FINAL Draft

For consideration at April 21, 2022 CPUC Voting Meeting

California Public Utilities Commission DISTRIBUTED ENERGY RESOURCES ACTION PLAN ALIGNING VISION AND ACTION



Table of Contents

| Table of Contents | 2 |
|--|----|
| Introduction | 3 |
| Scope and Structure of DER Action Plan 2.0 | 5 |
| Track One: Load Flexibility and Rates | 8 |
| Track Two: Grid Infrastructure | 11 |
| Track Three: Market Integration | 15 |
| Track Four: DER Customer Programs | 18 |
| Conclusion and Next Steps | 21 |
| Appendix A: Distributed Energy Resources Action Plan 2.0 "Track" and Related Proceedings | 21 |
| Appendix B: Definitions | 23 |
| Appendix C: Acronyms | 27 |

Introduction

In 2018, the California Legislature enacted Senate Bill 100, "The 100 Percent Clean Energy Act of 2018", which sets a 2045 goal of powering all retail electricity sold in California and state agency electricity needs with renewable and zero-carbon resources; and requires the California Energy Commission (CEC), California Public Utilities Commission (CPUC) and California Air Resources Board (CARB) to use programs under existing laws to achieve 100 percent clean electricity.

California leads the nation in the growth of distributed energy resources (DER), and this will continue due to policies such as SB 100,¹ new commitments to increase transportation and building electrification, continued commitment to Behind-the-Meter solar (BTM) generation and storage, and incentive programs like the Self-Generation Incentive Program (SGIP). Given these trends and the ongoing need for a coordinated strategic vision to guide DER policy, the time is ripe to prepare a new DER Action Plan (Plan 2.0).

The goal of this Distributed Energy Resources Action Plan (DER Action Plan, or DER Action Plan 2.0) is to ensure that DER policy implementation in support of SB 100 and California's energy and climate goals is coordinated across proceedings related to grid planning, affordability, load flexibility, market integration, and customer programs. Ultimately, this DER Action Plan 2.0 seeks to align the CPUC's vision and actions to maximize ratepayer and societal value of an anticipated high-DER future.

In 2016, the CPUC endorsed an earlier version of a DER Action Plan² covering the 2016-2020 period. The 1st Plan, DER Action Plan 1.0, served as a roadmap to coordinate activities across multiple CPUC proceedings aimed at advancing DER policy and reforming utility distribution planning, investment, and operations. The CPUC has completed the majority of the Action Elements set forth in the first Plan and now seeks to adopt a new DER Action Plan to guide the next phase of DER advancement.

The Need for a DER Action Plan 2.0 Update for 2022-2026

Policies and trends that indicate a future with sustained high growth of DERs are:

• The CEC's 2020 Integrated Energy Policy Report forecasts large increases in BTM solar generation (260 percent), BTM energy storage capacity (770 percent), and electric vehicle

¹ See also: Executive Order B-48-18, Executive Order N-79-20, and the California Energy Commission (CEC) 2018 EV projections in the Staff Report, *California PEV Infrastructure Projections 2017-2025* (Docket 17-ALT-01, 2018-2019 Investment Plan Update for the Alternative and Renewable Fuel and Vehicle Technology Program).
² The CPUC's Distributed Energy Resources Action Plan 1.0 from 2017 can be viewed at:

https://www.cpuc.ca.gov/about-cpuc/divisions/energy-division/der-action-plan

demand (370 percent) from 2019 to 2030.³ Among the factors driving DER growth include advancements in technology and cost declines.⁴

- California's transportation electrification (TE) and climate goals are expected to result in millions of electric vehicles (EVs) and electric vehicle service equipment (EVSE) DERs by 2030. Executive Order N-79-20 sets a target for 100 percent of new cars and passenger trucks sold in California to be zero emission by 2035.
- Customer incentive programs such as SGIP continue to drive DER expansion by increasing the financial appeal of DER investment.
- Legislation aimed at reducing greenhouse gas (GHG) emissions from buildings, ongoing Commission rulemakings,⁵ and local "reach codes"⁶ are likely to further drive electrification in buildings.
- California's Electricity System of the Future Report, Governor Gavin Newsom July 2021

DER Action Plan 2.0 seeks to maximize the ratepayer and societal value of millions of DERs on the grid, while ensuring affordable and equitable rates. Some of the aspirational vision elements of the first DER Action Plan are still relevant today, and more progress is needed in other areas. Some issues and challenges that were not prevalently featured in the first Plan include: accelerated transportation and building electrification, microgrids and resiliency, flexible loads and dynamic rates, and equity and affordability.

Purpose of DER Action Plan 2.0

Similar to the previous Plan, DER Action Plan 2.0 will serve as a roadmap for CPUC decisionmakers, staff, and stakeholders as they facilitate forward-thinking DER policy. The DER Action Plan 2.0 is intended to *coordinate* development and implementation of policy related to DERs, *not to determine outcomes* of individual proceedings. Because many of these policies are strongly linked to initiatives at the California Air Resources Board, the California Energy Commission, and the California Independent System Operator, the CPUC remains committed to close coordination with these agencies in the development and implementation of this plan.

The CPUC is committed to ensuring that DER policy is harmonized with CPUC policy directives related to safety, reliability, affordability, equity and environmental stewardship. For example, the CPUC adopted an Environmental and Social Justice (ESJ) Action Plan⁷, which establishes the following goals:

³ BTM solar generated 15,800 GWh in 2019 and is forecast to generate 41,200 GWh by 2030 (mid case). BTM energy storage capacity was 340 MW in 2019 and is forecast to reach 2,600 MW by 2030 (mid case). Consumption by all types of EVs is currently about 5,000 GWh and is forecast to reach 18,500 GWh by 2030. See *Final 2020 Integrated Energy Policy Report Update Volume III California Energy Demand Forecast Update*, March 23, 2021, TN #237269.

⁴ Refer to the Wood Mackenzie July 2020 DER outlook report previously cited. The report considers reduced DER installations due to the 2020 pandemic and forecasts the 2019 peak in DER capacity installations will not be exceeded until 2024.

⁵ Senate Bill 1477 and AB 3232 and Building Decarbonization (R.19-01-011) and Long-Term Gas System Planning (R.20-01-007) proceedings.

⁶ Reach codes are local building codes that seek higher energy savings and emission reductions than those required by the State's Title 24 building standards.

⁷ Environmental and Social Justice Action Plan (ca.gov)

- Consistently integrate equity and access considerations throughout CPUC proceedings and other efforts.
- Increase investment in clean energy resources to benefit ESJ communities, especially to improve local air quality and public health.
- Increase climate resiliency in ESJ communities.
- Enhance outreach and public participation opportunities for ESJ communities to meaningfully participate in the CPUC's decision-making process and benefit from CPUC programs.
- Enhance enforcement to ensure safety and consumer protection for ESJ communities.
- Promote economic and workforce development opportunities in ESJ communities.
- Improve training and staff development related to environmental and social justice issues within the CPUC's jurisdiction.
- Monitor the CPUC's environmental and social justice efforts to ensure that they are achieving their objectives.

Furthermore, in 2018 the CPUC adopted a comprehensive Tribal Consultation Policy⁸ that sets forth the following goals:

- Recognize and respect Tribal sovereignty.
- Encourage and facilitate Tribal government participation in CPUC proceedings.
- Give meaningful consideration to Tribal interests in issues within the CPUC's jurisdiction.
- Encourage and facilitate Tribal government participation in CPUC-approved utility programs.
- Protect Tribal cultural resources.
- Encourage investments by Tribal governments and Tribal members in onsite renewable energy generation, energy efficiency, low carbon transportation, and energy storage.

Ongoing Tribal consultation on the DER Action Plan 2.0 will further the identified goals, particularly given the increase in public safety power shutoff events, expansion of Tribal microgrid projects, and the need for expanded rural EV infrastructure.

Scope and Structure of DER Action Plan 2.0

The scope of DER Action Plan 2.0 includes an overall vision statement and four distinct tracks that collectively advance the CPUC's overall vision for a high DER future. Similar to the first Plan, the four tracks in DER Action Plan 2.0 serve to highlight how a unified vision for the development of DERs can support CPUC consideration of specific actions undertaken through various proceedings and external initiatives. By highlighting the four central tracks that comprise an overall DER Action Plan, each with its own shared common vision elements, themes, and objectives, CPUC staff and stakeholders can strive to work efficiently and coherently towards a clean energy future with a large participation of DERs.

⁸ https://www.cpuc.ca.gov/about-cpuc/divisions/news-and-public-information-office/business-and-community-outreach/tribal-office

The scope of the DER Action Plan 2.0 is focused on electric sector DERs.

Overall Vision Statement

DER deployment will play an integral role in a 100% clean energy future. The CPUC continuously explores new policies, technologies, business models, and ideas to advance distributed energy resources deployment in a manner that maximizes ratepayer and societal value and contributes to equity and affordability for all customers.

Tracks and Related Proceedings

CPUC proceedings can be wide-ranging in scope with touchpoints that interact with many other proceedings. The tracks are logically grouped into related proceedings. We recognize that some proceedings may cut across several tracks as conceptualized in this Plan. For simplicity, where proceedings feature most prominently within the vision elements for a particular track, they are included in that "primary" track, even if they may touch upon other tracks. See Appendix A for a list of Track and Related Proceedings.

Track 1) Load Flexibility and Rates

The Load Flexibility and Rates Track is focused on improving demand-side resource management through more effective, integrated demand response (DR) and retail rate structures that promote widespread, scalable, and flexible load strategies enabled by electrification and DER deployment opportunities. The vision and actions address grid issues associated with the growth of renewables, electrification, and DER adoption in support of California's clean energy goals, minimize cost of electricity service, and provide fair compensation for grid services provided by customer owned DERs.

Track 2) Grid Infrastructure

The Grid Infrastructure Track is focused on CPUC actions to guide utility infrastructure planning and operations to make the most of existing and future infrastructure and maximize the value to ratepayers of DERs interconnected to the electric grid.

Track 3) Market Integration

The Market Integration Track is focused on the efficient integration of Behind-the-Meter (BTM) and Front-of-the-Meter (FTM) DERs into wholesale markets to support renewable integration, GHG reduction, and grid reliability. This track addresses how market integrated DERs connected to the customer, distribution, and transmission grid "domains" can be harnessed and compensated to produce multiple streams of benefits.

Track 4) DER Customer Programs

The DER Customer Programs Track focuses on improving coordination, planning and developing consistent metrics across DER proceedings related to customer programs to maximize their contributions to GHG reductions and other state energy goals. The goal is to enable all customers to effectively manage their energy usage in a manner that ensures equitable participation and distribution of benefits, alignment with evolving rate design and load flexibility, alignment with distribution planning objectives, and alignment with integrated resource planning objectives.

Vision and Action Elements

Each track consists of "Vision Elements" and "Action Elements." The scope and structure of the Action Plan are necessarily limited. Because of the sheer breadth of issues touching DERs and the necessity for a concise and implementable plan, certain intermediate goals and milestones may be omitted. The Action Elements reflect ongoing and future efforts that can be undertaken to achieve the vision. Where Action Elements indicate "by year X," this means by the end of that calendar year.⁹ Action elements are intended to be "SMART": specific, measurable, achievable, realistic, and time-bound.

⁹ Dates set out in the DER Action Plan 2.0 are aspirational, and not binding, on proceedings.

TRACK ONE: Load Flexibility and Rates

The Load Flexibility and Rates Track is focused on improving demand-side resource management through more effective, integrated demand response and retail rate structures that promote widespread, scalable, and flexible load strategies enabled by electrification and DER deployment opportunities. The vision and actions address grid issues associated with the growth of renewables, electrification, and DER adoption in support of California's clean energy goals, thereby minimizing the cost of electricity service, and providing fair compensation for grid services provided by customer owned DERs.

Vision Element 1A

Dynamic and real time pricing (RTP) rate options that address load flexibility objectives are available for each customer class and customers are educated to make informed choices.

Action Elements

- 1. By 2023, the large investor-owned utilities (IOUs) should design and complete qualitative and quantitative market research to evaluate tolerance and acceptance of a range of dynamic and RTP options for all customer segments. Small multijurisdictional utilities (SMJUs) and community choice aggregators (CCAs) are encouraged to participate in this effort.
- 2. By 2024, utilities, in coordination with CCAs, SMJUs, and ESPs, should finalize marketing, education, and outreach (ME&O) programs that are developed in a formal load flexibility rulemaking and working group implementation process to educate all customers, both bundled and unbundled, on opt-in dynamic and RTP rates. The ME&O programs should include efforts to educate lower-usage, low-income and vulnerable segments of residential and small commercial customers, pursuant to the protections set forth in PU Code Section 745 to educate customers and meet ESJ directives.
- 3. By 2025, all utility customer classes have access to multiple rate options, including dynamic and RTP rate pilots, that are informed by qualitative and quantitative market research and supported by ME&O programs to match various customer preferences and engagement levels. SMJUs, ESPs, and CCAs are encouraged to participate in the pilots, and present dynamic rate offerings for their generation rate components in coordination with the IOU proposals.

Vision Element 1B

Available rates reflect time-variant and location-based marginal costs and are transparent, equitable, and aligned with load management standards.

Action Elements

1. By Spring 2022, CPUC staff should issue a white paper proposal and recommend a load flexibility rulemaking process that solicits stakeholder feedback and considers whether and how dynamic and RTP rates can incorporate time-variant and location-based marginal costs.

- 2. By Summer 2022, CPUC staff should initiate an ongoing stakeholder working group to address issues related to flexible load management and dynamic and RTP rates, including the development of IOU pilots that offer dynamic and RTP rates across all customer classes.
- 3. Starting in 2022, CPUC and CEC staff should continuously coordinate on elements of rate design and tariffs to ensure alignment with load management standards.
- 4. In 2022-2023, the CPUC will assess the potential for time-differentiated, dynamic transmission rates, and in 2023, will determine **whether** to introduce these concepts and proposals in each new transmission owner (TO) rate case for consideration at FERC.

Vision Element 1C

Dynamic and real time pricing (RTP) rates are designed to maximize participation and benefits for customers in disadvantaged communities, and to minimize pricing volatility and bill impacts through robust consumer protection elements.

Action Elements

- 1. By 2022, the CPUC should conduct a workshop and/or working group sessions to address stakeholder recommendations for maximizing equity and inclusion considerations, including participation of tribal nations and tribal utilities, in dynamic and RTP rate designs to increase opportunities for widespread DER adoption.
- 2. By 2023, IOUs conduct research and issue recommendations to support successful deployment of dynamic/RTP rates to disadvantaged, low income and vulnerable customers.

Vision Element 1D

Available rates reflect cost causation and provide opportunities for fair compensation for the comprehensive benefits provided by DERs.

- 1. By 2022, the CPUC and the CEC should coordinate to address data collection and sharing requirements needed to support demand forecasts of customers participating in dynamic and RTP rates.
- 2. By 2023, the CPUC should begin a nonresidential rate design proceeding (or track of the load flexibility rulemaking) to evaluate DER cost studies and recommend changes to existing IOU Transmission and Distribution rate designs.
- 3. By 2024, the IOUs should submit proposals for opt-in and opt-out dynamic and RTP rates in certain customer classes, as permitted by law, informed by pilot evaluation studies in either a load flexibility rulemaking process or separate rate design window applications.

- 4. By 2024, the CPUC should analyze data from dynamic, RTP, and traditional rate offerings through independent evaluation studies to assess cost causation of DERs on the different rate offerings, and whether DERs are receiving fair compensation for the comprehensive benefits provided to the grid.
- 5. By 2025, the CPUC should evaluate the costs and benefits of dynamic and RTP rates through pilot evaluation studies to inform rate design options for IOU implementation.

Vision Element 1E

Rates are designed to allocate costs in alignment with cost causation principles for all customers enrolled in each rate tariff.

Action Elements

- **1.** By 2024, the CPUC should assess cost-shift associated with opt-in dynamic or RTP rate pilots, at each customer class level.
- 2. By 2025, the CPUC should approve rate designs that incorporate principles that minimize the potential of cost-shift between customers on dynamic and RTP rates and other customers unless deemed necessary to meet specific policy goals.

Vision Element 1F

A menu of time-varying rate options is made available to load management technologies through a "universal access"¹⁰ pricing platform and customized rates marketing, education and outreach for all customer segments.

Action Elements

- 1. By 2023, the CPUC initiates consideration of proposals to ensure that customers, technology vendors, and third-party service providers have access to pricing information for a wide range of rates through a "universal access" pricing platform.
- 2. By 2023, the CPUC initiates an evaluation of process, value, and criteria associated with third-party subscription "pay for load shape" load management services, including an assessment of how to promote participation and benefits to low-income and ESJ communities.

Vision Element 1G

¹⁰ Universal access refers to statewide access to pricing information available via online portal, search engines, apps, inhome devices (i.e., NEST or other programmable thermostats), or other relevant technologies).

Potential strategies, including non-ratepayer-funding proposals, are considered to address affordability concerns associated with high electric rates that may impede adoption of transportation and building electrification DER technologies, especially among low-income and ESJ communities, and tribal nations and tribal utilities.

Action Elements

1. By 2022, a workshop and/or series of working group meetings will be convened in an appropriate proceeding (for example, Rulemaking (R.) 20-08-022 concerning accessible financing) to address affordability issues and barriers to participation in the transportation and building electrification DER marketplace, including alternative sources of funding for DERs, supporting technologies, and third-party load management services.

Vision Element 1H

Electric vehicle owners, fleet operators, and charging station managers respond to price and/or load management signals that reflect the real-time and dynamic costs and benefits of charging at different times to optimize grid operations and reduce charging costs.

- 1. By 2024, utilities should offer Commercial EV owners and fleet operators RTP pilot rates set forth in the current General Rate Case (GRC) cycle and individual IOU EV rate applications, which address grid optimization issues.
- 2. By 2025, CPUC staff should complete analysis of RTP pilots to assess the ability of EV charging loads and BTM energy storage to integrate excess supply of renewables through flexible load management response to dynamic price signals.
- **3.** By 2026, CPUC staff should analyze the impact of RTP rates and consider whether EV owners and fleet operators should be offered such rates on an opt-out basis, as permitted by law.

TRACK TWO: Grid Infrastructure

The Grid Infrastructure Track is focused on CPUC actions to guide utility infrastructure planning and operations to make the most of existing and future infrastructure and maximize the value to ratepayers of DERs interconnected to the electric grid.

Vision Element 2A

The CPUC will guide the utilities to modernize the electric grid for a high DER future and will consider a range of distribution system operator roles and responsibilities to determine a distribution system operator (DSO) model that best enables swift evolution of grid capabilities and operations to integrate higher levels of DER to meet the State's 100 percent clean energy goals.

Action Elements

- 1. Starting in 2022 the CPUC will initiate a study on how alternative DSO models compare in their ability to plan and operate a high DER grid, unlock economic opportunities for DERs to provide grid services, limit market power, reduce ratepayer costs, increase equity, support grid resiliency, and meet State policy objectives.
- 2. In 2022 and 2023, the CPUC will hold stakeholder workshops on topics related to the DSO study investigation.
- 3. In 2023, the CPUC will present the completed DSO report at an En Banc hearing.
- 4. In 2024, the CPUC will consider findings of the DSO report in the High DER Future Proceeding.

Vision Element 2B

Utility infrastructure business processes, including planning, all-source resource acquisition, and operations, are transparent, responsive to local and tribal conditions and community needs, and seamlessly integrate cost-effective distributed energy resources.

- 1. Ongoing utilities continue to implement the systems and processes needed to_ensure the export of accurate, current, and comprehensive system-wide distribution system planning, load, and DER data to the CPUC, CEC and other state government agencies to inform state planning processes on an annual or more frequent basis. Planning processes include and are not limited to the CAISO. IRP, and DPP. The CPUC will implement similar data sharing protocols for all other CPUC jurisdictional LSEs to share data needed to inform state planning processes.
- 2. In 2022, CPUC staff documents all existing Distribution Investment Deferral Framework requirements into a formal Guidelines document to be updated regularly.
- 3. In 2022, utilities refine their Integration Capacity Analysis (ICA) tools to provide reliable, accurate, and useful data to developers and consumers seeking to integrate distributed energy

resources, including generation and load, to make the most of existing ratepayer investments.

- 4. By 2023, utilities establish or improve existing data portals to enhance accuracy, usefulness, and usability for the following two primary use cases: a) provide Tribal and local governments with information for the coordinated development of resilient energy infrastructure and emergency response processes to address community needs and reduce the social burden caused by large-scale disruptions; b) provide DER developers with information for project planning, siting, and interconnection to maximize the net societal benefits of DERs.
- 5. By 2024, the CPUC considers proposals to reform the utility Distribution Planning Process (DPP) to achieve goals such as, but not limited to:

a) enhance community engagement needs, including with Tribal and local governments and ESJ communities, to ensure equity and local concerns are adequately addressed. These concerns may include the improvement and development of utility infrastructure that sufficiently serves all households, businesses, and institutions, as well as options for capacity building and development of such resources in a manner that fits a community's or Tribe's needs and resource limitations; is and

b) consider how utilities can better integrate DERs into their standard DPPs proactively, rather than considering DERs on the back end of planning only as deferral alternatives to planned investments.

Vision Element 2C

Utility operations continuously improve interconnection performance, leading to greater transparency, cybersecurity, speed, and cost certainty.

Action Elements

- Ongoing utilities continue to pilot a notification-only interconnection process and collect data to determine practicality, safety, and associated costs. Advice Letters due in late 2023 will recommend the parameters under which this approach may be extended to other interconnection use cases.¹¹
- 2. By 2022, utilities implement a transparent technical review process to approve, after determining that safety, cybersecurity, and reliability requirements have been met, the use of technologies or products that can reduce the cost of DER integration or optimize the benefits of DER (e.g., lower cost relays, multi-port utility revenue meters).
- 3. Starting in late 2022, utilities use the IEEE 2030.5 communications protocol for telemetry and to pilot the use of advanced smart inverter control functions for operational flexibility. 12

¹¹ D.21-06-002, OP 1 **12** D.21-06-002, OP 18

- 4. Ongoing Output ilities continue tracking the installation of both AC-coupled and DC-coupled vehicle-to-grid interconnections 13.14
- 5. Starting in 2022, the CPUC revisits interconnection fees and the cost allocation for distribution upgrades, with a goal of reaching a decision on these topics by Q4 2022.
- 6. By 2022, utilities begin tracking the energy stored in the form of hydrogen and subsequently returned to the grid by DERs, as well as the method of production for that stored hydrogen.

Vision Element 2D

Utilities implement standards for data communications and advanced inverters that facilitate visibility, operational control, provision of grid services, and interoperability of distributed energy resources and are consistent with best practices for ensuring cybersecurity.

Action Elements

- 1. In 2022, the CPUC convenes a Smart Inverter Operationalization Working Group and, by 2023, oversees completion of a working group report, staff proposal, and stakeholder process to develop use cases, guidelines, and an implementation plan.
- 2. Starting in 2024, utilities update their grid modernization plans to ensure grid investments and capabilities better prepare the electric grid for a high DER future including priority smart inverter operationalization use cases and interoperability of DER.
- 3. In 2022, utilities identify foundational industry or national standards for communications (e.g., IEEE 2030.5-2018 IEEE Standard for Smart Energy Profile Application Protocol, SunSpec Alliance standards) and best practices for cybersecurity to guide development of DERs that maximize the likelihood of interoperability with the evolving distribution grid, including third-party aggregators.
- 4. By 2023, utilities conduct a gap analysis in consultation with CPUC and CEC staff to identify any standards or best practices that need to be developed for the electric grid, utilities, and DERs to facilitate development of DERs that will be interoperable with the evolving distribution grid.

Vision Element 2E

Utilities integrate the anticipated impacts of electrification into distribution planning to maximize public benefits, minimize costs, and optimize deployment of complimentary and supporting infrastructure and distributed energy resources.

¹⁴ D.20-09-035, OP 43

- 1. By 2023, in coordination with CEC, CPUC staff completes a comprehensive, data-driven electrification impacts study to estimate the scope of distribution grid buildout and identify opportunities to mitigate costs, such as using DER power control systems and limited generation profiles.
- 2. By 2025, utility DPPs and DIDF incorporate findings of the CPUC electrification impact studies and evolve distribution planning in ways that effectively anticipate the impacts of electrification to maximize public benefits, minimize cost, and optimize deployment of complimentary and supporting infrastructure and DER.

TRACK THREE: Market Integration

The Market Integration Track is focused on the efficient integration of BTM and FTM DERs into wholesale markets to support renewable integration, GHG reduction, and grid reliability. This track addresses how market integrated DERs connected to the customer, distribution, and transmission grid "domains" can be harnessed and compensated to produce multiple streams of benefits. Included in this track will be the consideration of any federal versus state jurisdictional ratemaking issues that may be relevant to integrating DERs into the wholesale market.

Vision Element 3A

Energy storage and hybrid configurations with other DERs participate in wholesale markets to support efficient grid operation focused on integration of renewable energy, reduction in system cost, grid reliability, and reduction in GHG emissions.¹⁵

Action Elements

- In 2022, CPUC staff completes an evaluation of energy storage procurement and operational performance measuring achievement of energy storage policy goals including GHG reduction, renewable integration, and grid optimization, and identifying changes that can improve the future operation and procurement of energy storage.¹⁶
- 2. In 2022, CPUC staff issues a report with the results of its inaugural energy storage procurement study. The study scope includes a review of actual wholesale market participation, operations, identification of potential wholesale market-related barriers, a review of policy and market design practices in other jurisdictions, and consideration of shifts in future wholesale market value streams. Study recommendations include market enhancements that could increase opportunities for energy storage resources to participate in wholesale markets in a competitive and efficient manner.
- **3.** In 2022, the CPUC will hold two public workshops for the energy storage procurement study in which stakeholders can comment on the study's draft findings.
- 4. By 2023, the CPUC should consider the findings of the energy storage procurement study in one or more relevant proceedings.
- 5. By 2026, CPUC staff completes the 2nd evaluation of energy storage procurement as required by CPUC Decision.

Vision Element 3B

DERs, including those being counted for Resource Adequacy, receive fair compensation when providing multiple unique services to the wholesale market, distribution grid, and end-users ("value stacking"). Rules and procedures are in place governing how DERs may participate in the wholesale market while providing distribution capacity and other services to distribution utilities and providing customer-level services such as bill management or

¹⁵ See D.20.06-031 and D.21-06-029.

¹⁶ This study is required under CPUC Decision 13-10-040.

backup power. Rules include a clear prioritization of services in case of reliability or emergency events. Rules include appropriate safeguards to avoid cross subsidies between retail and wholesale jurisdiction.

Action Elements

- By 2023, the CPUC should determine in a proceeding, in consultation with the CAISO, the priority multi-use application (MUA) policy issues that should be resolved to further the MUA framework. This effort will take into consideration the report of the R.15-03-011 MUA Working Group presented to the CPUC in 2018.
- 2. By 2024, the CPUC and CAISO should identify key DER services and prioritization for those services based on reliability and resiliency implications. The CPUC should identify any modifications or amendments needed to enable DER value stacking.

Vision Element 3C

Market rules and market access tariffs are structured to facilitate BTM DERs to efficiently participate in wholesale markets, and to fulfill all requirements of that participation, including the Distributed Energy Resource Provider (DERP) participation model.

Action Elements:

- 1. In consultation with CAISO, the CEC, and distribution utilities under CPUC oversight, the CPUC reviews a) the results of the Emergency Load Reduction Program pilots identified in the Reliability OIR and b) feedback provided in the 2021 "Future of RA" workshops to develop a record in the RA Proceeding that addresses barriers and questions of whether, and if so, how exporting BTM DERs and Distributed Energy Resource Aggregations can more effectively participate in wholesale markets and qualify for Resource Adequacy (RA).
- 2. CPUC, CAISO, and CEC resolve questions of 1) whether and how exporting BTM DERs, including aggregations, should receive capacity credit and wholesale market compensation for the energy exported to the distribution grid by BTM DERs, and 2) whether and how the export capability of BTM DERs should be considered in various planning frameworks.
- **3.** By 2024, Rule 21 includes the study process and requirements for DER Aggregations interconnections for DERs with new or existing interconnection agreements.

Vision Element 3D

Wholesale Distribution Tariffs (WDTs) for interconnection of DERs to the wholesale grid allow for reasonable cost recovery from DERs seeking interconnection based on cost causation principles while providing those resources with full access to wholesale markets.

Action Elements

1. The CPUC participates in FERC proceedings and rulemakings related to WDTs for interconnection of DERs to the wholesale grid to represent the interests of California rate-payers and state energy and climate goals affected by FERC policy.

CPUC DER Action Plan 2.0 04/21/2022

TRACK FOUR: DER Customer Programs

The DER Customer Programs Track focuses on improving coordination, planning and developing consistent metrics across DER proceedings related to customer programs to maximize their contributions to GHG reductions and other state energy goals. The goal is to enable all customers to effectively manage their energy usage in a manner that ensures equitable participation and distribution of benefits, alignment with evolving rate design and load flexibility, alignment with distribution planning objectives, and alignment with integrated resource planning objectives.

Vision Element 4A

Coordinated DER potential studies and other resource- and technology-specific research provides the data needed for full incorporation of DERs into Integrated Resource Planning.

Action Elements

- 1. In 2022, the CPUC should prioritize which DER technology types should be studied as candidate resources for Integrated Resource Planning. The CPUC will coordinate with the CEC to ensure appropriate alignment with the demand forecast.
- 2. By 2023, the CPUC, in coordination with the CEC, should develop a plan for additional combined or individual resource studies to provide DER data needed for IRP

Vision Element 4B

CPUC decisions on budgets and priorities for all ratepayer-funded DER programs are informed by metrics and guidelines for cost-effectiveness, program impact, GHG emissions, equity, marketing, and other criteria that are as consistent as possible across programs and proceedings.

- 1. In 2022, the CPUC should consider whether and how to best conduct a programmatic review of all DER customer programs. The objective of the review is to assess, categorize, and compare DER programs and recommend programmatic changes to further align and achieve state goals and maximize ratepayer benefits.
- 2. By 2023, the CPUC should adopt DER cost-effectiveness protocols, similar to the existing Demand Response Cost-Effectiveness Protocols, that apply to all DER programs.
- 3. During 2023 and 2024, the CPUC should use the results of a programmatic review to develop other common metrics and guidelines in addition to cost-effectiveness.
- 4. During 2023 and 2024, the CPUC should use the results of a programmatic review to determine whether changes are needed to the portfolio of ratepayer-funded DER programs to achieve state goals and maximize ratepayer benefits. Such changes could include streamlining processes, combining complementary programs, prioritizing based on integrated resource planning results, or recommendations for deeper structural changes.

Vision Element 4C

Understanding the impact of DER programs on middle-income ratepayers and ESJ communities is an inherent part of program design and management.

Action Elements

1. By 2023, the CPUC should consider whether to develop guidelines and metrics that can be used across DER programs to understand and evaluate the impact of all DER programs on ESJ communities, to be done before program approval and as part of program evaluation.

Vision Element 4D

DER activities in tribal and ESJ communities are coordinated across proceedings and with the ESJ Action Plan, as well as with other Commission-wide and state-wide efforts.

Action Elements

- 1. By 2023, the CPUC should consider a framework for mutual eligibility between programs that have similar eligibility criteria and/or are seeking to expand access to similar technologies, with the goal of creating mutual eligibility or auto enrollment in all programs that focus on tribal and ESJ communities.
- **2.** By 2023, the CPUC should consider issuing rules for standardized data collection and reporting for all programs that target ESJ communities.
- **3.** During 2023 and 2024, the CPUC should use the results of a programmatic review to improve program design and organization across all programs that focus on ESJ communities, possibly combining similar programs.

Vision Element 4E

Data from smart meters and other ratepayer-funded "smart" devices is available for research purposes while retaining privacy protections and is used to improve program design and marketing.

- 1. Ongoing and continuing in 2022, in coordination with the Grid Infrastructure track, CPUC and CEC staff will coordinate data collection, storage, and analytical efforts related to smart meter data.
- 2. By 2023, the CPUC, in coordination with CEC, should consider updating existing rules and requirements for the release of smart meter data, and best practices for use of this data to improve customer adoption of DERs.
- 3. By 2023, the CPUC should consider adopting similar rules and requirements for the release of data from smart devices that receive incentives from ratepayer funds.

Vision Element 4F

End-of-life management programs are in place to ensure the effective collection, safe transport, and environmentally responsible recycling or re-use of DERs at end of life.

- 1. By 2024, the CPUC should consider whether to adopt measures to ensure photovoltaic panels deployed through CPUC-overseen programs are effectively and responsibly recycled or re-used at end-of-life, considering recommendations made by the interagency working group paper *Addressing End-of-Life Management of Photovoltaic Panels*.¹⁷
- 2. By 2024, the CPUC should consider whether to adopt measures to ensure electric vehicle and energy storage batteries deployed through CPUC-overseen programs are effectively and responsibly recycled or re-used at end-of-life, considering recommendations made by the interagency working group paper *Addressing End-of-Life Management of Electric Vehicle and Energy Storage Batteries.*¹⁸
- **3.** By 2024, the CPUC should, in coordination with CARB, consider adoption of measures for the end-of-life disposal of devices such as heat pumps that use refrigerants or other high global warming potential gases.
- 4. By 2024, the CPUC should consider whether and how to incorporate end-of-life disposal costs into DER program cost effectiveness tests.

 ¹⁷Photovoltaic Panels, Energy Storage Batteries, and Electric Vehicle Batteries (ca.gov)
 ¹⁸Photovoltaic Panels, Energy Storage Batteries, and Electric Vehicle Batteries (ca.gov)

Conclusion

This DER Action Plan 2.0 seeks to align the CPUC's vision and actions to maximize ratepayer and societal value of an anticipated high-DER future. CPUC staff will monitor the implementation of the DER Action Plan 2.0 and keep track of completed Action Items. An internal implementation structure will be established, consisting of subject matter experts from numerous sections of the CPUC's Energy Division.

Appendix A: Distributed Energy Resources Action Plan 2.0 "Track" and Related Proceedings

| Track | Proceeding Number | Proceeding Name |
|-------------------------------|-----------------------|--|
| Load Flexibility and Rates | | |
| | R.20-08-020 | Net Energy Metering |
| | A.20-10-011 | PG&E Day Ahead Hourly Real Time Pricing (DAHRTP) Rate and Pilot Application to Evaluate Customer Understanding and Supporting Technology |
| | SDG&E A.19-03- 002 | General Rate Case Phase 2 |
| | PG&E A.19-11-019 | General Rate Case Phase 2 |
| | SCE A.20-10-012 | General Rate Case Phase 2 |
| | A.17-12-011 | Rate Design Window Applications for evaluating and implementing default residential TOU rate designs. |
| | A.19-07-006 | SDG&E Application for Approval of Electric Vehicle High Power (EV-HP) Charging Rate Application |
| | Docket #19-OIR-1 | CEC's Load Management Standard |
| | Pending | Load Flexibility Management OIR, recommended by CPUC staff |
| Grid Infrastructure | | |
| | R.21-06-017 | High DER Future OIR |
| | R.17-07-007 | Streamlining Interconnection of Distributed Energy Resources and Improvements to Rule 21 |
| | R.19-09-009 | Microgrids OIR |

| | Various | General Rate Case Phase 1 proceedings for PG&E, SCE, and SDG&E |
|--------------|-------------------|--|
| | R.20-11-003 | Emergency Reliability |
| Market | | |
| Integration | | |
| | R.19-11-009 | Resource Adequacy |
| | | Energy Storage and Distributed Energy Resources, Energy |
| | | Storage Enhancements, Hybrid Resources, Transmission |
| | | Planning Process, Storage as a Transmission Asset, Dispatch |
| | CAISO stakeholder | Enhancements (decremental market power and bid floor), |
| | initiatives | Frequency Response Measures, and FERC Order 2222 |
| | | Streamlining Interconnection of Distributed Energy |
| | R.17-07-007 | Resources and Improvements to Rule 21 |
| | | Successor Energy Storage and/or Demand Response OIR(s), |
| | Pending | as recommended by CPUC staff |
| DER Customer | | |
| Programs | | |
| | R. 20-05-012 | Self-Generation Incentive Program |
| | R.14-10-003 | Integrated Distributed Energy Resources |
| | R.13-11-005 | Energy Efficiency OIR |
| | R.19-01-011 | Building Decarbonization |
| | R.18-12-006 | Transportation Electrification |
| | Pending | Demand Response Budget Applications due November 2021 |
| | | Successor to the Integrated Distributed Energy Resources |
| | | (R.14-10-003) successor OIR, as recommended by CPUC |
| | Pending | staff |

Appendix B: Definitions

Advanced Distribution Management System: (ADMS) See Distribution Management System.

Advanced Metering Infrastructure: (AMI) refers to the full energy consumption data measurement and collection system that includes advanced meters / Smart Meters at the customer site, communication networks between the customer and utility, and data collection and management systems that make the information available to the utility, customer, and authorized third party vendors.

Behind-the-Meter: (BTM) refers to electrical equipment and technologies that are interconnected on the customer's side of the electric meter. Customer-sited distributed energy resources (DERs) such as rooftop solar PV arrays are one of the most common examples of BTM resources.

CAISO: The California Independent System Operator is the electric grid operator for the transmission system, with responsibility to maintain reliability on one of the largest and most modern energy grids in the world, and operates a transparent, accessible wholesale energy market.

CARB: California Air Resources Board

Community Choice Aggregator: a governmental entity formed by one or more cities or counties to procure electricity for its residents, businesses, and municipal facilities.

CEC: California Energy Commission

CPUC: California Public Utilities Commission

Demand Response: (DR) refers to any change in electricity (net) demand made by the customer in response to an economic or grid signal to reduce, increase, or shift (net) demand relative to what the (net) demand level would have been in the absence of the signal. The change could be temporary or recurring in response to the signal to provide grid benefit (service).

Demand Response Auction Mechanism: (DRAM) a competitive solicitation mechanism run by the investor-owned utilities that enables distributed energy resource aggregators to offer their services to utilities and the state's wholesale energy markets. The commodity being traded is measured in kilowatt-months of capacity or the ability to reduce use or add energy for up to four hours at a time during the state's late afternoon and evening peaks, over the course of a month.

Disadvantaged Communities: DAC refers to the areas throughout California which most suffer from a combination of economic, health, and environmental burdens. These burdens include poverty, high unemployment, air and water pollution, presence of hazardous wastes as well as high incidence of asthma and heart disease. These areas represent the 25% highest scoring census tracts in State of California's CalEnviroScreen 3.0 tool.

Distributed Energy Resources: (DERs) include distributed renewable generation resources, energy efficiency, energy storage, electric vehicles, time variant and dynamic rates, flexible load management, and demand response technologies. Most DERs are connected to the distribution grid

behind the customer's meter (BTM), and some are connected in front of the customer's meter (FTM).

Distributed Energy Resources Aggregations: (DERAs) a CAISO initiative to allow small DERs—including energy storage resources—to aggregate into consolidated resources to meet the CAISO's extant minimum capacity requirement of 0.5 MW and participate in wholesale markets.

Distribution Management System: [DMS, also referred to as Advanced Distribution Management System (ADMS)] a software platform that can monitor and control the distribution system efficiently and reliably.

Electric Tariff Rule 21: (or Rule 21) refers to the CPUC jurisdictional tariff governing the utilities' interconnections of distributed energy resources.

Electric Service Provider: an entity that offers electric service to a retail or end-use customer, but which does not fall within the definition of an electrical corporation under Public Utilities Code Section 218.

Environmental and Social Justice Communities: (ESJ Communities) are identified as those where residents are:

- Predominantly communities of color or low-income;
- Underrepresented in the policy setting or decision-making process;
- Subject to a disproportionate impact from one or more environmental hazards; and
- Likely to experience disparate implementation of environmental regulations and socioeconomic investments in their communities.

These communities also include, but are not limited to:

- Disadvantaged Communities (Defined as census tracts that score in the top 25% of CalEnviroScreen 3.0, along with those that score within the highest 5% of CalEnviroScreen 3.0's Pollution Burden but do not receive an overall CalEnviroScreen score);
- All Tribal lands;
- Low-income households (Defined as household incomes below 80 percent of the area median income); and
- Low-income census tracts (Defined as census tracts where aggregated household incomes are less than 80 percent of area or state median income).

EV: (Electric vehicle) for purposes of this plan, EV refers to a battery-electric vehicles capable of being charged by plugging into an external power source.

Electric Vehicle Service Equipment: (EVSE) the equipment that interconnects the AC electricity grid at a site to the EV. Sometimes used more broadly to mean "charger station," whether AC or DC, but not including other behind-the-meter charging-related infrastructure.

Flexible Load Management: Steps taken to reduce power demand at peak load times or to shift some of it to off-peak times. This may be with reference to peak hours, peak days or peak seasons. The primary factor affecting electric peaks is air-conditioning usage, which is therefore a prime target for load management efforts, but electric vehicle charging load is rapidly emerging as a primary target of load management. Load management may be pursued by persuading consumers to modify behavior or by using equipment that regulates some electric consumption in response to time variant and dynamic prices.

General Rate Case: (GRC) is a proceeding used to address the costs of operating and maintaining the utility system and the allocation of those costs among customer classes. GRCs also determine the IOUs' allowed rate of return on capital investments. For California's three large IOUs, GRCs are parsed into two phases. Phase I of a GRC determines the total amount the utility is authorized to collect, while Phase II determines the share of the cost each customer class is responsible for and the rate schedules for each class. Each large electric utility files a GRC application every four years as of the 2020 general rate case plan decision D.20-01-002.

FTM– Front-of-the-meter: refers to DERs connected to the distribution and transmission grid on the utility side of the utility meter

Integrated Resource Plan: (IRP) is a comprehensive utility procurement plan that detail what resources are to be procured and how it will be done to comply with the State's climate and energy policies and adequately balance safety, reliability, and cost while meeting the State's environmental goals in SB 350 and SB 100.

Interoperability: The capability of two or more networks, systems, devices, applications, or components to externally exchange and readily use information securely and effectively.

Load Management Standard: Standards promulgated by the CEC with the goal of modifying a utility's load curve. The standards are intended to encourage load shedding (short-term energy reduction), load shifting to periods of high supply and/or low GHG emissions, and energy efficiency.

LSE:(Load Serving Entity) an electrical corporation, electric service provider, or community choice aggregator.

Multiple-Use Applications: (MUA) refers to the multiple benefits and services that energy storage devices can provide to the grid and customers to increase the economic value provided.

Net Energy Metering: (NEM) allows customers who generate their own energy ("customergenerators") to serve their energy needs directly onsite and to receive a financial credit on their electric bills for any surplus energy fed back to their utility. Customers who install small solar, wind, biogas, and fuel cell generation facilities to serve all or a portion of onsite electricity needs are eligible for the state's net metering program.

Order Instituting Rulemaking: (OIR) is a rulemaking proceeding opened by the CPUC to consider the creation or revision of rules, general orders, or guidelines in a matter affecting more

than one utility or a broad sector of the industry. Comments and proposals are submitted in written form. Oral arguments or presentations are sometimes allowed.

PEV: (plug-in electric vehicle) is a type of zero emission vehicle (ZEV) that has no tail pipe emissions. A plug-in electric vehicle is any motor vehicle that can be recharged from an external source of electricity, such as wall sockets, and the electricity stored in the rechargeable battery packs drives or contributes to driving the car. With 100% clean energy sources, a PEV can become a ZEV.

Program: Mechanism that provides incentives, education, or both to ratepayers to change their behavior, purchase an energy-saving or energy-generating device, or otherwise in engage in activities that help reach the state's energy or climate goals.

Procurement: Market-based mechanism for obtaining a DER such as an established CAISO market or a bidding process.

Real-Time-Pricing: (RTP) under real time pricing tariffs, electricity consumers are charged prices that vary over short time intervals, typically hourly, and are quoted one day or less in advance to reflect contemporaneous marginal supply costs.

Reliability: The ability to maintain power delivery in the face of routine uncertainty during normal operating conditions.

Resiliency: The ability to prepare for, absorb, adapt to, and recover from low probability, high-consequence disruptive events that could lead to long duration outages.

Resource Adequacy: (RA) is a regulatory requirement designed to provide sufficient resources to the California Independent System Operator to ensure the safe, reliable operation of the grid in real time. RA is a planning reserve margin of available generation resources.

Resource: A technology that provides an energy service.

Time-of-Use Rates: (TOU) is rate plan in which rates vary according to the time of day, season, and day type (weekday or weekend/holiday). Higher rates are charged during the peak demand hours and lower rates during off-peak (low) demand hours. Rates are also typically higher in summer months than in winter months. This rate structure provides price signals to energy users to shift energy use from peak hours to off-peak hours. Time-of-use pricing encourages the efficient use of the system and can reduce the overall costs for both the utility and customers.

Vehicle-Grid Integration: (VGI) is any method of altering the time, charging level, or location at which grid-connected light-duty electric vehicles, medium-duty electric vehicles, heavy-duty electric vehicles, off-road electric vehicles, or off-road electric equipment charge or discharge, in a manner that optimizes plug-in electric vehicle or equipment interaction with the electrical grid

Appendix C: Acronyms

| A/S | Ancillary Service |
|---------------------|--|
| ALJ | Administrative Law Judge |
| BTM | Behind the Meter |
| C&I | Commercial & Industrial |
| CAISO | California Independent System Operator |
| CARB | California Air Resources Board |
| ССА | Community Choice Aggregator/Aggregation |
| CEC | California Energy Commission |
| CESA | California Energy Storage Alliance |
| CPUC | California Public Utilities Commission |
| СНР | Combined Heat & Power |
| CSF | Competitive Solicitations Framework |
| DAC | Disadvantaged Community |
| DER | Distributed Energy Resources |
| DER Action Plan 2.0 | Distributed Energy Resources Action Plan 2.0 |
| DERA | Distributed Energy Resource Aggregations |
| DERMS | Distributed Energy Resource Management Systems |
| DERP | Distributed Energy Resource Provider |
| DR | Demand Response |
| DRP | Distributed Resources Plan |
| EDP | Emergency Dispatch Program |
| EE | Energy Efficiency |
| EM&V | Evaluation, Measurement, and Verification |
| ESA | Energy Savings Assistance |
| ESJ | Environmental and Social Justice |

| EV | Electric Vehicle |
|-------|---|
| FTM | Front of the Meter |
| GHG | Greenhouse Gas |
| GNA | Grid Needs Assessment |
| GRC | General Rate Case |
| ICA | Integration Capacity Analysis |
| IDER | Integrated Distributed Energy Resources |
| IEEE | Institute of Electrical and Electronics Engineers |
| IOU | Investor-Owned Utility |
| IRP | Integrated Resource Plan |
| ME&O | Marketing, Education, and Outreach |
| MUA | Multi-Use Application |
| NEM | Net Energy Metering |
| OIR | Order Instituting Rulemaking |
| PG&E | Pacific Gas & Electric |
| RFO | Request for Offers |
| RPS | Renewable Portfolio Standards |
| RTP | Real Time Pricing |
| SCE | Southern California Edison |
| SDG&E | San Diego Gas & Electric |
| SGIP | Self-Generation Incentive Program |
| SOC | Standard Offer Contract |
| TOU | Time of Use |
| ТРА | Third Party Administered |
| V2G | Vehicle to Grid |
| VGI | Vehicle Grid Integration |