2018 Report of the Statewide Advisory Committee on Cooling Water Intake Structures

March 5, 2018

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Acronyms and Abbreviations

AFC	Application for Certification
ATC	Authority to Construct
AQMP	Air Quality Management Plan
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
CECP	Carlsbad Energy Center Project
CPUC	California Public Utilities Commission
FERC	Federal Energy Regulatory Commission
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 Pollution Discharge Elimination System
NQC	Net Qualifying Capacity
OTC	Once-Through Cooling
PPA	Power Purchase Agreement
PPTA	Power Purchase Tolling Agreement
PTA	Petition to Amend
PTC	Permit to Construct
PTO	Participating Transmission Owner
RA	Resource Adequacy
RECLAIM	Regional Clean Air Initiatives Market

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
SEC	Securities and Exchange Commission
SLC	State Lands Commission
SONGS	San Onofre Nuclear Generating Station
State Water Board	State Water Resources Control Board

I. Introduction

The Statewide Advisory Committee on Cooling Water Intake Structures (SACCWIS) prepared this report for the State Water Resources Control Board (State Water Board) to summarize the State of California's electrical grid reliability needs and to recommend modifications, if necessary, in the compliance schedule for fossil fuel power plants using ocean water for once-through cooling.

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's 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 policy 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 implementation schedule each year.

This report focuses on power generating facilities within the California Independent System Operator (CAISO) balancing authority area. It does not focus on facilities owned or operated by the Los Angeles Department of Water and Power (LADWP), as their compliance dates were reviewed and modified by the State Water Board in July 2011.

The SACCWIS continues to closely monitor grid reliability needs throughout the state and does not recommend changes to any final compliance schedule in the OTC Policy at this time.

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

Since the OTC Policy was adopted, several units have retired or repowered. The closure of the San Onofre Nuclear Generating Station (SONGS) resulted in a significant reduction in projected water use for power plant cooling. Table 1 shows the power plants in the CAISO and Los Angeles Department of Water and Power (LADWP) balancing authority areas that have achieved

[1] A copy of the latest Water Board's OTC Policy is available at the following Web site: https://www.waterboards.ca.gov/water_issues/programs/ocean/cwa316/policy.shtml#amendments

compliance in order of retirement date, several of which did so well in advance of their mandated compliance deadlines.

Table 1: OTC Compliance Achievement

Facility & Units	NQC[2]	Compliance Date	Retirement 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
Huntington Beach 3, 4	452	Dec. 31, 2020	Retired Nov. 1, 2012
Contra Costa 6, 7	674	Dec. 31, 2017	Retired April 30, 2013[3]
San Onofre 2, 3	2,246	Dec. 31, 2022	Retired June 7, 2013[4]
Haynes 5, 6	535	Dec. 31, 2013	Retired June 13, 2013[5]
El Segundo 3	335	Dec. 31, 2015	Retired July 27, 2013[6]
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 March 1, 2017
Mandalay 1, 2	430	Dec. 31, 2020	Retired Feb. 6, 2018

Table 2 reflects the current compliance plans for the remaining power generating units that use once-through cooling and Table 3 presents recent performance. 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.

[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.
[3] 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.
[4] SONGS Units were officially retired June 7, 2013, but they ceased power generation on Jan. 31, 2012.
[5] LADWP retired Haynes 5-6, and replaced them with Haynes 11-16.
[6] NRG retired El Segundo 3 and replaced it with El Segundo 5-8.

Table 2: OTC Compliance Plans for Remaining Units

Facilities and Units	NQC	Compliance Date	Owner Proposed Compliance Method
Alamitos 1, 2, 6	848	Dec. 31, 2020	Plans to retire on Dec. 31, 2019 to meet emissions requirements for its replacement
Alamitos 3, 4, 5	1,163	Dec. 31, 2020	Retire and replace units by compliance date
Encina 2-5	844	Dec. 31, 2018	Retire and replace units by compliance date
Harbor 5	229	Dec. 31, 2029	Plans to repower on Dec. 31, 2029[7]
Haynes 1, 2	444	Dec. 31, 2029	Plans to repower on Dec. 31, 2025
Haynes 8	575	Dec. 31, 2029	Plans to repower on Dec. 31, 2028
Huntington Beach 1	215	Dec. 31, 2020	Plans to retire on Dec. 31, 2019 to meet emissions requirements replacement
Huntington Beach 2	215	Dec. 31, 2020	Retire and replace unit by compliance date
Moss Landing 1, 2	1,020	Dec. 31, 2020	Complying with Track 2 of the OTC Policy to reduce impingement and entrainment
Ormond Beach 1, 2	1,516	Dec. 31, 2020	Retire units by compliance date
Redondo Beach 7	493	Dec. 31, 2020	Plans to retire on Oct. 1, 2019 to provide emission offsets for Huntington Beach replacement
Redondo Beach 5, 6, 8	848	Dec. 31, 2020	Retire units by compliance date
Scattergood 1, 2	367	Dec. 31, 2024	Plans to repower by Dec. 31, 2024

[7] LADWP informed the Energy Commission in comments on the 2017 Integrated Energy Policy Report of revisions to their OTC compliance dates based on an ongoing OTC study, see http://docketpublic.energy.ca.gov/PublicDocuments/17-IEPR-01/TN221735_20171113T143301_Ramon_D_Gamez_Comments_LADWP's_Comments_to_DRAFT_2017_IEPR_and.pdf

Table 3: Recent Performance of OTC Generating Units

Facilities and Units	State Water Board Compliance Date	NQC	Annual Capacity Factors			
			2014	2015	2016	2017 Jan-Sept
Alamitos 1	12/31/2020	175	1.4%	3.0%	2.0%	2.4%
Alamitos 2	12/31/2020	175	5.4%	6.1%	3.4%	4.6%
Alamitos 3	12/31/2020	326	16.6%	10.8%	10.4%	6.7%
Alamitos 4	12/31/2020	324	18.7%	7.0%	9.9%	9.7%
Alamitos 5	12/31/2020	485	1.7%	3.4%	1.9%	3.7%
Alamitos 6	12/31/2020	485	4.5%	6.2%	2.7%	5.1%
Encina 2	12/31/2017	104	2.6%	5.1%	1.4%	2.9%
Encina 3	12/31/2017	110	4.7%	5.3%	1.6%	3.2%
Encina 4	12/31/2017	300	6.3%	8.2%	3.2%	6.0%
Encina 5	12/31/2017	330	9.9%	10.4%	5.6%	7.5%
Huntington Beach 1	12/31/2020	215	22.3%	19.0%	13.3%	13.3%
Huntington Beach 2	12/31/2020	215	26.2%	19.4%	12.4%	10.6%
Moss Landing 1	12/31/2020	540	39.2%	35.5%	24.6%	21.6%
Moss Landing 2	12/31/2020	540	47.0%	37.0%	26.1%	21.2%
Ormond Beach 1	12/31/2020	806	0.8%	2.5%	0.7%	2.0%
Ormond Beach 2	12/31/2020	806	2.4%	3.2%	0.8%	2.3%
Redondo Beach 5	12/31/2020	179	2.3%	3.5%	1.4%	2.5%
Redondo Beach 6	12/31/2020	175	2.1%	4.2%	3.1%	4.6%
Redondo Beach 7	12/31/2020	505	0.9%	4.5%	4.0%	6.0%
Redondo Beach 8	12/31/2020	496	3.3%	3.9%	1.7%	4.8%
LADWP BAA Units						
Harbor 5	12/31/2029	75	3.3%	2.4%	4.0%	2.3%
Haynes 1	12/31/2029	230	12.7%	6.5%	12.3%	4.1%
Haynes 2	12/31/2029	230	13.1%	8.0%	16.0%	5.3%
Haynes 8	12/31/2029	264	34.2%	38.0%	40.9%	49.1%
Scattergood 1	12/31/2024	163	24.5%	8.3%	22.9%	7.2%
Scattergood 2	12/31/2024	163	6.6%	21.2%	5.9%	2.8%

Source: California Energy Commission, Quarterly Fuel and Energy Report, January 2018.

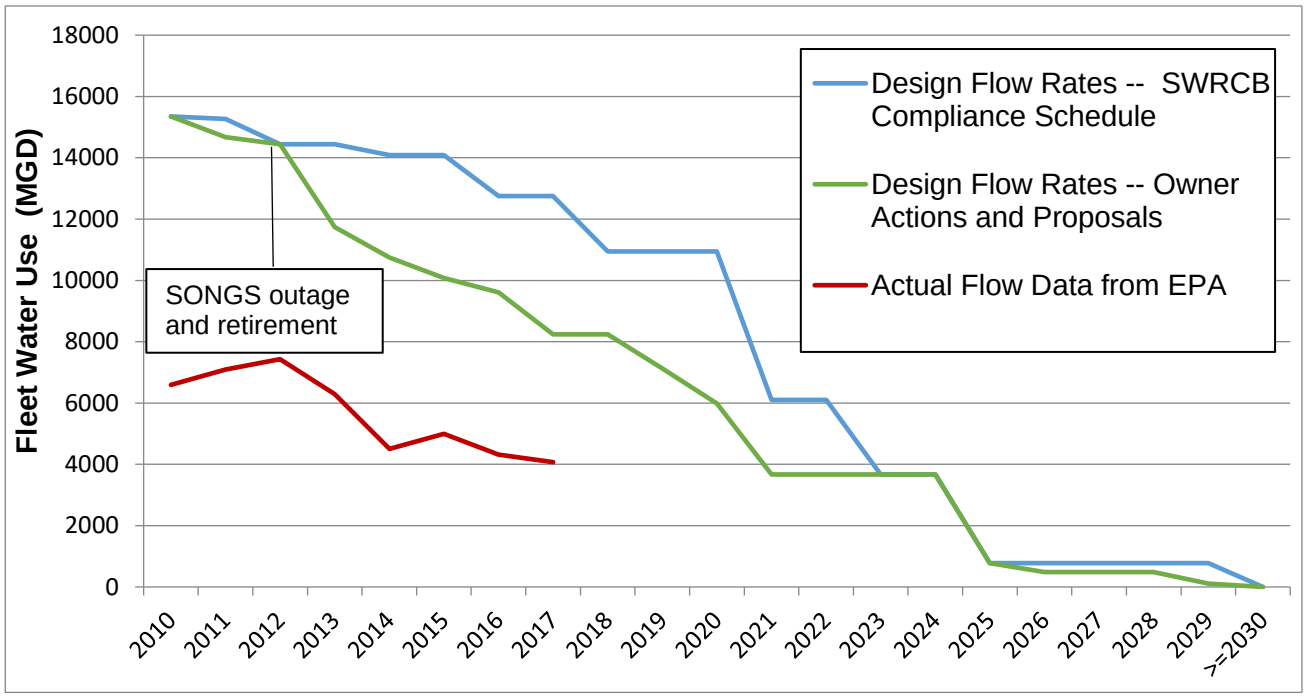
Once-Through Cooling Water Use

There are a number of perspectives from which to assess the impact of the OTC fleet on ocean and estuarine impingement and entrainment. All direct biological measures are beyond the scope

of the SACCWIS' responsibility. Figure 1 offers a rough indicator of environmental impact using water flow rates as the metric through time. The two upper lines show the design flow rates of the OTC fleet included within the OTC Policy adopted May 2010. 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 flows used for once-through cooling. See Appendix A for actual flow 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). Table 3 shows that most fossil fuel OTC facilities are operating at extremely low annual capacity factors. 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



Source: CEC and State Water Board Staff, February 2018

III. Grid Resource, Infrastructure, and Reliability Needs

The CPUC, CAISO, and CEC continue to work together 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.

The CPUC's Long-Term Procurement Plan (LTPP) proceeding evaluated generation resources in the CAISO system every two years. 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. OTC retirement schedules 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 is in the process of implementing a new Integrated Resource Planning (IRP) process in response to the legislative requirements of SB350, which will serve as a successor to LTPP and will include the function of periodically evaluating generation resources in the CAISO system[8].

The CEC is the lead agency for licensing fossil fuel power plants 50 MW and larger and has a regulatory certification process (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, however, apply to the repowering or replacement of an existing power plant wherein the net increase in capacity is less than 50 MW.

The Southern California Reliability Project, comprised of the CEC, CPUC, CAISO and CARB, has been monitoring reliability in Southern California since the unexpected retirement of SONGS and the scheduled retirement of the OTC facilities. This inter-agency effort reviews monthly the development of replacement resources pursuant to CPUC authorization and the CAISO Board decisions and the expected impacts of utility demand-side programs. This group created options

[8] The combined IRP-LTPP proceeding is R.16-02-007.

that could be triggered to maintain reliability in the event contingencies occur. One contingency option is to recommend delay of OTC compliance dates for specific facilities if needed to "bridge the gap" between the expected online date of new resources and an existing OTC facility's compliance date. The OTC compliance date deferral recommendation was exercised in 2017, and the State Water Board approved extending the compliance date for Encina Units 2-5 for one year.

Tables 4 through 7 show the different authorizations and approvals 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 4 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 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 LCR[9] (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 Resources[10] & Energy Storage (Minimum)	200	--	400	600	431
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	12[11]
Total	1,400 to 1,800	215 to 290	500 to 700	2,115 to 2,790	1,825

[9] Local Capacity Requirement (LCR)

[10] Preferred resources are those used for efficiency, demand response, renewable resources, and distributed generation. Preferred resources are described in the 2005 State Energy Action Plan II at: (http://www.energy.ca.gov/energy_action_plan/2005-09-21_EAP2_FINAL.PDF).

[11] In addition to these 12 MW of energy efficiency and distributed generation, CPUC also approved the 262 MW Puente Power Project (gas combustion turbine) in D.16-05-050. On October 5, 2017, the CEC indicated that it would not issue a permit for the project and the developer subsequently suspended its permit application.

Table 5: Southern California Edison Approved Applications[12]

Resource Type	Location	Capacity MW	Status
Energy Efficiency	West LA Basin	101	Approved
Energy Efficiency	Johanna/Santiago	23	Approved
Demand Response	West LA Basin	5	Approved
Distributed Solar Generation	West LA Basin	28	Approved
Distributed Solar Generation	Johanna/Santiago	10	Approved
Energy Storage	Long Beach	100	Approved
Energy Storage	Johanna/Santiago	46	Approved
Energy Storage	West LA Basin	118	Approved
Combined Cycle Gas Turbine	Alamitos	640	Approved
Combined Cycle Gas Turbine	Huntington Beach	644	Approved
Gas Combustion Turbine	Stanton	98	Approved
Energy Efficiency	Big Creek/Ventura	6	Approved
Distributed Generation	Big Creek/Ventura	6	Approved

[12] For additional details, see Southern California Edison Applications A.14-11-012, available online at http://docs.cpuc.ca.gov/SearchRes.aspx?DocFormat=ALL&DocID=143307429, http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M143/K307/SearchRes.aspx?DocFormat=ALL&DocID=143307429.PDF, and A.14-11-016, available online at http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M143/K307/143307496.PDF

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	107
Optional: Any Resource	300 (Pio Pico, CA)	300 to 600	600 to 900	800
Total	300	500 to 800	800 to 1,100	907

Table 7: San Diego Gas & Electric Approved and Pending Application[13]

Resource Type	Location	Capacity in MW	Status
Gas Turbine	Pio Pico	300	Operational
Gas Combustion Turbine	Carlsbad (Encina site)	500	Approved[14] and Under Construction
Energy Efficiency	San Diego/Imperial Valley	19	Approved
Energy Storage	San Diego/Imperial Valley	83.5	Pending
Demand Response	San Diego/Imperial Valley	4.5	Pending

The Alamitos AFC and Huntington Beach Petition to Amend (PTA) Certifications were approved on April 12, 2017, and the projects are under construction. Stanton Energy Reliability Center is one of the projects selected by SCE to meet the Western Los Angeles Basin local capacity requirements, and its AFC is in process. The Redondo Beach AFC remains suspended, and the NRG Puente Power Project proceeding is suspended until May 1, 2018. More details of the licensing process are provided in Section V.

[13] For additional details on approved and pending projects, see San Diego Gas & Electric applications A.14-07-009, available online at http://docs.cpuc.ca.gov/SearchRes.aspx?DocFormat=ALL&DocID=98406519, A.16-03-014 available at https://apps.cpuc.ca.gov/apex/f?p=401:56:0::NO:RP,57,RIR:P5_PROCEEDING_SELECT:A1603014, and A.17-04-017 available at https://apps.cpuc.ca.gov/apex/f?p=401:56:0::NO:RP,57,RIR:P5_PROCEEDING_SELECT:A1704017

[14] The CPUC approved this contract. The Decision (D.15-050-51) was contested but eventually affirmed by the Court of Appeal of the State of California.

In addition to its work supporting the CPUC-LTPP proceeding, the CAISO expanded its transmission planning process to explore transmission alternatives for improving reliability. 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 pending projects, as well as authorized procurement levels for Southern California Edison (SCE) and San Diego Gas & Electric (SDG&E), facilitate attainment of the compliance schedule of the OTC Policy.

The CAISO's analysis in the Draft 2017-2018 Transmission Plan Report [16] indicated that the authorized resources and previously-approved transmission projects are working together to meet the reliability needs in the Los Angeles Basin and San Diego areas. Due to the delay of Carlsbad Energy Center Project (CECP), the CAISO conducted a 2018 summer reliability study to assess risk to the local capacity area. The assessment culminated in the "Encina Power Station 2018 Reliability Study."[17] 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.

Due to the inherent uncertainty in the significant volume of preferred resources and other conventional mitigations, local grid reliability is being continually monitored in the Southern California Reliability Project.

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 Plans[18] 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.

[16] http://www.caiso.com/Documents/Draft2017-2018_Transmission_Plan-Feb1_2018.pdf
[17] https://www.waterboards.ca.gov/water_issues/programs/ocean/cwa316/saccwis/docs/saccwis_encina_2018rpt.pdf
[18] http://www.caiso.com/Documents/BoardApproved2012-2013TransmissionPlan.pdf
http://www.caiso.com/Documents/Board-Approved2013-2014TransmissionPlan.pdf
http://www.caiso.com/Documents/Board-Approved2014-2015TransmissionPlan.pdf
http://www.caiso.com/Documents/Board-Approved2015-2016TransmissionPlan.pdf
http://www.caiso.com/Documents/Board-Approved_2016-2017TransmissionPlan.pdf

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	Mid July 2018
5	San Onofre Synchronous Condensers (1x225 MVAR)	SDG&E	8/16/2018
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[19]

Mesa Loop-In Substation Project

The Mesa Loop-In Substation Project is at risk of a delay. 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. SCE needs to find a way to accelerate the 48-month construction schedule to be able to meet the original June 1, 2021 need date. The current schedule forecasts a March 2022 in-service date as noted in the SCE 10Q and Federal Energy Regulatory Commission (FERC) form 730. SCE will be evaluating the construction progress of the Mesa Loop-In Substation Project in the summer of

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

2018 to determine whether a June 1, 2021 in-service date remains feasible. If it is not, SCE will consider the following potential interim or short-term mitigation options for summer 2021[20]:

- A temporary modification of the operating procedure to change the system configuration (i.e., via temporary opening of the Serrano corridor) to redirect power to other transmission corridors after an initial N-1 contingency;
- Installation of a temporary remedial action scheme to automatically modify system configuration (i.e., via temporary opening the Serrano corridor) after an overlapping N-1-1 contingency;
- An upgrade of terminal equipment for higher emergency rating in the Serrano corridor.

These potential interim mitigation options are an effort to meet design objectives for consideration of interim solutions until the permanent transmission mitigation (Mesa Loop-In Substation Project) is implemented and to meet the scheduled retirement dates of once-through cooling generating units in the Los Angeles Basin. At this time, the SACCWIS is not recommending an amendment to the OTC to extend compliance dates to provide grid reliability associated with the Mesa Loop-In Substation Project.

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

The South Coast Air Quality Management District's (SCAQMD) Regional Clean Air Incentives Market (RECLAIM) program is a local market-based pollutant trading system for NO_x and SO_x emissions that has been operating since 1994. RECLAIM sets an emissions cap and declining balance for participating facilities, which trade air pollution credits while meeting clean air goals. The SCAQMD regulates the total pollution under the NO_x and SO_x cap, rather than regulating each source. The program was designed to provide industries with greater flexibility to reduce air pollution beyond traditional command-and-control rules requirements. All of the OTC power plants in SCAQMD participate in RECLAIM.

The SCAQMD 2016 Air Quality Management Plan (AQMP), approved by CARB in March 2017, commits to reduce NO_x by 5 tons per day[21] from RECLAIM sources by 2025 and to phase out the

[20] http://docketpublic.energy.ca.gov/PublicDocuments/17-IEPR-11/TN217645_20170519T114355_Energy_Reliability_in_Southern_California.pdf
[21] This is in addition to the 12 tons per day by 2022 reduction approved in 2015 amendments to RECLAIM.

program[22]. The transition away from RECLAIM entails requiring Best Available Retrofit Control Technology (BARCT)-level NO_x controls on electric generating units and other sources as soon as practicable through command-and-control rules. SCAQMD staff started convening stakeholder working groups in spring 2017 to develop options and the timing for the transition. SCAQMD is proposing to amend its existing rule for electric generating facilities to reflect current BARCT emission levels and held a kick-off working group meeting in January 2018 to start the rule amendment process. To the extent the generating units do not already meet updated BARCT standards (yet to be determined), potential compliance outcomes would include retrofitting units with additional emission controls or retiring units. SCAQMD staff is aware of OTC compliance schedules and Implementation Plans and will be working with each of the generators to discuss individual situations and available options. CARB staff will continue to monitor this activity.

V. Review of Generating Facility Compliance Dates Through 2020

This section identifies specific issues associated with generating facilities in the CAISO's balancing authority area that have compliance dates in the OTC Policy of 2020 or sooner. These facilities include: Encina, Moss Landing, Ormond Beach, Mandalay, Huntington Beach, Alamitos, and Redondo Beach. Specifics for each power plant represent the aspirations of the owners of these facilities, which may not coincide with the regulatory decisions made by the CPUC, CAISO, and CEC affecting the amount and type or timing of resources to be procured.[23]

Encina

The Encina facility consists of five steam boiler generating units using once-through cooling with an aggregate capacity of 950 MW. In its original April 1, 2011 implementation plan, NRG proposed different approaches for the five units. For Units 1-3 (an aggregate of 318 MW capacity), NRG proposed repowering with a new flexible combined cycle facility, the CECP, consisting of two combined cycle units with an aggregate capacity of 550 MW. In 2013, NRG informed the State Water Board that it still plans to replace Units 1-3 with the CECP but no longer intends to pursue Track 2 compliance options and will retire Units 4 and 5 no later than the final

[22] See AQMP documents for further detail at: http://www.aqmd.gov/home/air-quality/clean-air-plans/air-quality-mgt-plan/final-2016-aqmp.

[23] For example, in Decision 12-04-046, Ordering Paragraph #3, the CPUC has limited the ability of jurisdictional investor-owned utilities to enter into contracts with facilities using once-through cooling beyond their compliance dates in the OTC Policy. This decision influences the sequence of steps and therefore the timing of any potential extension of compliance dates under the OTC Policy.

compliance date for Encina, then scheduled for December 31, 2017. NRG announced that it will seek to redesign the CECP as a set of peaking units, pursuant to an agreement reached among the company, the City of Carlsbad and, SDG&E.

NRG submitted a PTA to the CEC on May 2, 2014, to replace all five units and a small combustion turbine at Encina with a 600 MW Simple Cycle Gas Turbines (SCGT) power plant. The CEC approved the Amendment on July 30, 2015. SDG&E submitted an application to the CPUC for approval of a Power Purchase Agreement (PPA) with NRG. On May 21, 2015, the CPUC adopted D.15-05-051, which approved 500 MW of the 600 MW originally requested and allocated the remaining 100 MW to preferred resources or energy storage. The Decision ordered SDG&E to file the revised contract within 30 days. Pursuant to this Decision, SDG&E filed an advice letter seeking approval of a Power Purchase Tolling Agreement (PPTA) with CECP in June 2015. That advice letter was approved by the CPUC in July 2015, but six interveners filed Applications for Rehearing within the CPUC appellate section. In November 2015, the CPUC re-affirmed in D.15-11-024 its earlier approval of the CECP PPTA in response to the Applications for Rehearing. In response, petitioners requested that the California First District Court of Appeals overturn the CPUC's decision. The Court of Appeals accepted the petition for consideration and ordered final briefing from the petitioner and respondents.

On December 1, 2016, the First District Court of Appeals ruled that the CPUC's D.14-03-004 was supported by the evidence and that the plaintiffs were not hurt when the CPUC decided to approve only a scaled down PPA (from 600 MW to 500 MW). With this ruling, the First District Court of Appeals affirmed the CPUC's decision of granting the PPTA to SDG&E and NRG for the 500 MW CECP. The Sierra Club, Protect Our Communities Foundation, and the Center for Biological Diversity had until January 9, 2017, to seek Supreme Court review, which they did not.

Given the continuing delays in resolution of the intervener's petition to the courts, NRG began notifying the financial community of delays with CECP online dates. On February 29, 2016, NRG announced via Form 10-K filing to the Securities and Exchange Commission (SEC) that it did not expect CECP to be commercially operational until winter 2018.[24] This is a delay of one year from

[24] NRG Energy, Inc., Form 10-K, p. 98, 2/29/2016, see http://investors.nrg.com/phoenix.zhtml?c=121544&p=irol-SECText&TEXT=aHR0cDovL2FwaS50ZW5rd2l6YXJkLmNvbS9maWxpbmcueG1sP2lwYWdlPTEwNzgwODEyJkRTRVE9MCZTRVE9MCZTUURFU0M9U0VDVElPTl9FTlRJUkUmc3Vic2lkPTU3#s25C0190B88FD603E85CBB2843826F997

the November 1, 2017 date included in the PPA approved by the CPUC. NRG has delayed the commercial operation date of CECP several times from November 1, 2017 (per the PPTA approved by the CPUC), to Q1 2018 (as reported in NRG's 10-K filing to the SEC) and then again to Q2 2018 (as reported in NRG's 10-Q filing to the SEC) and finally to Q4 2018 (based on the latest NRG's 10-Q filing to the SEC).

The SACCWIS convened on February 23, 2017 and by a vote of 7-0 unanimously adopted the Encina deferral request and a recommendation that the State Water Board defer the OTC compliance date for the Encina from December 31, 2017, to December 31, 2018. The report included an interim study conducted by the CAISO indicating that reliability in the combined West LA Basin and San Diego areas could not be maintained if Encina were to retire prior to the completion of the CECP. The report was presented to the State Water Board on March 21, 2017. The State Water Board staff posted the SACCWIS report online with their recommendation on May 23, 2017. On August 15, 2017, the State Water Board adopted the SACCWIS recommendation to extend the OTC compliance date for Encina Units 2-5 until December 31, 2018, Resolution 2017-0047. On November 30, 2017, the Office of Administrative Law approved the OTC policy change.

On December 22, 2017, the CAISO issued a Capacity Procurement Mechanism designation for 272 MW of Encina Unit 4 and 273 MW of Encina Unit 5, effective January 1, 2018. The CAISO issued this designation pursuant to its authority based on failure of the scheduling coordinators for the load serving entities to demonstrate sufficient local capacity in individual annual Resource Adequacy (RA) plans and failure to collectively procure sufficient capacity to ensure compliance with the local capacity technical study. Encina Units 2 and 3 will remain available in 2018 to provide back-up capacity. All Encina Units will retire no later than when the CECP Units become commercially available during the fourth quarter (Q4) of 2018.

In the January 19, 2018 generator update letter to the State Water Board, NRG confirmed that construction of the CECP will be completed in Q4 of 2018. As construction of each unit is completed, commissioning will be conducted sequentially starting in the second and third quarters of 2018. Table 9 shows an approximate construction and commissioning schedule as of the date of this report, subject to minor changes that would not affect the commercial online date during Q4 of 2018. Facility testing is scheduled to commence in October 2018.

Table 9: Approximate Construction and Commissioning Schedule for CECP Units 6-10

Unit	Substantial Construction Estimated Completion Date	Substantial Commissioning Estimated Completion Date
6	August 2018	September 2018
7	August 2018	September 2018
8	July 2018	August 2018
9	June 2018	July 2018
10	May 2018	June 2018

Encina currently operates under an administratively continued National Pollutant Discharge Elimination System (NPDES) permit (No. CA0001350, Order R9-2006-0043) for non-contact cooling water, low volume wastes, metal cleaning wastes, and storm water runoff. On March 9, 2016, the San Diego Regional Water Quality Control Board issued draft NPDES Order R9-2016-0002 and the associated Tentative Time Schedule Order No. R9-2016-0007, which requires Cabrillo Power I LLC to comply with specified requirements in Order Number R9-2016-002. Cabrillo does not anticipate changes to the draft NPDES permit that would introduce permit conditions that would influence the availability of or preference for either unit.

Operationally, NRG generating units would not be able to exceed the allowed operational MW for the interconnection or exceed air permit limits. The Authority to Construct (ATC) for Carlsbad issued by the San Diego Air Pollution Control District does not require the shut down and demolition of the existing Encina boilers and peaking turbine. However, there are constraints on their operation once the new Carlsbad turbines come online. The emissions from the existing Encina boilers and peaking turbine are required to reach zero tons of NO_x per year once the shakedown period for all six Carlsbad turbines has ended. The ATC also phases-in declining NO_x and PM_{10} emission limits as more Carlsbad turbines become operational, since the emissions from the existing generating units are required to offset the emissions from the new turbines to meet air quality regulations. Regardless, the CEC license "requires the existing Encina boilers and turbine to cease operations once the amended CECP is operational." The shutdown of Encina is officially part of the CECP so any changes to what was proposed would require an

approved amendment. (See verification item AQ-47 from CEC Final Commission Decision, 07-AFC-06C[25]).

Moss Landing

Dynegy's Moss Landing (Dynegy) 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, it was determined that the OTC compliance date would be extended to 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).

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.[26]

In accordance with its Impingement Mortality and Entrainment Monitoring Plan, Dynegy began entrainment sampling on March 22, 2015, and completed the studies in March 2017. Dynegy also reduced flow during spring 2015 by taking planned maintenance outages of twenty days in April at Unit 2 and nine days in May at Unit 1. In 2016, Dynegy reduced flow during the spring and fall

[25] Energy Commission Final Decision on Carlsbad Amendments: http://docketpublic.energy.ca.gov/PublicDocuments/07-AFC-06C/TN205625_20150803T162317_Carlsbad_Amendments_Final_Commission_Decision.pdf

[26] The Dynegy Settlement updated Implementation Plan is available at http://www.waterboards.ca.gov/water_issues/programs/ocean/cwa316/powerplants/moss_landing/

entrainment and impingement seasons by taking a total of 69 planned outages in February, March, October, and November. In preparation for meeting the Settlement Agreement's December 31, 2016 deadline to install variable speed drive controls on the water pumps for Units 1 and 2, Dynegy issued a purchase order for these controls in January 2016. Dynegy completed installation of the variable speed drive controls on December 16, 2016. In September 2017, Dynegy submitted its Baseline Study Report for Impingement Mortality and Entrainment to the State Water Board for approval. In November 2017, Dynegy submitted its Pilot Study Design Plan for Supplemental Control Technology to the State Water Board for approval. The State Water Board approved Dynegy's Baseline Study Report by letter on December 1, 2017, and the Pilot Study Design Plan on January 24, 2018.

All construction necessary to implement Track 2 compliance measures is expected to occur during scheduled maintenance outages for Units 1 and 2. Dynegy does not anticipate that any dual unit outages will be necessary to complete the construction of Track 2 compliance measures.

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. The final compliance date for the facility under the OTC Policy is December 31, 2020. 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 CPUC its intention to shut down and retire Ormond Beach by October 1, 2018. The analysis has not been conducted to determine the potential impacts of the proposed earlier retirement date. At this time, the SACCWIS does not recommend a change in compliance dates for the Ormond Beach facility.

Mandalay

NRG's Mandalay Generating Station consisted of three units. Units 1 and 2 used once-through cooling and had a capacity of 215 MW each. Unit 3 was a peaking combustion turbine with an air quality permit allowing only a very limited number of operating hours each year due to lack of

emission controls. Unit 3 did not use once-through cooling technology. The final compliance date for the Mandalay facility under the OTC Policy was originally December 31, 2020. NRG notified the State Water Board that they have retired all three units of Mandalay as of February 6, 2018. Mandalay is now in compliance with the OTC Policy.

Huntington Beach

The AES Huntington Beach Generating Station (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. Units 1 and 2 use once-through cooling and each unit has a capacity of 226 MW. As shown in Table 3, Huntington Beach Units 1-2 are operating at a substantially higher level than most OTC facilities. The final compliance date for the Huntington Beach facility under the OTC Policy is December 31, 2020.

In its implementation plan update, dated January 17, 2018, to the State Water Board, AES confirmed its intention to comply with the OTC Policy compliance dates for Huntington Beach generating units that utilize once-through. A RA contract has been executed with SCE that would extend the operation of Huntington Beach units 1 and 2 through December 31, 2019, and December 31, 2020, respectively. The contract received final approval from the CPUC on September 28, 2017. Units 1, 3, and 4 will be shut down to enable the new combined-cycle gas turbine (CCGT) at Huntington Beach to be placed in service. Construction of the new 644 MW CCGT commenced on June 1, 2017, and is currently on schedule. First fire and testing is scheduled for October 3, 2019.

The Huntington Beach PTA was approved by the CEC on April 12, 2017. AES submitted an application for a 939 MW CCGT power plant, which was approved by the CEC on October 29, 2014. Subsequently, AES was selected for a 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 SCGT in phase 2. CEC staff released the Final Staff Assessment - Volume 1, preliminary engineering and environmental evaluation on October 17, 2016, and the Final Staff Assessment - Volume 2, addressing Air

Quality and Public Health on December 9, 2016. The CEC approved the revised project on April 12, 2017.

Huntington Beach was awarded a PPA for 644 MW capacity with a planned commercial online date of March 2020. This will require the shutdown of one Huntington Beach unit prior to the OTC Policy compliance date to satisfy the SCAQMD rules for new emission sources. Huntington Beach Unit 1 will be shut down and permanently retired on December 31, 2019. 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. If there is a possibility that Unit 2 would be needed beyond its current OTC Policy compliance date, AES would need to update the State Water Board well in advance. In the event of any continued need, State and Regional Water Board regulatory and permitting issues would need to be addressed and a suitable contracting mechanism would need to be developed to allow for continued operation of Huntington Beach Unit 2 beyond its compliance date.

In its 2017-2018 transmission planning process reliability studies, the CAISO modeled the proposed 644 MW Huntington Beach repowering to replace the Huntington Beach generating facility after 2020. SACCWIS will continue to monitor the circumstances affecting the Huntington Beach compliance date. At this time, SACCWIS does not recommend a change in compliance date for the Huntington Beach facility, but its role in maintaining reliability in the Los Angeles Basin requires that repowering activities be closely watched.

Alamitos

The AES Alamitos Generating Station (Alamitos) consists of six units using once-through cooling. Total capacity of these units is approximately 2,000 MW. The final compliance date for the Alamitos facility under the OTC Policy is December 31, 2020. In its January 17, 2018 update to their implementation plan, AES reaffirmed its intent to repower the Alamitos facility in order to comply with Track 1 of the OTC Policy. They plan to permanently retire all generating units at Alamitos that utilize once-through cooling per the compliance dates included in the OTC Policy.

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

Presiding Members Proposed Decision was issued on February 13, 2017, recommending approval subject to conditions. The CEC approved the project on April 12, 2017. Construction is underway, and the facility is scheduled to be online in April 2020.

The 640 MW of CCGT and 100 MW of energy storage was awarded to AES in a recent SCE requirement request for offer while AES was pursuing contracts and approvals for the additional 200 MW of storage and 400 MW of gas peakers.

In its implementation plan update on January 17, 2018, AES updated their proposed OTC Policy compliance timeline for its units. Units 1, 2 and 6 are now expected to be retired early on December 31, 2019, to provide emission offsets for the new 640 MW CCGT, which has a commercial operation date of April 1, 2020. Units 3, 4, and 5 are still expected to meet their OTC Policy compliance date of December 31, 2020.[27]

In its 2017-2018 transmission planning studies, the CAISO modeled the proposed 640 MW Alamitos Energy Center to replace Alamitos OTC generation after 2020. SACCWIS will continue to monitor the circumstances affecting the Alamitos compliance date. At this time, SACCWIS does not recommend a change in compliance date for the Alamitos facility, but its role in maintaining reliability in the Los Angeles Basin requires that repowering activities be closely watched.

Redondo Beach

The AES Redondo Beach Generating Station consists of four units using once-through cooling. Total capacity of these units is approximately 1,300 MW. The final compliance date for the Redondo Beach facility under the OTC Policy is December 31, 2020. In its January 17, 2018 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.

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

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

electrical generating facility with a net generating capacity of 496 MW. As previously mentioned in Section III, 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 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 Committee 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. No further updates have been provided to the CEC by either AES or the City of Redondo Beach, and AES intends to leave the AFC in suspension for the foreseeable future.

AES updated the compliance timeline for its units on January 17, 2018. Unit 7 is scheduled to be 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. Units 5, 6, and 8 are scheduled to be shut down by their OTC Policy compliance date of December 31, 2020.

AES has not yet obtained a contract that would support repowering its Redondo Beach units. Given the Track 1 and Track 4 LTPP activities to date, the CAISO modeled Redondo Beach offline after 2020 in its transmission planning studies. SACCWIS will continue to monitor the circumstances affecting the Redondo Beach compliance date. At this time, SACCWIS does not recommend a change in compliance date for the Redondo Beach facility.

VI. Conclusion

Currently, SACCWIS does not recommend any change on the compliance schedule in the OTC Policy for the generating facilities. SACCWIS members continue to assess the reliability impacts to the electric grid in connection with implementation of the OTC Policy. SACCWIS does not believe all of the OTC units will need to be replaced with new units in order to satisfy demands. The CPUC has authorized new electric resources to replace a portion of the OTC fleet's capacity

subject to the OTC Policy and is currently considering additional replacement capacity of preferred resources. Some owners of OTC units are retiring them in advance of the compliance dates established by the OTC Policy. The majority are pursuing infrastructure replacement plans to comply with the policy, while one owner is pursuing compliance through Track 2.

Mandalay Units 1 and 2 were retired on February 6, 2018, and the Mandalay facility is now in compliance with the OTC Policy.

Existing facilities using once-through cooling technology may still require an extension under the OTC Policy's compliance schedule if one or more uncertainties combine to threaten local or system reliability or if replacement infrastructure is not developed on a schedule that matches with the existing OTC compliance dates. In particular, the progress of the construction on the Mesa Loop-In Substation Project is being monitored closely to ensure grid reliability in the Western Los Angeles Basin Reliability Area.

APPENDIX A

ACTUAL WATER FLOW DATA FOR ONCE-THROUGH COOLING FACILITIES

	Average Annual Inflow (MGD)							
Power Plant Name	2010	2011	2012	2013	2014	2015	2016	2017
Humboldt Bay Power Plant Units 1&2	0	0	0	0	0	0	0	0
Potrero Power Plant	152	0	0	0	0	0	0	0
Contra Costa Generating Station	15.4	33	53	17	0	0	0	0
Pittsburg Power Plant	18.8	16.9	79	48.8	26	67	32	0.07
Moss Landing Power Plant	289.9	212.3	396.4	353.6	244.9	312.5	231	135.2
Diablo Canyon Nuclear Power Plant	2,347	2,368	2,277	2,311	2,242	2,360	2,372	2,286.4
Morro Bay Power Plant	21.5	41.7	50.2	22.7	0.2	0	0	0
El Segundo Generating Station	112.9	97	197	217	107	135	7	4.58
Haynes Generating Station Units 1&2	720	812	886	725	471	506	448	355.5
Scattergood Generating Station	276.4	299	296.8	272	244	311	151	109.8
Harbor Generating Station	45.5	44.0	47.3	46.8	49.6	49.1	47	50.07
Alamitos Generating Station	2.9	106	375	496	332	324	317	316.21
Redondo Beach Generating Station	59	180	178	95	107	142	95	156.95
Mandalay Generating Station	39.7	56	77	109	63	78	56	48.4
Ormond Beach Generating Station	12	18	71	133	68	98	60	86.6
Huntington Beach Generating Station	202.9	242.6	238.5	178	169	159.6	134	134.2
South Bay Power Plant	34.5	0	0	0	0	0	0	0
Encina Power Plant	211.9	314.5	531.1	264.0	338.6	410.2	325	387.8
San Onofre Nuclear Generating Station	2,030	2,256	1,677	1,003	42	42	37	0
Total	**6,592.3**	**7,097**	**7,430.3**	**6,291.9**	**4,504.3**	**4,994.4**	**4,312**	**4,071.8**

Source: EPA Flow Data, (Intergraded Compliance Information System [ICIS] Database) Renan Jauregui, Updated on Feb. 8, 2018