outcomes materially advancing achievement towards California's climate, clean energy, and equity goals. This section provides the proposed Strategic Goals for the critical pathways encompassing transportation electrification, grid modernization, the built environment, and evolving policy paradigms of electrification, along with discussion of the rationale for each proposed goal.

<sup>7</sup> AB 1279. Muratsuchi. The California Climate Crisis Act. 2022.

<sup>8</sup> SB 1020. Laird. Clean Energy, Jobs, and Affordability Act of 2022.

<sup>9</sup> CPUC Environmental and Social Justice Action Plan, Goal 2. Version 2.0. April 7, 2022. Available online at <https://www.cpuc.ca.gov/esjactionplan>

## 2.1 Transportation Electrification

**Strategic Goal:** EPIC will invest in RD&D that supports the planning, integration, and scaling and commercialization of technology that promotes the State’s climate goals to: 1) transition all medium- and heavy-duty vehicles in the State to ZEVs by 2045; 2) realize 100% ZEV in-state new car sales by 2035; and 3) significantly reduce pollution from the transportation sector in disadvantaged, low-income, ESJ, tribal (Disadvantaged Vulnerable Community or DVC<sup>10</sup>), and non-attainment communities as soon as possible,<sup>11</sup> by addressing the following gaps:

- High costs related to charger interconnection and grid upgrades for areas with high concentrations of electric vehicle charging infrastructure (Kick-Off at 9; Grid-Mod at 6, 10-11);<sup>12</sup>
- High costs of electric vehicle charging infrastructure for light-, medium-, and heavy-duty electric vehicles (Grid-Mod at 10, 11, 12, 15);
- Lack of availability of affordable public charging infrastructure (Grid-Mod at 14-15);
- Misalignment between electric vehicle loads and intermittent renewable energy production (Grid-Mod at 6, 9, 13);
- Incomplete understanding consumer decision-making behavior related to challenges of electric vehicles adoption (Grid-Mod at 12);
- Lack of opportunities for disadvantaged, low-income, ESJ, and tribal communities to directly benefit from electric vehicle adoption (Grid-Mod at 15);
- High costs of infrastructure for electrifying public transit to benefit DVC and non-attainment communities by mitigating pollution (Grid-Mod at 14-15);
- Additional innovations needed to ensure resilience during natural disasters and widespread power outages (Grid-Mod at 24); and
- Lack of robust and uniform data sharing and cybersecurity protocols for transportation electrification (Grid Mod at 14, 21).

**Discussion:** During the Strategic Goals Workshop process, participants identified Transportation Electrification as one of the key pathways to support meeting California’s climate, energy, and equity goals. The State of California has established clear goals to transition all medium- and heavy-duty vehicles to ZEVs by 2045 and realizing 100% ZEV in-state new car sales by 2035. Yet, stakeholders identified key gaps and challenges in achieving these goals, particularly around the high costs and

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<sup>10</sup> This staff proposal uses the term DVC or Disadvantaged Vulnerable Communities consistent with the EPIC proceeding’s definition established in D.21-11-028, at Appendix A, and at 43, which references the definition given in D.20-08-046, Ordering Paragraph 1 as follows: Disadvantaged Vulnerable Communities consist of communities in the 25% highest scoring census tracts according to the most recent version of the California Communities Environmental Health Screening Tool (CalEnviroScreen), as well as all California tribal lands, census tracts with median household incomes less than 60% of state median income, and census tracts that score in the highest 5% of Pollution Burden within CalEnviroScreen, but do not receive an overall CalEnviroScreen score due to unreliable public health and socioeconomic data.

<sup>11</sup> See Executive Department. State of California. Executive Order N-79-20, September 23, 2020. Available at: <https://www.gov.ca.gov/wpcontent/uploads/2020/09/9.23.20-EO-N-79-20-Climate.pdf>

<sup>12</sup> Citations to EPIC Strategic Goals Workshop Final Reports use the following convention:

- “**Kick-Off**”: EPIC Strategic Goals Workshop Kick-Off Report
- “**Equity**”: EPIC Strategic Goals Equity in RD&D Workshop Report
- “**Grid-Mod**”: EPIC Strategic Goals Grid Modernization Workshop Report
- “**Built**”: EPIC Strategic Goals Built Environment Workshop Report
- “**Emerging**”: EPIC Strategic Goals New & Emerging Strategies Workshop Report

delays in building the necessary charging infrastructure to support electrified transport and in ensuring equitable access and affordability for California's most vulnerable populations.

In her opening remarks, Commissioner Genevieve Shiroma stated that grid resiliency is a concern for the Commission given wildfires, floods, heat storms, cybersecurity, and other threats that California must be prepared for. She noted EPIC innovation can help adopt new technologies and best practices for a more resilient grid and protect vulnerable communities from outages.

Workshop participants highlighted that, as a ratepayer-funded program, EPIC has a unique opportunity and role to play in targeting and prioritizing RD&D programs that can effectively reduce pollution from the transportation sector in DVC and non-attainment communities and making ZEVs and charging accessible and affordable for these communities.

Participants also highlighted that the high costs of grid upgrades necessary to serve the new load from electrified transport may prevent charging infrastructure from being deployed at the scale, geography, and the cost necessary to support vehicle charging needs and ensure affordability of electric rates. For example, there is a lack of affordable charging infrastructure in multi-family dwellings where 50% of Californians live.

Participants highlighted opportunities to reduce costs by better aligning electric vehicle charging with the variability of renewable energy production, both locally and across the grid. Further, participants explained that scaling up and optimizing customer distributed energy resources (DERs) and ZEV batteries can support fully integrated grid operations to provide flexible load and grid services, reducing costs of grid infrastructure upgrades. Participants identified significant opportunities for DERs, ZEV batteries, aggregation and automation solutions, managed charging, vehicle-to-grid (V2G) strategies, and virtual power plant (VPP) deployments to align electric vehicle charging with renewable energy generation.

Unlocking these cost reduction opportunities will require understanding customer behavior in ZEV adoption and operation, customers' ability and willingness to participate in DER and ZEV programs to support load flexibility and grid services, and the distinct needs of DVC customers.

Participants discussed that use of RD&D to promote effective transportation electrification could result in additional ratepayer benefits, including the opportunity for income streams for grid services, and could deliver significant additional benefits to DVCs, including improved local air quality, reduced electric outages, ownership and job opportunities, and overall improved community resilience to extreme weather events.

Participants noted that many DVC customers are left behind in transportation electrification efforts and suggested EPIC provide direct transportation electrification benefits to these customers, including EV ownership, public transit options, and prioritization of these communities for pollution reduction efforts.

Many participants agreed that research in utilizing bi-directional charging data and EV telematics data for incentive programs and utility billing purposes would provide significant value to customers. One opportunity identified in this regard was for EPIC to aid in developing a streamlined data sharing process and in enhancing coordination between the utilities and contractors.



## 2.2 Distributed Energy Resource Integration

**Strategic Goal:** EPIC will invest in the cost-effective integration of high penetrations of DERs 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 MW of flexible load by 2030,<sup>13</sup> by addressing the following gaps:

- Insufficient valuation, incomplete businesses models, and lack of appropriate market mechanisms for transmission and distribution grid services provided by flexible resources (Grid-Mod at 16-17, 22, 27);
- 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 (Grid-Mod at 17, 18, 23);
- Complex and demanding interconnection processes that increase the costs and slow timelines for DER deployment (Grid-Mod at 17);
- Need for better understanding of the ability of aggregated DER and VPP deployment to reduce or forestall the cost associated with grid upgrades, and to support grid reliability (Kick-Off at 10; Grid-Mod at 16, 19, 21, 22);
- Lack of opportunities for disadvantaged, low-income, ESJ, and tribal communities to engage early in and directly benefit from deployment of flexible resources (Kick-Off at 8-9; Equity at 10-11, 13; Grid-Mod at 18-19, 25);
- An outsized burden that long-duration outages have on disadvantaged, low-income, ESJ, and tribal communities (Kick-Off at 10; Equity at 10, 13; Grid-Mod at 24);
- Need for better understanding of consumer adoption behavior regarding flexible DERs (Kick-Off at 8; Grid-Mod at 16, 26);
- Lack of comprehensive weather operational data to predict system conditions (Kick-Off at 10; Grid-Mod at 19);
- Need for reliable and resilient power for communities and critical facilities during periods of power outages due to wildfire, extreme weather, and other emergency situations (Grid-Mod at 23-24); and
- Lack of robust and uniform data sharing and cybersecurity protocols for DERs (Grid-Mod at 17-18, 21).

**Discussion:** During the Strategic Goals Workshop process, participants agreed that DER Integration is a key pathway in achieving California’s goal of 100% renewable and zero-carbon electricity by 2045. Participants noted that the California Energy Commission (CEC) identified that California would need to deploy 7,000 MW of flexible load by 2030 and generally supported this goal.<sup>14</sup> Participants further highlighted key gaps and obstacles, as outlined above, that need to be addressed to reach this goal.

Participants agreed that customer DERs must be utilized by grid operators on a much larger scale to help reduce the costs of grid modernization and offset the increasing load from electrification.

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<sup>13</sup> California Energy Commission, SB 846 Load Shift Goal Commission Report, May 26, 2023 (Docket 21-ESR-01). <https://efiling.energy.ca.gov/GetDocument.aspx?tn=250357&DocumentContentId=85095>

<sup>14</sup> California Energy Commission, SB 846 Load Shift Goal Commission Report, May 26, 2023 (Docket 21-ESR-01). <https://efiling.energy.ca.gov/GetDocument.aspx?tn=250357&DocumentContentId=85095>

Participants agreed that many customer-sited DERs—including behind-the-meter solar-plus-storage—and VPPs can enable greater opportunities for integration of clean energy and increasing resilience. However, customer behind-the-meter resources must be effectively valued and compensated for their services to the grid, such as load flexibility, peak load shifting, energy storage, and grid balancing. Participants noted that some of the key obstacles to scaling up DER integration are lack of proper valuation, viable business models, and market mechanisms to incentivize customers to offer their resources for transmission and distribution grid services.

Grid operators and utilities also often lack data, modeling, and management tools to rigorously evaluate and deploy aggregated DERs and VPPs as a resource to reduce grid upgrades and support grid reliability. Lack of comprehensive weather operational data to predict system conditions and DER operations in extreme weather events and other grid stress conditions make it harder to incorporate DERs into grid and resource modeling, forecasting, and planning. Participants agreed that EPIC could help address these data gaps and provide demonstrations to build operators' and utilities' trust, as well as capabilities, in DER integration as integral to their planning and operations.

Participants largely agreed that understanding customer responses to market and operational signals is a necessary area for EPIC research. Understanding customer psychology and social aspects of DER adoption, responses to various incentive structures, and customer ability and willingness to shift their load are crucial to reaching the necessary pace and scale of DERs and load flexibility.

Another key gap noted by workshop participants is the slow pace of DER integration due to complex, demanding, and inconsistent interconnection processes. Additionally, there is a lack of resources and knowledge for microgrid project planning and development by communities and non-profit associations. 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) significantly delay and increase the costs of DER interconnection and aggregation. Participants asserted that the majority of DERs do not require system upgrades to interconnect which provides an opportunity to streamline and expedite the interconnection process through standardized expedited procedures. Participants also noted that there is a great potential for EPIC to coordinate and inform the standardization of microgrids, communication protocols and cybersecurity requirements that could also significantly streamline deployment of DERs.

Participants highlighted that many DER interfaces are proprietary, preventing streamlined access of aggregation software to DERs and smart appliances from different vendors and manufacturers. Participants noted that open standards and application programming capabilities are crucial to scale up aggregation and increase load flexibility potential. To enable smart managed charging and DER coordination and aggregation, it is necessary to establish a seamless and multi-directional flow of data between devices, customers, utilities, and aggregators. Many participants agreed that EPIC could play a key role in enabling this data flow by developing standardized approaches, protocols and processes for data sharing and aggregation, and coordinating their adoption with the manufacturers, utilities, and aggregators.

Participants also asserted that DVCs are often left behind in DER integration efforts. Participants noted that EPIC could play a key role in developing solutions that provide direct benefits to these customers, including DERs ownership; pollution reduction; and community participation and leadership in project design, implementation, education, and workforce development. Participants also observed that EPIC should endeavor to develop solutions that also provide non-energy benefits related to health, habitability, and thermal comfort.

Participants noted that DERs can also enable greater grid resilience for the most vulnerable communities that are often exposed to longer and more frequent outages while also being more sensitive to such outages due to their reliance on the grid for essential medical and other needs, like access to fresh food, education, heating, and cooling. Participants noted that EPIC funding could help increase community resilience and well-being through local integrated DERs that can sustain their needs during outages and extreme weather events, such as microgrids, solar generation, battery storage, and community resilience hubs. Many participants stressed the importance of investing in community infrastructure and places where people spend most time in their community, like churches, schools, libraries, hospitals, and community centers. Supporting these facilities can help build more resilient and sustainable communities in the long term and help demonstrate the benefits of DERs to community members and increase DER adoption in those communities.

Participants identified cybersecurity as one of the key gaps for reliable DER integration, stating that no standard protocols apply and that there is no DERs monitoring by grid operators for cybersecurity. One opportunity identified was for EPIC to support research into the amount of communications encryption necessary for substations and various grid facilities and how to share and update encryption keys on all the devices.

### 2.3 Building Decarbonization

**Strategic Goal:** EPIC will invest in the rapid acceleration of comprehensive, cost-effective, and equitable building decarbonization strategies to support the achievement of the State’s targets to be carbon neutral by 2045 economy-wide, including achieving and sustaining a 3% annual building electrification retrofit rate (3.6% for affordable housing) by and beyond 2030,<sup>15</sup> by addressing the following gaps:

- High upfront costs of electrification retrofits (Built at 12, 19-20);
- Long lead and installation times for electrification retrofits, in comparison to emergency equipment replacement timeline needs (Built at 16, 20-23);
- High costs of grid upgrades associated with new, unmanaged electric load (Built at 11, 21, 24, 26);
- Lack of flexible load capacity from building electric use (Built at 7, 11, 25-26);
- Need for advanced modeling and forecasting to better account for demand flexibility potential (Grid-Mod at 16, 19; Built at 17, 21);
- Lack of standardization in currently complex and demanding building codes, permitting, and interconnection processes (Built at 19, 21, 23);
- High energy burden levels for low-income customers as compared to national and State averages, and increasing electric rates (Built at 13, 15, 19);
- Lack of energy burden, air quality, and safety metrics for building decarbonization efforts (Built at 13-14,18);
- Lack of whole home retrofit approaches for low-income retrofits (Built at 14, 30);
- Inability of renters to make large-scale, permanent upgrades in tenant-occupied buildings, and risks of increased rent burdens and loss of affordable housing (Built at 20, 29-30; Emerging at 30-31);

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<sup>15</sup> See EPIC Strategic Goals Workshop Built Environment Report at 12.

- Increasing share of gas infrastructure costs accruing to those not able to afford electric retrofits (Built at 26, 27-28; Emerging at 25, 31);
- Inability to easily share data across systems needed to plan for, develop, interconnect; and optimize building retrofits (Built at 6, 16, 20-21, 24);
- Lack of understanding of customer behavior in technology adoption and demand flexibility (Kick-Off at 8; Built at 16-18, 25);
- 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 costs (Built at 16, 18-19, 22, 31);
- Lack of advanced planning, including city planning, for grid needs (Built at 26); and
- Lack of low-cost automation and sensing solutions for commercial buildings (Built at 25).

**Discussion:** During the Strategic Goals Workshop Process, workshop participants largely concluded that decarbonizing the buildings sector is expected to be a significant and challenging task; the scale and costs of electrification efforts currently outpace existing State funding, as well as household and business abilities and willingness to pay. Significant effort must be made to reduce the costs of decarbonization both on the customer side and on the electric grid. Reducing household, business, and grid costs was identified as a top and urgent priority.

Participants identified several obstacles that households and businesses face in building decarbonization, including long lead times in planning and budgeting for replacing building appliances, a lack of whole home retrofit solutions for low-income households, barriers to renters being able to make permanent upgrades, high energy burden levels, and challenges in piecing together myriad complementary incentive and financing opportunities. Further, participants identified that while some types of RD&D investments may be well-supported by federal and private funding, EPIC has a unique role in addressing California-specific process challenges, including accounting for the unique characteristics of the State's buildings, housing affordability issues, and local permitting and code processes.

On the grid side, participants highlighted the anticipated significant increase in electric loads as a result of building electrification investments. Participants noted particular concerns with such electric load increases, and associated costs, during periods of the day and year that do not align with renewable energy production. While the State has ambitious goals for load flexibility to mitigate those expected grid costs, participants largely found that there is a lack of flexible load expected to come from building energy usage. Despite the potential, such lack of flexibility is due in part to reliance on customer behavior in the absence of low-cost automation solutions, such as distributed sensors to reveal zone-by-zone energy intensity in commercial buildings.

Finally, participants highlighted the role that local governments and utilities can play in achieving the necessary retrofit level in the built environment to meet the State's carbon reduction goals. Participants raised concerns that complex and disparate building codes, permitting processes, and interconnection processes resulted in the process being un navigable for the ordinary household or business. Further, participants noted that there is currently a lack of coordination and advanced planning between local governments and utilities regarding existing capacity and constraints on the electric grid, which creates inefficient, delayed, and costly retrofit campaigns and electrification strategies.

## 2.4 Getting to 100% Net-Zero Carbon and the Coordinated Role of Gas

EPIC will seek to identify cost-effective opportunities for achieving the “last 10%” of reaching the State’s goal to be carbon neutral by 2045 economy-wide.<sup>16</sup> Investments will help scale up and commercialize California-specific decarbonization strategies that provide ratepayer benefit and coordinate with other California RD&D programs, by addressing the following gaps:

- 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 (Emerging at 13-14);
- Lack of coordination between grid operators in the western region to integrate new large-scale renewable resources, including offshore wind (OSW) (Emerging at 17);
- Lack of independent studies on the 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 (Built at 7, 29; Emerging at 14-17, 19-24, 26-27);
- Lack of information on high production and life-cycle costs of “green” electrolytic hydrogen (Emerging at 12, 20-24);
- 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 (Built at 30, Emerging at 14, 21, 30-31);
- 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 (Built at 6, 15; Emerging at 14, 31);
- Lack of understanding on the potential to transition entire neighborhoods from gas to geothermal heating and cooling, particularly in warm climates (Built at 7, 12, 15, 27-28; Emerging at 12, 19); and
- Lack of a coordinated, statewide program to substitute non-pipeline alternatives for gas system repair and replacement projects where technically feasible (Grid-Mod at 21; Built at 12, 27-29; Emerging at 23, 30-31).

**Discussion:** During the Strategic Goals Workshop process, participants identified a need to identify new and emerging strategies to cost-effectively meet the “last 10%” of carbon emissions to support the State’s efforts to reach its net-zero climate goals by 2045. However, participants cautioned that guideposts must be established to ensure solutions deployed to get to 100% net-zero carbon do not negatively impact DVCs across the State. Some participants asserted that some proposed technologies and solutions, such as biomass combustion and hydrogen combustion, would potentially sustain, or even increase, local pollutant impacts on these communities.

Under this Strategic Goal category, participants acknowledged that significant federal and private funding exists for pursuing carbon-management investments. Participants identified that EPIC investments should focus on addressing California-specific gaps and challenges.

One of those specific areas of focus was offshore wind. Participants noted California’s anticipated floating offshore wind technology approach was distinct from the type of wind technology

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<sup>16</sup> See EPIC Strategic Goals Workshop New and Emerging Strategies Report at 13.

anticipated being deployed on the East Coast (though it would likely draw on lessons from worldwide offshore wind projects as well as from oil and gas exploration). Instead, participants identified that an effective use of ratepayer EPIC funding would be supporting coordination among grid operators in the Western region to optimize the offshore wind resource, reduce congestion and transmission needs, and better meet grid demands.

Participants further noted a lack of independent studies on the appropriate roles of emerging technologies in achieving carbon neutrality, particularly in terms of lifecycle and techno-economic analysis. Understanding sensitivities and scenarios of costs and impacts of different emerging technology strategies is an important input into State resource planning and policymaking.

Sufficient lack of study and data was noted specifically around the topic of “green” electrolytic hydrogen. Participants recommended that a role for EPIC could be to evaluate the best potential clean renewable hydrogen end uses by narrowing applications to the hard-to-electrify sectors that cannot be addressed by other electrification technologies. Participants noted further that this research should assess social impacts, potential GHG emissions, potential air pollution, cost, and energy efficiency aspects of using hydrogen as compared to alternatives, such as electrification. Getting an understanding of this “least cost best fit” approach was identified as an effective use of ratepayer resources.

As emerging technology policies further evolve (such as clean renewable hydrogen, direct air capture and storage, biomass, and geothermal), participants asserted that DVCs must be included in discussions, particularly for solutions that could create negative impacts on their communities.

In an intersection with the Built Environment pathway, participants noted that there are significant opportunities for cost reduction with electrification efforts if coordinated with decommissioning of the gas system. This included both strategies to identify non-pipe alternatives, as well as transitioning entire neighborhoods to geothermal heating and cooling. Potential challenges include the difficulty of concentrating electrification efforts geographically to allow for the retirement of gas distribution infrastructure. Participants largely found that EPIC could be leveraged to support development of strategies to avoid costs of legacy gas system upgrades, maintenance, and repair.

Finally, participants identified a significant challenge in the misalignment and lack of coordination between EPIC and other gas and electric RD&D efforts around a common goal. While the EPIC program is now undertaking such strategic goal and objectives planning, other ratepayer-funded RD&D investments lack a similar aligned goal focus. Such coordination of RD&D investments is necessary to ensure ratepayer investments are efficiently focused on achieving the State’s climate, energy, and equity goals, avoid duplication, and improve outcomes from collaboration.

### **Section 3. Proposed Principles for Equity and other Crosscutting Strategies**

ED staff proposes key principles for crosscutting strategies to be applied in the development of the above critical pathway Strategic Goals. As a result of discussions at the EPIC workshops, staff conclude that certain initial goals and pathways are cross-cutting and should be considered in each of the above critical pathways, including 1) equity, 2) customer focused solutions, 3) reliability, 4) resilience, 5) emerging strategies, and 6) safety (including cybersecurity). To inform strategic planning and assessment of EPIC portfolios, staff identifies below key principles gleaned from workshop participants that may be used by the CPUC to inform EPIC strategic frameworks.

### 3.1 Principles for an Overall EPIC Strategy

Based on robust stakeholder input throughout the EPIC Strategic Goals Workshop series and general agreement among workshop participants on the role of EPIC, ED staff proposes the following eight principles to support development of a framework for Overall EPIC Strategy for Commission consideration in evaluating proposed Strategic Goals for the EPIC 5 (2026-2030) investment period. Workshop participants discussed several priorities cutting across most or all critical pathways, including the need to prioritize investments, make rapid progress toward state goals, take equity into account, and coordinate with and leverage complimentary efforts and resources. Specifically, these principles are that EPIC should:

- Prioritize investment in areas where EPIC has a unique role;
- Prioritize addressing California-specific issues;
- Prioritize investment for projects offering rapid and substantive impact in meeting State goals;
- Ensure that all ratepayers benefit from EPIC investment and no ratepayer is left behind;
- Significantly speed and scale innovation deployment to decarbonize all electricity-consuming sectors;
- Facilitate long-range planning for California's electric sector;
- Coordinate with regional, state, federal and private efforts; and
- Maximize utilization of complimentary funding sources.

### 3.2 Principles for Equity in RD&D Strategies

In D.23-04-042, the CPUC directed EPIC Administrators to align their EPIC investment plans with CPUC's Environmental and Social Justice Action Plan and the federal Justice40 initiative. The decision further requires administrators to dedicate at least 35% of technology demonstration and deployment (TD&D) funds toward projects located in and benefitting disadvantaged and low-income communities and to engage with environmental and justice communities before developing their plans. In her August 17, 2023 remarks to the Equity in RD&D Workshop, Commissioner Shiroma stated investing in low-income, tribal, and disadvantaged communities is crucial to achieving California's 2045 climate goals, and that EPIC should look not only for the location of the projects but also the accrual of benefits to these communities.

Based on robust stakeholder input throughout the EPIC Strategic Goals Workshop series, ED staff proposes the following five principles to support development of a framework for Equity in RD&D strategies.

- **PRIORITIZATION:** EPIC administrators should prioritize investments and measure impacts on the most vulnerable communities, including reducing the energy burden and reducing air pollution in DVCs and non-attainment areas.
- **ENGAGEMENT:** EPIC administrators should develop deeper and ongoing engagement with DVCs including through financial support to advisory groups composed of community-based organizations (CBOs) to 1) build trust, 2) better understand relevant needs, 3) educate communities on innovative technologies and processes, 4) design projects with community input from the start of the process in advance of and to inform portfolio development, 5) inform ESJ stakeholders how their feedback was or was not incorporated into EPIC plans and why, 6) engage communities in project evaluation, and 7) develop sustainable continuous community partnerships. In particular, EPIC administrators and their plans should address specific concerns

raised by ESJ community representatives about the role of biomass, clean renewable hydrogen, combustion technologies, and the potential for unintended consequences such as increased emissions in vulnerable communities.

- **METRICS:** EPIC administrators should develop clear and measurable metrics for assessing the impact of RD&D investment in DVCs. Potential metrics recommended by workshop participants include energy burden, health and safety, program access and education, and financial and economic measures. The Commission should identify required data to be tracked over time to form a complete picture of community impacts, as part of its objective to establish measurable goals and track progress. Such metrics should take into consideration that equity needs are regionally diverse, and one size may not fit all when measuring impacts.
- **ACCESS:** EPIC administrators should make information on innovative technologies, incentives, and financial mechanisms easily accessible and understandable to DVCs. The Commission should provide guidance to administrators in developing a consistent approach to simplify and streamline application processes, such as a "one-stop shop" providing assistance on all available incentive programs. The Commission should establish policies to address the challenges of split incentives that renters face in decarbonization efforts, including consistent coordination across other CPUC programs and proceedings.
- **OUTREACH:** EPIC administrators should work to enable better integration and coordination with local communities throughout the entire RD&D process. EPIC should meet DVCs at times and locations that work for them and consider the digital divide when hosting virtual outreach opportunities. Administrators should both acknowledge differences in communities and encourage opportunities for coordination and collaboration among them. Administrators should share among themselves information on community outreach. Additionally, Administrators should at a minimum apply the Disadvantaged Communities Advisory Group (DACAG) framework and seek input from the DACAG regarding project formulation and execution in DVCs.<sup>17</sup>

### 3.3 Principles for Emerging Strategies

Based on robust stakeholder input throughout the EPIC Strategic Goals Workshop series, ED staff proposes the following three principles to inform development of a framework for Emerging Strategies for a net zero future which may include such technologies as clean renewable hydrogen, geothermal energy, floating offshore wind, biomass conversion, carbon management, fuel cells, and artificial intelligence.

- **EQUITY:** The CPUC should develop EPIC RD&D strategies and equity guideposts to achieve the last 10% of the 100% carbon free grid, and study potential impacts of emerging strategies on DVCs and develop project protocols to avoid harm from unintended consequences.
- **INNOVATION GAPS:** EPIC administrators should undertake research where there are gaps in emerging strategies to inform opportunities for innovation in CO<sub>2</sub> removal. Further, EPIC should perform resource availability and potential studies highlighting California-specific opportunities for emerging technologies such as offshore wind, geothermal, and clean renewable hydrogen.
- **COST:** EPIC administrators should prioritize RD&D that can significantly reduce ratepayer costs through strategies to reduce the capital and deployment costs of decarbonization by

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<sup>17</sup> Formation of the DACAG was called for in Senate Bill 350, the Clean Energy and Pollution Reduction Act of 2015. The DACAG Equity Framework is accessible online at: <https://www.cpuc.ca.gov/dacag>



performing demonstrations, testing, and streamlining of permitting for emerging carbon-neutral technology.

### **3.4 Principles for Safety (including Cybersecurity) Strategies**

Based on robust stakeholder input throughout the EPIC Strategic Goals Workshop series, ED staff proposes the following two principles to support development of a framework for Safety and Cybersecurity strategies.

- **UNCERTAINTY:** EPIC administrators should take situational uncertainty into account, including considerations of extreme weather, increased climate variability, and physical and cyber threats to electric system infrastructure.
- **COORDINATION:** EPIC administrators should assess the unique role it could play in advancing cybersecurity standards and protocols as a partner with the Federal government. This may include: 1) developing uniform cybersecurity best practices for smart devices, 2) supporting robust and uniform data sharing and standard cybersecurity protocols for transportation electrification and DER, and 3) addressing issues unique to California transmission and distribution systems, including developing implementation standards with local differences in mind.

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## Appendices

### Appendix 1    **EPIC Strategic Goal Stakeholder Workshop Final Reports<sup>18</sup>**

- A.1 Kick-Off Workshop, August 16, 2023
- A.2 Equity in RD&D Workshop, August 17, 2023
- A.3 Grid Modernization Workshop, September 6-7, 2023
- A.4 Built Environment Workshop, September 19, 2023
- A.5 New and Emerging Strategies Workshop, September 20, 2023

**(End of Attachment A)**

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<sup>18</sup> The EPIC Strategic Goal Stakeholder Workshop Final Reports are attached to the *Administrative Law Judge's Ruling Requesting Comments On Staff Proposal* as Attachment B.