

**BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA**

Order Instituting Rulemaking to Develop an
Electricity Integrated Resource Planning
Framework and to Coordinate and Refine Long-
Term Procurement Planning Requirements

Rulemaking 16-02-007
(Filed February 11, 2016)

**NOTICE OF *EX PARTE* COMMUNICATION OF THE
CALIFORNIA ENERGY STORAGE ALLIANCE**

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Counsel for the
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October 25, 2017

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Pursuant to Rule 8.4 of the Rules of Practice and Procedure of the California Public Utilities Commission (“Commission”), the California Energy Storage Alliance (“CESA”) hereby gives notice of the following ex parte communication.

On October 22, 2017, CESA’s Executive Director, Janice Lin, gave a presentation titled the “Future of California’s Energy Grid: Highly Renewable, Highly Flexible “ (which is attached hereto as Appendix A) as a participant in a panel discussion titled “The Future of Energy Storage in the Aftermath of the Aliso Canyon Leak” at the 2016 Environmental Law Conference at Yosemite, sponsored by the State Bar of California Environmental Law Section located at the Tenaya Lodge in Yosemite National Park, California. The panel discussion in which Ms. Lin participated lasted from approximately 11:00 a.m. to 1:30 p.m.

Ms. Lin provided an overview of grid reliability challenges for California’s current and future renewable energy mix, the importance of encouraging fast flexible resources to provide current and future ramping needs, and the strategic role of flexible resource adequacy enhancements that are urgently needed. Further, Ms. Lin explained the role of energy storage as a key component of the CAISO’s flexibility tool kit in helping to maintain reliable and cost effective grid operations.

Commissioner Liane M. Randolph was also a participant in the panel discussion.

To receive a copy of this ex parte notice, please contact: please contact Michelle Dangott, at 818.961.3003 or mdangott@energyattorney.com.

Respectfully Submitted



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APPENDIX A

Future of California's Energy Grid: Highly Renewable, Highly Flexible

Janice Lin

Co Founder & Executive Director, California Energy Storage Alliance (CESA)

Yosemite Law Conference
October 22, 2017



About CESA


The **California Energy Storage Alliance (CESA)** is a 501c(6) membership-based advocacy group committed to advancing the role of energy storage in the electric power sector through policy, education, outreach, and research. CESA was founded in January 2009 by Janice Lin and Don Liddell.

CESA's mission is to make energy storage a mainstream energy resource in helping to advance a more affordable, clean, efficient, and reliable electric power system in California.



California ISO
Shaping a Renewed Future

















CESA
CALIFORNIA ENERGY STORAGE ALLIANCE

CESA Members

Board Members









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| | | |
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| <ul style="list-style-type: none"> Able Grid Adara Power Amber Kinetics American Honda Motor Bright Energy Storage BrightSource Energy Brookfield Consolidated Edison Customized Energy Solutions Doosan GridTech Eagle Crest Energy EDF Renewable Energy ElectrIQ Power | <ul style="list-style-type: none"> eMotorWerks Energyport Energy Storage Systems GAF Geli Green Charge Networks Greensmith Energy Gridscape Solutions Gridtential Energy Hitachi Chemical IE Softworks Johnson Controls Lockheed Martin AES | <ul style="list-style-type: none"> Mercedes-Benz Energy National Grid NEC Energy Solutions NEXTracker NGK Insulators NICE America Research Ormat Technologies OutBack Power Parker Hannifin Qnovo Recurrent Energy RES Americas SD Energy Storage |
| <ul style="list-style-type: none"> Sempra Renewables Sharp Electronics Southwest Generation Sovereign Energy STOREME Sumitomo Electric Sunrun Swell Energy UniEnergy Technologies Viridity Energy Yunicos | | |

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CESA
CALIFORNIA ENERGY STORAGE ALLIANCE

California's Ambitious & Important Clean Energy Goals

California's policies are creating a need for more flexible and grid integration solutions to maximize renewables investments and manage grid reliability:

- **SB 350** established a 50% RPS by 2030, among other requirements for electric vehicles, energy efficiency, and disadvantaged communities
- **SB 32** set a goal to reduce California's GHG emissions by 40% from 1990 levels by 2030
- **NEM 2.0 Decision** largely maintained tariff and continued rooftop PV growth trajectory
- **SB 338** provides direction that planning exercises should consider roles for storage and preferred resources in meeting ramps and peaks
- **SB 100** did not pass in the 2017 Legislative session, but may be considered next year to set a 100% RPS by 2045
- **Executive Order B-16-2012** set a long-term goal of reaching 1.5 million zero-emission vehicles (ZEVs) on California's roadways by 2025
- **Zero Net Energy (ZNE) Homes vision** was established by the CPUC to have 100% of all new homes be ZNE starting in 2020

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Future of California's Energy Grid: Highly Renewable, Highly Flexible

Focus for Today:
The strategic (and urgent) role of Flex RA in achieving a highly flexible, reliable fleet



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Energy Storage: the Ultimate Flexibility Tool



Electro-Chemical



Mechanical



Bulk Mechanical



Thermal



Bulk Gravitational



Transportation



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Expedited Aliso Canyon Procurement Demonstrated Rapid Speed of Installation



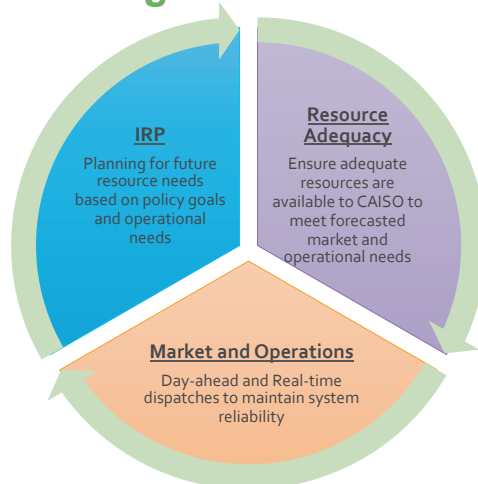
In < 8 months, 99.5 MW of energy storage was procured and operational to address reliability issues stemming from limitations of the Aliso Canyon gas storage facility

| Utility | Developer | MW | MWh | COD |
|--------------|-------------------------------|-------------|--------------|------------|
| SCE | AltaGas Services / Greensmith | 20.0 | 80.0 | 12/31/2016 |
| | Powin Energy | 2.0 | 9.0 | 12/31/2016 |
| | Tesla Energy | 20.0 | 80.0 | 12/31/2016 |
| | GE / Wellhead | 20.0 | 8.0 | 12/31/2016 |
| SDG&E | AES Energy Storage | 37.5 | 150.0 | 1/31/2017 |
| Total | | 99.5 | 327.0 | |

Updated May 2, 2017

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Long term planning is preparing for new operational needs as generation fleet evolves



A unified vision should guide planning, procurement, and operations

Source: CAISO Flexible Resource Adequacy Criteria and Must Offer Obligation Working Group Meeting 9/26/17

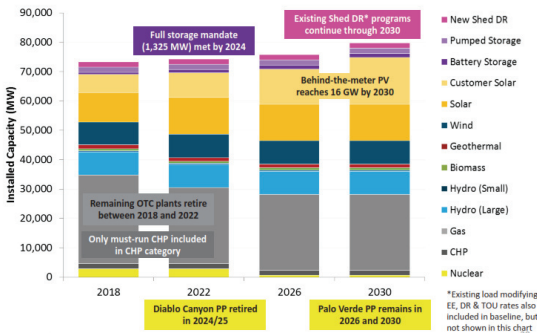
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IRP: More Renewables are Needed to Meet 42MMT 2030 GHG Goal

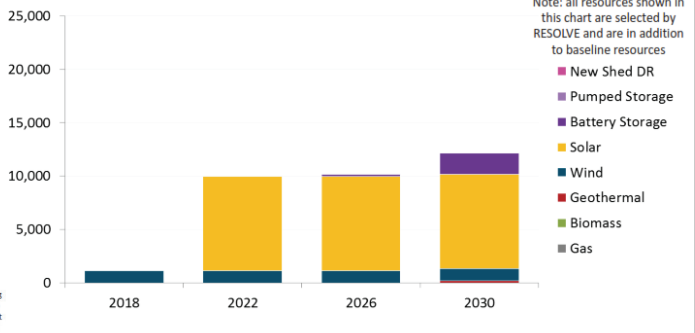
The CPUC's Reference System Plan recommends + 9,000 MW of utility-scale solar PV and + 1,100 MW of wind in California (on top of assumed +16,000 MW of additional rooftop PV)

CPUC Proposed Baseline Resources 2018-2030



Source: E3 RESOLVE Model & CPUC IRP Workshop (2017)

CPUC Proposed 42 MMT Reference System Plan 2018-2030

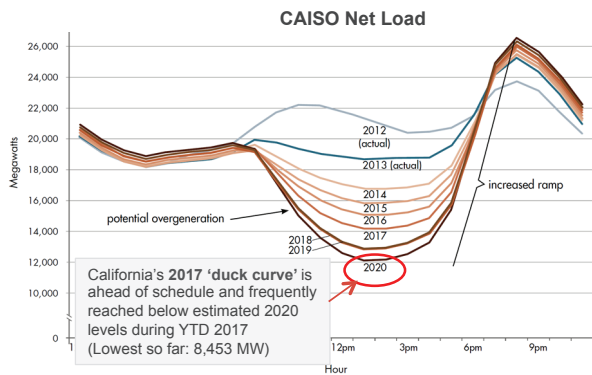


Source: E3 RESOLVE Model & CPUC IRP Workshop (2017)

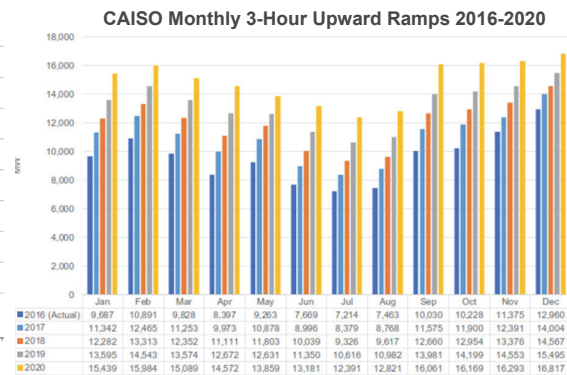


Current Real-Time Operational Difficulties

Planning models often focus on three-hour 'solutions', which can blur actual hourly and intra-hour ramps, outages, and other factors that make the real-time operation of the grid a growing challenge



Source: CAISO (2013)

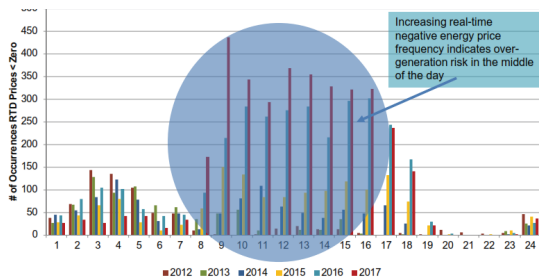


Source: CAISO (2017)

Implications for California's Flexible Fleet

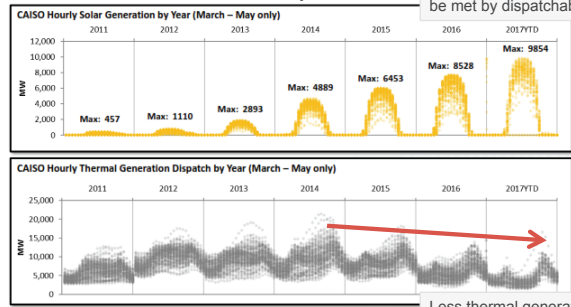
Flexible ramping has been historically provided by the CAISO's gas fleet, which face financial hurdles due to GHG policies and lower (sometimes negative) energy prices

CAISO Distribution of Negative Prices: Mar-May 2012-2017



Source: CAISO (2017)

CAISO Solar Generation vs. Thermal Dispatch

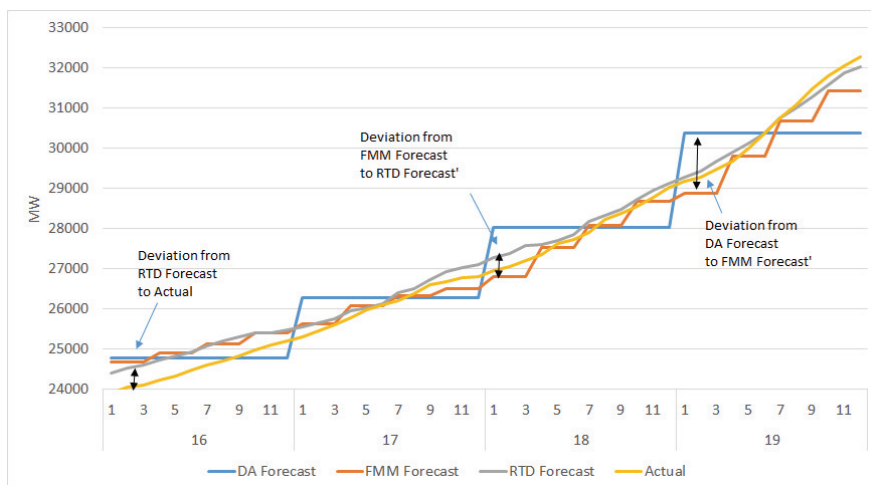


Increasing mid-day solar generation reduces net load to be met by dispatchable fleet

Source: E3 (2017)

Less thermal generation dispatch, but it is still needed for evening ramp and peak

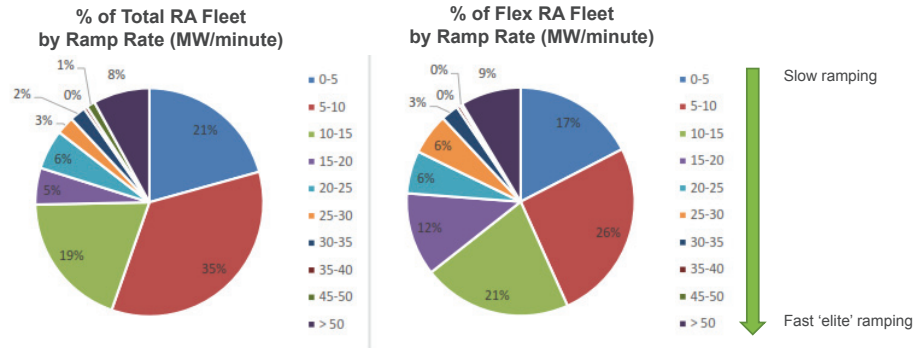
Fast flexible fleet is needed to deal with forecast error



Source: CAISO Flexible Resource Adequacy Criteria and Must Offer Obligation Working Group Meeting 9/26/17

Inadequate Flexibility Tools for the CAISO

California can better incentivize flexible resources that are fast-ramping, quick starting, and have low minimum operating levels (Pmin) – i.e., System/Local RA looks like Flex RA!

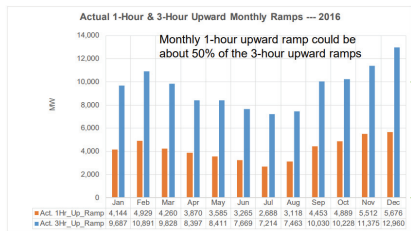


Flex RA should be used to incentivize fast flexible resources to meet CAISO's operational needs

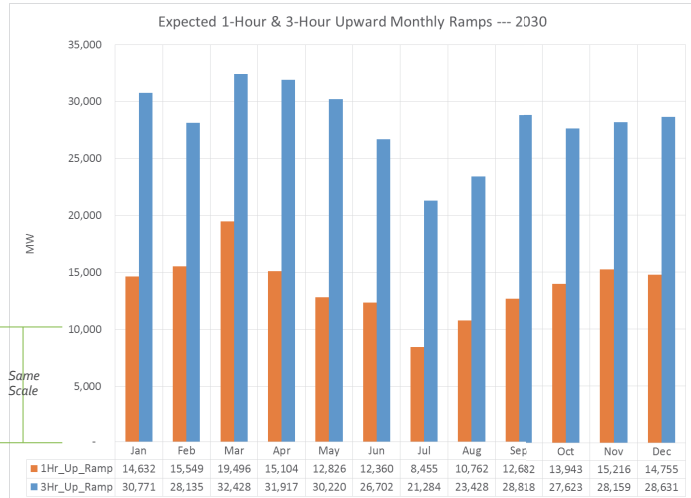
Source: CAISO (2017)

In 2030, Much More Flexibility Will Be Needed

Adding the Proposed Reference System Plan from the IRP will increase ramp rates as well as downward ramping needs



Source: CAISO OASIS data (2016)

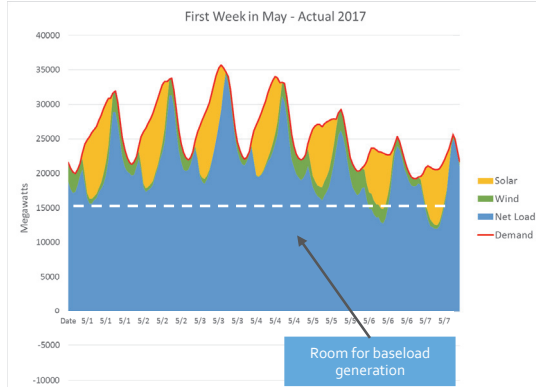


Source: CAISO OASIS data (2016), 2030 IRP Proposed Reference System Plan Scenario

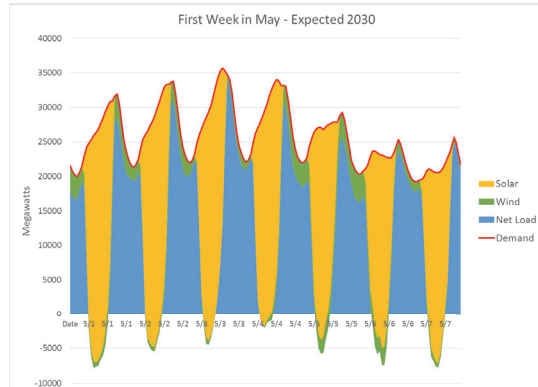
2030 Grid Operations with Renewables: Spring

Today: Net load is met by Flexible Gas, Baseload Gas, Nuclear, Geothermal, Imports/Exports, and Curtailments

2030: Net load will need to be met by a combination of Flexible Resources, Imports/Exports, and Curtailment



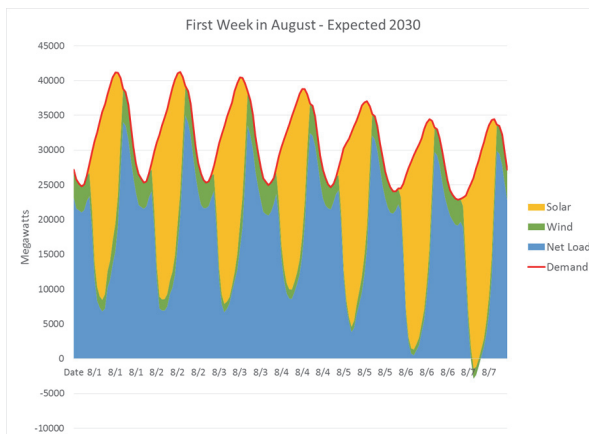
Source: CAISO OASIS data (2016)




Source: CAISO OASIS data (2016), 2030 IRP Proposed Reference System Plan Scenario

2030 Grid Operations with Renewables: Summer


These steep ramps and overgeneration risks are not just a spring-time problem



Source: CAISO OASIS data (2016), 2030 IRP Proposed Reference System Plan Scenario



The Flex RA Program is Strategically Important To Development of Grid Reliability Toolkit




CAISO Flexibility Tools

Flex RA Program Should Provide Economic Signal for Grid Needs:

- Value ramping speed and low Pmin
- Value ‘negative generation’ contributions (charging)
- Develop short duration products (5-min, 15-min, hourly), in addition to 3-hour product

Flex RA Program Reform should happen ASAP, in parallel to IRP – key to begin developing flexible fleet

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Pathways to Collaborate & Find Solutions

CPUC and CAISO initiatives will address these challenges and opportunities:

- **CPUC Resource Adequacy (RA) proceeding** can tune or improve planning and procurement of needed flexible capacity resources. Flex RA is critical to ENSURE a viable fleet with the right participation requirements
 - CAISO indicating current Flex RA isn't working. Instead of providing market signals, RA sometimes yields cheapest 'limp-along' payments to keep old, inflexible generators alive.
- **CPUC Integrated Resources Plan (IRP) proceeding** will identify reliability-driven and policy-driven grid needs and reference plans
 - Very cool and cutting edge modeling and planning effort but should ensure even extreme conditions and intra-hour ramps are reliably met.
 - CESA suggestion: consider cost of keeping gas fleet available and/or fast gas retirement scenario
- **CAISO Flex Capacity (FRACMOO), Energy Storage Participation improvements, Frequency Response, and other initiatives queued up or underway**
 - Better defining 'flex need', setting up capacity 'needs' that can inform RA construct, considering overgeneration and solutions from Storage

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Key takeaways:

- 1. Much more flexible resources are needed to reliably operate the grid**
- 2. Flex RA is strategically important to California's grid reliability**
- 3. Reform is urgently needed - should provide clear, non-discriminatory market signals so fast flexible resources can compete head to head against conventional resources**
- 4. Appropriate market signals will stimulate investment toward a fleet with the necessary flexibility capabilities**
- 5. Energy storage is the ultimate flexibility tool for the grid**

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Thank You!

Questions?

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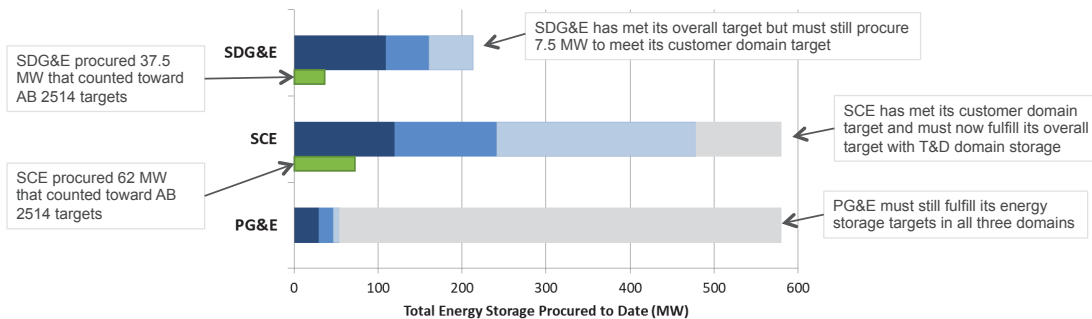
Backup Slides



Energy Storage Is Arriving



Each of California's three investor-owned utilities (IOUs) are making major progress toward their 1,325 MW energy storage procurement target by 2020, including 99.5 MW of energy storage that was procured and operational *in six months* to address reliability issues stemming from limitations of the Aliso Canyon gas storage facility



Updated July 7, 2017

■ Transmission ■ Distribution ■ Customer ■ Residual Procurement Target