



Once-Through Cooling Phase-Out

The Clean Water Act requires the U.S. Environmental Protection Agency to ensure that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impacts. Since 1972, states have enforced this requirement on a case-by-case basis in the absence of a specific federal rule. California parties expressed concerns that federal regulations were inadequate and should be addressed by a clearer, more prescriptive California rule.

The State Water Resources Control Board (SWRCB) first described a California regulatory approach in March 2008 when it published a scoping document titled *Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling* to implement Section 316(b) of the Clean Water Act, 33 U.S.C. § 1326(b).

The California Independent System Operator (California ISO), California Energy Commission (Energy Commission), and California Public Utilities Commission (CPUC) worked closely with the SWRCB to develop a policy to achieve water quality goals while ensuring electricity grid reliability.

On May 4, 2010, the SWRCB approved a once-through-cooling (OTC) policy that included many grid reliability recommendations made by the California ISO, as well as a joint implementation proposal developed by the Energy Commission, CPUC, and California ISO. The Office of Administrative Law approved the policy on September 27, 2010, and the policy became an effective regulation on October 1, 2010.

The regulation affected 19 California power plants. Of those, 16 power plants totaling about 17,500 megawatts (MW) are in the California ISO balancing authority area, and 3 are in the Los Angeles Department of Water & Power (LADWP) balancing area. The original regulatory compliance dates range from 2010 to 2024. In July 2011, LADWP obtained the SWRCB's consent to delay compliance for its three units until 2029. In return, LADWP agreed to exceed the ocean water best available control technology embodied in the OTC policy by completely eliminating use of ocean water for its repowered facilities.

The policy recognizes that some of these plants are critical for system and local reliability. Some may also provide operational services (such as flexible capacity requirements, ramping to follow net load, and regulation) needed to integrate renewable resources. Owners that plan to repower their plants face additional regulatory challenges due to the lack of air credits required for new facilities or major changes to existing facilities in one or more of the air basins. To assure effective communication among the state's energy and environmental agencies concerning the role of these plants in ensuring reliability, the OTC policy created a permanent advisory body – the Statewide Advisory Committee on Cooling Water Intake Structures (SACCWIS)¹ – that is

¹ SACCWIS includes seven organizations: California ISO, Energy Commission, CPUC, California Coastal Commission, State Lands Commission, California Air Resources Board, and SWRCB.



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scheduled to report annually to the SWRCB. A principal function of SACCWIS is to provide recommendations to the SWRCB if the member agencies believe a delay in compliance is needed to assure reliability. Recognizing the unique circumstances of the two nuclear power plants in California that were using OTC technologies (now only one), the OTC policy also established a second advisory body – the Review Committee for Nuclear Fueled Power Plants (RCNFPP) – to refine the cost estimates for the nuclear power plants to satisfy the policy.

In 2014, the United States Environmental Protection Agency issued its own OTC regulations, but these do not appear to have substantive requirements for California plants that exceed those regulations already enacted by the SWRCB.

Several generating companies contested the SWRCB OTC policy in court, but a settlement was reached between the SWRCB and the current owners of the power plants in fall 2014. In this settlement, the Moss Landing compliance dates were pushed back to December 31, 2020, and the SWRCB agreed to several specific implementation constraints for the Pittsburg, Mandalay, and Ormond Beach facilities. (The Pittsburg and Mandalay power plants have since retired.)

OTC Phase-Out Status Tracks

The OTC policy determined that closed-cycle evaporative cooling was the best available technology and established this as a benchmark for two compliance tracks.

Track 1: Reduce the intake flow rate at each power-generating unit to a level that can be attained with a closed-cycle evaporative cooling system.² A minimum of 93 percent reduction is required compared to the design intake flow rate.

Track 2: If compliance with Track 1 is not feasible, reduce the impingement mortality and entrainment³ for the facility as a whole to 90 percent of Track 1 reductions, using operational or structural controls, or both.

Alternatively, a plant can comply by shutting down.

² *Closed-cycle evaporative cooling system* refers to a cooling system that transfers waste heat to the surrounding air through the evaporation of water, thus enabling the reuse of a smaller amount of water several times to achieve the desired cooling effect. The only discharge of wastewater is from periodic blowdown to limit the buildup of materials in excess of desirable limits by best engineering practice.

³ Most power plants that obtain cooling water from surface water sources use some method of primary screening to prevent large objects from being drawn through the cooling system, where they may clog or damage sensitive equipment. These screens typically have mesh panels with slot sizes ranging from 3/8 inch to 1 inch and are rotated periodically or removed to clean any debris, including aquatic organisms. *Impingement* occurs when organisms are trapped against the screen as a result of the force of the intake water and are unable to escape. *Entrainment* is the action of drawing smaller objects through the entire cooling water system, including the pumps and condenser tubes, and discharging them along with the cooling water and other plant wastes.



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Recent Power Production Patterns of OTC Facilities

It is commonly understood that the OTC plants have, over decades, changed power production patterns from base load units to load-following or peaking units, but the reality is more nuanced. **Tables 1 and 2** provide annual capacity factors for the natural gas-fired OTC plants still in service in the California ISO and LADWP balancing authority areas, respectively, for 2014, 2015, 2016, and 2017. Unit-specific and cumulative (total amount for all units added together) capacity and capacity factors are provided.

Table 1: Annual Capacity Factors for Natural Gas OTC Units in the California ISO Balancing Authority Area, 2014 to 2017

Units	SWRCB Compliance Date	Unit Capacity	ANNUAL CAPACITY FACTORS			
			2014	2015	2016	2017
Alamitos Unit 1	12/31/2020	175	1.4%	3.0%	2.0%	2.7%
Alamitos Unit 2	12/31/2020	175	5.4%	6.1%	3.4%	4.2%
Alamitos Unit 3	12/31/2020	326	16.6%	10.8%	10.4%	6.7%
Alamitos Unit 4	12/31/2020	324	18.7%	7.0%	9.9%	8.8%
Alamitos Unit 5	12/31/2020	485	1.7%	3.4%	1.9%	3.1%
Alamitos Unit 6	12/31/2020	485	4.5%	6.2%	2.7%	4.2%
Alamitos Units 1-6	12/31/2020	1,970	7.9%	6.1%	5.0%	5.0%
Encina Unit 1	12/31/2017	107	2.0%	4.0%	1.2%	Retired 4/18/17
Encina Unit 2	12/31/2017	104	2.6%	5.1%	1.4%	2.7%
Encina Unit 3	12/31/2017	110	4.7%	5.3%	1.6%	3.6%
Encina Unit 4	12/31/2017	300	6.3%	8.2%	3.2%	7.4%
Encina Unit 5	12/31/2017	330	9.9%	10.4%	5.6%	7.4%
Encina Units 1-5	12/31/2017	951	6.5%	7.8%	3.4%	5.6%
Huntington Beach Unit 1	12/31/2020	215	22.3%	19.0%	13.3%	12.7%
Huntington Beach Unit 2	12/31/2020	215	26.2%	19.4%	12.4%	9.0%
Huntington Beach Units 1-2	12/31/2020	430	24.2%	19.2%	12.9%	10.9%
Moss Landing Unit 1	12/31/2020	540	39.2%	35.5%	24.6%	24.7%
Moss Landing Unit 2	12/31/2020	540	47.0%	37.0%	26.1%	24.8%
Moss Landing Units 1, 2	12/31/2020	2,484	43.10%	36.20%	25.30%	24.80%
Ormond Beach Unit 1	12/31/2020	806	0.8%	2.5%	0.7%	1.6%
Ormond Beach Unit 2	12/31/2020	806	2.4%	3.2%	0.8%	1.7%
Ormond Beach Units 1-2	12/31/2020	1,612	1.6%	2.9%	0.7	1.7%



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Units	SWRCB Compliance Date	Unit Capacity	ANNUAL CAPACITY FACTORS			
			2014	2015	2016	2017
Redondo Beach Unit 5	12/31/2020	179	2.3%	3.5%	1.4%	2.5%
Redondo Beach Unit 6	12/31/2020	175	2.1%	4.2%	3.1%	4.2%
Redondo Beach Unit 7	12/31/2020	505	0.9%	4.5%	4.0%	5.4%
Redondo Beach Unit 8	12/31/2020	496	3.3%	3.9%	1.7%	4.0%
Redondo Beach Units 5-8	12/31/2020	1,355	2.1%	4.1%	2.7%	4.3%

Source: California Energy Commission staff

Table 2: Annual Capacity Factors for Natural Gas OTC Units in the LADWP Balancing Authority Area, 2014 to 2017

Units	SWRCB Compliance Date	Unit Capacity	ANNUAL CAPACITY FACTORS			
			2014	2015	2016	2017
Harbor 5	12/31/2029	75	3.3%	2.4%	2.9%	2.0%
Haynes Unit 1	12/31/2029	230	12.7%	6.5%	12.8%	3.4%
Haynes Unit 2	12/31/2029	230	13.1%	8.0%	12.7%	5.3%
Haynes Unit 8	12/31/2029	264	34.2%	38.0%	39.0%	39.6%
Haynes Units 1, 2, 8	12/31/2029	724	20.7%	18.5%	22.3%	17.2%
Scattergood Unit 1	12/31/2024	163	22.2%	7.6%	21.5%	4.8%
Scattergood Unit 2	12/31/2024	163	5.8%	18.9%	4.0%	1.9%
Scattergood Units 1-2	12/31/2024	326	14.0%	13.3%	12.7%	3.3%

Source: California Energy Commission staff

Although the annual capacity factors shown in **Tables 1 and 2** suggest relatively little use for most of these OTC facilities across the year, many of them operate at full capacity at some point in many months of these years. For example, Ormond Beach Unit 1 and Unit 2 ran at its full capacity only on peak days during the summer months May through October 2017. This reflects the usage of these plants as part of a complex system that the two balancing authorities manage to best serve the requirements of the overall grid within each area.

Status of OTC Facility Compliance

Below is a review of the compliance dates for each power plant, as reflected in the adopted policy or formally approved amendments, as well as information about compliance proposals from generator owners. Within the policy itself, generator owners have options for compliance and can petition the SWRCB for changes in compliance dates. Also provided below is information about the recommendations SACCWIS made to the SWRCB for compliance date changes needed to assure electric system reliability.



Facility Owner Plans

The owners of each facility were required to submit an implementation plan by April 1, 2011. In these plans, the owners indicated whether they proposed to follow Track 1 or Track 2, or shut down the plant. SWRCB staff, with assistance from the technical staff of the SACCWIS agencies, submitted letters seeking clarifications of the original implementation plans and, in some cases, sought further clarification as new issues surfaced. In initial implementation plans, no facility owner proposed Track 1, and many proposed Track 2 if power purchase agreements justifying the investment in retrofit costs could be secured. As a general rule, most of the owners of fossil-fueled generating facilities, except for Dynegy – Moss Landing, have abandoned plans to pursue Track 2 and have announced retirement plans.

For the nuclear power plants in California with OTC technologies, one is retired, and the second is scheduled to be retired. In January 2012, the San Onofre Nuclear Generating Station (San Onofre) was shut down for steam generator tube leaks, which the owners later determined to be too costly to repair. Southern California Edison announced the permanent retirement of San Onofre in June 2013. In August 2016, PG&E submitted a joint proposal⁴ to the CPUC to retire the Diablo Canyon Power Plant when its nuclear regulatory license expires. PG&E joined with labor, leading environmental organizations, and a community-based nuclear safety advocacy group⁵ to develop the proposal to phase out nuclear power in California in 2024 and 2025. The Diablo Canyon Nuclear Regulatory Commission (NRC) license expires November 2, 2024, and August 26, 2025, for Units 1 and 2, respectively, while the OTC compliance date is December 31, 2024, for both units. In Decision 18-01-022, the CPUC approved the retirement of Diablo Canyon nuclear power plant at the end of its federal NRC operating licenses.⁶ PG&E's implementation plan would require an extension of the OTC compliance date for Unit 2. Per the joint proposal, PG&E will ask the SWRCB for an amendment to the OTC policy to conform the compliance date to the date of actual expiration of the Unit 2 NRC operating license. Although PG&E has not yet made this request to the SWRCB, there is sufficient time to do so.

The information shown in **Table 3** is from the original April 2011 filings of owner implementation plans, any subsequent revisions, and other statements of intent to retire facilities, if applicable. This table shows each facility and unit, the existing net qualifying capacity (NQC),⁷ the mandated

⁴ See <http://www.pge.com/includes/docs/pdfs/safety/dcpp/diablo-canyon-retirement-joint-proposal-application.pdf>.

⁵ The joint parties include PG&E, the Natural Resources Defense Council, Friends of the Earth, Environment California, International Brotherhood of Electrical Workers (IBEW) Local 1245, Coalition of California Utility Employees, and the Alliance for Nuclear Responsibility.

⁶ <http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M205/K423/205423920.PDF>.

⁷ *Net qualifying capacity* is the concept used to describe the capacity from each resource that can be used by a load-serving entity to satisfy its overall obligation. Most technologies have a single value, such as dependable capacity, used year-round. Some technologies (wind and solar without backup) have monthly NQC values reflecting the variability in performance using historical data.



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compliance date, and the owner-proposed method and date of compliance. The power plants are listed in order of SWRCB compliance date.

Table 3: OTC Implementation Schedules – Adopted and Owner-Proposed

Facility & Units	NQC	SWRCB Compliance Date	Owner Proposed Compliance Method/Date
Humboldt Bay 1, 2	135	Dec. 31, 2010	Retired Sept. 30, 2010
Potrero 3	206	Oct. 1, 2011	Retired Feb. 28, 2011
South Bay	296	Dec. 31, 2011	Retired Dec. 31, 2010
Haynes 5,6	535	Dec. 31, 2013	Repowered as air cooled June 1, 2013
El Segundo 3	335	Dec. 31, 2015	Repowered as air cooled July 27, 2013
El Segundo 4	335	Dec. 31, 2015	Retired Dec. 31, 2015
Morro Bay 3, 4	650	Dec. 31, 2015	Retired Feb. 5, 2014
Scattergood 3	450	Dec. 31, 2015	Repowered as air cooled.in 2015.
Encina 1	106	Dec. 31, 2017	Retired March 1, 2017
Encina 2,3,4,5	840	Dec. 31, 2017	OTC Deferral approved by SWRCB to Dec. 31, 2018
Contra Costa 6, 7	674	Dec. 31, 2017	Retired April 30, 2013 ⁸
Pittsburg 5,6,7	1,307	Dec. 31, 2017	Retired Dec. 31, 2016 ⁹
Moss Landing 1,2	1,020	Dec. 31, 2020	Settlement defers compliance to Dec. 31, 2020 ¹⁰
Moss Landing 6,7	1,510	Dec. 31, 2020	Retired Dec. 31, 2016
Huntington Beach 1, 2	452	Dec. 31, 2020	Plans to retire HB 1 on Dec. 31, 2019 and HB 2 on Dec. 31, 2020 ¹¹
Huntington Beach 3, 4	452	Dec. 31, 2020	Retired Nov. 1, 2012
Redondo 7,	493	Dec. 31, 2020	Plans to retire on Oct. 1, 2019, to allow Huntington Beach to be repowered ¹²
Redondo 5, 6, 8	850	Dec. 31, 2020	Plans to retire by Dec. 31, 2020
Alamitos 1, 2, 6	848	Dec. 31, 2020	Plans to retire on Dec. 31, 2019 ¹³ to allow Alamitos to be repowered.
Alamitos 3, 4, 5	1,163	Dec. 31, 2020	Plans to retire on Dec. 31, 2020
Mandalay 1, 2	430	Dec. 31, 2020	Retired February 6, 2018
Ormond Beach 1, 2	1,516	Dec. 31, 2020	Plans to retire by Oct.1, 2018 ¹⁴
San Onofre 2, 3	2,246	Dec. 31, 2022	Retired June 7, 2013 ¹⁵

⁸ Although NRG retired Contra Costa 6-7, the Marsh Landing facility was constructed beside it.

⁹ Unit 7 (682 MW) cannot operate independently of Units 5-6.

¹⁰ Dynegy/SWRCB Settlement Agreement, http://www.swrcb.ca.gov/water_issues/programs/ocean/cwa316/docs/energy_comp/settlement_dynegy_2014.pdf.

¹¹ AES Huntington Beach, letter to SWRCB, February 12, 2016.

¹² AES Redondo Beach, letter to SWRCB, February 12, 2016.

¹³ AES Alamitos, letter to SWRCB, February 12, 2016.

¹⁴ On February 28, 2018, NRG submitted a letter to the CPUC and California ISO providing notice of its plans to retire Ormond Beach early on October 1, 2018. The California ISO plans to study the reliability impacts in its 2019 Local Capacity Technical Analyses, which will be finalized in the second quarter of 2018.

¹⁵ Although both San Onofre units ceased generation by January 31, 2012, they draw limited amounts of ocean water to cool nuclear fuel rods and other “hot” equipment. According to an SCE report to the SWRCB dated November 27, 2013, the combination of Units 2 and 3 is now drawing water at about 4 percent of normal power flow rates. The report says that San Onofre will continue to draw ocean water throughout the decommissioning, but not above Track 1 compliance levels.

http://www.waterboards.ca.gov/water_issues/programs/ocean/cwa316/powerplants/san_onofre/docs/sce_112713.pdf.



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Scattergood 1, 2	367	Dec. 31, 2024	Plans to repower by Dec. 31, 2024
Diablo Canyon 1, 2	2,240	Dec. 31, 2024	Plans to retire unit 1 on Nov. 2, 2024 and unit 2 on Aug. 26, 2025 ¹⁶
Haynes 1, 2	444	Dec. 31, 2029	Plans to repower by Dec. 31, 2025 ¹⁷
Harbor 5	229	Dec. 31, 2029	Plans to repower by Dec. 31, 2029 ¹⁸
Haynes 8	575	Dec. 31, 2029	Plans to repower by Dec. 31, 2028

Source: California Energy Commission staff

SACCWIS Analysis

In early September 2013, the CPUC, Energy Commission, California ISO staff, and some other SACCWIS member agencies put forward a preliminary reliability plan, and the Energy Commission conducted a workshop as part of the *2013 Integrated Energy Policy Report* to review it.¹⁹ Included within the plan is the opportunity for the energy agencies to request deferral of compliance dates for specific units if the primary mechanisms for assuring reliability (increased use of preferred resources, transmission system upgrades, and flexible gas-fired resource additions) fail to develop on schedule or at the level anticipated. In March 2014, the CPUC adopted a decision authorizing a combination of preferred resource development (energy efficiency, demand response,²⁰ fuel cells, renewable distributed generation [power generation at the point of consumption], combined heat and power, and so forth)²¹ and gas-fired procurement by the affected utilities.²² Subsequently, San Diego Gas & Electric and Southern California Edison have submitted specific power purchase agreements to the CPUC for review and approval under the procurement authority provided to them.²³ The CPUC has approved most of

San Onofre has reduced water intake below 93 percent of normal power flow rates, and therefore, is in compliance with Track 1 of the OTC policy.

16 CPUC Decision 18-01-022 approving the retirement of the Diablo Canyon nuclear power plant, <http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M205/K423/205423920.PDF>.

17 LADWP informed the Energy Commission in comments on the *2017 Integrated Energy Policy Report* of revisions to its 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.

18 The original OTC policy didn't specify which Harbor or Haynes units were under the policy. The amendment for LADWP specified that the policy applies only to Harbor Unit 5 and Haynes Unit 8. Harbor 5 and Haynes 8 are combined-cycle units. Although only the heat recovery steam generator uses OTC technology, it is unclear whether LADWP will repower just that portion or replace the combustion turbines.

19 http://www.energy.ca.gov/2013_energypolicy/documents/#09092013.

20 Demand response programs are designed to shift end-use customers' consumption patterns by altering the timing, level of instantaneous demand, or the total electricity consumption.

21 Fuel cells and combined heat and power facilities can be environmentally desirable resources under some but not all circumstances. These technologies are preferred in situations where fuel source and efficiency characteristics of the power plant have a lower environmental impact than conventional power plants.

22 <http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M089/K008/89008104.PDF>.

23 CPUC D.14-03-004.



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the power purchase agreements.²⁴ These power purchase agreements allow the retirement of steam-boiler units using OTC technology with new air-cooled, gas turbine technologies at several OTC facilities.²⁵ At most OTC power plants, the new generating capacity being built is less than the OTC capacity being retired. Preferred resources (energy efficiency, distributed generation, demand response, and storage) are being developed to serve some of the capacity needs once provided by legacy OTC units. Appropriate amounts of replacement capacity must be in place before the associated OTC facility can be retired. In adopting the *2013-2014 Transmission Plan*,²⁶ the California ISO board approved several additional transmission system upgrades that will reduce local capacity requirements.²⁷ If any of the resources or transmission system upgrades fail to develop on schedule or at the level anticipated, a compliance date extension may be necessary.

The energy agencies are using the SACCWIS process to communicate the need for compliance date changes to the SWRCB. The Energy Commission published the staff report *Mitigation Options for Contingencies Threatening Southern California Electric Reliability*,²⁸ which included the OTC deferral process as a mitigation option. The OTC compliance date deferral recommendation was exercised in 2017, and the SWRCB approved extending the compliance date for Encina Units 2-5 for one year to December 31, 2018.

The Alamitos Application for Certification and Huntington Beach petition to amend certifications were approved by the Energy Commission on April 12, 2017, and the projects are under construction and on track to be on-line in 2020 to allow the existing OTC generating units to retire. The Puente application for certification (the proposed replacement project for Mandalay) has been suspended until May 1, 2018. As an alternative to the Puente project, the California ISO draft *2017-2018 Transmission Plan*²⁹ recommends approval of a transmission project in conjunction with preferred resources to meet the reliability needs in the Moorpark and Santa Clara subareas and allow Mandalay and Ormond Beach to retire. Mandalay was retired on February 6, 2018.

The Mesa Loop-in substation project in the Western Los Angeles Basin local capacity area is at risk of a delay and is being monitored closely to ensure grid reliability in the Western Los Angeles Basin area. In its Securities and Exchange Commission 10Q filing and Federal Regulatory

24 CPUC D.15-05-051, CPUC D.15-11-041, and CPUC D.16-05-050. In D.15-11-041, the CPUC approved all of Southern California Edison's power purchase agreements located in Greater Los Angeles Area except for 70 MW of demand response. These six demand response contracts were denied based on not meeting the definition of preferred resources and excessive costs.

25 Power purchase agreements have been approved to replace capacity at Alamitos, Huntington Beach, Encina, and Mandalay OTC facilities.

26 http://www.caiso.com/Documents/Board-Approved2013-2014TransmissionPlan_July162014.pdf.

27 <http://www.caiso.com/Documents/DecisionTransmissionPlan-Presentation-Mar2014.pdf>.

28 http://docketpublic.energy.ca.gov/PublicDocuments/16-IEPR-06/TN212836_20160818T131005_Staff_Report_Mitigation_Options_for_Contingencies_Threatening_S.pdf

29 http://www.caiso.com/Documents/Draft2017-2018_Transmission_Plan-Feb1_2018.pdf



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Commission Form 730, SCE forecasts an in-service delay from June 1, 2021, to March 2022. In summer 2018, SCE will evaluate potential mitigation solutions until the transmission project is implemented and to meet the scheduled retirement dates of the once-through cooling generating units in the Greater Los Angeles Area.

In the draft 2018 *Report of the Statewide Advisory Committee on Cooling Water Intake Structures*, SACCWIS does not recommend any change to the compliance schedule in the OTC Policy for the generating facilities.

Implication of Owner Compliance Plans and Actual Operations on Power Plant Water Use

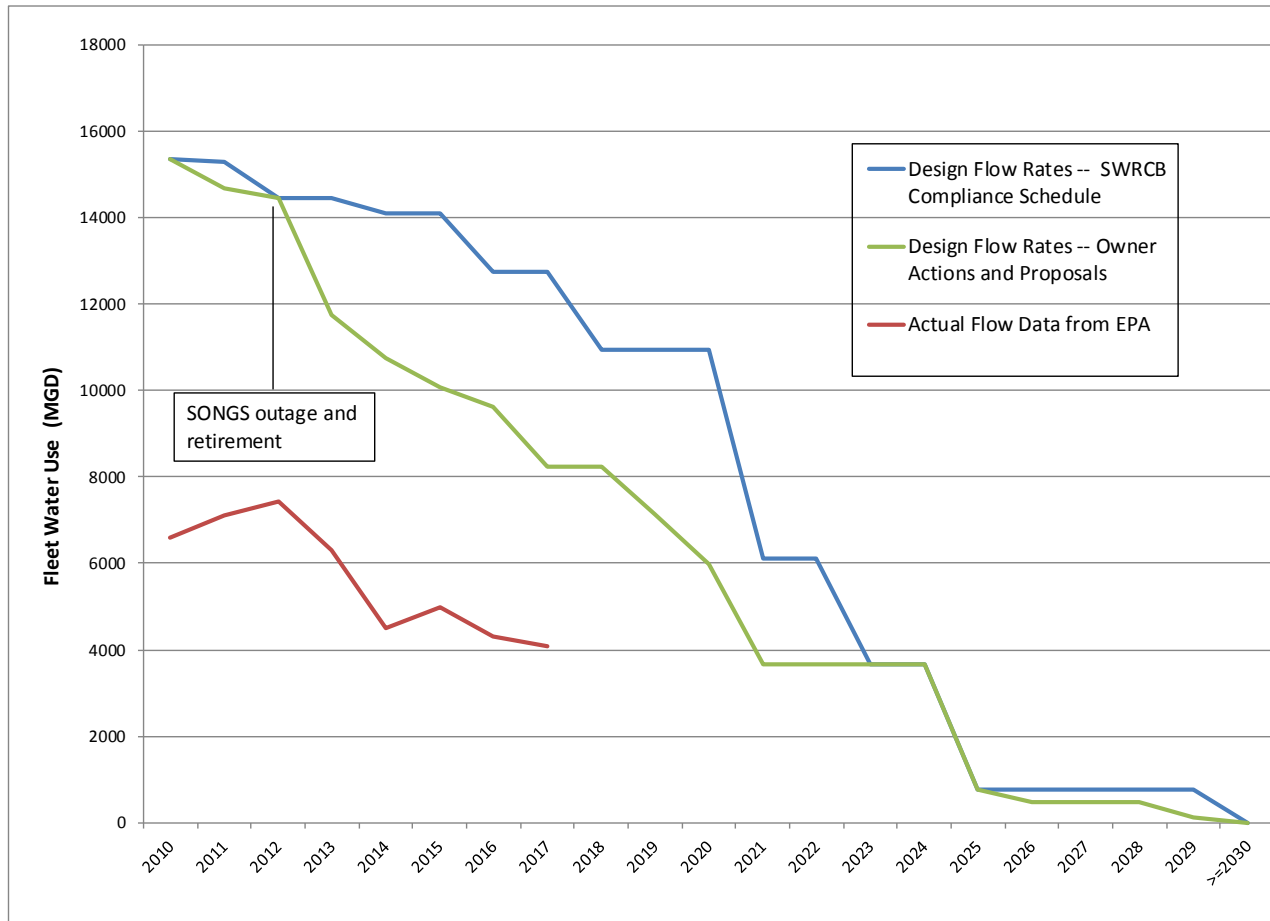
Figure 1 shows expected progress toward the goal of the OTC policy – reduction in the inflow of ocean and estuarine water for power plant cooling – assuming plants fully use cooling water inflows as designed.³⁰ The two upper lines show the design flow rates of the OTC fleet included within the OTC policy adopted May 2010. The uppermost line shows the reduction in design water flow based on the OTC policy compliance schedule as adopted (and amended) by the SWRCB. The green line shows the aggregate, or combined, water flow using design flow rates, using the actual retirement dates and expected retirement dates based on OTC owner implementation plans or other plans known to the SACCWIS agencies. The short red line is an estimate of actual flows for the OTC fleet. 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 1 and Table 2** show that most fossil fuel OTC facilities are operating at extremely low annual capacity factors. In addition, San Onofre and some OTC facilities have retired well before the respective OTC compliance dates, thus creating accelerated environmental benefits compared to the OTC policy. All the owners' latest implementation schedules show compliance with the OTC policy.

³⁰ Although most plants use less water in an actual operating year than expected under design conditions, data about actual water use are incomplete, and some available data appear to be inaccurate.



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Figure 1: Historical and Projected Water Usage by the Combined OTC Fleet



Source: California Energy Commission staff

Additional References:

http://www.swrcb.ca.gov/water_issues/programs/ocean/cwa316/docs/policy100110.pdf.

http://www.waterboards.ca.gov/water_issues/programs/ocean/cwa316/powerplants/.

http://www.energy.ca.gov/2013_energy/policy/documents/2013-09-09_workshop/2013-08-30_prelim_plan.pdf.

<http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M089/K008/89008104.PDF>.

http://docketpublic.energy.ca.gov/PublicDocuments/16-IEPR-06/TN212836_20160818T131005_Staff_Report_Mitigation_Options_for_Contingencies_Threatening_S.pdf.



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https://www.waterboards.ca.gov/water_issues/programs/ocean/cwa316/saccwis/docs/20180305_final_saccwis_report.pdf.

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Next Update:

April 2018 and annually