

2021 Report of the Statewide Advisory Committee on Cooling Water Intake Structures

DRAFT

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Acronyms and Abbreviations

AFC	Application for Certification
BAA	Balancing Authority Area
BARCT	Best Available Retrofit Control Technology
CAISO	California Independent System Operator
CARB	California Air Resources Board
CCGT	Combined Cycle Gas Turbine
CEC	California Energy Commission
CPUC	California Public Utilities Commission
HE	Hour Ending
IEPR	Integrated Energy Policy Report
IOU	Investor-Owned Utility
IRP	Integrated Resource Planning
LADWP	Los Angeles Department of Water and Power
LCR	Local Capacity Requirement
LTPP	Long-Term Procurement Plan
MGD	Million Gallons per Day
MVAR	Mega Volt, Ampere, Reactive
MW	Megawatt
NPDES	National Pollutant Discharge Elimination System
NQC	Net Qualifying Capacity
OTC	Once-Through Cooling
PDT	Pacific Daylight Time
PPA	Power Purchase Agreement
PRM	Planning Reserve Margin
PTA	Petition to Amend
PTC	Permit to Construct
PTO	Participating Transmission Owner
RECLAIM	Regional Clean Air Initiatives Market

RMR	Reliability Must Run
SACCWIS	Statewide Advisory Committee on Cooling Water Intake Structures
SCAQMD	South Coast Air Quality Management District
SCE	Southern California Edison
SCGT	Single Cycle Gas Turbine
SDG&E	San Diego Gas & Electric
SLC	State Lands Commission
SONGS	San Onofre Nuclear Generating Station
State Water Board	State Water Resources Control Board
TMDL	Total Maximum Daily Load
TSO	Time Schedule Order

I. Introduction

The Statewide Advisory Committee on Cooling Water Intake Structures (SACCWIS) has prepared this report to the State Water Resources Control Board (State Water Board) to summarize the State of California's current electrical grid reliability needs and to recommend a two-year extension to the compliance schedule for Redondo Beach Generating Station (Redondo Beach) to address system-wide grid reliability needs.

The SACCWIS includes representatives from the California Energy Commission (CEC), California Public Utilities Commission (CPUC), California Coastal Commission (CCC), California State Lands Commission (SLC), California Air Resources Board (CARB), the California Independent System Operator Corporation (CAISO), and the State Water Board. The State Water Board, in adopting the Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling, also known as the Once-Through Cooling (OTC) Policy,¹ impaneled the SACCWIS to advise the State Water Board on the implementation of the OTC Policy. The SACCWIS provides recommendations to ensure the compliance schedule takes into account the reliability of California's electricity supply, including local area reliability, statewide grid reliability, and permitting constraints. Section 3.B(4) of the OTC Policy provides that the SACCWIS will report to the State Water Board with recommendations on modifications to the compliance schedule each year.

Since 2010, the OTC Policy has reduced marine and estuarine water use by electric generators in California and lessened entrainment and impingement mortality of marine life. The SACCWIS is committed to realizing full compliance with the OTC Policy in the coming years, while maintaining the reliability of California's electric system and meeting the state's environmental and energy goals.

This report primarily focuses on power generating facilities within the California Independent System Operator (CAISO) balancing authority area (BAA). It does not focus on facilities owned or operated by the Los Angeles Department of Water and Power

¹ The most recent version of the OTC Policy is available on the [State Water Board's website](#).

(LADWP), as those compliance dates were reviewed and modified by the State Water Board in July 2011.

On November 7, 2019, the CPUC adopted Decision (D.) 19-11-016, which directed load serving entities under its jurisdiction to procure 3,300 MW of capacity by August 1, 2023, and also recommended extensions of OTC Policy compliance dates for four OTC generators while procurement is underway. On January 23, 2020, the SACCWIS recommended a slightly modified extension schedule for the same four generators. On September 1, 2020, the State Water Board amended the OTC Policy under Resolution No. 2020-0029, which extended the compliance dates of four power plants to address system-wide grid reliability in the CAISO BAA. This OTC Policy amendment was approved by the Office of Administrative Law on November 30, 2020. The OTC Policy amendment extended the compliance dates as follows:

- Alamitos Generating Station Units 3, 4, and 5 for three years until December 31, 2023;
- Huntington Beach Generating Station Unit 2 for three years until December 31, 2023;
- Ormond Beach Generating Station Units 1 and 2 for three years until December 31, 2023; and
- Redondo Beach Generating Station Units 5, 6, and 8 for one year until December 31, 2021.

In August 2020, swaths of the western United States encountered a prolonged and extreme heat storm. This led to a series of circumstances that ultimately required the CAISO to initiate rotating outages in its BAA to prevent wide-spread service interruptions. Since that time, critical uncertainties have sparked efforts from the CPUC, CAISO, and CEC to revise their forecasting models and have highlighted the need for additional capacity.

On November 19, 2020, the CPUC adopted Rulemaking (R.) 20-11-003, which directs the CPUC to consider short-term procurement to address potential grid reliability issues starting in summer 2021. The CPUC adopted D.21-02-028 on February 11, 2021, which

directed the three investor-owned utilities to undertake expedited procurement for capacity that will be available to serve demand in the summer of 2021. D.21-02-028 also anticipates a subsequent decision in R.20-11-003 to address 2022 capacity needs. While this proceeding and other CPUC procurement efforts are still ongoing, a comprehensive stack analysis conducted by the CPUC, CAISO, and CEC indicates that additional procurement is needed to mitigate grid reliability concerns. The power generated by Redondo Beach will help offset projected system-wide shortfalls during periods of high energy demand.

As a result, the SACCWIS recommends the State Water Board extend the OTC Policy compliance date of Redondo Beach Units 5, 6, and 8 for two years through December 31, 2023.

II. Status of Compliance and Once-Through Cooling Water Use

Since the OTC Policy was adopted in 2010, several power generating units have retired, repowered, or come into compliance. The closure of the San Onofre Nuclear Generating Station (SONGS) resulted in a significant reduction in projected ocean or estuarine water use for power plant cooling. Table 1 shows the power plants in the CAISO and LADWP BAAs that have achieved compliance, several of which did so well in advance of their mandated compliance deadlines.

Table 1: OTC Compliance Achievement

Facility & Units	NQC (MW)²	OTC Policy Scheduled Compliance Date	Actual Compliance Date
Humboldt Bay 1, 2	135	Dec. 31, 2010	Retired Sept. 30, 2010
South Bay	296	Dec. 31, 2011	Retired Dec. 31, 2010
Potrero 3	206	Oct. 1, 2011	Retired Feb. 28, 2011

² Net Qualifying Capacity (NQC) in Mega Watts (MW). NQC is the net amount of capacity available from a resource that can be counted towards meeting Resource Adequacy Requirements.

Facility & Units	NQC (MW)²	OTC Policy Scheduled Compliance Date	Actual Compliance Date
Huntington Beach 3, 4	452	Dec. 31, 2020	Retired Nov. 1, 2012 ³
Contra Costa 6, 7	674	Dec. 31, 2017	Retired Apr. 30, 2013 ⁴
San Onofre 2, 3	2,246	Dec. 31, 2022	Retired June 7, 2013 ⁵
Haynes 5, 6	535	Dec. 31, 2013	Retired June 13, 2013 ⁶
El Segundo 3	335	Dec. 31, 2015	Retired July 27, 2013 ⁷
Morro Bay 3, 4	650	Dec. 31, 2015	Retired Feb. 5, 2014
El Segundo 4	335	Dec. 31, 2015	Retired Dec. 31, 2015
Scattergood 3	497	Dec. 31, 2015	Retired Dec. 31, 2015
Pittsburg	1,159	Dec. 31, 2017	Operations ceased Dec. 31, 2016
Moss Landing 6, 7	1,509	Dec. 31, 2020	Retired Jan. 1, 2017
Encina 1	106	Dec. 31, 2017	Retired Mar. 1, 2017
Mandalay 1, 2	430	Dec. 31, 2020	Retired Feb. 5, 2018
Encina 2-5	844	Dec. 31, 2018	Retired Dec. 11, 2018
Redondo Beach 7	493	Dec. 31, 2020	Retired Oct. 1, 2019
Alamitos 1, 2, 6	848	Dec. 31, 2020	Retired Dec. 31, 2019
Huntington Beach 1	215	Dec. 31, 2020	Retired Dec. 31, 2019
Moss Landing 1, 2	1,020	Dec. 31, 2020	Complied Oct. 23, 2020 ⁸
Total Capacity (MW)	12,985	--	--

³ Huntington Beach Units 3 and 4 were converted to synchronous condensers in 2013. Once-through cooling water was used in a limited capacity until September 30, 2018.

⁴ Although NRG retired Contra Costa Units 6-7, the Marsh Landing facility was constructed immediately next to the retired facility. The Marsh Landing Generating Station is a non-OTC generating facility.

⁵ SONGS Units 2 and 3 were officially retired June 7, 2013, but they ceased power generation on Jan. 31, 2012.

⁶ LADWP retired Haynes Units 5-6 and replaced them with Haynes Units 11-16, which do not use OTC technology.

⁷ NRG retired El Segundo Unit 3 and replaced it with El Segundo Units 5-8, which do not use OTC technology.

⁸ Dynegy Moss Landing complied with Track 2 of the OTC Policy.

Table 2 reflects the current compliance plans for the remaining power generating units that use ocean water for once-through cooling. Table 3 presents recent performance of the OTC units in percent of annual capacity factors. The annual capacity factor is defined as the ratio of the electrical energy produced by a generating unit for the year divided by the maximum energy that could have been produced at continuous full power operation. The capacity factor provides one indication of how a generating unit is utilized. Generating units used to meet peak power needs typically have lower capacity factors. The capacity of most of the remaining OTC plants is only used a small percentage of the time, but this capacity helps serve demand during peak hours and stressed operating conditions. Some of the capacity at these plants will need to be replaced to ensure system and local reliability.

Table 2: OTC Compliance Plans for Remaining Units

Facilities and Units	NQC (MW) as of 12/2020	OTC Policy Scheduled Compliance Date	Owner Proposed Compliance Method
Alamitos 3, 4, 5	1,137	Dec. 31, 2023	Plans to retire and replace units by compliance date
Harbor 5	229	Dec. 31, 2029	Plans to comply by Dec. 31, 2029 ⁹
Haynes 1, 2	444	Dec. 31, 2029	Plans to comply by Dec. 31, 2029
Haynes 8	575	Dec. 31, 2029	Plans to comply by Dec. 31, 2029
Huntington Beach 2	226	Dec. 31, 2023	Plans to retire and replace unit by compliance date
Ormond Beach 1, 2	1,491	Dec. 31, 2023	Plans to retire units by compliance date
Redondo Beach 5, 6, 8	834	Dec. 31, 2021	Plans to retire units by compliance date
Scattergood 1, 2	367	Dec. 31, 2024	Project pending
Total Capacity (MW)	5,303	--	--

⁹ In February 2019, the City of Los Angeles Mayor Eric Garcetti announced that LADWP will replace the OTC units with alternative renewable alternatives and LADWP has embarked on studies to assist in the determination of alternative(s) for future repower to replace the remaining OTC units at the Harbor, Haynes, and Scattergood Generating Stations.

Table 3: Recent Performance of OTC Generating Units

CAISO Balancing Authority Area Facilities and Units	OTC Policy Scheduled Compliance Date	NQC (MW)	Annual Capacity Factors (Percent)					
			2014	2015	2016	2017	2018	2019
Alamitos 1	Dec. 31, 2020	175	1.40	3.00	2.00	2.70	2.09	1.81
Alamitos 2	Dec. 31, 2020	175	5.40	6.10	3.40	4.17	5.71	2.72
Alamitos 3	Dec. 31, 2023	321	16.60	10.80	10.40	6.67	10.13	5.58
Alamitos 4	Dec. 31, 2023	336	18.70	7.00	9.90	8.78	9.60	5.59
Alamitos 5	Dec. 31, 2023	480	1.70	3.40	1.90	3.06	2.93	1.24
Alamitos 6	Dec. 31, 2020	485	4.50	6.20	2.70	4.23	3.58	3.32
Huntington Beach 2	Dec. 31, 2023	226	26.20	19.40	12.40	9.03	6.99	4.12
Moss Landing 1	Dec. 31, 2020	540	39.20	35.50	24.60	24.73	44.64	56.80
Moss Landing 2	Dec. 31, 2020	540	47.00	37.00	26.10	24.83	43.46	53.57
Ormond Beach 1	Dec. 31, 2023	741	0.80	2.50	0.70	1.64	1.31	0.55
Ormond Beach 2	Dec. 31, 2023	750	2.40	3.20	0.80	1.75	1.28	1.63
Redondo Beach 5	Dec. 31, 2021	179	2.30	3.50	1.40	2.52	2.04	1.94
Redondo Beach 6	Dec. 31, 2021	175	2.10	4.20	3.10	4.18	1.67	2.50
Redondo Beach 8	Dec. 31, 2021	480	3.30	3.90	1.70	3.99	2.79	1.88
LADWP Balancing Authority Area Facilities and Units								
Harbor 5	Dec. 31, 2029	75	3.30	2.40	4.00	2.29	1.01	3.40

CAISO Balancing Authority Area Facilities and Units	OTC Policy Scheduled Compliance Date	NQC (MW)	Annual Capacity Factors (Percent)					
			2014	2015	2016	2017	2018	2019
Haynes 1	Dec. 31, 2029	230	12.70	6.50	12.30	3.45	1.64	4.05
Haynes 2	Dec. 31, 2029	230	13.10	8.00	16.00	5.34	1.13	1.18
Haynes 8	Dec. 31, 2029	264	34.20	38.00	40.90	39.56	45.39	39.22
Scattergood 1	Dec. 31, 2024	163	24.50	8.30	22.90	5.32	4.47	3.62
Scattergood 2	Dec. 31, 2024	163	6.60	21.20	5.90	2.09	2.38	6.62

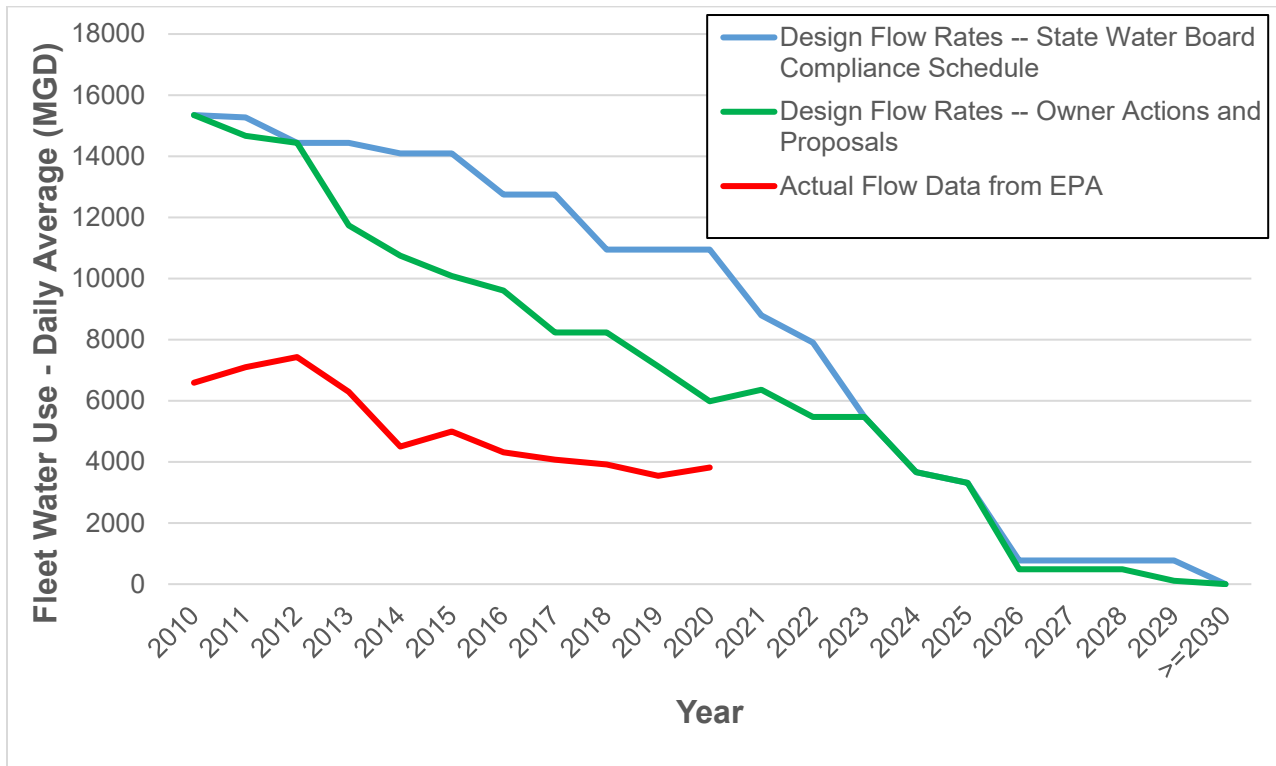
Source: California Energy Commission, Quarterly Fuel and Energy Report, December 2019.

Once-Through Cooling Water Use

There are a number of perspectives from which to assess the impact of the OTC power generating plants (OTC fleet) on impingement and entrainment of marine and estuarine aquatic life. All direct biological measures are beyond the scope of the SACCWIS' responsibility. However, Figures 1 and 2 offer an indicator of environmental impact using ocean or estuarine water flow rates as the metric through time, where Figure 1 shows flow without an extension of Redondo Beach and Figure 2 shows flow with an extension of Redondo Beach. The uppermost line in blue shows the reduction in design water flow based on the OTC Policy compliance schedule as most recently amended and adopted by the State Water Board. The green line shows the aggregate water flow using design flow rates based on the actual retirement dates and expected retirement dates. The red line shows actual flow rates from the OTC fleet. See Appendix A for actual flow rate data.

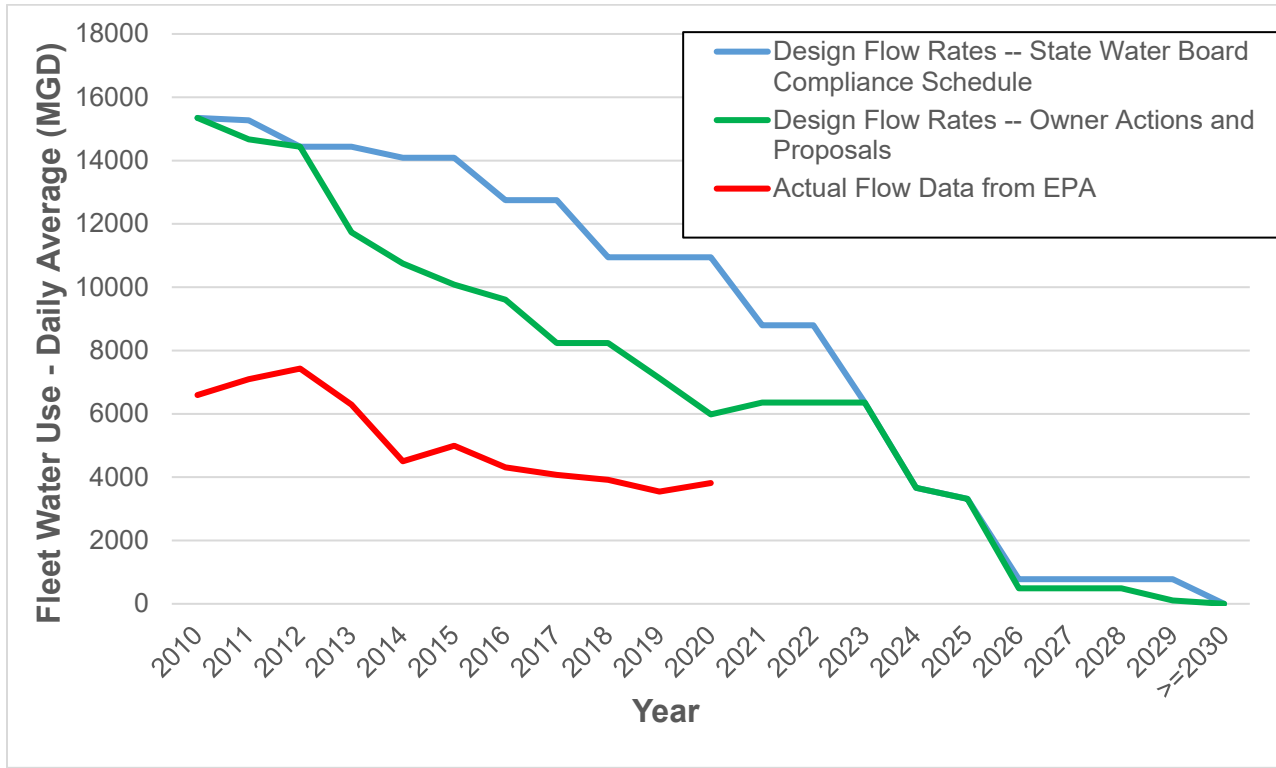
The red line is far below the two upper lines because virtually all fossil fuel OTC facilities are operating with annual capacity factors far below power plant permit expectations (the source of the design condition flow rates). In addition, SONGS and several other OTC facilities retired well before their OTC compliance date, thus creating accelerated environmental benefits compared to the original compliance schedule.

Figure 1: Historic and Projected Water Usage by the Combined OTC Fleet Without a Redondo Beach Extension



Source: CEC and State Water Board Staff, Updated February 17, 2021

Figure 2: Historic and Projected Water Usage by the Combined OTC Fleet With a Redondo Beach Extension



Source: CEC and State Water Board Staff, Updated March 3, 2021

III. Grid Resource and Infrastructure Planning and Status

The CPUC's Long-Term Procurement Plan (LTPP) proceeding evaluated generation resources in the CAISO system every two years, most recently in 2015. The intent was to evaluate whether existing and projected resources are sufficient to meet future demand, and to authorize procurement of additional resources in the event that they are insufficient. Retirement schedules for OTC generating facilities were incorporated into this analysis and updated according to progress towards or changes in retirement deadlines. In addition to system-wide analyses, the LTPP also evaluated capacity requirements in localized, high-demand areas. The CPUC has now implemented its Integrated Resource Planning (IRP) process in response to the legislative requirements of Senate Bill 350 (De Leon, Chapter 547, Statutes of 2015), which serves as a successor to LTPP and includes the function of periodically evaluating generation resources in the CAISO system.¹⁰

The CEC is the lead agency for licensing fossil fuel power plants 50 MW and larger and has a regulatory certification process under the California Environmental Quality Act. Under this process, the CEC conducts an environmental analysis of each project's Application for Certification (AFC) including an analysis of alternatives and mitigation measures to minimize any significant adverse effect the project may have on the environment. These requirements do not apply to the repowering or replacement of an existing power plant wherein the net increase in capacity is less than 50 MW.

Tables 4 through 7 show the different authorizations and approvals of electric capacity procurement for the Southern California Area. The different tracks reflect the separate procurement authorizations under the CPUC's most recent full LTPP proceeding, R.12-03-014. Track 1 procurement stems from D.13-02-015, which outlined requirements in the West Los Angeles Basin and Big Creek/Ventura local reliability areas. Track 8 procurement stems from D.14-03-004, which outlined additional requirements in the West Los Angeles Basin and San Diego/Imperial Valley local reliability areas in response to the

¹⁰ The combined IRP-LTPP proceeding is R.16-02-007.

retirement of the SONGS. The use of the term “track” in this context is different from the two tracks for compliance with the OTC Policy.

Table 4: Southern California Edison Current Authorizations

Resource Type	Track 1 LCR¹¹ (West LA Basin) MW	Track 1 LCR (Big Creek/Ventura) MW	Additional Track 4 Authorization (West LA Basin) MW	Total Authorization MW	Approved Applications MW
Preferred Resources¹² & Energy Storage (Minimum)	200	--	400	600	565 ¹³
Gas-fired Generation (Minimum)	1,000	--	--	1,000	1,000
Optional: Preferred Resources/ Storage	Up to 400	--	--	Up to 400	0
Optional: Any Resource	200	--	100 to 300	300 to 500	382
Required: Any Resource	--	215 (minimum) to 290	--	215 (minimum) to 290	207 ¹⁴
Total	1,400 to 1,800	215 to 290	500 to 700	2,115 to 2,790	2,154

¹¹ Local Capacity Requirement (LCR)

¹² Preferred resources are those used for energy efficiency, demand response, renewable resources, and distributed generation. Preferred resources are described in the 2005 State Energy Action Plan II.

¹³ Includes roughly 27 MW of storage capacity authorized by Resolution E-4804 to alleviate constraints in Southern California due to the Aliso Canyon gas storage facility outage.

¹⁴ Includes the 100 MW Strata Saticoy storage project approved in D.19-12-055 and 95 MW of storage and demand response resources (with the option for an additional 20 MW from one storage resource) approved in Resolution E-5033, which replaced the 262 MW Puente Power Project that was approved in D.16-05-050 and subsequently cancelled.

Table 5: Southern California Edison Approved Applications¹⁵

Resource Type	Location	Capacity MW	Status
Demand Response	Big Creek/Ventura	14	Approved ¹⁶
Demand Response	West LA Basin	5	Approved
Distributed Generation	Big Creek/Ventura	6	Approved
Distributed Solar Generation	Johanna/Santiago	12	Approved
Distributed Solar Generation	West LA Basin	28	Approved
Energy Efficiency	Big Creek/Ventura	6	Approved
Energy Efficiency	Johanna/Santiago	23	Approved
Energy Efficiency	West LA Basin	101	Approved
Energy Storage	Big Creek/Ventura	186	Approved
Energy Storage	Johanna/Santiago	153	Approved
Energy Storage	Long Beach	100	Operational
Energy Storage	West LA Basin	138	Approved
Combined Cycle Gas Turbine	Alamitos	640	Operational
Combined Cycle Gas Turbine	Huntington Beach	644	Operational
Gas Combustion Turbine	Stanton	98	Operational

¹⁵ For additional details, see Southern California Edison application [A.14-11-012](#), [A.14-11-016](#), [A.15-12-013](#), [A.16-11-002](#), [Resolution E-4804](#), and [Resolution E-5033](#).

¹⁶ Approved status indicates that the project has been approved, or that a portion of the capacity (MW) of the associated facility may be operational.

Table 6: San Diego Gas & Electric Current Authorizations

Resource Type	D.13-03-029/ D.14-02-016 MW	Additional Track 4 Authorization MW	Total Authorization MW	Pending & Approved Applications MW
Preferred Resources & Energy Storage	--	200 (Minimum)	300	144.5 ¹⁷
Optional: Any Resource	300 (Pio Pico, CA)	300 to 600	600 to 900	800
Total	300	500 to 800	800 to 1,100	944.5

Table 7: San Diego Gas & Electric Approved Applications¹⁸

Resource Type	Location	Capacity in MW	Status
Demand Response	San Diego/Imperial Valley	4.5	Approved ¹⁹
Energy Efficiency	San Diego/Imperial Valley	19	Approved
Energy Storage	San Diego/Imperial Valley	121	Approved
Gas Combustion Turbine	Carlsbad (Encina site)	500	Operational
Gas Turbine	Pio Pico	300	Operational

¹⁷ Includes roughly 38 MW of storage capacity authorized by Resolution E-4798 to alleviate constraints in Southern California due to the Aliso Canyon gas storage facility outage.

¹⁸ For additional details on approved projects, see San Diego Gas & Electric application [A.14-07-009](#), [A.16-03-014](#), [A.17-04-017](#), and [Resolution E-4798](#).

¹⁹ Approved status indicates that the project has been approved, or that a portion of the capacity (MW) of the associated facility may be operational.

The Alamos AFC and Huntington Beach Petition to Amend (PTA) Certifications were approved on April 12, 2017, and the projects reached commercial operation in February 2020. The Stanton Energy Reliability Center is one of the projects selected by Southern California Edison (SCE) to meet the Western Los Angeles Basin local capacity requirements, and reached commercial operation in July 2020. The Redondo Beach AFC was withdrawn by AES on April 7, 2020, and on June 3, 2020, the Energy Commission's Presiding Member terminated the proceeding for the Redondo Beach AFC. The NRG Puente Power Project AFC was withdrawn by NRG on December 7, 2018, and will now be replaced with a suite of alternatives.²⁰ On December 11, 2018, the Energy Commission's Presiding Member terminated the proceeding for the NRG Puente Power Project AFC.²¹ Following solicitations by SCE to replace the Puente Power Project, the CPUC approved 195 MW of storage and demand response capacity in D.19-12-055 and Resolution E-5033.

In addition to its work supporting the CPUC LTPP and now the IRP proceeding, the CAISO expanded its transmission planning process to explore transmission alternatives for improving reliability to the local capacity areas affected by the retirements of OTC generating units. The CAISO approved several transmission upgrades and additions in its 2013-2014 transmission planning process to help address Local Capacity Requirements (LCR) issues associated with the compliance schedule under the OTC Policy and the closure of SONGS. The timing of the CAISO-approved transmission projects and CPUC projects, as well as authorized procurement levels for SCE and San Diego Gas & Electric (SDG&E), facilitate attainment of the compliance schedule of the OTC Policy.

The CAISO's analysis in the 2019-2020 Transmission Plan²² indicated that the authorized resources and previously-approved transmission projects are working together to meet

²⁰ The Puente Power Project was a replacement project for the Mandalay Power Plant. The suite of alternatives includes: transmission upgrades, additional energy efficiency, demand response, and battery storage.

²¹ The 2018-2019 Transmission Plan is available on [CAISO's website](#).

²² Draft plans and appendices of the 2018-2019 Transmission Plan are available on [CAISO's website](#).

the reliability needs in the Los Angeles Basin and San Diego areas. Due to the delay of the Carlsbad Energy Center Project, the CAISO conducted a 2018 summer reliability study to assess risk to the Los Angeles Basin and San Diego-Imperial Valley local reliability areas. The assessment culminated in the Encina Power Station 2018 Reliability Study.²³ This study was completed at the end of 2016 and was the basis for amending the OTC Policy to defer the compliance date for Encina Units 2, 3, 4, and 5 by one year to 2018.

The following provides a summary of the reliability transmission projects approved by the CAISO Board of Governors in the 2012-2013, 2013-2014, 2014-2015, 2015-2016, and 2016-2017 Transmission Plans²⁴ to address reliability concerns related to the retirement of SONGS and OTC generating facilities in the Los Angeles Basin and San Diego local areas. In Table 8, the target in-service date and responsible Participating Transmission Owner (PTO) are identified.

Table 8: In-Service Dates for CAISO Board Approved Transmission Projects

	Transmission Projects	PTO Service Territory	Target In-Service Dates
1	Talega Synchronous Condensers (2x225 MVAR)	SDG&E	In-Service (8/7/2015)
2	San Luis Rey Synchronous Condensers (2x225 MVAR)	SDG&E	In-Service (12/29/2017)
3	Imperial Valley Phase Shifting Transformers (2x400 MVAR)	SDG&E	In-Service (5/1/2017)
4	Sycamore – Peñasquitos 230kV Line	SDG&E	In-Service (8/29/2018)
5	San Onofre Synchronous Condensers (1x225 MVAR)	SDG&E	In-Service (10/16/2018)

²³ The SACCWIS’ Encina Power Station 2018 Reliability Study is available on the [State Water Board’s website](#).

²⁴ Transmission plans are found on the CAISO’s website as follows: [2012-2013 Transmission Plan](#); [2013-2014 Transmission Plan](#); [2014-2015 Transmission Plan](#); [2015-2016 Transmission Plan](#); [2016-2017 Transmission Plan](#).

	Transmission Projects	PTO Service Territory	Target In-Service Dates
6	Miguel VAR Support (450 MVAR)	SDG&E	In-Service (4/28/2017)
7	Santiago Synchronous Condensers (3x81 MVAR)	SCE	In-Service (12/8/2017)
8	Mesa Loop-In Project and South of Mesa 230kV Line Upgrades	SCE	3/31/2022
9	Extension of Huntington Beach Unit 3 Synchronous Condenser (140 MVAR)	SCE	RMR contract extended and expired on 12/31/2017 ²⁵

Mesa Loop-In Substation Project

The Mesa Loop-In Substation Project operational date is delayed until 2022. SCE filed an application for a Permit to Construct (PTC) the Mesa Loop-In Substation Project with the CPUC on March 13, 2015. On February 9, 2017, SCE received the PTC from the CPUC. SCE received the first Notice to Proceed from the CPUC on September 27, 2017, and the second Notice to Proceed for the remaining scope of work (remaining substation, satellite substation work, telecom scope of work) on November 15, 2017. Construction of the project commenced on October 2, 2017. The current schedule forecasts a March 2022 in-service date as noted in the SCE 10Q and Federal Energy Regulatory Commission (FERC) form 730.

The Mesa 230 kV loop-in portion of the Mesa Loop-In Project has been completed, bringing new power sources to Mesa substation. The 230 kV bus tie breaker is operated in the closed position (while 500kV portion is constructed) to help mitigate loading concerns. Therefore, at this time, the SACCWIS is not recommending an amendment to the OTC Policy to extend compliance dates to provide grid reliability associated with the Mesa Loop-In Substation Project.

²⁵ The contract for the synchronous condensers expired on Dec. 31, 2017, and they are no longer operating.

CPUC Incremental Capacity Procurement Pursuant to D.19-11-016

On November 7, 2019, the CPUC adopted D.19-11-016 directing procurement of 3,300 MW from load serving entities under the CPUC's jurisdiction to ensure system-wide electric reliability. The decision also recommended that the State Water Board consider revising the OTC Policy to extend the compliance dates for Alamitos Units 3, 4, and 5 for up to three years, Huntington Beach Unit 2 for up to three years, Redondo Beach Units 5, 6, and 8 for up to two years, and Ormond Beach Units 1 and 2 for up to one year. Ultimately the SACCWIS recommended a slight modification to the State Water Board to extend the OTC Policy compliance dates of Alamitos Units 3, 4, and 5 for three years through December 31, 2023, Huntington Beach Unit 2 for three years through December 31, 2023, Ormond Beach Units 1 and 2 for three years through December 31, 2023, and Redondo Beach Units 5, 6, and 8 for one year through December 31, 2021. The modification was in recognition of comments the State Water Board received. The State Water Board received comments regarding impacts from the continued operation of Redondo Beach. The State Water Board also received comments from the Oxnard City Manager on November 18, 2019, noting his support for an extension of Ormond Beach Units 1 and 2 if the City Council and GenOn agree on a plan to perform comprehensive decommissioning, dismantling, and remediation of the site. An amendment to the OTC Policy compliance dates for Alamitos, Huntington Beach, Ormond Beach, and Redondo Beach consistent with recommendation of the SACCWIS was adopted by the State Water Board on September 1, 2020.

The CPUC continues to monitor procurement under D.19-11-016.²⁶ That decision required 50 percent of the required procurement to be online by August 1, 2021; 75 percent to be online by August 1, 2022; and 100 percent to be online by August 1, 2023. In D.20-12-044, the CPUC established interim milestones and reporting deadlines (September 1, February 1, and August 1) for each procurement tranche.²⁷

²⁶ CPUC D.19-11-016 can be found on the [CPUC's website](#).

²⁷ CPUC D.20-12-044 can be found on the [CPUC's website](#).

IV. Local Air District Permitting and Rulemaking Activity Affecting Power Plants

In accordance with their 2016 Air Quality Management Plan, the SCAQMD has been working to transition from their local market-based pollutant trading Regional Clean Air Incentives Market (RECLAIM) program back to source-specific command-and-control rules that reflect Best Available Retrofit Control Technology (BARCT). All of the OTC power plants in SCAQMD participate in RECLAIM.²⁸

Amendments to Rule 1135 for electric generating facilities were adopted in 2018 to reflect BARCT. The rule currently exempts OTC power plants from the BARCT standards through their OTC Policy compliance dates, including approved extensions, as long as other applicable air quality rule requirements are satisfied. Presently, emission offset requirements for OTC power plants undergoing repower are satisfied through access to SCAQMD's internal offset bank on a fee basis through provisions in Rules 1304 and 1304.1. Although RECLAIM program transition work is ongoing, SCAQMD currently does not have plans to change the eligibility of these plants' access to the internal offset bank, and to date U.S. EPA has not requested any changes with respect to power plants.

SCAQMD plans to amend Rule 1135 in the summer/fall 2021 timeframe, primarily for alignment with U.S. EPA's review of the rule and to update monitoring, recordkeeping, and reporting requirements. Stakeholders could recommend rule changes that may impact OTC repowers at that time. CARB staff will continue to monitor rulemaking activity that could affect power plant operation.

V. Review of Generating Facility Compliance Dates

This section identifies specific issues associated with generating facilities in the CAISO's BAA. These facilities include: Moss Landing, Ormond Beach, Huntington Beach, Alamitos, and Redondo Beach.

²⁸ Includes AES Alamitos, AES Huntington Beach, AES Redondo Beach, El Segundo Power, LADWP Harbor Generating Station, LADWP Haynes Generating Station, LADWP Scattergood Generating Station.

Moss Landing

Dynegy's Moss Landing facility consists of two types of units – older steam boiler units and new combined cycle units. Units 6 and 7 are steam boilers with a capacity of roughly 750 MW each for a total of 1,510 MW. Units 1 and 2 are combined cycle units. Each 510 MW unit consists of two combustion turbines and a heat recovery steam generator. The final compliance date for Moss Landing under the original OTC Policy was December 31, 2017. In a signed settlement agreement on October 9, 2014, between Dynegy and the State Water Board, staff committed to seek an OTC compliance date extension through December 31, 2020, for Units 1, 2, 6, and 7. On April 7, 2015, the State Water Board adopted the OTC Policy amendment (Resolution No. 2015-0018) to extend the compliance date to December 31, 2020.

In its November 25, 2013, letter to the State Water Board, Dynegy stated its intent to implement Track 2 for Units 1 and 2 as well as Units 6 and 7. In its November 2014 updated implementation plan, Dynegy again stated its intent to implement Track 2 for Units 1 and 2 and identified its plans to achieve Track 2 compliance through prior flow reduction credits, use of operational controls, and installation of technology controls. Dynegy also stated its intent to implement Track 2 for Units 6 and 7 by December 31, 2020, or to cease operation until compliance was achieved. In its January 5, 2017, letter to the State Water Board, Dynegy indicated that it no longer intended to achieve Track 2 compliance for Units 6 and 7 and instead retired both units. Dynegy subsequently sent an updated implementation plan to the State Water Board and confirmed that Units 6 and 7 were shut down on January 1, 2017.²⁹

On August 27, 2020, the CPUC issued Resolution E-5097, which approved a contract with SCE for portions of the energy produced by Moss Landing Units 1 and 2 through 2022.³⁰ On October 23, 2020, the State Water Board confirmed that Moss Landing

²⁹ The Dynegy Settlement updated Implementation Plan is available on the [State Water Board's website](#).

³⁰ CPUC Resolution E-5097 is available on the [CPUC's website](#).

Power Plant was in compliance with the OTC Policy via Track 2 and the terms of the 2014 Settlement entered into by the State Water Board and Dynegy Moss Landing, LLC.

The SACCWIS does not recommend a change in compliance dates for the units at the Moss Landing facility.

Ormond Beach

NRG's Ormond Beach Generating Station consists of two steam boiler units using once-through cooling with a combined capacity of 1,486 MW. An October 9, 2014 settlement agreement between the State Water Board and NRG determined Track 1 to be infeasible. NRG confirmed its intent to retire the facility by its OTC Policy compliance date in its implementation plan update sent to the State Water Board on January 19, 2018. On February 28, 2018, NRG notified the CPUC of its intention to shut down and retire Ormond Beach by October 1, 2018.

However, on September 28, 2018, NRG sent a letter to the CAISO to withdraw the earlier shutdown notice to meet local area reliability needs in 2019 pursuant to D.18-06-030. The CAISO's 2019 Local Capacity Technical Analysis Final Report (released May 15, 2018) identified that at least one Ormond Beach unit is needed to meet local capacity requirements, and this need cannot be addressed with other alternatives in time to meet the 2019 calendar year. As a result, CPUC decision D.18-06-030 required SCE to attempt to sign a contract with NRG for power from Ormond Beach for 2019 and 2020 to meet local capacity requirements. SCE filed an Advice Letter with the CPUC on September 4, 2018, seeking approval of a contract with NRG for power from Ormond Beach Unit 2 from January 1, 2019, through November 30, 2019; this contract was approved by the CPUC on September 26, 2018. On November 5, 2018, SCE filed another Advice Letter seeking approval of a contract with Ormond Beach Unit 2 from December 1, 2019, through December 31, 2020. This contract was approved by the CPUC on March 28, 2019, in Resolution E-4986. Based on the CPUC's decision D.19-11-016, the SACCWIS published a final report on January 23, 2020, recommending an extension of Ormond Beach's compliance date by three years. On August 27, 2020, the CPUC issued Resolution E-5099, which approved a contract with SCE for Ormond Beach

Units 1 and 2 through 2023. On September 1, 2020, the State Water Board amended the OTC Policy, which extended the compliance date for Ormond Beach Units 1 and 2 until December 31, 2023. The National Pollutant Discharge Elimination System (NPDES) permit for this facility was amended to reflect this change, effective January 1, 2021.

At this time, the SACCWIS does not recommend a change in compliance dates for the Ormond Beach facility.

Huntington Beach

AES Huntington Beach consists of four units. Units 3 and 4 retired on October 31, 2012, and were converted to synchronous condensers to provide voltage support in 2013. The synchronous condensers ceased the use of once-through cooling and permanently retired in September 2018. Unit 1 ceased the use of once-through cooling and retired on December 31, 2019. Unit 2 uses once-through cooling and has a capacity of 226 MW.

The Huntington Beach PTA was approved by the CEC on April 12, 2017. AES submitted an application for a 939 MW Combined Cycle Gas Turbine (CCGT) power plant, which was approved by the CEC on October 29, 2014. Subsequently, AES was selected for a Power Purchase Agreement (PPA) for a 644 MW power plant by SCE for the Huntington Beach facility, with different equipment configurations than had been approved by the CEC. The CPUC approved SCE procurement selection of the Huntington Beach repowering project for the Western Los Angeles Basin local capacity needs per D.15-11-041 at the November 19, 2015 CPUC voting meeting. On September 14, 2015, AES submitted a PTA for an 844 MW power plant, comprised of a 644MW CCGT in phase 1 and a 200 MW Single Cycle Gas Turbine (SCGT) in phase 2. The CEC approved the revised project on April 12, 2017.

Huntington Beach was awarded a PPA for 644 MW capacity with an initial date of May 1, 2020. This required the shutdown of one Huntington Beach unit prior to the OTC Policy compliance date due to limited interconnection capacity and to satisfy the SCAQMD rules for new emission sources. Huntington Beach Unit 1 complied with the OTC Policy on December 31, 2019, and the 644 MW CCGT began commercial operation in May 2020. AES does not plan to retrofit any of the existing units with alternate cooling technologies

to comply with Track 1 or utilize any operational or technical measures to comply with Track 2.

In its 2019-2020 transmission planning process reliability studies, the CAISO modeled the proposed 644 MW Huntington Beach repowering to replace the Huntington Beach generating facility after 2020.

In its December 18, 2020 implementation plan update to the State Water Board, AES confirmed its intention to comply with the OTC Policy compliance dates for the Huntington Beach generating unit that uses once-through cooling. A power purchase agreement has been executed with a non-utility Load Serving Entity that would extend the operation of Huntington Beach Unit 2 through December 31, 2023. Units 1, 3, and 4 have shut down to enable the new combined-cycle gas turbine (CCGT) at Huntington Beach to be placed in service. The Huntington Beach Phase 1 CCGT completed construction and began commercial operations as of February 4, 2020. On September 1, 2020, the State Water Board amended the OTC Policy, which extended the compliance date for Huntington Beach Unit 2 until December 31, 2023.

At this time, the SACCWIS does not recommend a change in compliance dates for the Huntington Beach facility.

Alamitos

Alamitos consists of six units using once-through cooling. Total capacity of these units is approximately 2,000 MW. In its December 18, 2020 update to their implementation plan, AES confirmed its intention to comply with the OTC compliance dates for the Alamitos generating units that utilize once-through cooling by utilizing Track 1 and shutting down and permanently retiring these units.

On December 27, 2013, AES filed an AFC with the CEC to repower the facility with four 3-on-1 CCGTs with a net generating capacity of 1,936 MW. On October 26, 2015, AES submitted a Supplemental Application for Certification, replacing the prior application, for a 1,040 MW power plant, comprised of a 640 MW CCGT in phase 1 and a 400 MW SCGT in phase 2. The CEC approved the project on April 12, 2017.

AES Alamitos was awarded a PPA for 640 MW of CCGT and 100 MW of energy storage capacity, and commercial operation began on June 1, 2020, and January 1, 2021, respectively. AES continues to pursue contracts and approvals for the additional 200 MW of storage and 400 MW of gas peakers. In its December 18, 2020, update to the State Water Board, AES stated there are currently no plans to proceed with the Phase 2 SCGT at Alamitos.

Alamitos generating units 1, 2, and 6 retired on December 31, 2019, to provide emission offsets for the new 640 MW CCGT, which began commercial operations as of February 4, 2020. AES does not plan to retrofit any of the existing units with alternate cooling technologies to comply with Track 1 or utilize any operational or technical measures to comply with Track 2. A resource adequacy contract has been executed with SCE that would extend the operation of Alamitos Units 3, 4, and 5 through December 31, 2023. The contract received final approval from the CPUC on August 27, 2020.³¹ On September 1, 2020, the OTC Policy was amended to continue the operations of Alamitos Units 3, 4, and 5 until December 31, 2023. The NPDES Permit was amended and Time Schedule Order (TSO) approved to reflect this change, effective January 1, 2021. Further, the San Gabriel River Metals Total Maximum Daily Load has been amended and a contract with SCE has been approved to allow for continued operation of Alamitos Units 3, 4, or 5 until their compliance date of December 31, 2023 (see Resolution E-5098).³²

In its 2019-2020 transmission planning studies, the CAISO modeled the proposed 640 MW Alamitos Energy Center to replace Alamitos OTC generation after 2020. An extension of the compliance date has been approved to meet local capacity needs in the Western LA Basin due to the delay of the Mesa Loop-In Project as well as CAISO system capacity needs.

At this time, the SACCWIS does not recommend a change in compliance dates for the Alamitos facility.

³¹ The resource adequacy contracts for the Alamitos units received CPUC approval on September 28, 2017.

³² CPUC Resolution E-5098 is available on the [CPUC's website](#).

Redondo Beach

Redondo Beach consists of four units using once-through cooling. The total capacity of these units is approximately 1,300 MW. In its December 18, 2020, update to their implementation plan, AES reaffirmed its intent to comply with Track 1 of the OTC Policy and to shut down and permanently retire all generating units at Redondo Beach per the compliance dates included in the OTC Policy.

Unit 7 was shut down on September 30, 2019, in advance of the OTC Policy compliance date to accommodate the provision of SCAQMD Rule 1304(a)(2) for offset exemptions for the new Huntington Beach CCGT. Redondo Beach has executed power purchase agreements with 16 non-utility Load Serving Entities for Units 5, 6 and 8 through December 31, 2021.

In 2013, AES proposed to repower the Redondo Beach facility in order to comply with the OTC Policy. The proposed repowering project is a natural-gas fired, combined-cycle, air-cooled electrical generating facility with a net generating capacity of 496 MW. As detailed later in this report, AES' AFC at the CEC is suspended. AES proposed alternative land use of the site, the CEC suspended the application on September 2, 2014, and a ballot initiative with the City of Redondo Beach to rezone the property to allow commercial and residential usage including a hotel occurred on March 3, 2015. The voters of the City of Redondo Beach rejected the ballot initiative to redevelop the property, resulting in AES resuming permitting efforts to repower the facility. On November 6, 2015, AES and the City of Redondo Beach filed a petition with the CEC requesting that the AFC proceeding be suspended until August 1, 2016. On November 25, 2015, the CEC suspended the proceedings, but stated that the suspension will remain in place until the applicant or other party makes a motion to reopen the proceeding and the CPUC grants the requested reopening. In early 2016, AES placed the power plant and its 51-acre site on the commercial real estate market. On August 12, 2016, AES and the City of Redondo Beach submitted a notice of agreement to continue the suspension until February 1, 2017. On March 30, 2020, AES closed on the sale of the Redondo Beach site, and AES withdrew the AFC on April 7, 2020.

On September 1, 2020, the OTC Policy was amended to continue the operations of Redondo Beach Units 5, 6, and 8 until December 31, 2021. The NPDES Permit was amended and TSO approved, effective January 1, 2021.

Previously, the CPUC, CAISO, and CEC indicated that a request for extending Redondo Beach's compliance date may be necessary depending on the pace and success of incremental procurement authorized by the CPUC. Additionally, in amending the OTC Policy on September 1, 2020, the State Water Board recognized in finding twenty of the adopting resolution (Resolution No. 2020-0029) that the CPUC, CAISO, and CEC may be revising their forecasting models to account for unexpectedly high peak energy demands during widespread extreme high temperatures, and may determine that there is a need to request additional extensions of compliance dates to maintain grid reliability and avoid rolling blackouts in the future.

At this time, the SACCWIS recommends an OTC Policy compliance date extension for Redondo Beach for two years, through December 31, 2023, to address system-wide grid reliability needs as described below.

VI. System-Wide Grid Reliability Concerns and Need for Redondo Beach Generating Stations' Operation Through 2023

The CPUC, CAISO, and CEC all have critical roles in ensuring reliability for California's electrical system. The three agencies continue to collaborate to study electric reliability issues associated with the compliance schedule under the OTC Policy. The CPUC considers procurement authorizations for its jurisdictional load serving entities; the CAISO conducts reliability analysis and examines infrastructure upgrades and additions in its transmission planning process; and the CEC evaluates and, when necessary, issues licenses to site new generation resources.

Final Root Cause Analysis and Recent Backstop Actions

In August 2020, swaths of the western United States encountered a prolonged and extreme heat storm. This led to a series of circumstances that ultimately required the CAISO to initiate rotating outages in its BAA to prevent wide-spread service interruptions. Subsequent to these outages, Governor Gavin Newsom directed the CPUC, CAISO, and

CEC to publish a report identifying the root cause of the events leading to these outages. Consistent with this directive, the CPUC, CAISO, and CEC published a Final Root Cause Analysis report on January 13, 2021.³³ The Final Root Cause Analysis points to three main factors that led to these outages, which are discussed in greater detail below along with recent backstop actions.

1. **“The climate change-induced extreme heat wave across the western United States resulted in demand for electricity exceeding existing electricity resource adequacy (RA) and planning targets.** Taking into account 35 years of weather data, the extreme heat wave experienced in August was a 1-in-30 year weather event in California. In addition, this climate change-induced extreme heat wave extended across the western United States. The resulting demand for electricity exceeded the existing electricity resource planning targets and resources in neighboring areas were also strained.”³⁴

Although future weather conditions are not known today, climate change-induced impacts could result in a variety of outcomes, including: extreme and prolonged heat waves that drive up demand and cause generator-forced outages; droughts that reduce hydroelectric generation in California and nearby states that export electricity to California; altered weather patterns that reduce wind and solar generation; and wildfires that threaten transmission lines.

The current 15 percent planning reserve margin (PRM) was not designed to capture the uncertainties related to these scenarios. As a result, increasing the PRM is being considered. The CAISO has proposed for consideration to the CPUC a higher interim PRM of 17.5 percent that would apply both at system peak and at a critical hour after the peak while more substantive reforms are considered. A recent ruling in the

³³ The Final Root Cause Analysis for the Mid-August 2020 Extreme Heat Wave can be found on [CAISO's website](#).

³⁴ CAISO, CPUC, and CEC, *Final Root Cause Analysis: Mid-August 2020 Extreme Heat Wave*, January 13, 2021, pp. 3-4.

CPUC's IRP proceeding proposes using a 20.7 percent PRM at system peak for reliability planning purposes.³⁵

The CEC will focus on additional reliability-related actions in the 2021 Integrated Energy Policy Report (IEPR).³⁶ The general scope of the IEPR addresses both electric reliability and natural gas reliability issues, as well as the development of an electric reliability Contingency Plan.³⁷ The Contingency Plan is being prepared by the CEC in coordination with the Governor's Office, CPUC, CAISO, and other appropriate state agencies and stakeholders. It will lay out a process to sequence emergency measures in rank order to minimize the potential for outages, while considering environmental, equity, and safety impacts.

- 2. “In transitioning to a reliable, clean, and affordable resource mix, resource planning targets have not kept pace to ensure sufficient resources that can be relied upon to meet demand in the early evening hours. This made balancing demand and supply more challenging during the extreme heat wave.** The rotating outages both occurred after the period of gross peak demand, during the “net demand peak,” which is the peak of demand net of solar and wind generation resources. With today's new resource mix, behind-the-meter and front-of-meter (utility-scale) solar generation declines in the late afternoon at a faster rate than demand decreases. These changes in the resource mix and the timing of the net peak have increased the challenge of maintaining system reliability, and this challenge is amplified during an extreme heat wave.”³⁸

³⁵ CPUC, Administrative Law Judge's Ruling Seeking Feedback on Mid-Term Reliability Analysis and Proposed Procurement Requirement, Order Instituting Rulemaking to Continue Electric Integrated Resource Planning and Related Procurement Processes, [Rulemaking 20-05-003](#), February 22, 2021.

³⁶ Additional details are available on the [CEC's website](#).

³⁷ CAISO, CPUC, and CEC, *Final Root Cause Analysis: Mid-August 2020 Extreme Heat Wave*, January 13, 2021, p. 73.

³⁸ CAISO, CPUC, and CEC, *Final Root Cause Analysis: Mid-August 2020 Extreme Heat Wave*, January 13, 2021, p. 4.

The Final Root Cause Analysis lists several actions that will address the contributing factors that caused the August 2020 rotating outages, including “expedit[ing] the regulatory and procurement processes to develop additional resources that can be online by 2021” and to ensure resources are effective during the net demand peak. The CPUC specifically opened R.20-11-003 in November 2020 to establish policies, processes, and rules to ensure reliable electric service in California in the event of an extreme weather event in 2021.³⁹

On February 11, 2021, the CPUC adopted D.21-02-028, which directs Pacific Gas and Electric Company, SCE, and SDG&E to procure additional capacity that is effective during the net demand peak for summer 2021.⁴⁰ Specifically, the investor-owned utilities (IOUs) were authorized to seek incremental capacity from existing plants, capacity that is at risk of retirement, incremental energy storage, and firm forward imported energy. The CPUC has also solicited party proposals for securing additional demand-side resources that can be available during the net demand peak period for summer 2021 and summer 2022. A subsequent CPUC decision addressing these measures is expected in the coming months.

These resource additions are on top of prior directives from the CPUC that will result in an increase of over 2,200 MW of new battery storage that can help meet the net peak demand by 2022. Most recently, the CPUC released a ruling seeking party comments on whether another 1,800 MW of procurement should be accelerated to be online by August 2023; comments from parties on the feasibility of that expedited procurement are due on March 19, 2021.⁴¹

3. **“Some practices in the day-ahead energy market exacerbated the supply challenges under highly stressed conditions.** A subset of energy market practices

³⁹ Documents pertaining to CPUC proceeding R.20-11-003 can be found on [CPUC’s website](#).

⁴⁰ Additional details are available on the [CPUC’s website](#).

⁴¹ CPUC, Administrative Law Judge’s Ruling Seeking Feedback on Mid-Term Reliability Analysis and Proposed Procurement Requirement, Order Instituting Rulemaking to Continue Electric Integrated Resource Planning and Related Procurement Processes, Rulemaking 20-05-003, February 22, 2021.

contributed to the inability to obtain or prioritize energy to serve CAISO load in the day-ahead market that could have otherwise relieved the strained conditions on the CAISO grid on August 14 and 15.”⁴²

In addition, the combination of existing real-time scheduling priorities and a previously implemented market enhancement inadvertently caused the CAISO’s markets to fail to account for the obscuring effects of under-scheduling and convergence bidding during August’s stressed operating conditions.⁴³ The CAISO has conducted a market enhancements stakeholder initiative to address the market-related factors identified in the Final Root Cause Analysis and plans to bring the proposals to its Board of Governors for approval in March 2021, with targeted implementation of changes by June 2021.⁴⁴

The CPUC, CAISO, and CEC have been taking decisive action to address each of the above three factors. Although the proposals from each agency have not yet been fully implemented, they continue to collaborate towards the implementation of identified and potential solutions to support system-wide grid reliability; however, a great deal of uncertainty remains. At this point in time it is unclear whether authorized or proposed procurement will be realized and whether such procurement will adequately address the net demand peak period; whether an average level of imports can be delivered, whether actual operating conditions stay within planning targets for load, forced outages and needed operating reserves; whether all existing resources stay online and load serving entities are able to contract for all necessary resources in the CAISO BAA; and whether new and untested programs will perform as anticipated.

In addition to actions taken to address the findings and recommendations of the Final Root Cause Analysis, in 2020 almost 400 MW of resources announced their intent to

⁴² CAISO, CPUC, and CEC, *Final Root Cause Analysis: Mid-August 2020 Extreme Heat Wave*, January 13, 2021, p. 5.

⁴³ CAISO, CPUC, and CEC, *Final Root Cause Analysis: Mid-August 2020 Extreme Heat Wave*, January 13, 2021, p. 5.

⁴⁴ Details regarding this market enhancements stakeholder initiative are available on the [CAISO’s website](#).

retire or mothball from the CAISO system. The first group of announced retirements included approximately 150 MW of cogeneration resources in local capacity areas.⁴⁵ Since these resources were needed in their respective local areas for reliability, the CAISO was authorized by its Board of Governors to retain these resources under a cost-based contract to designate these resources as “reliability must run” (RMR) backstop resources. In December 2020, the CAISO Board of Governors approved the first ever system RMR for a 248 MW cogeneration power plant, which is needed to support system-wide reliability needs.⁴⁶ Unlike a local RMR, a resource needed for system-level reliability signals that all resources are equally needed to maintain reliability.

System-wide Grid Reliability Analysis

Following the Final Root Cause Analysis, the CPUC, CAISO, and CEC conducted a stack analysis to compare the forecasted demand in 2022 to all of the existing energy producing and load reduction resources and energy producing resources expected to come online by 2022. This analysis was completed by “stacking up” resource capacity values and comparing them to the forecasted demand plus two PRM alternatives. The analysis was conducted based on publicly available data at the time of publication of this report or using average or expected values.

Demand Analysis at the Most Critical Hour

To ensure the stack analysis considered the periods of greatest need, the analysis focused on the most critical hour after peak of the forecasted demand for each month June through October 2022. Demand is typically the highest during these months.

Traditionally, stack analyses focus on the gross demand peak hour. However, with the proliferation of solar resources, both behind-the-meter and grid-connected, the most critical hours the grid typically experiences are now after the peak load period. This period is when load is still relatively high, but intermittent resource generation (such as

⁴⁵ See [CAISO's website](#) for additional details.

⁴⁶ See [CAISO's website](#) for additional details.

solar) is below its capacity value and output is rapidly declining, otherwise known as the “net demand peak period” between 4 p.m. and 9 p.m.

To account for this pattern, the CPUC, CAISO and CEC created a stack analysis that addresses declining intermittent generation in the evening hours. For ease of comparison, the hour that ends (hour ending, HE) at 8 p.m. Pacific Daylight Time (PDT) was selected because solar generation is at or near zero by the end of the hour, but the demand remains relatively high compared to the peak. Table 9 shows this relationship. In July and August, the load for HE 8 p.m. PDT is over 600 MW lower than the peak of the month, which occurs an hour or two earlier. For June, September, and October, the difference is much smaller.

Table 9: Comparison of June-October 2022 Peak Demand and Load for HE 8 p.m. PDT (MW)

Month	Peak demand	Peak demand hour ending (PDT)	Load for HE 8 p.m. PDT	Peak demand minus HE 8 p.m. PDT load ([B] - [D])
[A]	[B]	[C]	[D]	[E]
June	41,255	7 p.m.	41,204	51
July	44,424	6 p.m.	43,603	822
August	44,684	6 p.m.	44,009	675
September	45,448	7 p.m.	45,343	105
October	37,036	8 p.m.	37,036	0

Source: California Energy Commission, 2020 Integrated Energy and Policy Report, California Energy Demand Update 2020 Hourly Forecast for CAISO footprint, mid-demand and mid additional achievable energy efficiency case.

Figures 3 through 7 show five illustrative snapshots of renewable generation in the CAISO market during the middle of each month from June through October 2020. Each figure shows that solar generation declines from a peak of approximately 10,000 MW or more to less than 300 MW by 8:00 p.m. PDT (shown in military time 20:00).

Figure 3: Illustrative Snapshot of Renewable Generation in CAISO Footprint mid-June

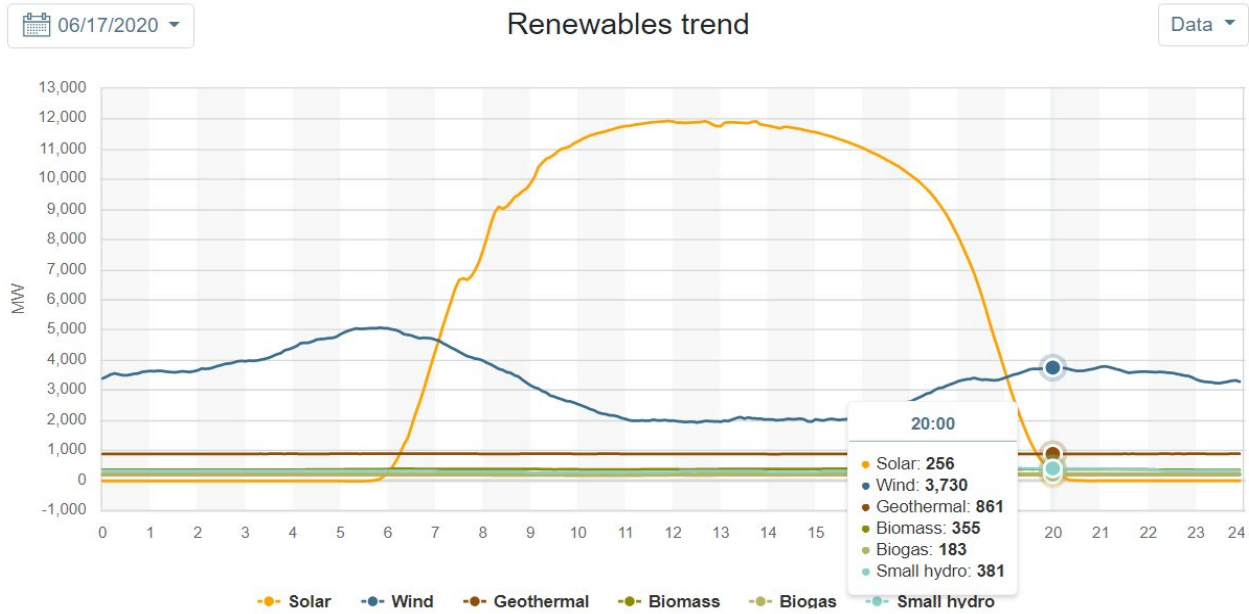


Figure 4: Illustrative Snapshot of Renewable Generation in CAISO Footprint mid-July

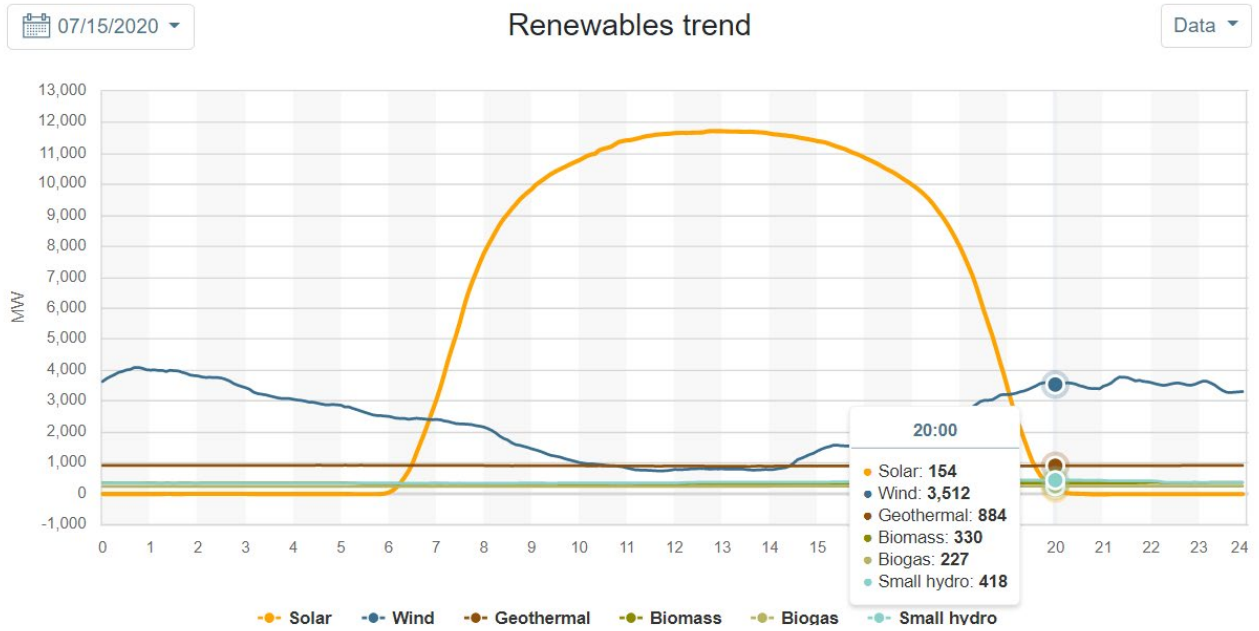


Figure 5: Illustrative Snapshot of Renewable Generation in CAISO Footprint mid-August

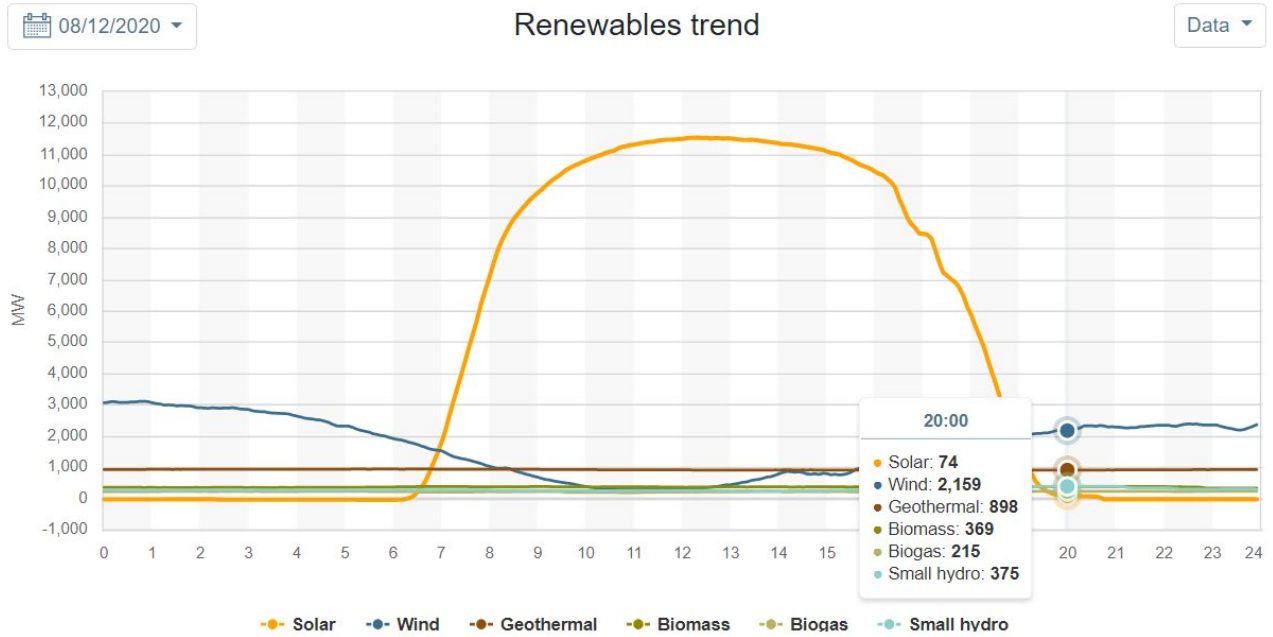


Figure 6: Illustrative Snapshot of Renewable Generation in CAISO Footprint mid-September

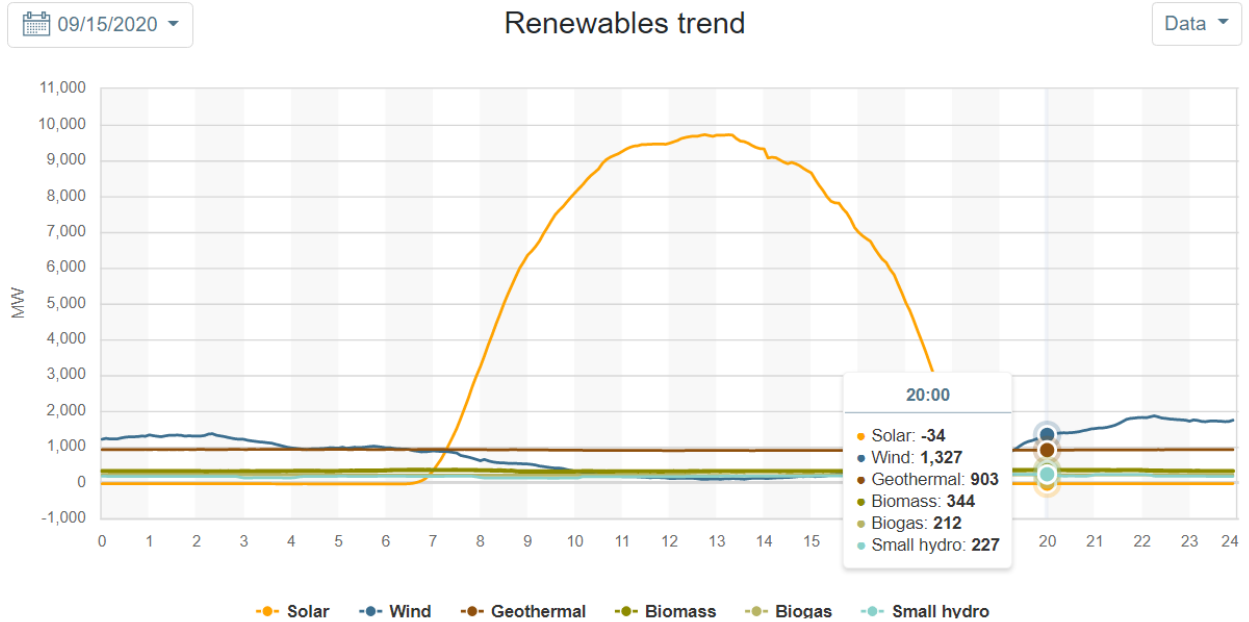
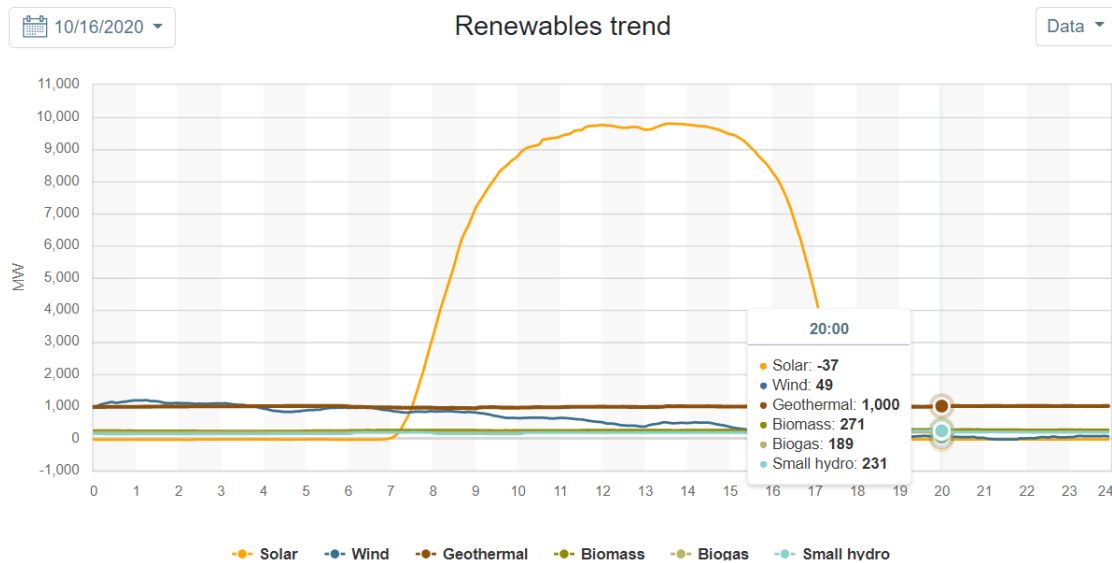


Figure 7: Illustrative Snapshot of Renewable Generation in CAISO Footprint mid-October



Resource Stack Analysis

Detailed assumptions and sources of data for the resource stack analysis described herein are provided in Appendix B.

The stack analysis employed for this exercise reflects zero solar generation recognizing the minimal solar output at the end of the hour, if not over the whole hour, for the HE 8 p.m. PDT in each of the summer months.

For all other existing resources, the analysis used as a starting point the 2021 net qualifying capacity (NQC) values available for each month and assumed the same resources with these NQC values will be available in 2022, except for Redondo Beach. The NQC values reflect the amount of capacity that can be counted towards meeting the load plus PRM. They are based on counting methodologies established by the CPUC and tested for deliverability by the CAISO.

For demand response resources, the Final Root Cause Analysis showed that approximately 50 percent of the demand response procured by the CPUC’s jurisdictional

load serving entities was effective during the mid-August rotating outages.⁴⁷ The stack analysis assumed an improvement in overall performance to 60 percent of the 2021 NQC value by 2022. For imports, the stack analysis assumed procurement of resource adequacy imports based on the historical average from 2015 through 2020 for each month. This assumption does not consider whether tightening supply conditions in the rest of the west could decrease imports into the CAISO footprint. Imports may decrease due to west-wide heat waves like those experienced during mid-August 2020, drought conditions in neighboring states that reduce the amount of surplus hydroelectric energy available for export, or the retirement of major resources in the rest of the west.

For incremental resources, the stack analysis relied on the CPUC's list of new resources expected to be online by August each year through 2022 (both contracted and uncontracted) to reflect potential supply.⁴⁸ This list of resources was developed from a variety of CPUC proceedings. Not all resources were explicitly procured to address the Final Root Cause Analysis findings, and not all of the resources can be counted-on to be effective during the net demand peak period. To address this concern, the stack analysis removed stand-alone solar capacity to reflect little to no generation at HE 8 p.m. PDT, although solar paired with storage is included at its NQC value. All other resources were also assumed to be effective later in the day.

Forecasted Demand and Planning Reserve Margin

All of the existing and incremental resource capacity is “stacked up” and compared to the demand at HE 8 p.m. PDT, plus a PRM. The forecasted demand contained in the stack analysis is based on the 1-in-2 average hourly forecast for June through October 2022, which is derived from the mid-demand and mid-additional achievable energy efficiency scenario from the CEC's 2020 IEPR Update.

⁴⁷ CAISO, CPUC, and CEC, *Final Root Cause Analysis: Mid-August 2020 Extreme Heat Wave*, January 13, 2021, p. 56.

⁴⁸ CPUC Energy Division, *Status of New Resources Expected*, November 2020. See [CPUC's website](#) for additional details.

This stack analysis compared two PRM levels. The first is the current 15 percent PRM, comprised of a 6 percent margin for required operating reserves plus a 9 percent margin for the combination of above average load and generation forced outage rates. The second PRM is the CAISO's proposed 17.5 percent PRM, comprised of a 6 percent margin for required operating reserves, 4 percent margin for the difference between a forecasted 1-in-2 and 1-in-5 system demand, and 7.5 percent margin for forced outages based on North American Electric Reliability Corporation Generator Availability Data System data.⁴⁹ The 17.5 percent PRM is based on the CAISO's analysis that the current PRM does not fully address the findings in the Final Root Cause Analysis noted above.

Table 10 below provides the numerical comparison between the total resource stack versus the load for HE 8 p.m. PDT, plus a 15 percent and 17.5 percent PRM.

⁴⁹ CAISO, Legal and Policy Brief of the California Independent System Operator, CPUC Rulemaking 20-11-003, February 5, 2021. A 1-in-2 forecast reflects a 50 percent probability that the forecasted peak will be less than actual peak load, and a 50 percent probability that the forecasted peak will be greater than actual peak load. A 1-in-5 forecast reflects a 20 percent probability that the forecasted peak load will be greater than actual peak load and reflects an above average load level.

Table 10: Surplus and Shortfall of 2022 Existing and Expected Online Resource Stack Without Redondo Beach as Compared to Load for HE 8 p.m. PDT Plus 15 percent and 17.5 percent PRM (MW)

Month	Existing and expected online resource stack without Redondo Beach	Load for HE 8 p.m. PDT	15% PRM plus load for HE 8 p.m. PDT	17.5% PRM plus load for HE 8 p.m. PDT	Resource stack minus 15% PRM plus load ([B] - [D])	Resource stack minus 17.5% PRM plus load ([B] - [E])
[A]	[B]	[C]	[D]	[E]	[F]	[G]
June	49,466	41,204	47,385	48,415	2,082	1,051
July	50,819	43,603	50,143	51,233	676	(414)
August	52,073	44,009	50,610	51,711	1,463	363
September	50,715	45,343	52,145	53,278	(1,430)	(2,563)
October	47,537	37,036	42,591	43,517	4,946	4,020

Note: In columns [F] and [G], a surplus is shown in black font and a shortfall is shown in red font within parentheses.

Based on only the existing and expected online incremental resources, the results showed shortfalls in September 2022 under both the current 15 percent PRM and the proposed 17.5 percent PRM of 1,430 MW and 2,563 MW, respectively, as well as a smaller 414 MW shortfall in July under the proposed 17.5 percent PRM. This projected shortfall is conservative, as it assumes load serving entities will contract with all existing and incremental resources known today. This assumption also assumes all existing resources today (except Redondo Beach) remain operational through summer 2022, incremental resources come online as expected, and load serving entities are able to contract for all resources within the CAISO BAA plus at least the historical average level of resource adequacy imports.

For all other months, the stack analysis signaled that there may be sufficient NQC available for procurement to satisfy both current and proposed PRM levels if contracted by load serving entities. However, because the resource adequacy program is designed to give load serving entities additional time during the year to layer in additional

procurement for the summer months, the total level of procurement is not known at this time.⁵⁰

Resource Stack Analysis Projections for 2022

Table 11 compares stack analysis projections for September 2022, the month with the largest anticipated shortfall, to CPUC staff estimates for expedited procurement that is effective at the 8 p.m. hour. Assuming the expedited procurement results in 1,500 MW of additional capacity that can effectively address energy needs during the net demand peak, the shortfall in September is potentially reduced to a 70 MW surplus under a 15 percent PRM but still a 1,063 MW shortfall under a 17.5 percent PRM. Note that at the time of publication of this report, the CPUC has not yet voted on additional expedited procurement, and once adopted some of the proposed programs are likely to be new and untested. In addition, some of the resources targeted in that proceeding—such as contracting with resources at risk of retirement and securing contracts for imported energy—overlap with resources that are already counted in other categories of the resource stack. Consequently, the incremental resources that will result from that procurement are estimates only, and there is likely to be a non-trivial level of risk and uncertainty associated with the resources being proposed in that effort.

Table 11 also includes the capacity from Redondo Beach Units 5, 6, and 8 that would be available should the OTC Policy compliance deadline be extended through December 31, 2023. The combination of the capacity potentially available from expedited procurement and from Redondo Beach results in a 900 MW surplus for September 2022 under the current 15 percent PRM. However, there is a 229 MW deficit under the 17.5 percent PRM.

⁵⁰ Annual resource adequacy filings are due every October for the following program year to meet 90 percent of the total requirement. 100 percent of the requirement is not due until 45 days before the operating month. In other words, total procurement for September 2022 will not be fully known until mid-July 2022.

Table 11: Surplus and Shortfall for September 2022 Total Resource Stack as Compared to Load for HE 8 p.m. PDT Plus 15 percent and 17.5 percent PRM (MW)

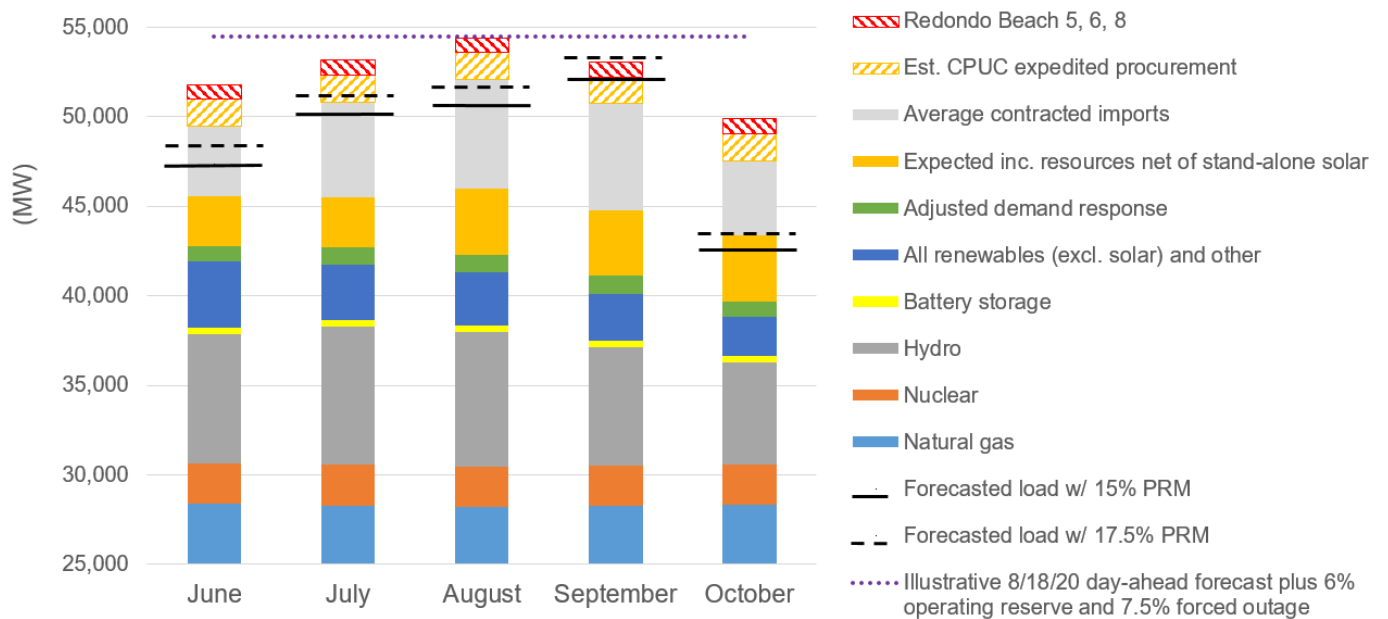
	15% PRM	17.5% PRM
[1] Existing and expected online resource stack	(1,430)	(2,563)
[2] Estimated CPUC expedited procurement	1,500	1,500
[3] Sub-total with only expedited procurement	70	(1,063)
[4] Redondo Beach Units 5, 6, and 8 (RB)	834	834
[5] Total with expedited procurement and RB	904	(229)

Note: A surplus is shown in black font and a shortfall is shown in red font within parentheses.

Figure 8 shows stacked resource columns for June through October 2022 compared with the forecasted load for HE 8 p.m. PDT, plus a 15 percent and 17.5 percent PRM for each stack. The figure includes both the estimated CPUC expedited procurement as well as the extension of Redondo Beach Units 5, 6, and 8.

In addition to the projected 2022 stack analysis, Figure 8 also includes a historical comparison based on an actual weather event. On August 18, during the mid-August 2020 heat wave, the day-ahead forecast was projected to be 48,000 MW at HE 8 p.m. PDT. This is over 4,000 MW higher than the projected August 2022 forecast at HE 8 p.m. PDT. Adding in the required 6 percent operating reserves and the CAISO’s recommended forced outage rate of 7.5 percent results in a total requirement of 54,480 MW. This requirement is illustrated with a horizontal dotted line. The conditions surrounding this event and level of demand—extended high temperatures and stressed grid conditions throughout the western United States—are representative of the circumstances in which the capacity of Redondo Beach would be most needed.

Figure 8: June – October 2022 Resource Stack vs. Load for HE 8 p.m. PDT Plus 15 percent and 17.5 percent PRM



Projections for 2023

There are several uncertainties in developing a 2023 stack analysis, as neither the 2022 nor 2023 NQC lists are available, current procurement authorizations are either still in progress or not yet approved, and the resource adequacy program continues to evolve. At this time, the CEC’s demand forecast is showing approximately 500 MW of load increase at HE 8 p.m. PDT between 2022 and 2023, as shown in Table 12 below.

Table 12: Increase in Forecasted 2023 Load for HE 8 p.m. PDT

Month	2022 Load for HE 8 p.m. PDT	2023 Load for HE 8 p.m. PDT	Increase in 2023 Load ([C] - [B])
[A]	[B]	[C]	[D]
June	41,204	41,610	406
July	43,603	44,031	428
August	44,009	44,406	397
September	45,343	45,826	483
October	37,036	37,589	554

Should the demand for energy increase in 2023 as projected, the power generated by Redondo Beach will be critical to offset system-wide grid shortfalls.

VII. SACCWIS Recommendation and Alternatives

SACCWIS considered the following alternatives to address grid reliability and makes the following recommendation.

Alternative 1 & Recommendation – Extend OTC Compliance Date for Redondo Beach for Two Years

The SACCWIS recommends the State Water Board amend the OTC Policy to extend the compliance date of Redondo Beach Units 5, 6, and 8 for two years from December 31, 2021, to December 31, 2023.

The extension would help meet system reliability needs for September 2022 at HE 8 p.m. PDT as demonstrated by the system-wide grid shortfalls in the 2022 stack analysis. The second year of the extension is necessary to address the uncertainty in the 2023 resource supply stack and the CEC's forecasted 500 MW increase in demand between 2022 and 2023. The stack analysis indicates shortfalls of 1,430 MW under a 15 percent PRM and 2,563 MW under a 17.5 percent PRM, with the only resources online in 2022 being those that currently exist (not including Redondo) and those expected to come online by 2022. Assuming 1,500 MW of additional, expedited procurement comes online on schedule, the power generated by Redondo Beach would help offset a remaining shortfall of 1,063 MW, based on a 17.5 percent PRM. The 17.5 percent PRM is a more conservative reserve margin, in part intended to reduce the risk of power outages when demand is high during west coast-wide heat waves. The addition of 834 MW from Redondo Beach would help meet the demand and significantly offset system-wide grid shortfalls.

Even with an extension of the Redondo Beach compliance date, California may experience black-outs or brown-outs during times when electrical demand is high and imports are unreliable due to similar high demands in other states or BAAs, such as during extreme and prolonged heat waves. However, this risk would be significantly decreased due to the availability of additional power from Redondo Beach.

Furthermore, a two-year extension would minimize the regulatory risk of returning to the State Water Board should the power generated by Redondo Beach be needed in 2023. Should it be determined that there is no need for Redondo Beach in 2023, the unit may retire earlier than its compliance date deadline.

This recommendation follows indications from the CPUC, CAISO, and CEC that a request for extending Redondo Beach's compliance date may be necessary depending on the pace and success of incremental procurement authorized by the CPUC.⁵¹ Additionally, in amending the OTC Policy on September 1, 2020, the State Water Board recognized that "portions of California were subject to rotating power outages during mid-August 2020 due largely to unexpectedly high peak energy demands during widespread extreme high temperatures. The CPUC, CAISO, and CEC may be revising their forecasting models to account for this scenario, and may determine that there is a need to request additional extensions of final compliance dates to maintain grid reliability and avoid similar blackouts in the future."⁵²

Since September 1, 2020, critical uncertainties discussed both in this report and in the Final Root Cause Analysis have sparked efforts from the CPUC, CAISO, and CEC to revise their forecasting models and have highlighted the need for additional capacity. Specifically, these uncertainties include:

1. Whether authorized or proposed procurement will adequately address the net demand peak period;
2. Whether imports can be successfully contracted for up to at least the historical average resource adequacy levels despite tightening supply conditions in the rest of the west;
3. Whether resources assumed online today will remain so beyond 2021 and perform as expected;
4. Planning processes have not entirely changed to address high loads and the net demand peak but expedited actions seek to provide a stop-gap;

⁵¹ Additional details are available on the [State Water Board's website](#).

⁵² The Resolution is found on the [State Water Board's website](#).

5. Processes that address additional procurement and market changes are still in progress, and once implemented a fair amount of uncertainty regarding their effectiveness will remain; and
6. Lastly, there are a variety of climate-change and real-time conditions that could negatively impact the operation of the fleet but are unknown until much closer to the operational period, such as drought, wildfires threatening generation and transmission infrastructure, and cloud cover which reduces solar output and battery storage charging capability.

The CPUC has authorized new electric resources to replace a portion of the OTC fleet's capacity subject to the OTC Policy, and will continue to monitor this procurement, as well as incremental procurement under D.19-11-016 and R.20-11-003. As part of this process, and pursuant to a request by the State Water Resources Control Board, the CPUC submitted its first quarterly report on D.19-11-016 procurement on March 16, 2021. Additionally, efforts are underway to address the recommendations of the Final Root Cause Analysis of the mid-August rotating outages. Though incremental procurement is in progress or soon to be authorized, not all of the new resources can address the critical grid needs later in the evening.

Extending the compliance date for Redondo Beach would be responsive to supporting system-wide grid reliability concerns in summer 2022 and 2023 due to extreme and prolonged climate-change induced weather conditions and would ensure that the electrical power needs essential for the welfare of the citizens of the State of California are met. Furthermore, the extension would also provide a necessary "bridge" as new procurement comes online, some of which will specifically address critical grid needs during the net demand peak period.

Alternative 2 – Extend OTC Compliance Date for Redondo Beach for One Year

In this alternative, SACCWIS would recommend the State Water Board extend the OTC Policy compliance date for Redondo Beach Units 5, 6, and 8 for one year, until December 31, 2022.

This alternative would help meet system reliability needs for September 2022 at HE 8 p.m. PDT. The need for an extension of Redondo Beach is demonstrated by the stack analysis, which shows shortfalls of 1,430 MW under a 15 percent PRM and 2,563 MW under a 17.5 percent PRM, with the only resources online in 2022 being those that currently exist (not including Redondo Beach) and those expected to come online by 2022. Assuming 1,500 MW of additional expedited procurement comes online on schedule, the power generated by Redondo Beach would help offset a remaining shortfall of 1,063 MW, based on a 17.5 percent PRM.

Even with an extension of the Redondo Beach compliance date, California may experience black-outs or brown-outs during times when electrical demand is high and imports are unreliable due to similar high demands in other states or BAAs, such as during extreme and prolonged heat waves. However, this risk would be significantly decreased due to the availability of an additional 834 MW from Redondo Beach to help meet the high demand in 2022.

This alternative would not help meet system reliability needs in 2023 due to the high level of uncertainty around resource supply. If a need is subsequently identified for 2023, there may not be enough time to conduct regulatory processes to amend the OTC Policy and further extend the compliance date. Similarly, depending on when a need is identified, the resource owner may not be capable of keeping the plant in service for an additional year.

Alternative 3 – No Action

In this alternative, SACCWIS would recommend no change to the OTC Policy compliance date. Redondo Beach would stop using ocean water for once-through cooling on or before December 31, 2021. California may experience black-outs or brown-outs during times when electrical demand is high and imports are unreliable due to similar high demands in other states or BAAs.

VIII. Regulatory Requirements

The following section describes water quality and air quality regulatory requirements and procedures related to a compliance date extension for Redondo Beach. These actions are separate and distinct from the contracting process for the power plant. If the State Water Board approves an OTC Policy compliance date extension, contracting for the power plant would occur separately and through other processes. The procurement process will identify the specific capacity needed to meet reliability requirements.

Water Quality

Following the SACCWIS' recommendation to extend the compliance date for Redondo Beach, the State Water Board would consider adopting an amendment to the OTC Policy to extend the compliance date. The most likely process will be for the State Water Board to consider the amendment in fall 2021 with sufficient time for the California Office of Administrative Law to review the amendment prior to December 31, 2021.

An alternative suspension process involves the CAISO sending letters to SACCWIS, the State Water Board, and the Los Angeles Regional Water Board notifying them that continued operation of Redondo Beach is deemed necessary to maintain grid reliability beyond December 31, 2021, and requesting suspension of Redondo Beach's compliance date for more than 90 days per Section 2.B.(2)(b) of the OTC Policy. Executive directors of the CEC and CPUC have ten days to submit letters stating any opposition to the suspension. If there is no opposition from the other energy agencies, the State Water Board shall conduct a hearing during the 90-day suspension or within 90 days of receiving the notification to determine whether to suspend the compliance date for more than 90 days. Per the OTC Policy, the State Water Board will afford significant weight to the recommendations of the CAISO. If suspended, the State Water Board would need to amend the OTC Policy on or before the end of the suspension period granted by the State Water Board.

Additionally, the Los Angeles Regional Water Quality Control Board (Los Angeles Regional Water Board) would need to re-issue a NPDES permit and associated TSO for Redondo Beach. The NPDES Permit and TSO can be developed concurrently with the

OTC Policy amendment, and the process takes approximately six to nine months to complete.

Air Quality

Stationary source permitting in California is the shared responsibility of CARB, the State's 35 local air pollution control agencies (air districts or districts), and U.S. EPA Region 9. CARB does not issue any preconstruction or operating permits for stationary sources, but plays an oversight role over district permitting programs. In California, a new or modified stationary source that will emit air pollutants typically must meet certain emission control requirements and obtain preconstruction and operating permits from the district where the source is located. The district prepares an engineering analysis and places conditions in the preconstruction permits to ensure compliance with the requirements of federal, State, and local air pollution regulations. Once construction is complete and compliance with preconstruction permit conditions is verified, an operating permit is issued. Title V is a federal Clean Air Act program, implemented by the states, designed to standardize operating permits and the permitting process for major sources of emissions.

Redondo Beach is located in the jurisdiction of the South Coast Air Quality Management District (SCAQMD) and has a valid Title V permit (expires on February 4, 2024). Generating Units 5, 6, and 8 can continue operating as long as the facility maintains compliance with its permit and any future applicable federal, state, and local air regulatory requirements.

IX. Conclusions

The SACCWIS recommends that the State Water Board extend the OTC Policy compliance date for Redondo Beach Units 5, 6, and 8 for two years through December 31, 2023, to help offset system-wide grid shortfalls projected during periods of high energy demand during the net demand peak period. Demand is projected to be highest in September 2022 and 2023 during the 8:00 p.m. hour, with highest needs during extreme and prolonged west coast-wide heat waves induced by climate change. Extending the compliance date for Redondo Beach would be responsive to supporting system-wide grid reliability concerns in summer 2022 and 2023 and would ensure that the

electrical power needs essential for the welfare of the residents of the State of California are met.

APPENDIX A

AVERAGE ANNUAL FLOW RATE DATA FOR ONCE-THROUGH COOLING FACILITIES

Power Plant Name	Average Annual Flow Rate (MGD)								
	2010	2011	2012	2013	2014	2015	2016	2017	2018
Humboldt Bay Power Plant Units 1&2	0	0	0	0	0	0	0	0	0
Potrero Power Plant	152	0	0	0	0	0	0	0	0
Contra Costa Generating Station	15.4	33	53	17	0	0	0	0	0
Pittsburg Power Plant	18.8	16.9	79	48.8	26	67	32	0.07	0
Moss Landing Power Plant	289.9	212.3	396.4	353.6	244.9	312.5	231	135.2	200.3
Diablo Canyon Nuclear Power Plant	2,347	2,368	2,277	2,311	2,242	2,360	2,372	2,286.4	2,338
Morro Bay Power Plant	21.5	41.7	50.2	22.7	0.2	0	0	0	0
El Segundo Generating Station	112.9	97	197	217	107	135	7	4.58	0
Haynes Generating Station Units 1&2	720	812	886	725	471	506	448	355.5	441
Scattergood Generating Station	276.4	299	296.8	272	244	311	151	109.8	108
Harbor Generating Station	45.5	44.0	47.3	46.8	49.6	49.1	47	50.07	46
Alamitos Generating Station	2.9	106	375	496	332	324	317	316.21	114.74*
Redondo Beach Generating Station	59	180	178	95	107	142	95	156.95	75.3*
Mandalay Generating Station	39.7	56	77	109	63	78	56	48.4	3
Ormond Beach Generating Station	12	18	71	133	68	98	60	86.6	117.9
Huntington Beach Generating Station	202.9	242.6	238.5	178	169	159.6	134	134.2	114.5
South Bay Power Plant	34.5	0	0	0	0	0	0	0	0

	Average Annual Flow Rate (MGD)								
Power Plant Name	2010	2011	2012	2013	2014	2015	2016	2017	2018
Encina Power Plant	211.9	314.5	531.1	264.0	338.6	410.2	325	387.8	356.1
San Onofre Nuclear Generating Station	2,030	2,256	1,677	1,003	42	42	37	0	0
Total	6,592.3	7,097	7,430.3	6,291.9	4,504.3	4,994.4	4,312	4,071.8	3,915.9

Source: EPA Flow Data, (Intergraded Compliance Information System [ICIS] Database) Julie Johnson and Jonathan Dolan. Updated on February 16, 2021.

*Previous 2018 values for Alamitos and Redondo Beach Generating Stations were not calculated properly. These values have been updated and are now displayed correctly.

AVERAGE ANNUAL FLOW RATE DATA FOR ONCE-THROUGH COOLING FACILITIES (CONTINUED)

Power Plant Name	Average Annual Flow Rate (MGD)	
	2019	2020
Humboldt Bay Power Plant Units 1&2	0	0
Potrero Power Plant	0	0
Contra Costa Generating Station	0	0
Pittsburg Power Plant	0	0
Moss Landing Power Plant	236.2	241.2
Diablo Canyon Nuclear Power Plant	2,067	2,282
Morro Bay Power Plant	0	0
El Segundo Generating Station	0	0
Haynes Generating Station Units 1&2	398.7	467.0
Scattergood Generating Station	98.1	124.0
Harbor Generating Station	48.1	45.0
Alamitos Generating Station	101.8	126.7
Redondo Beach Generating Station	72.4	80.2
Mandalay Generating Station	0	0
Ormond Beach Generating Station	146.9	227.5
Huntington Beach Generating Station	113.4	82.1
South Bay Power Plant	0	0

Power Plant Name	Average Annual Flow Rate (MGD)	
	2019	2020
Encina Power Plant	262.1	0
San Onofre Nuclear Generating Station	0	0
Total	3,545	3,814

Source: EPA Flow Data, (Intergraded Compliance Information System [ICIS] Database) Jonathan Dolan. Updated on February 16, 2021.

APPENDIX B

INPUTS, ASSUMPTIONS, AND METHODOLOGY FOR RESOURCE STACK ANALYSIS

The table below summarizes the input assumptions for Tables 9 through 12 and Figure 8 for June through October 2022.

Resource supply stack	
PRM	<p>Current PRM – 15 percent. See CPUC’s website for details.</p> <p>CAISO proposed PRM - 17.5 percent comprised of:</p> <ul style="list-style-type: none"> • 6 percent for operating reserves <ul style="list-style-type: none"> ○ Glossary of Terms Used in the North American Electric Reliability Corporation’s Reliability Standards ○ North American Electric Reliability Corporation Contingency Reserve • 4 percent for load above 1-in-2 system demand <ul style="list-style-type: none"> ○ Reflects the approximate difference between a 1-in-2 and 1-in-5 peak forecast. For example, the CAISO footprint coincident peak for 2022 is 45,448 MW for the 1-in-2 forecast. The 1-in-5 forecast from the same data set is 47,383 MW, or 4.3 percent higher. An increase from the 1-in-2 to the 1-in-10 forecast reflects a 6.6 percent increase in the peak demand. ○ Load Serving Entity and Balancing Authority Tables • 7.5 percent for forced outages <ul style="list-style-type: none"> ○ Based on the weighted equivalent forced outage rate from the North American Electric Reliability Corporation Generator Availability Data System.
Load	<ul style="list-style-type: none"> • CEC 2020 2020 IEPR 1-in-2 system peak Mid-Mid Load. • Used 2022 forecast for HE 8 p.m. PDT which is HE19 Pacific Standard Time (HE19 PST) in 2020 IEPR data. IEPR dataset is entirely in PST, which does not consider daylight saving.

Existing generation	
NQC	<p>Final NQC Report for Compliance Year 2021 (Version dated November 13, 2020.)</p> <p>Resource IDs from the NQC list were cross-referenced with CAISO Master Control Area Generating Capability List for resource category verification. The Master Control Area Generating Capability List is available on CAISO's website.</p>
Gas Generation	
Existing gas generation	<p>Existing generators from 2021 NQC list based on values for each month of analysis. Includes OTC units: Alamitos Units 3, 4, and 5; Huntington Beach Unit 2; and Ormond Beach Units 1 and 2. Includes RMR generators: Oakland Unit 2 and 3, Channel Island Power, Greenleaf II Cogen. Note: Midway Sunset Cogeneration was included on the 2021 NQC list.</p> <p>Includes announced retirements. Does not include new units. Dynamic scheduled generators included in Imports.</p>
Nuclear	
Existing nuclear	<p>Diablo Canyon Unit 1 and 2. Qualifying capacity based on 2021 NQC list based on monthly values.</p> <p>Dynamic scheduled generators included in Imports.</p>
Existing hydro (including Pumped Storage)	
Large Hydro	<p>>30 MW hydro resources within the CAISO footprint. Qualifying capacity based on 2021 NQC list based on monthly values.</p> <p>Dynamic scheduled generators included in Imports.</p>
Small Hydro	<p>≤30MW, renewable portfolio standard eligible resources within the CAISO footprint. Qualifying capacity based on 2021 NQC list based on monthly values.</p>
Pumps with NQC	<p>Pumps designated to provide ancillary services with an NQC value. Qualifying capacity based on 2021 NQC list based on monthly values.</p>
Pumped Storage	<p>Includes: Eastwood; Helms Units 1, 2, and 3; Lake Hodges Unit 1 and 2; and San Luis.</p>

Existing battery	
Existing batteries	Total installed values from 2021 NQC list based on monthly values.
Existing renewables and other resources	
Existing wind	Total installed values from 2021 NQC list based on monthly values. Qualifying capacity based on effective load carrying capability for each month from D.19-06-026.
Existing other renewables	Includes Biomass, Biogas, Geothermal, Heat Recovery, and Waste to Power. Qualifying capacity based on 2021 NQC list based on monthly values.
Existing other resources	Includes coal and miscellaneous resources. Qualifying capacity based on 2021 NQC list based on monthly values.
Demand Response	
Adjusted demand response	<p>Demand response assumed to be the sum of two sources (1) IOU programs registered in the CAISO market plus (2) third-party demand response programs in the CPUC-jurisdictional footprint typically shown as resource adequacy.</p> <p><u>Demand response from IOU programs:</u></p> <p>Individual IOU demand response totals spreadsheets for Pacific Gas & Electric, SCE, and SDG&E. Based on the monthly values from June through October for 2022 Total Event-Based/Supply-Side Programs (inclusive of transmission and distribution loss factor gross up). Monthly totals are further grossed up for 15 percent PRM per current practice.</p> <p><u>Demand response from third-party providers:</u></p> <p>Assumed 250 MW per month, equivalent to the current monthly shown resource adequacy levels of demand response.</p> <p>Adjusted Demand Response assumes a 60 percent success response rate of the total Demand Response for each month based on summer 2020 performance of 50 percent with a slight improvement expected by summer 2022. See also <i>Final Root Cause Analysis: Mid-August 2020 Extreme Heat Wave</i>, January 13, 2021, "Table 4.3: Comparison of Demand Response Performance During August Stage 3 Events," p. 56.</p>
Incremental resources net of stand-alone solar	

Incremental resources net of stand-alone solar	<p>Incremental resources are new resources expected to be online by August 2022 (both contracted and uncontracted).</p> <p>Source: Status of New Resources Expected, November 2020, CPUC Energy Division, page 7.</p> <p>Reporting method: Analysis only reports online dates by August 1 of each year. Therefore, data for June and July 2022 reflect values for all new resources expected online by August 1, 2021. August through October 2022 reflect values for all new resources expected online by August 1, 2022.</p> <p>Stand-alone solar NQC values are subtracted from the incremental resource values by month, using the same reporting method above.</p>
Imports (based on total maximum import capability of 10,805 MW)	
Contracted resource adequacy imports	<p>Based on average of historical contracted imports from 2015 through 2020 for each month, which includes both drought and non-drought years. Includes Palo Verde and Hoover and dynamically scheduled resources. Average values are:</p> <ul style="list-style-type: none"> ○ June: 3,922 MW ○ July: 5,340 MW ○ August: 6,095 MW ○ September: 5,921 MW ○ October: 4,171 MW
Estimated CPUC expedited procurement	
Estimated CPUC expedited procurement	1,500 MW per month based on CPUC staff estimates of expedited procurement through the CPUC’s <i>Order Instituting Rulemaking to Establish Policies, Processes, and Rules to Ensure Reliable Electric Service in California in the Event of an Extreme Weather Event in 2021</i> (R.20-11-003).
Redondo Beach Generating Station	
Redondo Beach Generating Station	Redondo Generating Station Unit 5, 6, and 8. Qualifying capacity based on 2021 NQC list based on monthly values.