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California's Distributed Energy Resources Action Plan: *Aligning Vision and Action*

May 3, 2017¹

Introduction

The California Legislature recently enacted legislation to further California's deep commitment to reducing greenhouse gas emissions and deploying distributed energy resources. Senate Bills 350 and 32, approved by the Governor in 2015 and 2016, commit California to reduce 2030 greenhouse gas emissions (GHG) by 40% below 1990 levels, by increasing to 50% the share of electricity to be produced by renewable generation, doubling targets for energy efficiency, and encouraging widespread transportation electrification. Assembly Bill 327, approved by the Governor in 2013, requires reform of utility distribution planning, investment, and operations to "minimize overall system cost and maximize ratepayer benefits from investments in preferred resources," while advancing time- and location-variant pricing and incentives to support distributed energy resources.²

Distributed energy resources (DER), which are defined as distribution-connected distributed generation resources, energy efficiency, energy storage, electric vehicles, and demand response technologies, are supported by a wide-ranging suite of California Public Utilities Commission (Commission) policies.³ The Commission is actively considering augmentations and refinements to many of these policies in Commission proceedings.⁴ This DER Action Plan (Action Plan) seeks to align the Commission's vision and actions to shape California's distributed energy resources future.

Senate Bill 350 requires the Commission to implement an integrated resource plan (IRP) process to identify optimal portfolios of resources to achieve the state's GHG goals and meet the challenge of renewable integration, and DERs will play an important role.⁵ The Commission anticipates that this Action Plan will inform, and be guided by, IRP as that process takes shape.

At the July 14, 2016 voting meeting, the Commission adopted fifteen strategic directives to guide staff activities throughout the agency. This DER Action Plan furthers several of those directives. Specifically, accomplishing the vision described in the Action Plan will support the directives related to rates and affordability, climate change, environmental sustainability, economic prosperity, and coordination with other governmental entities.

¹ The Commission endorsed the DER Action Plan at the November 10, 2016 Voting Meeting. On May 3, 2017, the Commission made the following non-substantive changes to the Plan in order to improve clarity: the "Continuing Elements" and "Action Elements" in each Track were consolidated into one set of "Action Elements" for each Track, elements were renumbered, and the text was modified to reflect these changes. No other modifications were made. A red-lined version of the DER Action Plan showing these changes and a document showing conversions between the old and new numbering systems are available on the Commission's webpage.

² Public Utilities Code §769(c)

³ See Appendix A, a matrix of existing DER sourcing mechanisms

⁴ Distributed Resource Plans: R.14-08-013; Integrated Distributed Energy Resources: R14-10-003; Energy Efficiency: R. 13-10-005; Energy Savings Assistance Program: A.14-11-002; Demand Response: R. 13-09-011; Distributed Generation: R.12-11-005; Energy Storage: R.10-12-007; Alternative Fuel Vehicles: R. 13-11-007; Combined Heat and Power: R. 15-07-028; Renewable Portfolio Standards: R. 14-07-002; Time of Use: R.15-12-012; Residential Rate Reform: R.12-06-013; Net Energy Metering: R.14-07-002

⁵ Public Utilities Code §454.51 and §454.52



Purpose

This DER Action Plan continues the Commission's support of DER, accomplishing four objectives:

- 1) **Provide a long-term *vision*** for DER and supporting policies;
- 2) **Identify *continuing efforts*** in support of the long-term vision;
- 3) **Assess and direct further near-term *action needed*** to support long-term vision;
- 4) **Establish a DER steering committee *responsible for*** sustained coordination of DER activities.

This DER Action Plan will serve as a roadmap for decision-makers, staff, and stakeholders working in support of California's DER future in order to facilitate proactive, coordinated, and forward-thinking development of related DER policy. This DER Action Plan is intended to guide 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 Commission remains committed to close coordination with these agencies.

Scope and Structure

To accomplish the purpose, a strategic scope and structure are endorsed. The scope includes three groups of related proceedings or initiatives:

1. **Rates and Tariffs**
2. **Distribution Grid Infrastructure, Planning, Interconnection and Procurement**
3. **Wholesale DER Market Integration and Interconnection**

The DER Action Plan includes "Vision Elements" and "Action Elements" for each proceeding grouping, detailed in the following section. The Action Elements are ongoing and future efforts that help achieve the vision.

The scope and structure of this DER Action Plan are necessarily limited. Because of the sheer breadth of issues touching DER, this Action Plan may not necessarily include all affected major policy areas (e.g., integrated resource planning (R.16-02-007)). A primary focus is on DER strategies that are sensitive to time and location. Many worthy intermediate goals and milestones may be omitted. This reflects the practical limitations of this Action Plan effort, and the reality that although the Commission can reasonably identify the starting block and finish line for work on DER, the rest will be determined as we go. Following our identification of Vision and Action Elements we state more fully how we will support that process, including action needed to expand this scope to complement other state energy policy priorities.



Vision and Action Elements

The following table sets forth the elements identified for each grouping:

(Note: Where Action Elements indicate “by year X,” this means by the end of that year.)

1. Rates and Tariffs

Vision Elements

- 1.A. A continuum of rate options, from the simple to complex, is available for customers, and customers are educated to make informed choices.
- 1.B. Rates reflect time-varying marginal cost.
- 1.C. Processes for adopting innovative rates and tariffs are flexible and timely.
- 1.D. Rates and demand charges better reflect cost causation and capacity benefits of DERs.
- 1.E. Rates remain affordable for non-DER customers.

Action Elements

- 1.1. Time of Use (TOU) Rulemaking (R.15-12-012), consideration of:
 - 1.1.a. TOU time periods
 - 1.1.b. Compendium of TOU rate designs.
- 1.2. Residential Rate Design (R.12-06-013), including the goal of default residential TOU by 2019, and implementation of:
 - 1.2.a. Marketing, Education, and Outreach for TOU
 - 1.2.b. TOU Pilots.
- 1.3. General Rate Case (GRC) Phase 2 (e.g., A.16-06-013) and Rate Design Window cases, consideration of: fixed charges, TOU periods and rates, nonresidential rate design, including enhancements to dynamic rates.
- 1.4. Appropriate rate designs to absorb renewables oversupply.
- 1.5. Consideration of Net Energy Metering (NEM) successor (R.14-07-002), including policy alternatives to reach disadvantaged communities.
- 1.6. By 2017, complete a review of non-residential demand charges and recommend alignment of pricing with DER vision elements.
- 1.7. By 2017, develop methodology for setting TOU periods.
- 1.8. By 2017, complete review of opt-in TOU residential pilots.
- 1.9. By 2017, consider changes to nonresidential rate design, including modification of demand charges.



- 1.10. By 2017, establish a forum for considering innovative rates and tariffs.
- 1.11. By 2018, start study of residential default TOU rates through pilots.
- 1.12. By 2018, ensure that analytical tools to assess the value of DERs support the review of NEM successor tariff (D.16-01-044).
- 1.13. By 2018, establish clear marketing, education and outreach plans that maximize the take-up of time-varying rates by customers able to take advantage of them with DERs.
- 1.14. By 2019, meet statutory requirements to default residential customers to TOU rates.

2. Distribution Planning, Infrastructure, Interconnection, and Procurement

Vision Elements

- 2.A. DERs are able to meet distribution grid needs through a transparent, seamless planning and sourcing process, resulting in increased DER deployment and grid reliability with decreased cost.
- 2.B. Investor-owned utilities (IOUs) are motivated to accelerate deployment of DER regardless of the impact on distribution capacity investment opportunities.
- 2.C. DER sourcing mechanisms are restructured to ensure that they are technology-neutral and competitively procured, where appropriate. Utility or affiliate ownership of DERs is also considered where it may be necessary to achieve market transformation or other public policy goals.
- 2.D. Cost effectiveness and valuation frameworks accurately and impartially reflect the full grid services, renewables integration, and GHG value of DERs.
- 2.E. Interconnection is facilitated by improving DER hosting capacity estimates to minimize the need for interconnection studies, and by ensuring greater cost certainty, streamlining utility application practices, and expediting resolution of disputes.
- 2.F. Sophisticated DER Growth Scenarios are regularly updated and inform proactive investments designed to strengthen DER hosting capacity and the efficiency of the distribution grid in identified growth areas and ensure net benefits to ratepayers of accommodating high penetrations of DERs.
- 2.G. Markets for distribution grid services are enabled through data communications and cybersecurity requirements.

Action Elements

- 2.1. Distributed Resource Plans (DRP) (R.14-08-013) proceeding, including consideration of:
 - 2.1.a. DRP demonstrations including establishing and testing integrated capacity and



locational net benefit methodologies

- 2.1.b. Grid condition data needed to support targeted DER sourcing
 - 2.1.c. Distribution infrastructure deferral framework, including reforms to consider DRP results in GRC Phase 1 proceedings (e.g., A.16-09-001)
 - 2.1.d. Grid modernization definition and characterization
 - 2.1.e. DER growth scenario forecast methodologies, including implementation of risk assessments as inputs to integrated resource planning.
- 2.2. Integrated Distributed Energy Resources (R.14-10-003) proceeding, including consideration of:
- 2.2.a. Competitive Solicitations Framework
 - 2.2.b. Integrated DER valuation and cost-effectiveness framework
 - 2.2.c. Utility incentive mechanism pilot.
- 2.3. Efforts to streamline interconnection of generation and storage facilities, including:
- 2.3.a. Implementing the cost envelope pilot and other D.16-06-052 directives
 - 2.3.b. Conducting a formal review of utility administration of Rule 21 to identify areas for process improvement
 - 2.3.c. Establishing a binding, 60-day dispute resolution process per Assembly Bill 2861.
- 2.4. Energy efficiency (R.13-11-005), including locational targeting to avoid or defer grid upgrades, and normalized metered energy consumption evaluation methods to increase visibility.
- 2.5. Periodic collection and review of demonstration activities, including enhancements, redirection, and augmentations where needed.
- 2.6. By 2016, begin Commission consideration of the use of a societal cost test in DER valuation.
- 2.7. By 2017, consider how existing DER sourcing mechanisms (e.g., programs and tariffs) should reflect location value and/or be transitioned to a competitive sourcing mechanism already reflecting locational value.
- 2.8. By 2017, the Commission concludes consideration of an independent distribution planning review process to ensure that DERs are being adequately evaluated in the context of utility distribution planning
- 2.9. By 2017, the Commission will conclude consideration of a grid modernization framework that shall provide guidance regarding the appropriate investments utilities should make to accommodate and facilitate higher penetrations of DERs, which may include required basic functionalities, data transmission and communications capabilities, and interoperability



standards.

- 2.10. By 2017, begin to consider the role of Distributed Energy Resource Management Systems to enhance grid management and maximize the value of DER deployment.
- 2.11. By 2018, the Commission will consider the use of Integration Capacity Analysis to streamline utility interconnection processes to accelerate DER deployment.
- 2.12. By 2018, consider developing guidelines to clarify the circumstances in which utility or affiliate ownership of DERs is appropriate, and review utility applications implementing Assembly Bill 2868.⁶
- 2.13. By 2020, fully operationalize advanced (beyond Phase 1) smart inverter functionalities to enhance the integration of DERs into the grid.

3. Wholesale DER Market Integration and Interconnection

Vision Elements

- 3.A. DERs participate robustly as grid resources through progressively greater visibility, dispatchability, and profitability in wholesale (and local) grid operations and markets.
- 3.B. DERs are appropriately enabled to earn multiple revenue streams by delivering multiple services to the wholesale market, distribution grid and end-users (“stacking value”). 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, including clear prioritization of services in case of reliability events.
- 3.C. Wholesale market rules and interconnection tariffs support behind-the-meter DERs.
- 3.D. Electric vehicle charging systems, and mobility and driving behaviors, can be predicted and overseen in the grid operations.
- 3.E. Non-discriminatory market rules and regulations for mobile electric transportation resources (addressing registration, interconnection, and physical connectivity) are established to support customer mobility.

Action Elements

- 3.1. Storage (R.15-03-011) proceeding and California Independent System Operator (CAISO) stakeholder processes, including consideration of market rules and regulatory policies for DER Multi-Use Applications.
- 3.2. Demand Response (R.13-09-011) proceeding and CAISO stakeholder processes, including consideration of IOU transition of demand response programs into the wholesale market

⁶ AB 2868 (2016) adds Public Utilities Code Section 2838.2 requiring utility applications to accelerate deployment of up to 500 MW of distributed energy storage.



and development of a “click-through” platform for DR direct participation.

- 3.3. Enhancement of demand response products and Proxy Demand Resource, including participation in ancillary services markets, viability of “reverse” demand response, and growth of third-party demand response aggregator participation in wholesale markets.
- 3.4. By 2017, consider issues regarding use of DER to meet both transmission and distribution system needs (e.g., optimizing dispatch) and related Federal Energy Regulatory Commission (FERC) jurisdictional issues.
- 3.5. By 2018, consider eligibility of NEM resources in wholesale markets.
- 3.6. By 2018, assess regulatory options to streamline Commission jurisdictional interconnection rules (Rule 21) and FERC interconnection rules such as Wholesale Distribution Open Access Tariff for behind-the-meter DERs
- 3.7. By 2018, complete research critical to vehicle-grid integration and incorporate results into transportation electrification policy.
- 3.8. Develop policies that ensure that transportation electrification infrastructure and rates avoid unreasonable cross-subsidies.

Implementation

To further the DER Action Plan, the Commission will establish the following ongoing oversight mechanisms:

- **Steering Committee** – A committee of staff will be constituted and given responsibility to oversee development of intermediate steps of this DER Alignment – those necessary to see the Action Elements lead to the Vision Elements. Among the tasks will be to coordinate implementation of the plan, facilitate communication across proceedings, periodically report to the Commission on current status, and prepare revisions to this action plan for subsequent consideration by the Commission. Another task will be to provide information to the Administrative Law Judge (ALJ) Division about development of these steps, and seek ALJ Division advice on appropriate procedural vehicles. The Steering Committee shall be supported by an analyst from the Energy Division.
- **Commission briefings** – Periodic briefings on the status of implementation will be provided at Commission meetings.
- **Future Revisions** – Staff may suggest revisions to the plan, as necessary, to respond to new legislation, new guidance from major proceedings such as IRP, advances in technology and DER markets, and other changes in circumstances.

Conclusion

Through this DER Action Plan the Commission reaffirms its commitment California’s clean energy future. We must continue to develop the market opportunities and remove unnecessary barriers to



unleash the full value that DERs can provide. The Commission must coordinate its efforts, both internally and with our sister agencies, to push efficiently toward these goals. This Action Plan reflects the Commission’s vision for achieving its DER goals.



Appendix A: Distributed Energy Resources (DER) Sourcing Mechanisms

(acronym / abbreviations list provided below)

Sourcing Mechanism	Brief Description	Applicable DER(s)	Applicable Customer Segment(s)	Proceeding(s)
TARIFFS				
NEM tariff	<ul style="list-style-type: none"> •Customers receive a full retail rate bill credit for energy they generate and export to the grid •Net surplus compensation at wholesale generation rate for annual true-up •Variations: V-NEM, NEM-A, FC-NEM 	RPS eligible resources; AES coupled w/ renewables	All sectors	R.14-07-002
FIT [e.g., WATER biogas, CREST, ReMAT, CHP, AB 1613]	Customer and utility enter into a long term contract to purchase wholesale power generation from clean energy resource	Varies	Varies; WATER FIT is for W and Wastewater (WW) agencies	R. 14-07-002 R. 15-06-028
RATES				
TOU rate	<ul style="list-style-type: none"> •Customers charged rate based on time of day that electricity is used •TOU period/rate design varies by IOU 	All DERs	<ul style="list-style-type: none"> •Mandatory for all non-residential + NEM customers •Opt-in for residential 	R.12-06-013; R.15-12-012; A.15-04-012; A.16-06-013
CPP rate	Default rate for all commercial and industrial customers. Customers pay peak pricing on event days and lower pricing on other days	DR, AES	<ul style="list-style-type: none"> •Default for all non-residential •PG&E has opt-in for residential 	GRC Phase 2; RDW
EV rates	<ul style="list-style-type: none"> •Customer rates exclusively for EV charging on a separate meter. All are TOU. •SDG&E VGI pilot examining "grid optimal" EV charging •SCE V2G LA AFB pilot examining optimal EV discharge for CAISO A/S frequency regulation 	EV	Residential and non-residential	R.13-11-007
INCENTIVE PROGRAMS				
IOU DR programs - various rate schedules [e.g., AC Cycling, TOU-BIP, API, CBP, DBP]	<ul style="list-style-type: none"> •Customers agree to lower demand during called events. Incentives may be offered to offset upfront costs or as reduced rates or both •Capacity payments + penalties for non-performance in certain programs 	DR, AES	All sectors	R.13-09-011



Sourcing Mechanism	Brief Description (e.g., CBP)	Applicable DER(s)	Applicable Customer Segment(s)	Proceeding(s)
Utility DR programs [e.g., PLS]	Load modifying DR program to incentivize mature TES technologies	Permanent Load Shifting (PLS)	Mostly non-residential	R.13-09-011
CSI	Incentives to customers installing eligible solar	Solar (PV and thermal)	Effectively only SDG&E non-residential (wait list)	R.12-11-005
SGIP	Incentives to customers installing eligible DERs	AES, wind, fuel cells, CHP	Residential (mostly AES), and non-residential (all technologies)	R.12-11-005
IOU EE Programs (mass market)	Deemed <i>upstream</i> incentives to manufacturers for lighting, etc.	EE	All sectors	R.13-11-005
Utility EE Programs	<ul style="list-style-type: none"> Deemed <i>midstream</i> incentives (to distributors) and <i>downstream</i> incentives (to customer) for HVAC, lighting, appliances, etc. Custom incentives for more complex projects 	EE	All sectors	R.13-11-005
Third-Party Implemented IOU EE Programs	• IOU EE portfolio implemented by third-parties, procured through competitive solicitations	EE	Mostly non-residential	R.13-11-005
TPA EE Programs	• Pilots administered by third-parties, such as MCE, SoCal REN, and BayREN	EE	Specialize in hard-to-reach segments (MF, small C&I)	R.13-11-005
ESA	<ul style="list-style-type: none"> Free installation of approved weatherization and EE measures for qualifying low-income customers Downstream delivery model via program contractors 	EE	Low-income residential	R.13-11-005
COMPETITIVELY PROCURED (RFOs)				
PRP + All-Source RFOs [e.g., SCE and SDG&E LCR]	CPUC-directed RFO process to meet need specified in LTPP. Follows IOUs' new generation procurement processes. RFO overseen by PRG. Contracts submitted by application.	EE, DR, RPS	Non-residential	A.14-11.012



Sourcing Mechanism	Brief Description	Applicable DER(s)	Applicable Customer Segment(s)	Proceeding(s)
SCE PRP	SCE voluntary initiative to procure (smaller) preferred resources projects in the West L.A. local area. Follows new generation RFO process, with refinements from LCR RFO experience.	EE, DR, RPS, AES	Mostly non-residential	A.15-12-013
Resource -specific competitive procurement [e.g., AES RFOs, SCE PV RFO, DRAM pilot]	<ul style="list-style-type: none"> •Third-party or aggregator bids for specific DERs, as directed by CPUC decision (e.g., AES RFOs or DRAM pilot) or on IOUs' own motion (e.g., SCE PV RFO) •Resources bid into wholesale markets (except SCE PV) • DRAM provides capacity payment; third-party Demand Response Providers bids energy or A/S into CAISO market 	AES, PV, DR, EV (in DRAM)	Res. and Non-residential. DRAM has residential set-aside	R.13-09-011 A.08-03-015
WHOLESALE MARKET PRODUCTS AND SERVICES				
Proxy Demand Response (PDR)	Market platform for <i>economically-triggered</i> load to participate in day-ahead and real-time energy and A/S markets	DR, AES	All	CAISO initiatives
Reliability Demand Response Resource (RDRR)	Market platform to provide CAISO visibility to <i>reliability-triggered</i> DR as administered through CAISO markets. CAISO rules require bidding at 95% of bid price ceiling.	DR, AES	Mostly non-residential	CAISO initiatives
NGR/ DERP	<ul style="list-style-type: none"> • Market platform for DERs to participate in day-ahead and real-time energy and A/S markets through the NGR model • New DERP enables aggregations of DERs at sub-load aggregation point (sub-LAP) level 	All DERs (but focused on AES)	All	CAISO initiatives



Abbreviations:

<p>A/S: Ancillary Service AC: Air Conditioning AES: Advanced Energy Storage AFV: Alternative Fuel Vehicles ALJ: Administrative Law Judge API: Agricultural and Pumping Interruptible BayREN: Bay Area Regional Energy Network C&I: Commercial and Industrial CAISO: California Independent System Operator CARB: California Air Resources Board CBP: Capacity Bidding Program CEC: California Energy Commission CREST: California Renewable Energy Small Tariff CHP: Combined Heat and Power CPP: Critical Peak Pricing CPUC: California Public Utilities Commission CSI: California Solar Initiative DBP: Demand Bidding Program DER: Distributed Energy Resources DERMS: Distributed Energy Resource Management Systems DERP: Distributed Energy Resource Provider DR: Demand Response DRAM: Demand Response Auction Mechanism DRP: Distributed Resources Plans EE: Energy Efficiency ESA: Energy Savings Assistance ESAP: Energy Savings Assistance Program EV: Electric Vehicle</p>	<p>FC NEM: Fuel Cell Net Energy Metering FEREC: Federal Energy Regulatory Commission FiT: Feed-in-Tariff GHG: Greenhouse Gas Emissions GRC: General Rate Case HVAC: Heating, Ventilation and Air Conditioning IDER: Integrated Distributed Energy Resources IOU: Investor Owned Utility IRP: Integrated Resource Plan LA AFB: Los Angeles Air Force Base LCR: Local Capacity Resource LTTP: Long Term Procurement Plan MCE: Marin Clean Energy MF: Multi-Family MUA: Multi-Use Application NEM: Net Energy Metering NEM A: Net Energy Metering Aggregation NGR: Non-Generator Resource PDR: Proxy Demand Response PG&E: Pacific Gas and Electric PLS: Permanent Load Shifting PPA: Power Purchase Agreement PRG: Procurement Review Group PRP: Preferred Resources Pilot PV: Photovoltaic</p>	<p>RDRR: Reliability Demand Response Resource RDW: Rate Design Window ReMAT: Renewable Market Adjusting Tariff RFO: Request for Offer RPS: Renewable Portfolio Standards RRR: Residential Rate Reform SCE: Southern California Edison SDG&E: San Diego Gas and Electric SGIP: Self-Generation Incentive Program SoCalREN: Southern California Regional Energy Network Sub-LAP: Sub-Load Aggregation Point TES: Thermal Energy Storage TOU: Time of Use TOU-BIP: Time of Use Base Interruptible Program TPA: Third Party Administered V2G: Vehicle-to-Grid VGI: Vehicle Grid Integration VNEM: Virtual Net Energy Metering W: Water WDAT: Wholesale Distribution Open Access Tariff WW: Waste Water</p>
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