

2019 Report of the Statewide Advisory Committee on Cooling Water Intake Structures

March 8, 2019



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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

Regional Water Boards	Regional Water Quality Control Boards
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
TSO	Time Schedule Order

I. Introduction

The Statewide Advisory Committee on Cooling Water Intake Structures (SACCWIS) has prepared this report for the State Water Resources Control Board (State Water Board) to summarize the State of California's current 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 OTC Policy, ensuring 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.

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 those 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. However, as discussed on pages 17 and 18, it is possible that an extension of the OTC Policy compliance date for either the AES Alamos Generating Station (Alamos) or AES Redondo Beach Generating Station (Redondo Beach) will be required to ensure grid reliability in the Western Los Angeles Basin if the Mesa Loop-In Project is delayed.

¹ The most recent version of the OTC Policy is available at the following website:
https://www.waterboards.ca.gov/water_issues/programs/ocean/cwa316/policy.shtml#amendments

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

Since the OTC Policy was adopted, several power generating 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 LADWP balancing authority areas that have achieved 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 (MW) ²	OTC Policy 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 ³
Contra Costa 6, 7	674	Dec. 31, 2017	Retired April 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 March 1, 2017
Mandalay 1, 2	430	Dec. 31, 2020	Retired Feb. 5, 2018

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 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.

⁷ NRG retired El Segundo Unit 3 and replaced it with El Segundo Units 5-8.

Encina 2-5	844	Dec. 31, 2018	Retired Dec. 11, 2018
Total Capacity (MW)	10,409	--	--

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. 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. 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)	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	Plans to retire and replace units by compliance date
Harbor 5	229	Dec. 31, 2029	Plans to repower on Dec. 31, 2029 ⁸
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 offset requirements for replacement generation
Huntington Beach 2	215	Dec. 31, 2020	Plans to 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	Plans to retire units by compliance date

⁸ 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. LADWP is currently undertaking a Once-Through Cooling study to evaluate alternatives to their OTC repowering plan and expects to complete the study in mid-year 2019.

Redondo Beach 7	493	Dec. 31, 2020	Plans to retire on Sept. 30, 2019, to provide emission offsets for Huntington Beach replacement
Redondo Beach 5, 6, 8	848	Dec. 31, 2020	Plans to retire units by compliance date
Scattergood 1, 2	367	Dec. 31, 2024	Plans to repower by compliance date
Total Capacity (MW)	7,933	--	--

Table 3: Recent Performance of OTC Generating Units

CAISO Balancing Authority Area Facilities and Units	State Water Board Compliance Date	NQC (MW)	Annual Capacity Factors				
			2014	2015	2016	2017	2018
Alamitos 1	12/31/2020	175	1.40%	3.00%	2.00%	2.70%	2.09%
Alamitos 2	12/31/2020	175	5.40%	6.10%	3.40%	4.17%	5.71%
Alamitos 3	12/31/2020	326	16.60%	10.80%	10.40%	6.67%	10.13%
Alamitos 4	12/31/2020	324	18.70%	7.00%	9.90%	8.78%	9.60%
Alamitos 5	12/31/2020	485	1.70%	3.40%	1.90%	3.06%	2.93%
Alamitos 6	12/31/2020	485	4.50%	6.20%	2.70%	4.23%	3.58%
Encina 2	12/11/2018 ⁹	104	2.60%	5.10%	1.40%	2.70%	2.39%
Encina 3	12/11/2018	110	4.70%	5.30%	1.60%	3.57%	2.71%
Encina 4	12/11/2018	300	6.30%	8.20%	3.20%	7.38%	4.02%
Encina 5	12/11/2018	330	9.90%	10.40%	5.60%	7.38%	4.96%
Huntington Beach 1	12/31/2020	215	22.30%	19.00%	13.30%	12.69%	9.84%
Huntington Beach 2	12/31/2020	215	26.20%	19.40%	12.40%	9.03%	6.99%
Moss Landing 1	12/31/2020	540	39.20%	35.50%	24.60%	24.73%	44.64%
Moss Landing 2	12/31/2020	540	47.00%	37.00%	26.10%	24.83%	43.46%
Ormond Beach 1	12/31/2020	806	0.80%	2.50%	0.70%	1.64%	1.31%
Ormond Beach 2	12/31/2020	806	2.40%	3.20%	0.80%	1.75%	1.28%
Redondo Beach 5	12/31/2020	179	2.30%	3.50%	1.40%	2.52%	2.04%
Redondo Beach 6	12/31/2020	175	2.10%	4.20%	3.10%	4.18%	1.67%
Redondo Beach 7	12/31/2020	505	0.90%	4.50%	4.00%	5.36%	2.16%
Redondo Beach 8	12/31/2020	496	3.30%	3.90%	1.70%	3.99%	2.79%
LADWP Balancing Authority Area Facilities and Units							
Harbor 5	12/31/2029	75	3.30%	2.40%	4.00%	2.29%	1.01%
Haynes 1	12/31/2029	230	12.70%	6.50%	12.30%	3.45%	1.64%
Haynes 2	12/31/2029	230	13.10%	8.00%	16.00%	5.34%	1.13%
Haynes 8	12/31/2029	264	34.20%	38.00%	40.90%	39.56%	45.39%
Scattergood 1	12/31/2024	163	24.50%	8.30%	22.90%	5.32%	4.47%
Scattergood 2	12/31/2024	163	6.60%	21.20%	5.90%	2.09%	2.38%

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

Once-Through Cooling Water Use

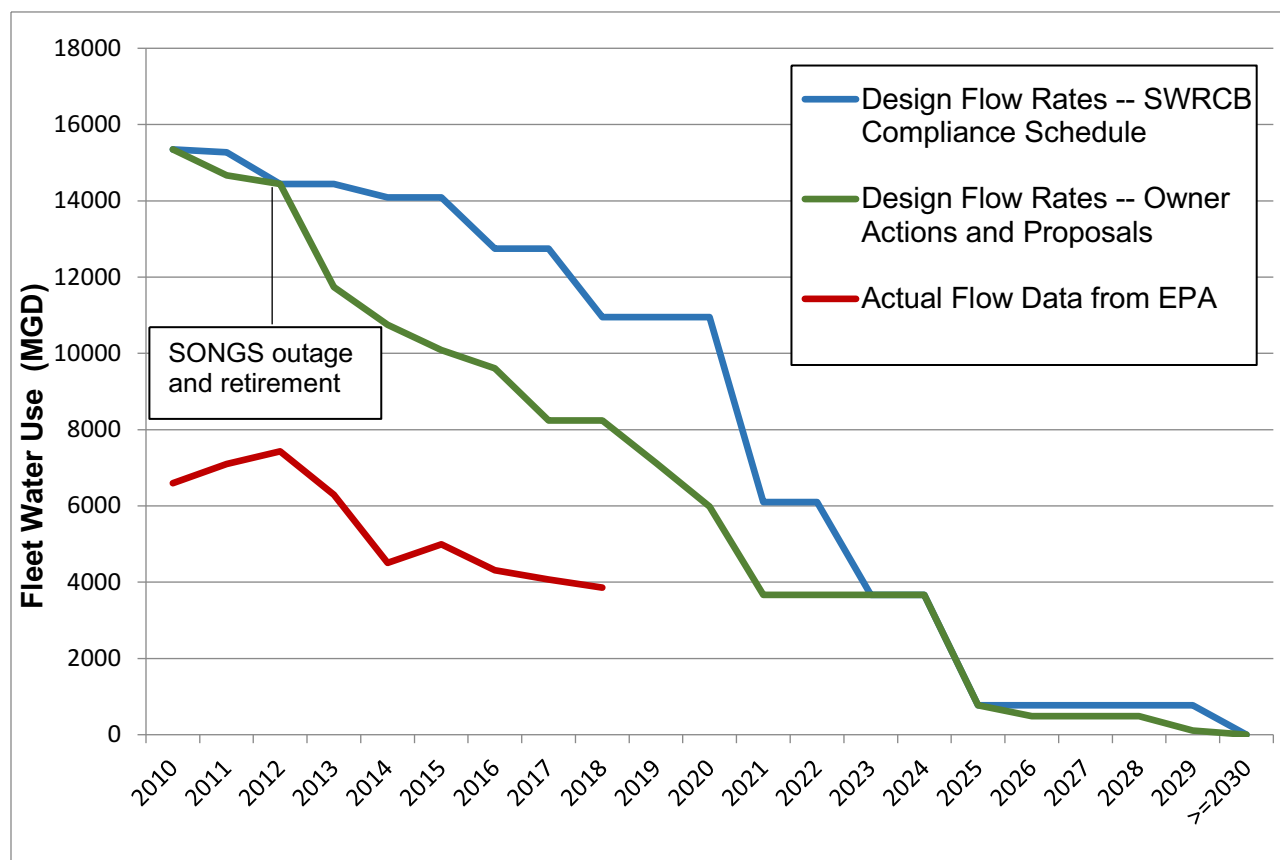
There are a number of perspectives from which to assess the impact of the OTC power generating plants (OTC fleet) on impingement and entrainment of marine and estuarine aquatic life. All direct biological measures are beyond the scope of the SACCWIS' responsibility. Figure 1 offers a rough indicator of environmental impact using water flow rates as the metric through time. The uppermost line in blue shows the reduction in design water flow based on the OTC

⁹ Actual retirement date for Encina Power Station Units 2, 3, 4, and 5.

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 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, Updated February 21, 2019

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 Senate Bill 350 (De Leon, Chapter 547, Statutes of 2015), which will serve as a successor to LTPP and will include 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.

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

¹⁰ 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, including planned and approved generating resources or transmission upgrades, 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, 3, 4, and 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 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	12 ¹⁴
Total	1,400 to 1,800	215 to 290	500 to 700	2,115 to 2,790	1,959

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 at: (http://www.energy.ca.gov/energy_action_plan/2005-09-21_EAP2_FINAL.PDF).

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 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 withdrew its permit application on December 7, 2018. A Request for Offer process to replace this capacity is ongoing.

Table 5: Southern California Edison Approved Applications¹⁵

Resource Type	Location	Capacity MW	Status
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	5	Approved
Energy Storage	Johanna/Santiago	153	Approved
Energy Storage	Long Beach	100	Approved
Energy Storage	West LA Basin	138	Approved
Combined Cycle Gas Turbine	Alamitos	640	Approved
Combined Cycle Gas Turbine	Huntington Beach	644	Approved
Gas Combustion Turbine	Stanton	98	Approved

¹⁵ For additional details, see Southern California Edison application A.14-11-012, available online at <http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M143/K307/143307429.PDF>, A.14-11-016, available online at <http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M143/K307/143307496.PDF>, A.15-12-013, available online at <http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M156/K571/156571612.PDF>, A.16-11-002, available online at <http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M169/K917/169917051.PDF>, and Resolution E-4804, available online at <http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M167/K245/167245981.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	144.5 ¹⁶
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 and Pending Application¹⁷

Resource Type	Location	Capacity in MW	Status
Demand Response	San Diego/Imperial Valley	4.5	Approved
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

¹⁶ 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.

¹⁷ For additional details on approved projects, see San Diego Gas & Electric application A.14-07-009, available online at https://apps.cpuc.ca.gov/apex/f?p=401:56:0::NO:RP,57,RIR:P5_PROCEEDING_SELECT:A1407009, 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, 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, and Resolution E-4798, available online at <http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M166/K269/166269958.PDF>.

The Alamitos AFC and Huntington Beach Petition to Amend (PTA) Certifications were approved on April 12, 2017, and the projects are under construction. As of December 2018, Huntington Beach and Alamitos are approximately 50 percent complete and are on track for an April 2020 completion date. The 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 was approved by the CEC on November 7, 2018. The Redondo Beach AFC remains suspended, and the NRG Puente Power Project AFC was recently withdrawn by NRG on December 7, 2018.¹⁸ On December 11, 2018, the Energy Commission's Presiding Member terminated the proceeding for the NRG Puente Power Project AFC.¹⁹ More details of the licensing process are provided in Section V.

In addition to its work supporting the CPUC LTPP 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 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 2018-2019 Transmission Plan Report²⁰ 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 Los Angeles Basin and San Diego-Imperial Valley local reliability areas. The assessment culminated in the "Encina Power Station 2018 Reliability Study."²¹ 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.

¹⁸ The Puente Power Project was a replacement project for the Mandalay power plant. Other resources are being pursued to satisfy the local capacity requirement in Big Creek/Ventura.

¹⁹ <https://efiling.energy.ca.gov/Lists/DocketLog.aspx?doctnumber=15-AFC-01>

²⁰ <http://www.caiso.com/Pages/documentsbygroup.aspx?GroupID=E17F9B56-753A-4A3D-B75E-ED763CD06C4A>

²¹ https://www.waterboards.ca.gov/water_issues/programs/ocean/cwa316/saccwis/docs/saccwis_encina_2018rpt.pdf

Additionally, based on the feedback from Southern California Edison Company, the CAISO expects that the in-service date for a major transmission upgrade, the Mesa Loop-In Project, will be delayed by one year to the March 2022 timeframe. The delay of this major transmission upgrade is expected to adversely impact the local capacity requirements for the Western Los Angeles Basin area. The CAISO will evaluate the need for potential deferral of OTC compliance date for the Alamitos or Redondo Beach generating facility for one year or more to address potential local capacity deficiency until the Mesa Loop-In Project is completed.

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 Plans²² 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)

²² <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

	Transmission Projects	PTO service territory	Target In-Service dates
5	San Onofre Synchronous Condensers (1x225 MVAR)	SDG&E	In-Service (10/16/2018)
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 ²³

Mesa Loop-In Substation Project

The Mesa Loop-In Substation Project operational date 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. The current schedule forecasts a March 2022 in-service date as noted in the SCE 10Q and Federal Energy Regulatory Commission (FERC) form 730.

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. However, it is possible that an extension of the OTC Policy compliance date of either Alamitos or Redondo Beach will be required to ensure grid reliability in the Western LA Basin until the Mesa Loop-In Project is complete. At this time, Alamitos is the preferred facility for a possible compliance date extension because AES is in the process of repowering Alamitos for continued power generation, intends to retire Redondo Beach by its OTC Policy compliance date, December 31, 2020, and is in the process of selling the Redondo Beach property. Additionally, Alamitos has a greater electrical generating capacity for contingencies. The CAISO will perform its local

²³ The contract for the synchronous condensers expired on Dec. 31, 2017, and they are no longer operating.

capacity technical analysis in Summer 2019 to determine the potential need and the amount of Alamitos or Redondo Beach generation needed to address the local capacity need for the Western LA Basin until the Mesa Loop-In Project is completed. The evaluation will also include the use of existing operating procedures to address previously identified reliability concerns as well as potential minor transmission upgrades if they are determined to be effective. The SACCWIS will convene a special meeting, if necessary, within 45 days after CAISO concludes its local capacity technical analysis to re-evaluate the need for an extension of the OTC Policy compliance date for either Alamitos or Redondo Beach.

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 day²⁴ from RECLAIM sources by 2025 and to phase out the program.²⁵ 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.

On November 2, 2018, the SCAQMD Governing Board approved amendments to Rule 1135 for electric generating facilities to reflect current BARCT emission levels. To the extent generating units do not already meet updated BARCT standards, compliance avenues include retrofitting units with additional emission controls, restricting operation, or retiring units. In consideration of Clean Water Act requirements that are prompting shutdown and replacement of existing

²⁴ This is in addition to the 12 tons per day by 2022 reduction approved in 2015 amendments to RECLAIM.

²⁵ See AQMP documents for further detail at: <http://www.aqmd.gov/home/air-quality/clean-air-plans/air-quality-mgt-plan/final-2016-aqmp>.

generating units with new, cleaner non-OTC technology, Rule 1135 exempts OTC generating units from the updated BARCT standards through their OTC compliance dates, as long as existing permitted emission limits are retained. In addition, staff at CARB, CEC, CAISO, and the Water Board worked with SCAQMD staff to incorporate OTC Policy grid reliability-related compliance date extension provisions into Rule 1135, as long as other applicable air quality rule requirements are satisfied. CARB staff will continue to monitor additional rulemaking activity that could affect power plant operation.

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: Moss Landing, Ormond Beach, 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.²⁶

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

²⁶ 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.

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, 2017.²⁷

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 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. Dynegy submitted its Pilot Study Design Plan and the State Water Board approval letter to the CEC on April 19, 2018. On June 25, 2018, the CEC informed Dynegy via e-mail that the Pilot Study Design Plan did not necessitate any amendments to the project's application for certification.

Dynegy has begun installing the Supplemental Control Technology at Moss Landing. 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.

²⁷ The Dynegy Settlement updated Implementation Plan is available at http://www.waterboards.ca.gov/water_issues/programs/ocean/cwa316/powerplants/moss_landing/

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 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 Ormond Beach for 2019 and 2020 to meet local capacity requirements. SCE filed an Advice Letter with CPUC on September 4, 2018, seeking approval of a contract with Ormond Beach Unit 2 from January 1, 2019, through November 30, 2019; this contract was approved by 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 Advice Letter is currently under review. While the NRG no longer intends to retire Ormond Beach early, it still intends to retire the two OTC units by the December 31, 2020 compliance date.

The need for one Ormond Beach unit will be mitigated after the Moorpark-Pardee #4 230 kV transmission project is in service, currently scheduled for December 31, 2020. SCE is in the process of soliciting preferred resources to mitigate the need for the other unit. At this time, the SACCWIS does not recommend a change in compliance dates for the Ormond Beach facility.

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. The synchronous condensers ceased the use of once-through cooling

and permanently retired in September 2018. 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 November 8, 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 cooling. A resource adequacy (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 3, 2017, and is approximately 50% complete as of December 2018 and currently on schedule. First fire and testing is scheduled for October 7, 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. 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 will require 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 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.

In its 2018-2019 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

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 November 8, 2018 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. A resource adequacy (RA) contract has been executed with SCE that would extend the operation of Alamitos units 1, 2, and 6 through December 31, 2019, and units 3, 4, and 5 through December 31, 2020.

Units 1, 2 and 6 are expected to retire early by December 31, 2019, to provide emission offsets for the new 640 MW CCGT, which has a planned 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, 2020.²⁸

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. Construction is approximately 50% complete as of December 2018 and is on schedule. First fire and testing is expected to occur on October 3, 2019.

AES Alamitos was awarded a PPA for 640 MW of CCGT and 100 MW of energy storage capacity with an initial delivery and planned commercial online date of June 1, 2020, and January 1, 2021,

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

respectively. AES continues to pursue contracts and approvals for the additional 200 MW of storage and 400 MW of gas peakers. This will require the shutdown of Alamitos generating units 1, 2, and 6 by December 31, 2019, prior to the OTC Policy compliance date to satisfy the SCAQMD rules for new emission sources. 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 the event of any continued need of Units 3, 4, or 5, the OTC Policy would need to be amended, the San Gabriel River Metals Total Maximum Daily Load would need to be amended, a new or updated Time Schedule Order (TSO) and NPDES permit would need to be adopted, and a contract with CAISO and/or an utility would need to be in place to allow for continued operation of Alamitos Units 3, 4, or 5 beyond their compliance date.

In its 2018-2019 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 as well as construction status of planned and approved transmission upgrades be closely watched. As mentioned in Section III, in 2019 the CAISO will evaluate the need for potential extension of the OTC schedule for Alamitos generation due to the delay of the Mesa Loop-In Project to meet local capacity need in the Western LA Basin. It is possible that an extension of the compliance date will be necessary to meet local capacity needs in the Western LA Basin due to the delay of the Mesa Loop-In Project.

Redondo Beach

Redondo Beach 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 November 8, 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. RA contracts have been executed for Redondo Beach unit 7 through September 30, 2019 and for units 5, 6, and 8 through December 31, 2019. 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. A portion of Redondo Beach capacity has been contracted through December 31, 2020,

and AES expects to contract all the available capacity through 2020 at which time units 5, 6, and 8 will be retired.

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 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 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 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. In its November 8, 2018 update, AES indicated that it sold two parcels of the Redondo Beach site and expects to close on the sale of the remaining property in 2019, and AES intends to terminate the AFC if the sale closes.

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. As mentioned in Section III, in 2019 the CAISO will evaluate the need for potential extension of the OTC schedule for Redondo Beach generation due to the delay of the Mesa Loop-In Project to meet local capacity need in the Western Los Angeles Basin. In the event of any continued need of Units 5, 6, or 8, the OTC Policy would need to be amended, a new or updated TSO and NPDES permit would need to be adopted, and a contract with CAISO and/or an utility would need to be in place to allow for continued operation of Redondo Beach Units 5, 6, or 8 beyond their 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 the remaining IOU Requests for Offers of replacement capacity from preferred resources are currently underway. 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.

Encina Units 2, 3, 4, and 5 were retired on December 11, 2018, and the Encina Power Station 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

AVERAGE ANNUAL FLOW DATA FOR ONCE-THROUGH COOLING FACILITIES

Power Plant Name	Average Annual Inflow (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	339.62
Redondo Beach Generating Station	59	180	178	95	107	142	95	156.95	147.7
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
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	3,857.2

Source: EPA Flow Data, (Intergraded Compliance Information System [ICIS] Database) Julie Johnson. Updated on February 20, 2019.