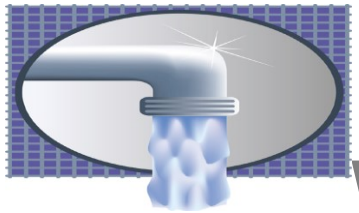

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Monthly California Energy Regulatory Report: May 2017

This Month	CAISO approved new transmission access charge for MWD (current agreement with SCE ends October 2017). CAISO expects to see a 4,194 MW reduction in solar generation during the 82-minute eclipse on August 21. California wholesale power prices fell 9% in 2016 to $34/MWh, due to a decline in natural gas prices, improved hydropower conditions, and about 1,900 MW of new peak summer generating capacity from solar resources. Ancillary services increased from $62 million to $119 million. On May 16th, 70% of power at 2 pm renewables. CPUC ordered utilities to get 500 MW of behind the meter battery storage. This is in addition to the 1,325MW storage solicitation program already approved. Community Choice - CA has eight operational members representing 1.25 million customers. Eight more members, including Los Angeles Community Choice (LACCE), are expected to launch this year and more than 20 groups are exploring the concept. LACCE would be the largest, with over 1 million potential accounts (3,000MW). LACCE is offering residential rate of $0.162/kWh for a 28% renewables mix — 5.4% below SCE's current $0.171/kWh. San Jose approved their own CCA (300,000 customers). IID – 33MW, 20MWH battery storage was used to start El Centro Generating Station – a first for battery black start capability. TEP – new price leader – 100MW solar+120MWH storage at less than 4.5 cents/kWh. Built by NextEra Energy resources, operation by 2019. SDG&E – PD in Phase 2 released. SCE – Opening testimony in RDW and Phase 1 submitted, Phase 2 filing delayed until June 30th. CEC – Report says by mid-2020's, up to 85% of retail load will be served through CCAs, solar, or direct access. New solicitations: SCE DER solicitation. Bassett Project -Proctor 66/12 substation located in City of Industry, Farrell Project -Desert Outpost 33/12 substation located in Cathedral City and Eisenhower 115/12 substation located in Palm Springs, Newbury Project - Intrepid 16 kV, Hooligan 16 kV and Belpac 16 kV circuits located in Thousand Oaks southwest of the Newbury 66/16 kV substation. Greenhouse Gas (GHG) Offset Credit RFO. RA capacity for August and September of this year. PG&E

	Distribution Resource Plan (DRP) Demo D Request for Offers (RFO) SDG&E: Strategic Energy Management (SEM) Request for Proposals (RFP) RAM solicitation >0.5MW
June	2 – R1503011. Workshop on Multiple-Use Applications for Energy Storage. 2 – SGIP workshop 5 – R1408013. Grid Modernization workshop. 5 – SGIP Step 2 opens 6 – CAISO Determination of Availability Assessment Hours web conference 7 – R1309011. Prohibited Resource Verification workshop 8 – R1309011. Responses on New Models of Demand Response, implementation of Competitive Cost Causation, and Barriers to DR in CAISO Market due. 8- Black Start and System Restoration Phase 2 comments due 9 – R1609003. Reply Comments due. 14 – R1602007. Comments on Integrated Resource Planning due 14 – Aliso Canyon Gas-Electric Coordination Phase 3 comments due. 15 – A1609003 – RDW Settlement conference. 16 – R1503011. Comments on Multiple-Use Applications for Energy Storage due 16 - Comments on Retail Choice due 19 – R1309011. Comments on Competitive Neutrality Principle due 19 - R1408013. Grid Modernization comments due 23 - R1503011. Reply Comments on Multiple-Use Applications for Energy Storage due 23 - R1309011. Reply Comments on New Models of Demand Response, implementation of Competitive Cost Causation, and Barriers to DR in CAISO Market due. 23 – Comments on Expedited Interconnection Dispute Process due 26 - R1602007. Reply Comments on Integrated Resource Planning due. 30 – Reply comments on Expedited Interconnection Dispute Process due. Undetermined – R1504012 – Comments on PD due two weeks after SDG&E provides compliant rates to parties.
Last Month	CAISO expects the need to curtail up to 8,000 MW this spring and up to 13,000 MW by 2024. On March 23 - 56.7% of ISO electricity came from renewables at 11am. CAISO curtailed 90 GWH of renewables in March. CAISO prices fell below $0/MWH. CA electricity: 26% of California electricity is imported from outside state. Hydro is expected to provide 19% of CA electricity this year (last year provided 5.9%). CAISO FNM and Master File data freeze May 18th. SGIP opening back up May 1 – emphasis upon storage. Utilities filed ALs to implement TOU proceeding decision – followed by host of protests on various details. By the end of 2017, 30-40 percent of California's investor-owned electric utility customers will be receiving some type of electricity service from an alternative source and/or provider, expected to be 50% by 2050. AL for expedited interconnection process for non-exporting storage facilities approved. CCA – utilities are saying there is cost shifting with CCA customers, asked for review of exit charges. California appellate issued 2-1 decision saying cap-and-trade program legal.

	W-E nexus extended to June to all resolution of SCE matinee pricing pilot request. PG&E's eliminated in PD. SCE suspended Goleta area RFO- said that it had to be combined with refurbishment of Elwood gas-fired peaker – which CPUC PD denied. SCE is selling RA for July-Q3 this year. SCE launched CR-RAM -community renewables solicitation. 45MW. Focus on disadvantaged communities. SDG&E contracted for 5 energy storage projects totaling 83.5MW. SDG&E has RFP/RFOs open for: 2017 Green tariff Shared Renewables, 2018 Local Resource Adequacy, and for Energy Storage. FERC Commissioner Honorable leaving in June. FERC will have one commissioner until appointees approved. Can't issue significant orders or determinations on pending infrastructure projects. Utilities (and ISO) must file tariff changes 60 days prior to effectiveness. IF FERC doesn't act, the automatically become effective. FERC already issued "tolling orders" which allows Office of Energy Projects to make decisions. Salt River Project joining EIM.		
New Things to Pay Attention To	CPS (Clean Peak Standards) requires a specific portion of peak demand from "clean resources", instead of a portion of total energy (like RPS). AZ has CPS, California looking at it. Blockchain - Blockchain has grabbed the attention of the power industry as tries to address the new world in which both utilities and consumers will produce and sell electricity. A number of neighborhoods in New York state are selling solar energy to one another using blockchain technology. Austria, the country's largest utility is taking part in a blockchain trial focused on energy trading with two other utilities. New DR report: A recent report on California's demand response potential by LBL and E3 introduces new analysis and lexicon into the discussion: shed, shape, shift, and shimmy. "Shed" describes loads that can be curtailed to provide peak capacity and support the system in emergency or contingency events—at the statewide level, in local areas of high load, and on the distribution system, with a range in dispatch advance notice times. The study found that there was 2-10GW of shed available under the $200/kW price referant, but the value of the shed was only $4/kW. "Shape" captures DR that reshapes customer load profiles through price response or on behavioral campaigns—"load-modifying DR"—with advance notice of months to days. TOU and CPP. 1GW of shedding and 3GWH of shifting potential. "Shift" represents DR that encourages the movement of energy consumption from times of high demand to times of day when there is surplus of renewable generation. Shift could smooth net load ramps associated with daily patterns of solar energy generation. "Shimmy" involves using loads to dynamically adjust demand on the system to alleviate short-run ramps and disturbances at timescales ranging from seconds up to an hour. Shimmy is fast DR that operates on a seconds-to-minutes ("regulation") and minutes-to-hours ("load following") and can respond in as little as four seconds. The study found ~300 MW of Shimmy Load Following Service resources are cost competitive under $50/kW-yr. For Shimmy Regulation DR, they found ~300 MW to be cost competitive under $85/kW.		
Water-Energy (W-E) Nexus	A water-energy and avoided water capacity calculator is being used by CPUC jurisdictional to determine the energy embedded in water and the marginal water supply for all areas in the state. This will be used to determine contributions to joint W-E programs. Water system Matinee Energy tariffs are proposed here, as well as joint water energy information sharing and W-E pilots.		
Venue / Proceeding	**Summary**	**Last Action**	**Next Action**
CPUC: R.13-12-011	Rulemaking proceeding to develop a partnership framework between investor owned energy utilities and the water sector to co-fund programs that reduce energy consumption by the water sector. Drought issues added to this proceeding, AMI utilization, Energy Matinee tariffs, and telecom added to this proceeding	AMI pilot approved: PG&E - (EBMUD). Residential focus. SDG&E – (Rainbow MWD). Leak detection and data management.	D16-12-047 updated W-E calculator, orders utilities to update calculator, including GHG emissions and natural gas embedded in water. Many of communications issues moved to R.14-0-8-013 et al.

			SCE filed petition for modification, saying matinee pricing requirements were not needed with their proposed TOU period changes. Petitions to modify D.16b-09-056 (Pilot Programs) was denied by CPUC, but PD approving SCE's request issued for comments.
Issue			
Utility Operations	Changes in utility operations will have an impact on water agency operations and opportunities		
Venue / Proceeding	**Summary**	**Last Action**	**Next Action**
CPUC: R14-08-013, A15.07.007 et al Utility Distribution Resource Plan	Reinvention of the electric utilities. Southern California Edison (SCE) is preparing to invest as much as and $2.5 billion to modernize its distribution grid to be compatible with distributed resources such as rooftop solar, behind-the-meter storage and electric vehicles. A good portion of that total, up to $500 million, could be spent on software, cloud computing and applications to provide grid management systems (GMS).	Locational Marginal Benefit Analysis (LNBA) and methodology and Integration Capacity Analysis (ICA) Methodology. ICA must have 9 functional components. Ruling on demonstration projects. AL regarding Automated Infrastructure Pilots put on hold by ED.	Via ALJ order, this consolidated proceeding will go on 3 tracks: 1: Methodological Issues (quasi-legislative); 2: Demonstration and Pilot Projects (ratesetting); 3: Policy Issues (quasi-legislative) Decision on Track 2 demonstration projects issued.
CPUC: R14-10-003 Distributed Energy Resource (DER)	Framework for the Guidance, Planning, and Evaluation of Integrated Distributed Energy Resources.	DER Action Plan 3 areas: rates and tariffs, DERs on distribution system, DERs in wholesale market.	See attachment. TOU Rulemaking (R.15-12-012), the Residential Rate Design proceeding (R.12-06-013), the General Rate Case (GRC) Phase 2 proceedings (like A.16-06-013), the Net Energy Metering (NEM) successor tariff proceeding (R.14-07-002), and Rule 21 plans. "Distribution Planning, Infrastructure, Interconnection, and Procurement" section includes the Distributed Resource Plan (DRP) proceeding (R.14-08-013), reforms to the GRC Phase 1 proceeding (A.16-09-001), the Integrated Distributed Energy Resources (IDER) proceeding (R.14-10-003), interconnection directives (D.16-06-052), and the energy efficiency proceedings (R.13-11-005). Wholesale DER Market Integration and Interconnection" section includes the Storage proceeding (R.15-03-011), the California Independent System Operator (CAISO) stakeholder processes, and the Demand Response proceeding (R.13-09-011).
CPUC: R.16-02-007 (ICA)	Proceeding for integrated resource planning and procurement planning to coordinate and refine	Umbrella resource planning proceeding that encompasses several other proceedings. All LSE (Load serving entities) included in this proceeding.	Schedule: Decision on Assumptions and scenarios - Decision on IRPs - May 2017 IRP filings - Fall 2017
CPUC: R13-09-011 2018-2022: A17-01-012	**Demand Response** New DR report: A recent report on California's demand response potential by LBL and E3 introduces new analysis and lexicon into the discussion: shed, shape, shift, and shimmy. "Shed" describes loads that can be curtailed to provide peak capacity and support the system in emergency or contingency events—at the statewide level, in local areas of high load, and		The utilities have a plethora of DR opportunities: Peak Day Pricing of Critical Peak Pricing Base Interruptible Program Scheduled Load Reduction Program Optional Binding Mandatory Curtailment Plan Capacity Bidding Program

	on the distribution system, with a range in dispatch advance notice times. The study found that there was 2-10GW of shed available under the $200/kW price referant, but the value of the shed was only $4/kW. "Shape" captures DR that reshapes customer load profiles through price response or on behavioral campaigns—"load-modifying DR"—with advance notice of months to days. TOU and CPP. 1GW of shedding and 3GWH of shifting potential. "Shift" represents DR that encourages the movement of energy consumption from times of high demand to times of day when there is surplus of renewable generation. Shift could smooth net load ramps associated with daily patterns of solar energy generation. "Shimmy" involves using loads to dynamically adjust demand on the system to alleviate short-run ramps and disturbances at timescales ranging from seconds up to an hour. Shimmy is fast DR that operates on a seconds-to-minutes ("regulation") and minutes-to-hours ("load following") and can respond in as little as four seconds. The study found ~300 MW of Shimmy Load Following Service resources are cost competitive under $50/kW-yr. For Shimmy Regulation DR, they found ~300 MW to be cost competitive under $85/kW.		Incentives: Automated Demand Response Incentive Permanent Load Shift Bidding into the California Independent System Operator (CAISO) market: Demand Response Auction Mechanism (DRAM) Pilot Scheduling Coordinator Request for Information (RFI) Third Party Offers – Rule 24

\Issue			
Time-of-Use	Changes in TOU periods has implications for water agency operations and the value of water agency generation. See also utility rate section.		
Venue / Proceeding	**Summary**	**Last Action**	**Next Action**
CPUC: R15-12-012 TOU periods	New proceeding to Assess Peak Electricity Usage Patterns and Consider Appropriate Time Periods for Future Time-of-Use Rates and Energy Resource Contract Payment	New Scoping ruling: will not set new TOU periods; rather, will establish a methodology for setting TOU periods in the future, including identifying appropriate data sources and principles. This proceeding addresses the narrow topic of how TOU periods should be set and used in rate designs, as well as time-of-delivery (TOD) periods in certain resource procurement contracts. CAISO provided comments on how to derive their TOU time periods.	Decision issued. - TOU periods utility wide, using utility marginal generation cost now and including distribution costs later, TOU periods should be fixed for 5 year, solar projects TOU periods grandfathered for 10years after PTO, multiple TOU rate options should be developed. Motion for modification of Decision filed March 2nd. Asks CPUC to review grandfathering deadlines in original decision.
Issue			
Generation	Incentives, interconnection, and programs for existing and new water agency generation		
Venue / Proceeding	**Summary**	**Last Action**	**Next Action**
CPUC: Net Energy Metering 1.0 sunset and cap	Net Energy Metering provides full retail value of electricity for renewable generation exported to the grid. Phasing out this program. Full retail credit" does not ensure that rate design won't change economics of NEM	Here is cap and remaining MW unallocated: Cap Available SCE 2240 473.6	Sunsets July 1, 2017 or when cap reached (PG&E and SDG&E have reached cap – new generation going on to NEM2.0) Decision establishes a reservation system for SCE only. Public agencies have to provide a signed interconnection from and commitment to build the project. NEM grandfathering will end December 31, 2036.
CPUC: R14-07-002	Contract options for new NEM projects.	Decision January 28, 2016. Allows for a minimum bill, a "reasonable" interconnection fee, and specifies certain nonbypassable charges	Utilities have established new interconnection fees and costs, and electronic payments of fees.

Net Energy Metering 2.0		(NBCs) for NEM customers (2-3 cents/kWh); determines that time of use (TOU) rates will be mandatory for new NEM customers; preserves retail rate credit for existing NEM customers for 20 years after their interconnection; allows solar arrays larger than 1 MW to earn NEM credits if owners cover interconnection costs. Utilities filed Advice Letters changing all NEM forms to reflect this decision. Filed Advice Letters for NEM2 tariff. CPUC rejected rehearing requests for NEM2.	Lot of work on storage, sizing, interconnection. SDG&E says it pays $0.176/kWh for residential net metered, $0.168 for commercial. .
CPUC: R12-11-005 Self-Generation Incentive Program	Incentives to support existing, new, and emerging distributed energy resources. Administered by the local utility. $83 million available annually for the 3 utilities. SGIP funded through 2019. Storage taking the majority (80%+) of funding. Incentives for wind turbines, waste heat to power technologies, pressure reduction turbines, internal combustion engines, microturbines, gas turbines, fuel cells, and advanced energy storage systems.	D15-12-023 allows customers to accelerate PBI under CSI: from 5 years to 2 years and end the two-year period with a lump sum buyout. New SGIP handbook out - changes GHG determinations. 20% limit on funds to any one developer. All SGIP projects must go through a pre-approved Developer.	Opening round (Step 1) of solicitations sold out in 24 hours. Lottery winners for large storage projects will receive an incentive of $0.50/Wh, or $0.36/Wh if they elect to also take the investment tax credit. Lottery winners for residential storage projects receive an incentive of $0.50/Wh. Generation incentives are $0.90/Wh for wind projects and $0.60/Wh for other forms of generation. Funding allocations will go through up to five steps. When funding is exhausted for one step, a 20-day "pause period" is triggered until the next step opens with a lower incentive rate. If available funds for one step are allocated in less than ten days — as is the case with most regions in this step — the incentive drops down by $0.10/Wh in the next round. If funding is not depleted within ten days, the incentive for the next step falls by $0.05/Wh.
Cost Responsibility Surcharge (CRS)	Certain customer generation were exempted from certain cost responsibilities surcharges until a statewide cap of 3,000MW was reached.	Both SCE and PG&E hit cap in February. Now customer generation is responsible for paying all of the cost responsibility surcharges costs.	Exemptions from cost responsibility surcharges for customer generation.
California Solar Initiative (CSI) R12-11-005	Program out of money.	Not issuing any more incentives	. End of CSI payments Dec 31, 2019
CPUC: R15-03-011 Energy Storage	Energy Storage Procurement Framework and Design Program (D.13-10-040, D.14-10-045) and related Action Plan of the California Energy Storage Roadmap.		A.16-03-001 et al are the utility applications for 2016/2017 procurements. ALJ issued ruling on comments on whether CPUC should establish an inspection checklist for energy storage facilities. PD on Track 1 issues needed for utilities 2016 energy storage procurement solicitations. Comments on staff report on station power for energy storage. Lots of comments on PD (still excludes large PS).
CPUC: Renewable Energy Bill Transfer Program (RES-BCT)	Allows local governments to generate electricity at one account and transfer any available excess bill credits (in dollars) to other account owned by the same local government.	Several large solar REMAT projects going in water agencies. 250MW available statewide. PG&E has 16 customers with 12MW connected, another 35.3 MW are in the queue. 105.25MW cap. SCE has 13 projects of 24.11 MW connected, with 10MW more contracted. 124.5 MW cap.	JPAs now allowed to have RESBCT projects. TOU shift destroys economics of stand alone solar RESBCT projects.
Issue			
Utility Integration/Interconnection	Interconnecting to the utility grid is one of the major issues influencing increased water agency generation		
Venue / Proceeding	**Summary**	**Last Action**	**Next Action**

CPUC: R.11-09-011 Rule 21 Distribution Level Interconnection Cost Certainty. closed	Available to projects applying to the Fast Track and Independent Study Processes; • Application of a 25% Cost Envelope to the estimated cost for applicable interconnection facilities and/or distribution system upgrades provided by the utility on the Generator Interconnection Agreement; • Projects that successfully complete either the Fast Track Initial Review or Supplemental Review must pay a new $2,500 deposit; • Allow an additional 20 business days for the utility to develop the Cost Envelope Option cost estimate following the completion of the engineering review phase; • Developers applying under the Independent Study Process must pay the required deposits and complete both a System Impact Study and Facilities Study in order to elect the Cost Envelope; and, • Require developers to submit a more thorough and detailed Rule 21 interconnection application (i.e., "Technical Scope Package") in order to elect the cost envelope.	Initial pre-application report and cost guides available. Expanded pre-application report and cost guide available. SDG&E example - SDG&E Fast Track study requires at least an $800 deposit and a 15-day review. Can require another $2,500 and extend another 20 days. A full detailed study requires a deposit of between $10,000 and $250,000 and takes 60 days or longer.	New pre-application report available. Utility unit cost guide published. Will only apply to standard applications (using listed inverters). Contains wealth of price data. Utilities filed AL asking for 5-year pilot program on cost envelope options. utilities filed AL on Smart Inverter Phase 3 requirements. (communication requirements) see below.
CPUC: R14-08-013 Smart Inverter Initiative	The use of smart inverters, while more expensive, will dramatically expedite the interconnection process and provide price certainty for inverter based generation.	Rule 21 updated to "enable" Smart Inverters (now required for Fast Track) The utilities filed proposals regarding: the provisions for Uninterruptible Power Supplies, Critical Loads, and Microgrids; enhanced Volt/Var specifications. UL has not approved specifications for smart inverters	Utilities granted one-year extension on filing smart inverter specifics. Smart inverters required by September 2017. The mandatory date for Phase 2 functionality is the later of (a) March 1, 2018 or (b) nine months after the release of the SunSpec Alliance communication protocol certification test standard or the release of another industry-recognized communication protocol certification test standard.
Issue			
Solicitations	Solicitations for various utility needs		

AVAILABLE PROGRAMS	ELECTRICITY RESOURCES										
	Renewables					Cogens					
	Biomass	Wind	Solar	Hydro (≤ 30 MW)	Geothermal	New	Existing	**Existing Other** (e.g., Nuclear, Coal, Large Hydro, Natural Gas)	**New** (All technologies)	**Energy Storage**	**Demand Response**
Renewable Request for Proposals (RFP) (20 MW min)	✓	✓	✓	✓	✓						
RA, Tolls, Firm Energy, Energy Call Options	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Local Capacity Requirement Request for Offer (LCR RFO)	✓	✓	✓	✓	✓	✓			✓	✓	✓
Net Energy Metering (NEM) (≤ 1 MW)[1]	✓	✓	✓	✓	✓						
Bilateral[2]	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Biofuel Renewable Auction Mechanism (BioRAM) RFO (≥ 0.5 MW)	✓								✓		
Community Renewables - Renewable Auction Mechanism (CR-RAM) (≤ 20 MW)	✓	✓	✓	✓	✓				✓		
Combined Heat & Power (CHP) RFO (min 5 MW) & Transition Contracts (no min)						✓	✓				
Energy Storage RFO (1 MW min)										✓	
QF Standard Offer Contract (≤ 20 MW)	✓	✓	✓	✓	✓	✓	✓				
AB 1613 (≤ 20 MW)						✓					
Diverse Business Enterprises	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Renewable Market Adjusting Tariff (Re-MAT) (≤ 3 MW)	✓	✓	✓	✓	✓						
Bioenergy Market Adjusting Tariff (BioMAT) (≤ 3 MW)	✓					✓			✓		
Demand Response Auction Mechanism (DRAM) RFO											✓
Preferred Resources Pilot (PRP) RFO	✓	✓	✓	✓	✓					✓	✓

1 – NEM service customer load only

Venue / Proceeding	**Summary**	**Last Action**	**Next Action**
CPUC: Feed in Tariff Renewable (R11-05-005)	RE-MAT. Renewable Market Adjusting Tariff. Much more rigorous application process, varying prices, and max increased to 3 MW. New solicitation every couple months.	Must have completed Phase I or System Impact Study, or passed Fast Track screens or Supplemental Review in order to apply.	. As-Available non peaking price and base load prices constant ($89.23/MWh). For solar - As-available peaking, price increasing (PG&E price is $61.23/MWh). Costing period adjustments have been changed.
	BioMat - Bioenergy Market Adjusting Tariff. An additional 250MW is available.	There is a set aside (about 1/3 of the program) for wastewater treatment, and other muni projects. 3 MW max, must be on distribution system, must be after 6/1/2013.	Price is $127.72/MWh.

Renewable Portfolio Standards Requirement (RPS) R15-02-020	Annual solicitation for additional renewable generation resources. Generally > 20 MW.	Currently under contract for 2020: PG&E- 37% SCE – 36.9% SDG&E – 43.1%	
Renewable Auction Mechanisms (RAM)	Semiannual utility solicitation for 5-20MW renewable projects. >3MW and <20MW.		SCE issued BioRam: >0.5MW from sustainable forestry management. Target 21.6MW
Demand Response R13-09-011	DRAM (Demand Response Auction Mechanism)	SCE's DRAM solicitation – selected Nest (50MW, 50,000 homes)	CPUC ordered PG&E and SDG&E to do over second DRAM – didn't get enough capacity. SCE got 56MW, PG&E got 21.4MW, SDG&E got 4 MW.
Preferred Resource	Solicitation for various types of resources: Resource Adequacy, Renewable Distributed Generation Preferred Resources	Includes: Demand Response Renewable Distributed Generation Energy Storage Renewable Distributed Generation paired with Energy Storage Permanent Load Shifting GHG	SCE chose Advanced Microgrid Solutions 40MW contract for demand response with energy conservation and batteries; Convergent with 35MW of batteries; Hecate with 15MW of batteries; NextEra with 10MW of batteries and 10MW of demand response, NRG with 10MW of solar-storage "hybrid," and Swell with 5MW of batteries from residential customers.
LCR	Local Capacity Resource As needed, often for short periods (e.g. June-August in L.A. basin for summer 2016)	Have to have ISO deliverability status	SDG&E issued its 2017 LCR RFO It is requesting offers for the following resource types: 1. Energy Efficiency (EE) 2. Demand Response (DR) 3. Renewable 4. Energy Storage 5. Distributed Generation (DG)
ES R15-03-011	Energy Storage	SCE a released 2016 DBT RFO for energy storage facilities: design, build, and transfer to SCE energy storage systems ready for placement into commercial operation, including performance guarantees, on a fixed-price, turnkey basis, and separately, additional maintenance services. Proposals with guaranteed discharge powers of 5, 10, 15, and 20 MW (if within the seller capabilities), each with a guaranteed discharge duration of at least 4 hours, and each with 5, 10, 15, and 20 year periods of guaranteed performance are solicited	SDG&E and AES 30MW, 120MWH Li-ion battery project operational.
ES&DD	Energy Storage and Distribution Deferral RFO	SCE released its 2016 ES&DD RFO. Track 1: Solicitation for Resource Adequacy from eligible Energy Storage Resources ("ESRs") and is open to energy storage resource facilities as defined in CPUC Decision 13-10-040. These ESRs will be located at pre-designated sites on SCE's system. Track 2: All-source solicitation for electrical energy, capacity, and renewable attributes from eligible Preferred Resources for distribution deferral at additional pre-designated areas on SCE's system	SCE proposals March 1, 2017 (Option 1)
PV	Solar Photovoltaic solicitations	SCE announced that its Community Renewables (CR) website for project developers is now live. This is the platform on which developers (applicants) and others can submit applications (Program Participation Requests, "PPRs"), and can communicate with SCE on the process of entering the CR Queue and ultimately obtaining a CR	

		power purchase agreement (PPA)*. Information and documents regarding the CR Program can be found at https://scecr.accionpower.com/.	
Renewable Sales	PG&E Renewable Sale Solicitation		PG&E issued an RFO to sell Category 1 bundled renewable generation and associated RECs . Bids due March 20, 2017.
CPUC: R13-11-005 R09-11-014 Energy Efficiency	Proceedings to fund IOU energy efficiency portfolios. Potential for the water-energy calculator developed as part of the above proceeding to be rolled into these.	SDG&E has released IDEEA 365 Innovative Round 4 Request for Abstracts (RFA)The following provides an overview of IDEEA 365 and the Round 4 RFA. IDEEA 365 Innovative is designed to: · allow for the introduction of innovative ideas and technologies into the energy efficiency portfolio by drawing from the skill, experience, and creativity of the energy efficiency community, and · offer third-party providers multiple opportunities to propose programs during energy efficiency program cycles (and thus not have to wait for a new cycle to begin).	
Others	DWR	sPower connects 107 MW solar project near Lancaster. Built in less than 12 months after PPA signed	CfD – contract for differences.
	Palo Alto	City of Palo Alto has two new solar projects totaling 60 MW located near Lancaster. 35 year PPA. Utility 100% carbon neutral.	
	SCPPA	Ice Energy will install 1 MW residential storage project. IceBear 20 is a 9.6Kw unit, and will be aggregated by by SCPPA	Ice Energy has an existing 26MW storage contract with SCE.
Storage	SDG&E has 120 MWh battery project with AES and Samsung batteries- operation by end of 2017: 30MW, 120 MWh project in Escondito and 7.5MW, 30MWh project in El Cajon. Green Charge installing 7.4MW in Grossmont Union High School District.	SCE has 20 MW 80MWh project at Pomona by AltaGas using Greensmith batteries that is operational. SCE TESLA 80MWh storage project Lithium ion at Mira Loma substation Operational. SCE selected Comvergent Energy+power for a 35MW/140MWH project and Advanced Microgrid Solutions for a 40 MW storage project in the area of Santa Ana, and Tustin. Powin Energy' 2 MW, 8MWh battery project in Irvine is operational.	
	Jamacha Substation	SDG&E soliciting generations resources connected to Jamacha substation.	3MW-12MW energy storage solicited. Due March 31, 2017
Goleta Area RFO	Utility solicitations are becoming more and more specific and directed.	SCE plans a Goleta RFO - soliciting DERs that connect to the Goleta 220/66kV substation.	Put on hold

Renewables Premium Price in CA (Western US Premium is 1.664 cents/kWh above market for renewables). RA Capacity adder of $58.27/kW-yr.

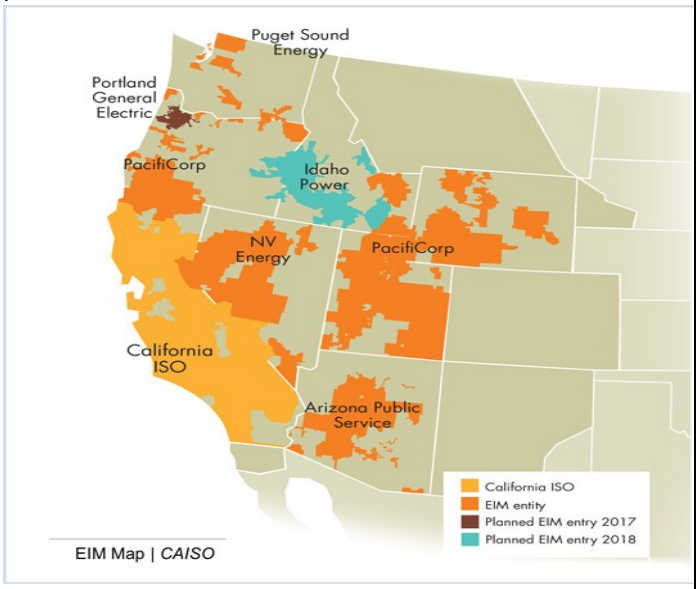
State-Specific Utility Green Pricing Programs (last updated January 2015)

State	Utility Information	Enrollment Information	Type	Start Date	Premium	Premium (cents/kWh)
AZ	Arizona Public Service	Green Choice	wind, biomass, landfill gas, geothermal, and solar	2007	1.02¢/kWh	1.02
AZ	Salt River Project	EarthWise Energy	PV for non-profits	1998/2001	Contribution	
AZ	Tri-State Generation & Transmission: Columbus Electr	Renewable Resource Power Rider	wind, hydro	2001	1.25¢/kWh	1.25
AZ	Tucson Electric	Bright Tucson Community Solar Program	local PV	2010	2.0¢/kWh	2.00
AZ	UniSource Energy Services	Bright Arizona Community Solar Program	local PV	2004	2.0¢/kWh	2.00
CA	Alameda Municipal Power	Alameda Green	wind, solar	2012	1.5¢/kWh	1.50
CA	Anaheim Public Utilities	Green Power Program	various renewables	2002	2.0¢/kWh	2.00
CA	Anaheim Public Utilities	Sun Power for the Schools	PV	2002	Contribution	
CA	Los Angeles Department of Water and Power	Green Power for a Green LA	wind, hydro and PV	1999	3.0¢/kWh	3.00
CA	Marin Clean Energy: City of Belvedere, Town of Fairfa	Local Sol	100% local solar	2014	6.0¢/kWh	6.00
CA	Marin Clean Energy: City of Belvedere, Town of Fairfa	Light Green	50% renewable	2008	0.0¢/kWh	-
CA	Marin Clean Energy: City of Belvedere, Town of Fairfa	Deep Green	100% renewable	2010	1.0¢/kWh	1.00
CA	PacifiCorp: Pacific Power	Blue Sky Block	wind	2000	1.95¢/kWh	1.95
CA	Pasadena Water & Power	Green Power	wind	2003	2.5¢/kWh	2.50
CA	Roseville Electric	Green Roseville	wind, PV	2005	0.5¢/kWh	0.50
CA	Sacramento Municipal Utility District	SolarShares	PV	2007	$10.75/mo	1.79
CA	Sacramento Municipal Utility District	Greenergy	100% wind, PV, landfill gas, hydro, geothermal	1997	$6/month	1.00
CA	Silicon Valley Power / 3Degrees	Santa Clara Green Power	wind, PV	2004	1.5¢/kWh	1.50
CA	Sonoma Clean Power	Clean Start	36% biomass, geothermal, wind	2014	0.0¢/kWh	-
CA	Sonoma Clean Power	Evergreen	100% geothermal	2014	3.5¢/kWh	3.50
CA	Southern California Edison	Green Rate	50% and 100% local solar	2015	3.5¢/kWh	3.50

Issue			
Utility Rates	Changes in utility rates impact water agencies operation and generation value		
Venue / Proceeding	**Summary**	**Last Action**	**Next Action**
General Rate Case Cycle	GRCs are missing their statutory deadlines due to the plethora of issues now involved		CPUC proposing 4 year cycle (instead of 3)
CPUC: A 15-04-012 San Diego Gas and Electric Phase II	Filed application for marginal cost and rate changes. Significant changes in TOU costing periods will impact water agency operations and decimate solar project economics On-peak period shifting from 11 am - 6 pm summer weekdays to 4-9 pm weekdays	-	Proposed Decision released: - 5 month summer (June-Oct) - - on-peak 3-9 daily - includes weekends - super off peak rate March and April 10-2 weekdays - - less on peak demand charges than SDG&E proposed - - Critical Peak Pricing events 2-6 pm - good for water agencies with solar. - rates in effect December 1, 2017.
CPUC: A16-09-001 Southern California Edison General Rate Case	2018 GRC application filed Sept 1	~5% increase in rates proposed ($570 million increase). Includes $2.3B for DER grid enhancements. Opening testimony filed. CPUC granted Phase 2 filing to June 30, 2017	Expect decision Q4 2017
CPUC: A1609003: SCE 2016 RDW	SCE Rate Design Window filed Sept 1	Proposes changes in TOU Periods (see below), changes to Real Time Pricing (RTP) and changes to CPP (Critical Peak Pricing)	Schedule Intervenor and SCE Supplemental Testimony Rebuttal - Due June 9, 2017 Evidentiary Hearings – Aug 7-11, 2017 Concurrent Opening Briefs - September 8, 2017 Reply Briefs/Record submitted - September 29, 2017
CPUC: A.16-06-013 PG&E GRC Phase 2	Significant changes in TOU periods and seasonal definitions	Summer changes from 6 to 4 months (June-September), shifts on-peak to 5-10pm all year (see below)	December 2017 decision, rates in effect by May 2018

CEC	California Energy Commission is responsible for statewide energy policy		
Venue / Proceeding	**Summary**	**Last Action**	**Next Action**
CEC: Integrated Energy Policy Report	Focus on implementing SB 350:: integrated resource plan development o reduce greenhouse gas emissions by efforts for doubling projected future energy efficiency savings by 2030, developing renewable resource to serve half of California electricity needs by 2030, and advancing zero and near zero vehicles and infrastructure in the transportation sector.	Dockets 17-IEPR-01 - General/Scope 17-IEPR-02 - Electricity Resource / Supply Plans 17-IEPR-03 - Electricity and Natural Gas Demand Forecast 17-IEPR-04 - Natural Gas Outlook 17-IEPR-05 - Transportation Energy Demand Forecast 17-IEPR-06 - Doubling Energy Efficiency Savings 17-IEPR-07 - Integrated Resource Planning 17-IEPR-08 - Barriers Study Implementation 17-IEPR-09 - Climate Adaptation and Resiliency 17-IEPR-10 - Renewable Gas 17-IEPR-11 - Southern California Energy Reliability 17-IEPR-12 - Distributed Energy Resources 17-IEPR-13 - Strategic Transmission Investment Plan 17-IEPR-14 - Existing Power Plant Reliability Issues	Final Scoping Order released - February Public workshops on specific topics: January -December June 19: SB 350 2030 Energy Efficiency Doubling Targets, Utility and Non-Utility Savings 20: Preliminary Transportation Energy Demand Forecast (27: Joint Agency Workshop on SB 1383 – Renewable Natural Gas August 03: Preliminary Electricity Energy Demand Forecast (29: Joint Workshop on Climate Change and Resiliency 31: Southern California Reliability September 07: Draft Commission Report to Establish Targets that Achieve a Statewide Cumulative Doubling of Energy Efficiency Savings in 2030 Release draft 2017 EPR - October Release final 2017 IEPR – January 2018 Adopt 2017 IEPR February 2018
CEC: Water and wastewater energy research roadmap	This roadmap now replaces the previous one developed in 2004 and may be used as guidance for allocating energy research funds for the next 5-10 years.	CEC 500-2016-019 released	32 projects were recommended for inclusion in the energy research roadmap based on these prioritization criteria: their likelihood of implementation at larger scale, timeliness of research needs, environmental and economic benefits, and risk management.
Solicitations	0% and 1% interest loans	Financing for energy efficiency and energy generation projects	New PON-13-401 loan application form. (1%) PON-13-403 (0%) for schools

California ISO	ISO actions have ramifications for operation of California utilities, rates, and transmission interconnection requirements		
Venue / Proceeding	**Summary**	**Last Action**	**Next Action**
ISO: Regional Initiative	SB-350 establishes a 50% renewable portfolio requirement for California by 2030, while also setting the stage for further expansion of the California Independent System Operator (CaISO) energy imbalance market (EIM) and the integration of western states balancing authorities, essentially expanding the CaISO throughout the West. The goal is to reduce carbon emissions, reduce cost of electricity, and enhance the reliability and integration of renewable energy (solve the "duck curve" issue by sending the oversupply of renewable California electricity to other states).	The Energy Imbalance Market (EIM) was formed in November 2014 by CAISO and PacifiCorp, the Northwest utility owned by Warren Buffett's Berkshire Hathaway. Buffett's NV Energy joined the system in December 2015. Arizona Public Service and Washington's Puget Sound Energy will join in October 2016, followed by Portland General Electric in October 2017, and Idaho Power announced they will join in April of 2018. The ISO issued a new set of proposed governance rules for the ISO's effort to organize 38 independent power providing systems includes provisions to "protect and preserve state authority," including over procurement policy and resource planning. Mountain West Transmission Group, with 7 transmission owners, is an alternative to the ISO plan. Western Area Power Authority (WAPA) spans 15 states with more than 17,000 miles of transmission line, making its inclusion	In the Energy Imbalance Market members are not required to turn over control of their transmission and generator day-to-day participation is voluntary. Powerex (BC Hydro) joining EIM.

		Mountain West Transmission Group a big draw for other potential participants.	. 
ISO: NRI – New Resource Implementation	Required registration with ISO for any generation > 500 kW.	Process takes 210 days. Buckets have to be completed on prescribed schedule or operational date will slip.	The ISO NRI process now provides an option for entities to connect to the ISO without the AT&T ECN and without the use of SSL/TLS certificates. This new service option is called Fully Managed SaaS with Field Gateway IPP-1000 from Dispersive Technologies, and is available for real-time devices (such as Remote Intelligence Gateways).
ISO: FNM - Full Network Model	New generation projects in 500 - 1,000 kW range. An agreement with the ISO to allow concurrent development path for small renewable generators to enter the New Resource Implementation (NRI) process (anytime) and follow with the Full Network Model (FNM) without affecting when the generator comes online.	Net Qualifying Capacity for Resource Adequacy final post ed.	

<table>
<tr><td></td><td></td><td></td><td>Table 1 FNM Database Critical Dates
<table>
<tr><th>Database Number</th><th>2018Q1</th><th>2018Q2</th><th>2018Q3</th><th>2018Q4</th></tr>
<tr><td>Project Submittal Timeline</td><td colspan="4">Please refer to descriptions in Table 2.</td></tr>
<tr><td>Deadline to submit changes that cannot be submitted through the Master File user interface (UI) or application programming interface (API) to RDT@caiso.com</td><td>February 6, 2018 at 11:00 a.m. PST</td><td>May 8, 2018 at 11:00 a.m. PST</td><td>August 7, 2018 at 11:00 a.m. PST</td><td>November 13, 2018 at 11:00 a.m. PST</td></tr>
<tr><td>Last day to submit changes through the Master File UI or API</td><td>February 7, 2018</td><td>May 9, 2018</td><td>August 8, 2018</td><td>November 14, 2018</td></tr>
<tr><td>UI/API submission black-out period</td><td>February 8, 2018 - February 20, 2018</td><td>May 10, 2018 - May 22, 2018</td><td>August 9, 2018 - August 21, 2018</td><td>November 15, 2018 - November 27, 2018</td></tr>
<tr><td>Last day changes can be made effective before the model promotion</td><td>February 14, 2018</td><td>May 16, 2018</td><td>August 15, 2018</td><td>November 21, 2018</td></tr>
<tr><td>Effective date black-out period</td><td>February 15, 2018 - February 22, 2018</td><td>May 17, 2018 - May 24, 2018</td><td>August 16, 2018 - August 23, 2018</td><td>November 22, 2018 - November 29, 2018</td></tr>
<tr><td>Master File UI and API submissions may resume</td><td>February 21, 2018</td><td>May 23, 2018</td><td>August 22, 2018</td><td>November 28, 2018</td></tr>
<tr><td>Production Effective Date</td><td>February 22, 2018</td><td>May 24, 2018</td><td>August 23, 2018</td><td>November 29, 2018</td></tr>
</table></td></tr>
<tr><td>Interconnection (ER15-2752), Local Capacity Requirements, Frequency Response, Metering & Telemetry, Load Granularity Refinements, Flexible Ramping, resource Adequacy, Congestion Revenue Rights, Reliability Service, Demand Response, Reactive Power, Reliability Must-Run Pump Load</td><td>Shareholder processes that will be reported on as needed.</td><td>DER >1MW must report voltage, real power, and reactive power every 4 seconds. >9.9MW must also report plant on/off, circuit breaker status.</td><td>Transmission Plan: Summary: No new transmission projects need to meet 33% RPS</td></tr>
<tr><td>2017 Stakeholder Initiatives</td><td>.</td><td>Initiatives include: Contingency Modeling Enhancements. Generator Interconnection Driven Network Upgrade Cost Recovery, Bid Cost Recovery Enhancements, Flexible RA Criteria and Must Offer Obligation, Transmission Access Charge Options, Review Transmission Access Charge Billing Determinant, Regional Resource Adequacy, Regional Integration California Greenhouse Gas Compliance, Metering Rules Enhancements, Storage and Aggregated DER, Stepped Constraint Parameters, Generator Contingency Modeling/Remedial Action Scheme Modeling,
Commitment Cost and DEB Enhancements, Frequency Response, Full Network Model Enhancements, Regional Transitional Implementation Items, Economic and Maintenance Outages, Review Grid Management Charge Billing Determinant</td><td>Energy Storage and Distributed Energy Resources (ESDER): The central focus of the ESDER Phase 2 initiative is to lower barriers and enhance the ability of the transmission grid-connected energy storage and the many examples of distribution-connected resources to participate in the ISO market. The ISO focused work in the four topic areas addressed within ESDER Phase 2: (1) non-generator resource model enhancements, (2) demand response enhancements, (3) multiple-use applications, and (4) distinction between wholesale charging energy and station power.</td></tr>
</table>

2016 Annual Report	The total estimated wholesale cost of serving load last year was about $34 per megawatt-hour, which was about 9 percent lower than in 2015, and the lowest nominal cost since 2008. The primary driver of lower electric prices was a 9 percent drop in natural gas prices	Costs for various ancillary services procured to reliably back up and balance other generating resources increased from $62 million in 2015 to $119 million. Demand Response programs operated by the ISO participating utilities continued to meet about 4 percent of the ISO's overall system resource adequacy capacity requirements.	. Almost 3,300 megawatts of new generation connected to the grid in 2016 with about 2,300 megawatts of summer peaking capacity. Of the total new generation, about 1,900 megawatts was solar, about 300 megawatts of new natural gas power plants were added, and about 50 megawatts of storage interconnected to the grid
Ancillary Services Scarcity (regulating up/down, ramping, spinning reserves, black start).	The California ISO has an ancillary services scarcity pricing mechanism in place that is triggered when the ISO is not able to procure the target quantity of one or more ancillary services in the integrated forward market or real-time market run	Scarcity events are occurring monthly	See latest duck curve below.
Feather River and Yuba City generators	Designation of two generators – the Calpine Feather River Energy Center (47 MW) and the Yuba City Energy Center (47 MW) – as Reliability Must-Run Units. The Calpine Corporation notified the ISO by letter, dated November 28, of its intention to retire four fast-start "peaker" plants at the end of 2017, when the plants come off contract.	Calpine requested that the ISO undertake the necessary studies to confirm that the absence of these units would not create unacceptable reliability impacts	The ISO's analysis has indicated that two of the four generators – the Feather River Energy Center and the Yuba City Energy Center are in fact required in order to meet the relevant criteria for reliable system operation in highly constrained local areas. Ordered to keep operating.
FERC	The Federal Energy Regulatory Commission is responsible for transmission/wholesale electricity	Markets in the US. All ISO action has to be approved by them. They are also the	permitting agency for hydroelectric facilities
Venue / Proceeding	**Summary**	**Last Actions**	**Comments**
		Trump nominated Robert Powelson, a member of the Pennsylvania Public Service Commission, and Neil Chatterjee, a longtime aide to Senate Majority Leader Mitch McConnell (R-KY) to seats on the Federal Energy Regulatory Commission. If confirmed by the Senate, Powelson and Chatterjee would join Acting Chairman Cheryl LaFleur and Commissioner Colette Honorable on the FERC board. Honorable plans to step down in June.	FERC only has two commissioners, not a quorum. Can't issue significant orders or determinations on pending infrastructure projects. Have cancelled all open Commission meetings until further notice. FERC designated Office of Energy Market Regulation with authority to make decision on uncontested filing and settlements, and rate filings. Utilities (and ISO) must file tariff changes 60 days prior to effectiveness. IF FERC doesn't act, the automatically become effective. FERC can kick the can down the road by issuing "tolling orders" which delay their final determination..
ISO: DER - Distributed Energy Resources	The FERC approved ISO tariff changes for demand response and distributed energy.	FERC approved the ISOs flexible ramping product. ISO didn't want to use its frequency regulation (real-time dispatch prices procured at penalty rates). Using real-time price for flexible ramping product.	Allows non-generator resources to submit their state-of-charge as a bid parameter in the day-ahead market, and to self-manage their state-of-charge and energy limits. And, the changes create performance methodologies to accommodate sub-metering and would allow the grid operator to ascertain demand response performance based upon the gross load, independent of behind-the-meter generation.
Hydro	Expedited permitting program for small hydro projects	Small hydro now just files NOI for exemption. 2-year pilot licensing program announced for hydropower development at non-powered dams FERC issued Hydropower Primer April 17. FERC sent Congress "Report on the Pilot Two-Year Hydroelectric Licensing Process for Non-Powered Dams	Revised Hydro Compliance Handbook available. MOU between DoE, FERC, and Corps of Engineers signed to integrate and coordinate hydro development at federal facilities. Opened proceeding (P-2100) on Oroville Dam Service Spillway. The Report provides a list of project attributes that are likely to result in a 2 year licensing approval.

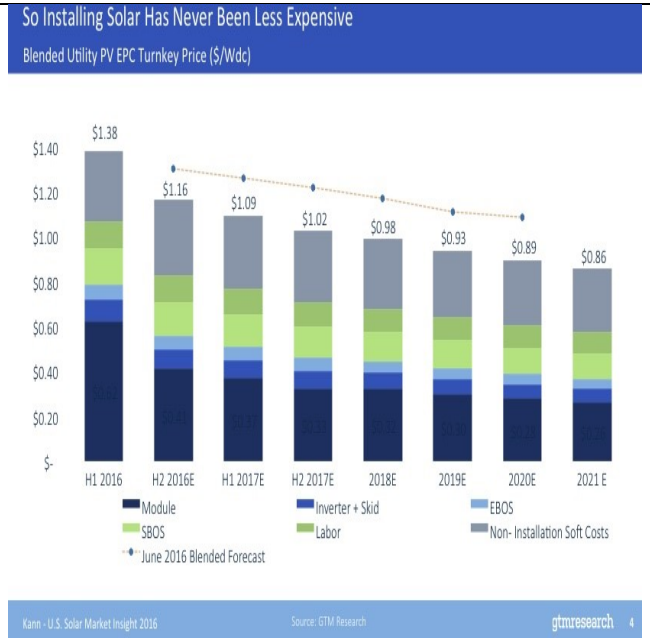
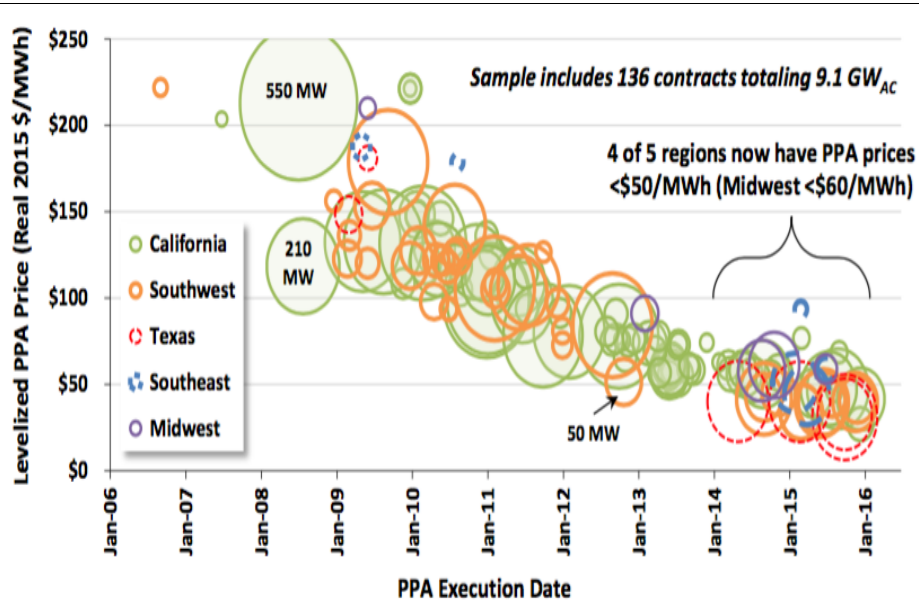
		and Closed-Loop Pumped Storage Projects and Recommendations Pursuant to Section 6 of the Hydropower Regulatory Efficiency Act of 2013"	
FERC: SGIA (Small Generator Interconnection Agreement)	FERC is proposing revisions to its small generator interconnection policy to reflect the need for those generators to "ride through" and stay connected during abnormal frequency	Changing industry conditions and the increasing presence and the impact of distributed energy resources on the electric system now require the extension of the capability to small generators similar to the requirements for generators larger than 20 megawatts.	Under the proposal, FERC would revise the pro forma Small Generator Interconnection Agreement (SGIA) adopted in Order No. 2006 and amended in Order No. 792 to require generators smaller than 20 megawatts signing new SGIAs to ride through abnormal frequency and voltage events, and not disconnect during those events.
Storage NOPR	Integrating storage into wholesale markets.	The proposal would require ISO/RTO to make their rules recognize the operational characteristics of storage and let such resources take part in the markets when they are capable of that	

Current Hot Issues

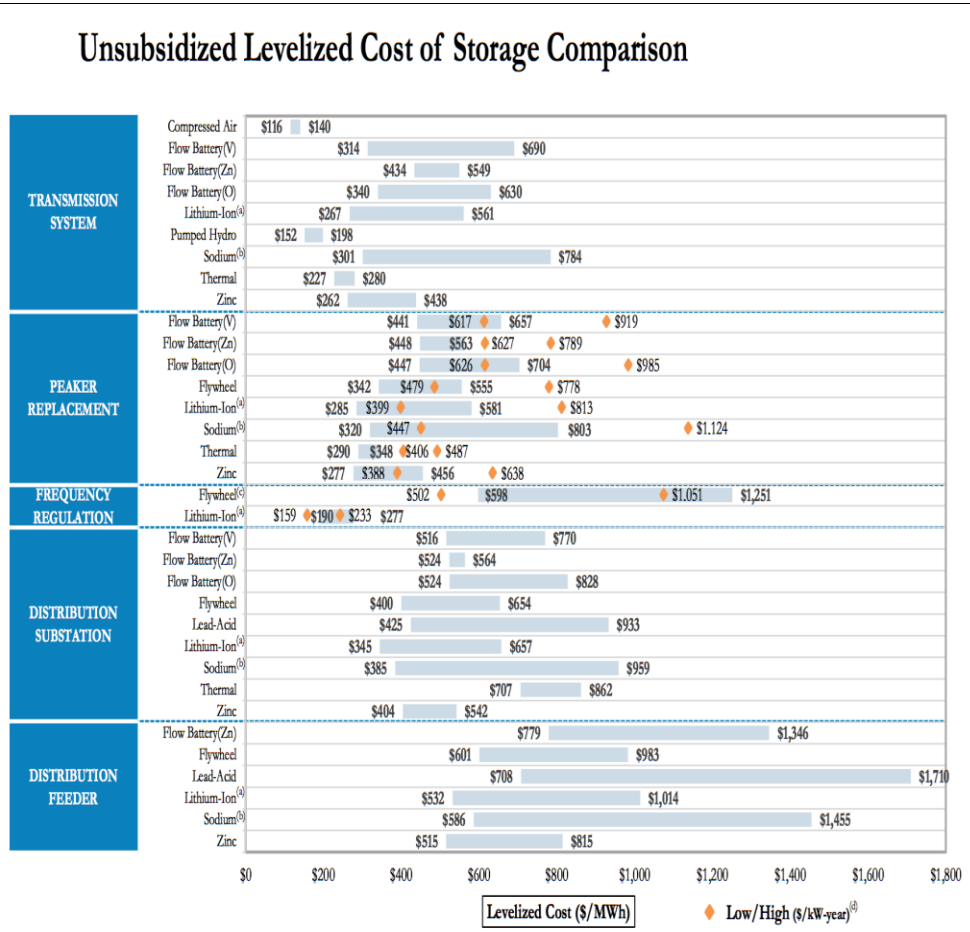
Venue / Proceeding	**Summary**	**Last Actions**	**Next Action**
Aliso Canyon	Southern California Gas Company's Aliso Canyon facility began leaking at an estimated 60,000kg/hr in October. Finally capped after 16 weeks. Largest methane release in US history. Aliso Canyon holds 86 billion cubic feet of natural gas, a 21-day supply at the region's 4 billion cubic feet/day peak use. Not being able to use this storage has severe ramification on electricity availability and ngas pipeline operation.	114 wells have been tested 34 have been certified as OK by DOGGR. And 79 taken out of service. They have 1 year to pass tests or will have to be plugged. Regulators proposed to limit gas storage in the facility to a maximum of 29 billion cubic feet (bcf). Aliso Canyon can hold up to 83 bcf.	SB 380 requires CPUC to investigate closing Aliso Canyon. CPUC initiated proceeding to determine if Aliso should be reopening and whether it should be closed permanently.

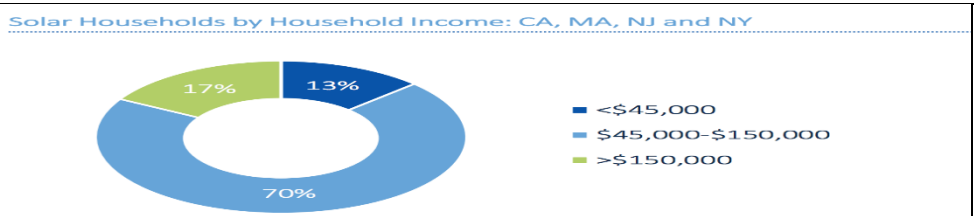
Interesting Information

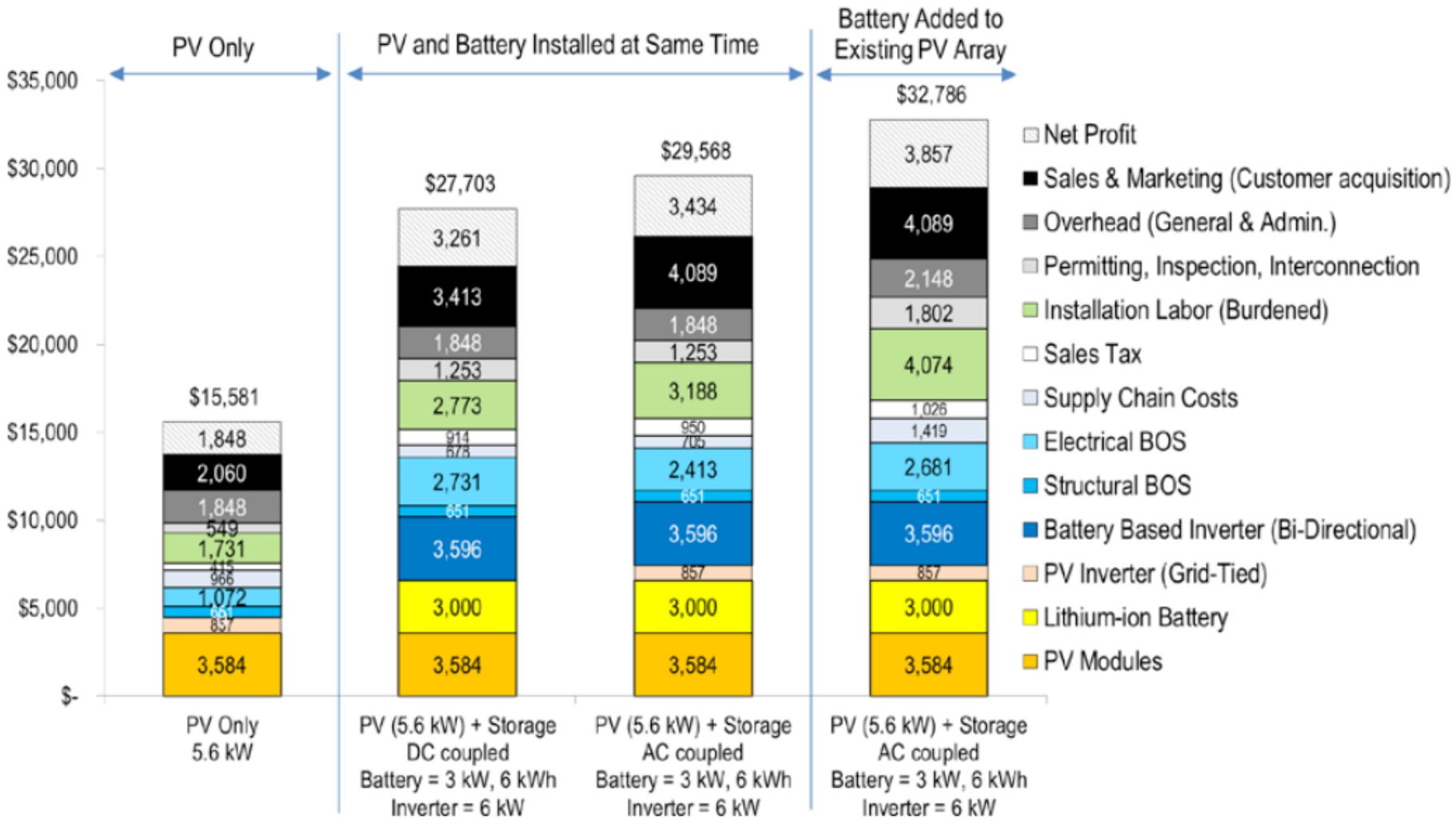
Issue	What Happened	Additional Information	
Interconnection	Rule 21 fast track study requires at least an $800 deposit and a 15-day review. If fail fast track require another $2,500 and extend another 20 days. A full detailed study requires a deposit of between $10,000 and $250,000 and takes 60 days or longer.		
Electricity news	California average was $0.1736/kWh in November 2015, according to the EIA.	The U.S. Energy Information Administration reported this week that total electricity sales in 2015 fell 1.1% from the previous year, marking the fifth time in the past eight years that electricity sales have fallen. EIA predicts residential will use over 11% less electricity by 2040	
Solar Performance		The ISO, NREL), and First Solar analyzed a 300 megawatt photovoltaic (PV) plant for performance in three critical areas: frequency control; voltage control; and ramping capacity. They demonstrated that renewable energy plants with smart inverter technology can offer these electric reliability services similar to conventional power plants. Report published by ISO: "Using Renewables to Operate a Low Carbon Grid."	
Solar Prices	Solar prices continue dropping. Two research studies say 15,000 MW of new solar capacity coming on line this year and next. Glut of solar panels expected. Predict price drop of 15% additional expected. Solar competitive with natural gas. 8minute energy signed 155MW solar project in Kern County called Springbrook to LADWP through SCPPA for 3.5 cents/kWh. Using land fallowed due to drought. Sonoma Clean \Power, citing dropping solar prices, will drop its residential electric rates 10% in march.	Solar Prices in $/W 2010 2015 2020(expected) Residential $6.20 $3.10 $1.60 Commercial $5.00 $2.20 $1.30 Utility $4.10 $1.80 $1.10	

		 **Figure 18. Levelized PPA Prices by Region, Contract Size, and PPA Execution Date: Full Sample**	
Wind prices	Wind PPA prices coming in at about 2.0 cents//kWh	Moody: Rate-Basing Wind Generation report 4 of 5 top wind producing states Republican (Texas, Iowa, Oklahona, Kansas.	
Solar + Storage	Tesla has teamed up its Powerwall with SolarCity.	AES will pair a 20 MW, 100 MWh battery system with a 28 MW solar array to deliver dispatchable generation to the Kauai Island Electric Cooperative for 11 cents/kWh.	
	IID: Grid Alternatives and Enphase installing 50 solar plus storage residential projects, using microinverters, 1.2kW AC batteries, and Enphase AC combiner box.		
	Navy investigating 44 MW solar+ storage at Barking Sands missile base in Kauai.		
	Pacific Union College – Green Charge Networks installing 1 MW, 2 MWH energy storage system	Green Charge has 7.4MWh storage at 14 sites in Sand Diego school district.	
	Residential solar+storage increases residential energy use and emissions (Nature Energy paper)	Transactional round trip efficiency (storage losses) increase residential energy use by 324-591 kWh per household, (+153-303 kg of C). Study was 3.3.KW, 7 kWh system, roundtrip efficiency 85%	

Diablo Canyon	PG&E proposed retiring Diablo Canyon nukes starting in 2024. Joint proposal parties are PG&E, International Brotherhood of Electrical Workers Local 1245, Coalition of California Utility Employees, Friends of the Earth, Natural Resources Defense Council, Environment California and Alliance for Nuclear Responsibility.	PG&E filed application for the retirement and replacement of the Diablo Canyon Nuclear Power Plant Requests Commission approval for various aspects of the Joint Proposal from a deal negotiated with environmental and labor groups. The main aspects of the proposal include the procurement of 2,000 GWh of energy efficiency before 2024 and another 2,000 GWh of GHG-free resources between 2025 and 2030. PG&E has requested 8 years of increased rates to close the facility ($1.77B). Comments Jan 27, Joint Reply by March	
San Onofre	CPUC ordered SFE to renegotiate its 2014 settlement on San Onofre.	Original settlement, unanimously approved by CPUC, was tainted by allegations of inappropriate contact by SCE. CPUC ordered SCE to renegotiate the settlement.	
Electricity to gas	SoCal Gas and Proton Onsite demonstration at UC Irvine. Siemens, Voestalpine, and Verbund also have hydro generation demonstration projects using renewable electricity.	Power-to-gas technology takes excess renewable electricity and converts it to hydrogen and then blends it with natural gas in the system. 5% blend of hydrogen could provide storage capacity much more cost effective and a much longer duration than Li-ion batteries.	

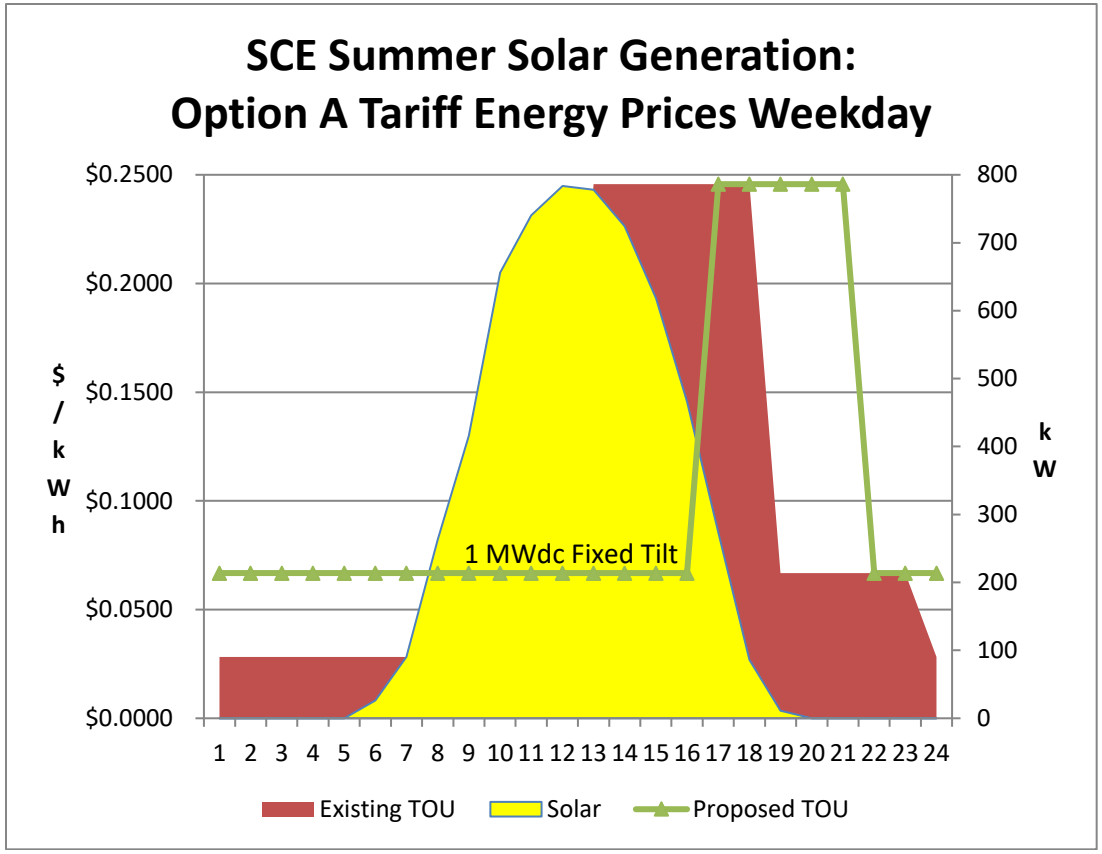
Electricity Storage	Storage cost dropping also. Based upon current demand charges on some tariffs, payback periods for adding storage are on the order of several years using existing TOU periods. Battery storage has dropped 40% since 2014. According to GTM Research, 21 U.S. states now have 20 megawatts of energy storage projects proposed, in construction or deployed. In fact, 10 U.S. states have pipelines greater than 100 megawatts..		
Tesla	Taking orders for solar roof starting in May	7 kW, 14 kWh system cost $5,500.	
Who is buying solar?	In CA, 1 out 0f 100 households in areas that elected Republicans have solar, 1 out of 500 households have solar in areas that elected Democrats. Of top 10 renewable energy states – 6 have Democrat Governors, 4 have Republicans.	Not for poor people.	

			
IceBears	IceBear and Horizon Solar Power have completed installation of a solar-plus-ice-battery-storage system at Palm Springs Cultural Center in California's Coachella Valley	The solar-plus-storage system comprises 73.6 kW of solar panels and five Ice Energy Ice Bear 30s.	
Beer solar	CA breweries using solar.	MillerCoors Irwindale – 3.2MW, Sierra Nevada Chico – 2.6MW, Lagunitas Petaluma - 2.1MW, Stone Brewery Escondito – 312kW, Bear Republic Cloverdale – 167kW, Anderson Brewing Boonville – 125kW, Pizza Port Carlsbad – 117kW	
Marijuana	Marijuana farming is a big electricity growth industry. Full spectrum lights needed. California legal pot economy expected to top $7 billion annually. Legalizations starts January 2018.	Sonoma Clean power offering ag rates and efficiency programs. Growers are eligible for PG&E programs that involve "agricultural production for sale which do not change the form of the product".	


PV Only
PV and Battery Installed at Same Time
Battery Added to Existing PV Array
$35,000
$30,000
$25,000
$20,000
$15,000
$10,000
$5,000
$-
$15,581
1,848
2,060
1,848
549
1,731
415
966
1,072
661
857
3,584
$27,703
3,261
3,413
1,848
1,253
2,773
914
673
2,731
651
3,596
3,000
3,584
$29,568
3,434
4,089
1,848
1,253
3,188
950
705
2,413
651
3,596
857
3,000
3,584
$32,786
3,857
4,089
2,148
1,802
4,074
1,026
1,419
2,681
651
3,596
857
3,000
3,584
Net Profit
Sales & Marketing (Customer acquisition)
Overhead (General & Admin.)
Permitting, Inspection, Interconnection
Installation Labor (Burdened)
Sales Tax
Supply Chain Costs
Electrical BOS
Structural BOS
Battery Based Inverter (Bi-Directional)
PV Inverter (Grid-Tied)
Lithium-ion Battery
PV Modules
PV Only 5.6 kW
PV (5.6 kW) + Storage DC coupled Battery = 3 kW, 6 kWh Inverter = 6 kW
PV (5.6 kW) + Storage AC coupled Battery = 3 kW, 6 kWh Inverter = 6 kW
PV (5.6 kW) + Storage AC coupled Battery = 3 kW, 6 kWh Inverter = 6 kW

Proposed Rate Changes

Utility and Application	Customer Class	Proposed seasons
San Diego Gas & Electric General Rate Case (A.15-04-012)	Commercial and Residential Rate Changes	- 4 to 9PM on peak - Super off-peak: 12AM to 2PM (weekends); 12AM to 6AM (weekdays)
Pacific Gas & Electric General Rate Case (A.16-06-013)	Commercial Rate Changes	- 5PM to 10PM on peak period all year, every day - 3PM-5PM; 10PM-12AM (all days of week) summer partial peak period - Shortened Summer (June-September) - "Spring" season with Super off Peak period 10AM to 3PM (March through May all days of week)
Southern California Edison Rate Design Window Case (A.16-09-003)	Commercial Rate Changes	- 4PM to 9PM on peak during summer weekdays - 4PM to 9PM mid-peak for summer weekends and for winter weekdays and weekends. - 8AM to 4PM super off-peak period for winter weekdays and weekends


SCE Summer Solar Generation:
Option A Tariff Energy Prices Weekday
$0.2500
$0.2000
$0.1500
$0.1000
$0.0500
$0.0000
$ / kWh
800
700
600
500
400
300
200
100
0
kW
1 MWdc Fixed Tilt
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Existing TOU
Solar
Proposed TOU

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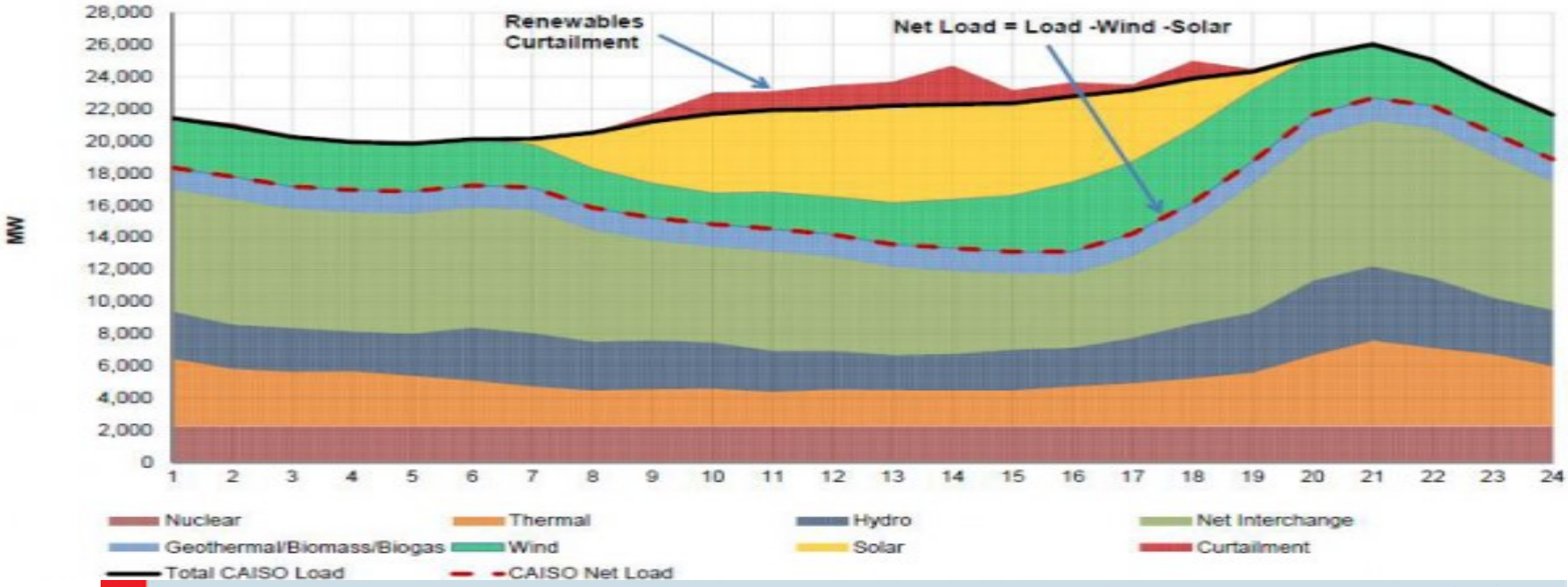
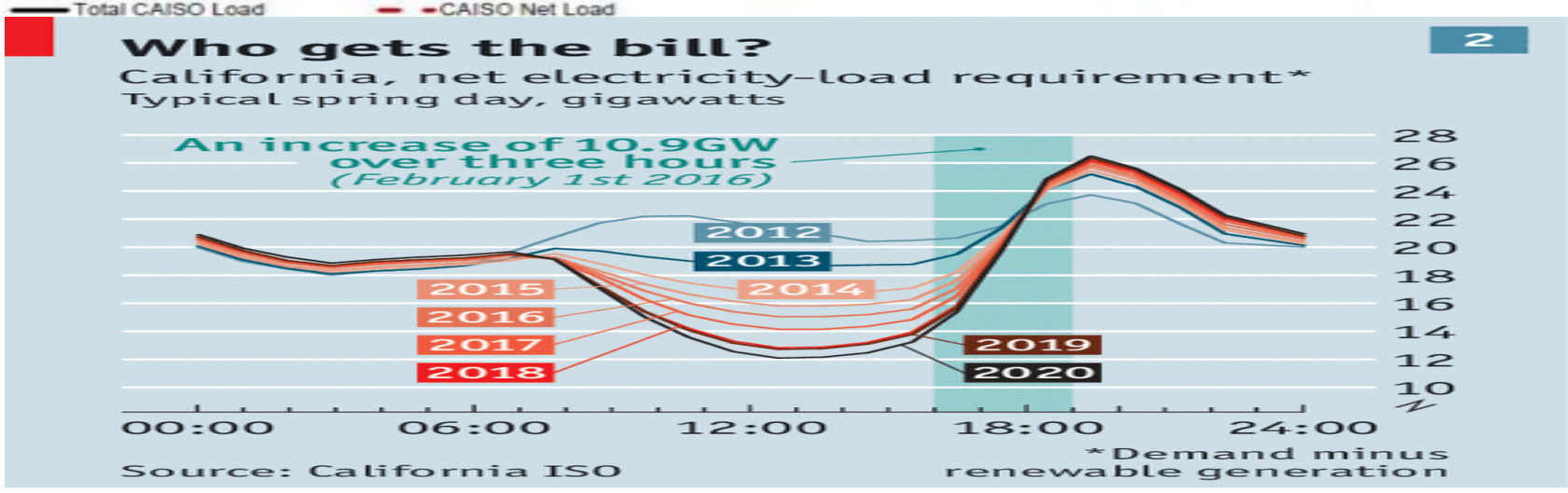

MW
28,000
26,000
24,000
22,000
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
Renewables Curtailment
Net Load = Load -Wind -Solar
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Nuclear
Thermal
Hydro
Net Interchange
Geothermal/Biomass/Biogas
Wind
Solar
Curtailment
Total CAISO Load
CAISO Net Load

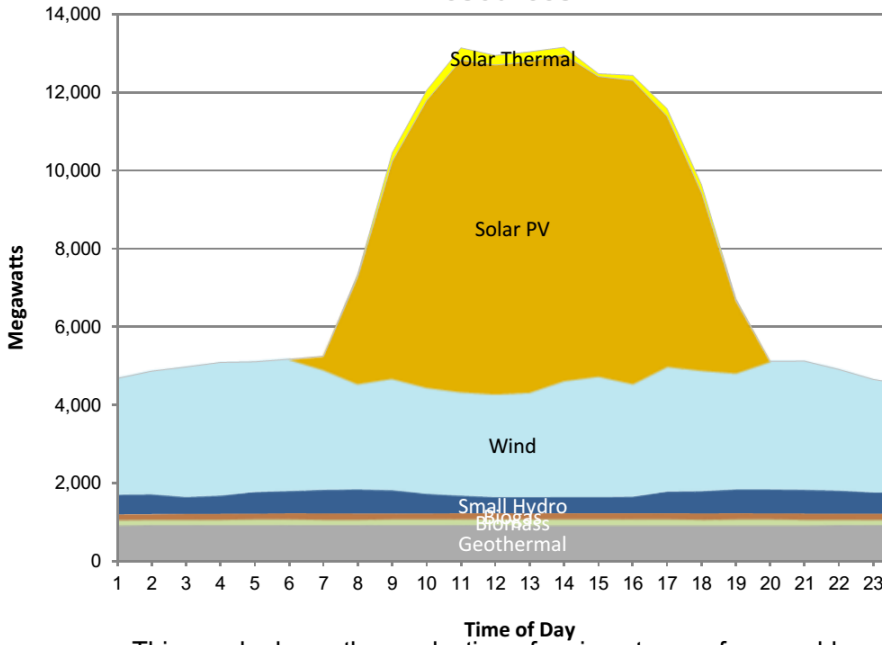

Who gets the bill?
2
California, net electricity-load requirement*
Typical spring day, gigawatts
An increase of 10.9GW over three hours
(February 1st 2016)
2012
2013
2014
2015
2016
2017
2018
2019
2020
28
26
24
22
20
18
16
14
12
10
00:00
06:00
12:00
18:00
24:00
Source: California ISO
*Demand minus renewable generation
Economist.com

24-Hour Renewables Production

Renewable Resources	Peak Production Time	Peak Production (MW)	Daily Production (MWh)
Solar Thermal	13:16	365	2,202
Solar	12:43	8,831	77,909
Wind	3:25	3,581	71,917
Small Hydro	7:56	653	12,717
Biogas	14:18	160	3,547
Biomass	16:21	159	3,563
Geothermal	6:54	934	22,274
Total Renewables			**194,128**
Total 24-Hour System Demand (MWh):			*582,625*

This table gives numeric values related to the production from the various types of renewable resources for the reporting day. All values are hourly average unless otherwise stated. Peak Production is an average over one minute. The total renewable production in megawatt-hours is compared to the total energy demand for the ISO system for the day.

Hourly Average Breakdown of Renewable Resources



This graph shows the production of various types of renewable generation across the day.

System Peak Demand (MW) *one minute average	**28,702**
Time:	**20:11**

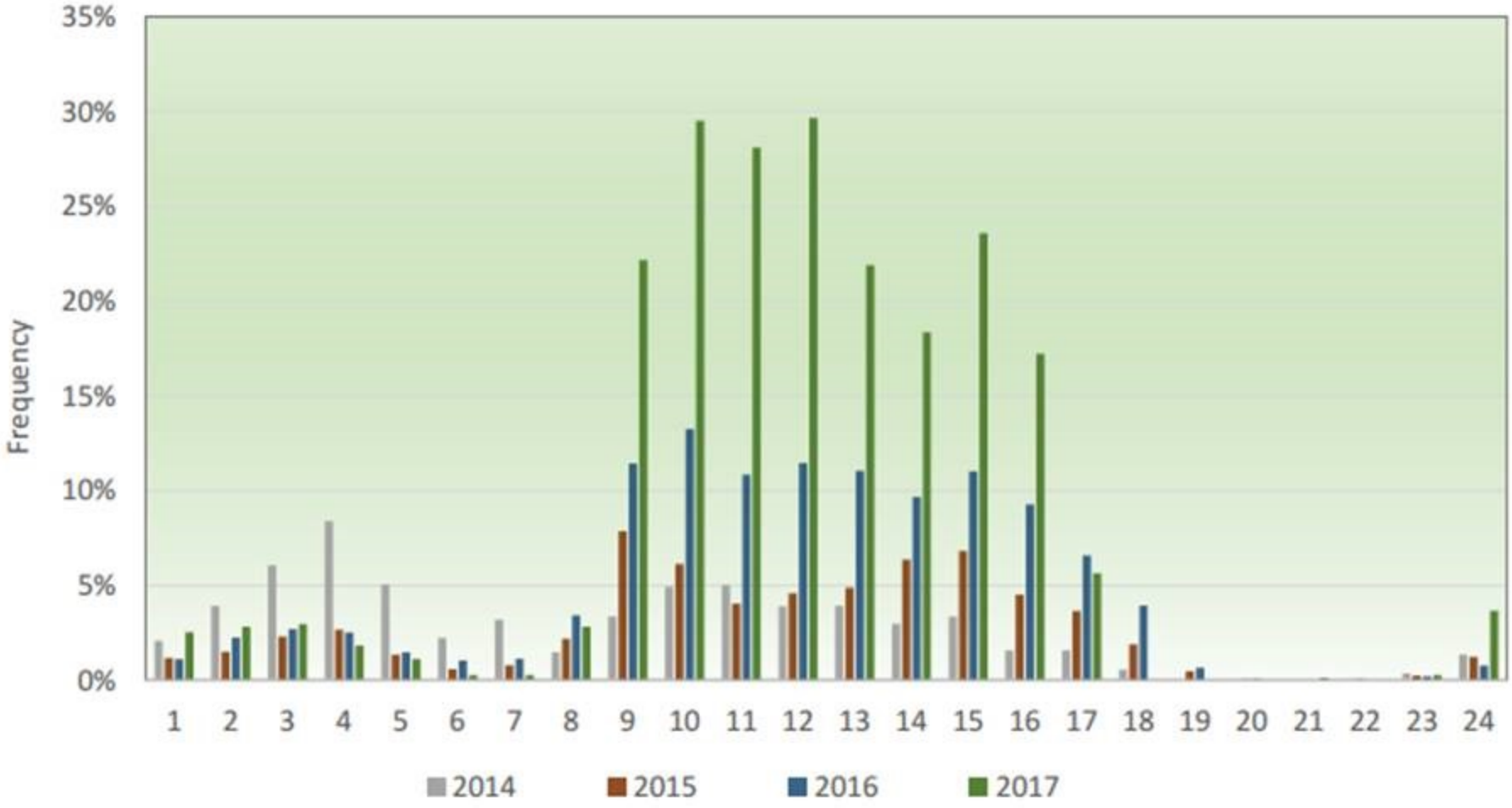
CA ISO Data for April 27, 2017

First Quarter | Second Quarter | Third Quarter | Fourth Quarter

California Independent System Operator average hourly real-time price
dollars per megawatthour

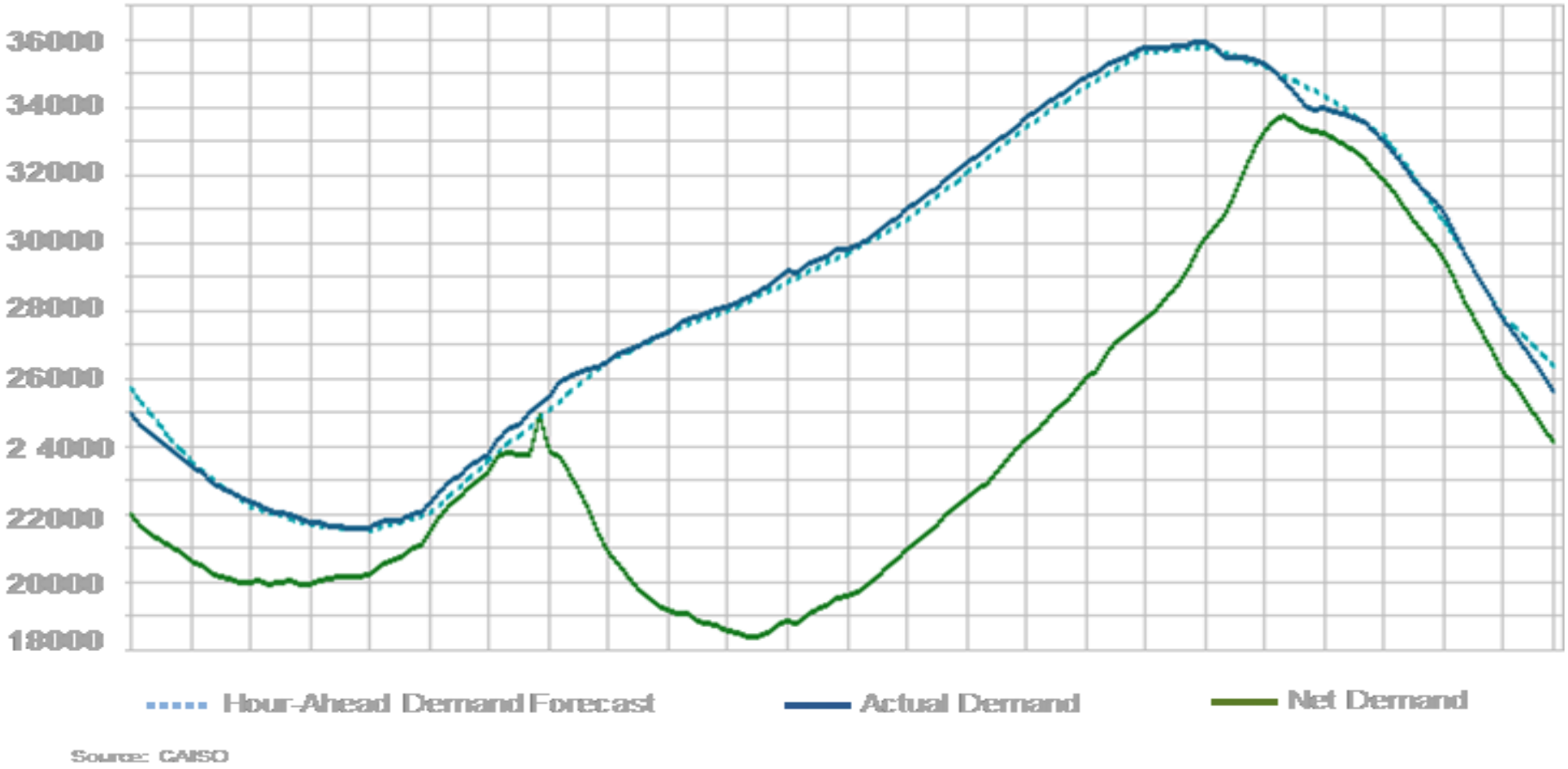
Source: U.S. Energy Information Administration, based on LCG consulting

Distribution of negative prices have shifted from early morning hours to midday hours*



California ISO

* Metric of 2017 may be over-estimated since it includes only January and February.



May 3, 2017 ISO data.

Sourcing Mechanism	Brief Description	Applicable DER(s)	Applicable Customer Segment(s)	Proceeding(s)
TARIFFS				
NEM tariff	•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	•Customers charged rate based on time of day that electricity is used •TOU period/rate design varies by IOU	All DERs	•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	•Default for all non-residential •PG&E has opt-in for residential	GRC Phase 2; RDW
EV rates	•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

Sourcing Mechanism	Brief Description	Applicable DER(s)	Applicable Customer Segment(s)	Proceeding(s)
INCENTIVE PROGRAMS				
IOU DR programs - various rate schedules [e.g., AC Cycling, TOU-BIP, API, CBP, DBP]	•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 (e.g., CBP)	DR, AES	All sectors	R.13-09-011
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 *upstream* incentives to manufacturers for lighting, etc.	EE	All sectors	R.13-11-005
Utility EE Programs	• Deemed *midstream* incentives (to distributors) and *downstream* 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	• 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

Sourcing Mechanism	Brief Description	Applicable DER(s)	Applicable Customer Segment(s)	Proceeding(s)
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
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]	•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 *economically-triggered* 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 *reliability-triggered* 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	• 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