

Report of the Statewide Advisory Committee on Cooling Water Intake Structures

March 2012

I. Introduction and Recommendations

The Statewide Advisory Committee on Cooling Water Intake Structures (SACCWIS)¹ has prepared this report to the State Water Resources Control Board (Water Board) in connection with implementation plans submitted by non-nuclear power plant owners on April 1, 2011, as contemplated by the Water Board's statewide policy on the use of coastal and estuarine water for power plant cooling.² The statewide policy requires SACCWIS to advise the Water Board annually on whether the statewide policy's compliance schedule takes into account local area and electric grid reliability, including permitting constraints. Section 3.B(4) of the statewide policy provides that SACCWIS will report to the Water Board with recommendations on modifications to the implementation schedule each March starting in 2012.

This report focuses on generating facilities not owned by Los Angeles Department of Water & Power (LADWP)³ with near-term final compliance dates (i.e. 2015 and 2017) and recommends the following:

- The Water Board should recognize that based on projected capacity needs in the ISO balancing authority area it may be necessary to modify final compliance dates for generating units.
- The Water Board should direct its staff to require generator owners with near term compliance dates to explain in writing by December 1, 2012 the status

¹ 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 (ARB), the California Independent System Operator Corporation (ISO), and the Water Board.

² A copy of the Water Board's statewide policy, effective on October 1, 2010, is available at the following Web site:

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

³ LADWP compliance dates were reviewed and modified by the Water Board in July 2011.

of any necessary permitting activities to repower or retrofit these generating facilities.⁴

- The Water Board should adopt SACCWIS' recommendations made last year to develop a compliance schedule on a unit-by-unit basis at existing power plants rather than on a facility-wide basis and require generators to supplement their implementation plans annually as new information becomes available.⁵

II. Based on projected capacity needs in the California ISO balancing authority area, the Water Board may need to modify final compliance dates for generating units with near-term compliance dates.

Under the Water Board's statewide policy, SACCWIS provides annual recommendations on modifications to the statewide policy schedule for final compliance dates. Effective December 31, 2011, Huntington Beach units 3 and 4 retired from service. In addition, SACCWIS anticipates retirement of El Segundo unit 3 and Contra Costa units 6 and 7 based on repowering projects that do not use once through cooling technology. SACCWIS expects these retirements to occur on or before December 31, 2013, well in advance of the final compliance dates for these units under the statewide policy. Table A estimates the decrease in cooling water use at these units based on known or anticipated retirement dates when compared to the final compliance dates for these units under the statewide policy. SACCWIS calculated this estimate by annualizing each unit's use of cooling water in 2010 as reported to the CEC and multiplying that annual use by the number of years ahead of the final compliance schedule that each unit achieved, or is expected to achieve, compliance.

⁴ This report does not address implementation plans for the Diablo Canyon Power Plant or San Onofre Nuclear Generating Station. These nuclear-fueled power plants are subject to a separate study process under the Water Board's statewide policy.

⁵ Section 3(b)(2) of the Water Board's statewide policy provides that SACCWIS shall review the owner or operator's proposed implementation schedule and report to the State Water Board with recommendations no later than October 1, 2011. SACCWIS submitted this report in September last year. http://www.waterboards.ca.gov/water_issues/programs/ocean/cwa316/saccwis/docs/rpt102911.pdf

Table A - Projected Decrease in Cooling Water Use based on Known and Anticipated Retirement Dates

Facility	Unit	Policy compliance date	Actual or expected compliance date	2010 cooling water use (in millions of gallons)	Resulting total decrease in cooling water use (using 2010 volumes)
Huntington Beach	3	12/31/2020	12/31/2011 (9 years sooner)	12,091.0	~109 trillion gallons
Huntington Beach	4	12/31/2020	12/31/2011 (9 years sooner)	18,124.3	~163 trillion gallons
Contra Costa	6	12/31/2017	12/31/2013 (4 years sooner)	1,524.4	~6 trillion gallons
Contra Costa	7	12/31/2017	12/31/2013 (4 years sooner)	3,615.5	~14 trillion gallons
El Segundo	3	12/31/2015	12/31/2013 (2 years sooner)	0.01	~0.02 million gallons

Table A Note: The California ISO has informed SACCWIS that contingency planning is underway in the event units at the San Onofre Nuclear Generation Station will not be available for service this summer (See, SCE press release dated March 2, 2012 <http://www.edison.com/pressroom/pr.asp?bu=&year=0&id=7884>.) The ISO, in consultation with state agencies and other entities, is undertaking a comprehensive review of mitigation measures, including transmission upgrades, generation as well as conservation and demand response. The ISO has informed SACCWIS that it may be necessary to return Huntington Beach units 3 and 4 to service for the summer of 2012 in light of the current outage at SONGS. This outcome would reduce the cooling water savings in 2012 from the early retirement of Huntington Beach units 3 and 4.

The Water Board must weigh these positive developments in the area of decreased use of coastal and estuarine waters for power plant cooling with projected capacity needs in the ISO balancing authority area that may require extensions of final compliance dates for other generating units using once through cooling technology. As explained in Section IV of this report, the California ISO is currently projecting local capacity needs that may be aggravated by retirements of generating facilities using once through cooling technology. Additional assessments may identify system-wide or zonal capacity needs, including flexible operating capabilities provided by existing generating facilities using once through cooling technology. Many of the generating units using once through cooling technology are dispatchable, although with long startup times, with the potential to help meet system needs associated with load variability and renewable intermittency. Replacement infrastructure may need to retain

or improve these capabilities (whether by the repowered plants or replacement capacity) to meet the system's need for flexibility. Although the CPUC has yet to make a determination of need in its procurement proceedings to support repowering of generating capacity using once through cooling technology, the California ISO has already projected a shortage of capacity with flexible operating characteristics by the end of 2017 under a planning scenario known as the 33 percent Renewable Portfolio Standard trajectory scenario with high load.⁶

The final compliance dates in the statewide policy were adopted in part based on milestones identified in the joint proposal of the CEC, CPUC and California ISO dated July 22, 2009.⁷ The joint proposal was predicated upon modification of these compliance dates as expectations of electricity infrastructure evolved.⁸ The adopted statewide policy acknowledges this perspective. As SACCWIS annually advises the Water Board of needed changes in compliance dates, the Water Board must implement the statewide policy in manner that does not threaten the reliable operation of the electric grid. The following paragraphs address SACCWIS' current recommendations pertaining to final compliance dates for generating facilities using once through cooling technology with near term compliance dates.

Contra Costa

SACCWIS anticipates that GenOn's Contra Costa units 6 and 7 will retire before their final compliance date (December 31, 2017) as a result of the Marsh Landing Generating Station project, which GenOn is constructing at the Contra Costa site. SACCWIS understands that GenOn intends to bring the Marsh Landing project into commercial operation during 2013. The CPUC has approved a power purchase

⁶ The CAISO filed a Petition for Waiver of tariff Provisions in FERC Docket ER12-897 at 2-4 and 13-26. http://www.caiso.com/Documents/2012-01-26_ER12-897_Sutter_Pet_TariffWaiver.pdf The California ISO believes this planning scenario contains **plausible planning assumptions**. The other scenarios, and more detail on the high load scenario are available at:

http://www.cpuc.ca.gov/PUC/energy/Procurement/LTPP/LTPP2010/LTPP_System_Plans.htm

⁷ Appendix C to Final Substitute Environmental Document issued in connection with the statewide policy at C-9.
http://www.waterboards.ca.gov/water_issues/programs/ocean/cwa316/docs/cwa316may2010/sed_final_c.pdf

⁸ *Id.* at C-10, fn 9.

agreement between GenOn and Pacific Gas and Electric Company that requires the existing capacity at Contra Costa units 6 and 7 to retire when Marsh Landing becomes operational. Based on these developments, SACCWIS does not believe an extension of the final compliance date for these units is necessary.

Moss Landing

Dynegy's Moss Landing facility consists of two types of units – older steam boiler units and new combined cycle units. Units 6 and 7 are steam boilers with a capacity of roughly 750 MW each for a total of 1510 MW. Power blocks 1 and 2 refer to two combined cycle facilities, each a 510 MW combined cycle facility made up of two combustion turbines and a heat recovery steam generator. The final compliance date for Moss Landing under the statewide policy is December 31, 2017. Dynegy has proposed a 2032 compliance date for power blocks 1 and 2. Dynegy has proposed to implement Track 2 retrofit measures by 2017 for units 6 and 7. Moss Landing represents the largest amount of capacity using once through cooling technology at a single facility in the entire state. While the Moss Landing is not located within an ISO local capacity area, power blocks 1 and 2 are dispatchable and can help balance system needs created by variability of renewable resources as well as load. As part of its ISO 2011/2012 transmission planning process studies, and consistent with planning scenarios in the CPUC's procurement proceedings, the ISO modeled power blocks 1 and 2 at Moss Landing as operational in 2021 because these are relatively new generating units. Additional assessments associated with losing all of the 2500 MW of capacity at Moss Landing may identify electric grid reliability issues. Based on system needs, it is possible that additional reliability studies may justify revisions to the final compliance date for some or all of Moss Landing's capacity.

Morro Bay

Dynegy has proposed to implement Track 2 retrofit measures for generating units 3 and 4 at its Morro Bay facility. Each of these units is approximately 325 MW. In its implementation plan, Dynegy states that if it is unable to implement Track 2 retrofit measures, it may develop a small power plant of roughly 160 MW at a new site using the air credits from the shutdown of the Morro Bay facility. The final compliance date

for Morro Bay under the statewide policy is December 31, 2015. Morro Bay is not located within a local capacity area. At this time, SACCWIS does not believe any electric reliability issues exist if Dynegy's efforts to comply with the statewide policy using Track 2 measures are unsuccessful and Dynegy must shutter Morro Bay. For this reason, SACCWIS does not believe an extension of the final compliance date for Morro Bay is necessary.

Pittsburg

GenOn's Pittsburg units 5 and 6 are 312 MW and 317 MW steam boilers, respectively. Both units use once through cooling technology. Pittsburg unit 7 is a 682 MW steam boiler unit that has water-cooled cooling towers. Unit 7 is interconnected to units 5 and 6 and cannot operate independent of them. In order to start Pittsburg unit 7, GenOn must start either unit 5 or 6 first. The final compliance date for Pittsburg under the statewide policy is December 31, 2017. In its implementation plan, GenOn proposes to sever the existing cooling towers from unit 7, connect them to units 5 and 6, and then retire unit 7. This sequence of steps would eliminate once through cooling at units 5 and 6 but also would result in the loss of capacity from unit 7. To finance and construct this new configuration, GenOn asserts it needs a multi-year contract from a load serving entity. The ISO's 2016 local capacity technical analysis report identified a capacity need within the Pittsburg sub-area of 1869 MW for 2016.⁹ Based on this analysis, at least one Pittsburg unit needs to continue to operate or the sub-area requires between 100 and 200 MW of new electrically equivalent capacity. The ISO's 2021 local capacity analysis performed as part of the 2011/2012 transmission planning process, however, reaches different conclusions. By 2021, the ISO's analysis shows that the Pittsburg subarea no longer exists as a result of another transmission system upgrade, the Vaca Dixon – Lakeville 230 kV reconductoring project (expected in

⁹ The California ISO's 2016 local capacity study includes the following Greater Bay Area transmission projects: Moraga #1 230/115 kV transformer replacement (expected in service date June 30, 2012), Tesla-Pittsburg 230 kV lines reconductoring (expected in service date May 13, 2013), Contra Costa-Moraga 230 kV reconductoring (expected in service date March 1, 2014). The California ISO's 2016 local capacity study also includes the following Greater Bay Area generation projects: Russell City, Marsh Landing generation station, Mariposa peaker project, Oakley generating station. The study does not include the proposed Los Esteros Critical Energy Facility, which Calpine is upgrading from a simple-cycle generation facility to a combined-cycle generation facility, adding approximately 100 MW to the local area at peak.

service date 6/1/2017). These numerous transmission upgrades as well as the build out of new resources within the Greater Bay Area should eliminate the local capacity needs for all Pittsburg area OTC resources. However, delay of in-service dates for any one of the transmission projects and or new generation resources would greatly increase the need for resources at the Pittsburg site. Based on this contingency, the Water Board may need to extend the final compliance dates for Pittsburg units 5 or 6. SACCWIS intends to continue analyzing whether there is a need to extend the final compliance dates and will report to the Water Board as warranted.

El Segundo

Units 3 and 4 at El Segundo use once through cooling technology. NRG, the plant owner, is constructing a repowering project that will consist of two combined cycle facilities, which will use dry air cooling and are currently expected to reach commercial operation in 2013. As part of that repowering, NRG is retiring unit three (units 1 and 2 have already been retired). The final compliance date for El Segundo under the statewide policy is December 31, 2015. In its implementation plan, NRG states that it would also like to repower El Segundo unit 4 and requests a delay in its final implementation date until 2017. At this time, NRG does not have a power purchase agreement with a load serving entity to support repowering unit 4, and NRG has not submitted an application for certification to the CEC to repower unit 4.

The analyses prepared by the ISO as part of the 2011/2012 transmission planning process for 2021 reflects that there is a need for only a portion of the capacity at the El Segundo facility to satisfy local capacity requirements in the El Nido subarea, which is part of the Los Angeles Basin local capacity area. The El Segundo repowering project, coupled with other generation not using once through cooling in the El Nido subarea satisfies projected local capacity requirements in the El Nido subarea. However, as part of the ISO's analysis for local capacity requirements for the larger Western Los Angeles Basin local capacity area, capacity requirements range in values based on the effectiveness of generation to relieve transmission constraints (i.e., generation capacity in the southern part of the Western Los Angeles Basin local capacity area is more effective than generation capacity in the northern part of the

same area to resolve this constraint).¹⁰ In light of this fact and the uncertainty as to which generation using once through cooling will undertake repowering projects in the Los Angeles Basin, it may be necessary to provide NRG additional time to pursue repowering of unit 4 by extending the final compliance date. SACCWIS intends to advise the Water Board in 2013 on the need for extending the final compliance date for El Segundo unit 4 after NRG provides additional information on its efforts to repower unit 4.

Encina

In its implementation plan, NRG has proposed different approaches for the five old steam-boiler units comprising the 950 MW at the Encina site. For units 1-3 (an aggregate of 318 MW capacity), NRG proposes to repower these units with a new flexible combined cycle facility, the Carlsbad Energy Center. NRG is actively pursuing an application for certification with the CEC for this facility. For units 4-5, NRG asserts that space limitations at the site do not allow repowering and, therefore, proposes retrofit measures under the statewide policy's Track 2 compliance option. If Track 2 measures prove infeasible, NRG states it will retire units 4 and 5. The final compliance date for Encina under the statewide policy is December 31, 2017.

The local capacity analyses for 2021, prepared by the ISO as part of its 2011/2012 transmission planning process, reflect a need for capacity at the Encina or an electrically equivalent site of 231 – 531 MW. This range depends upon the specific technologies and locations of prospective renewable development in the San Diego area and the addition of generation projects proposed by San Diego Gas & Electric in the southern portion of the SDG&E local capacity area. Without the new generation capacity proposed by SDG&E, the ISO projects the range of capacity needed at Encina or an electrically equivalent site is between 650 and 950 MW. SACCWIS intends to examine whether the 2017 compliance date remains appropriate for all units at Encina and intends to advise the Water Board on the need for extending the final compliance date for Encina units in 2013.

¹⁰ These study results are summarized in Table 3.3-19 of the draft ISO 2011 – 2012 Transmission Plan report. http://www.caiso.com/Documents/Draft2011_2012TransmissionPlan.pdf.

III. Generators with near-term compliance dates should explain the status of any permitting activities to repower or retrofit generating units using once through cooling technology.

SACCWIS believes that the Water Board needs to monitor closely generator owner efforts to pursue repowering or Track 2 compliance measures. As SACCWIS observed in its September 2011 report to the Water Board, some Track 2 compliance proposals such as flow reduction are considered feasible; others such as large-scale screening devices have not yet been proven in the marine environment. SACCWIS also recognizes that generators hoping to be successful in a repowering cannot know all the steps of that process until the CPUC procurement proceedings provide direction to the utilities about the type and amount of replacement capacity that will be authorized, and the utilities conduct solicitations resulting in proposed power purchase agreements.¹¹ Generators also face uncertainty regarding what air quality regulations will apply when they get to the point of seeking a permit from the CEC or local authority, as applicable. Understanding the status of permitting requirements for generators with near term compliance dates will help SACCWIS to advise the Water Board next year on the need to modify final compliance dates in the statewide policy. For this reason, the Water Board should direct its staff to require generator owners with near term compliance dates (i.e. 2015 and 2017) to explain in writing by December 1, 2012 the status of any necessary permitting activities to repower or retrofit these generating facilities. SACCWIS and the Water Board need to review this information to avoid situations where expected repowering or water intake retrofit measures do not materialize and satisfying the current compliance dates would result in the loss of capacity that could create reliability concerns.

IV. Study results reflect capacity needs at once through cooling generation sites in the ISO's balancing authority under the current compliance schedule.

As part of its 2011/2012 transmission planning process, the ISO conducted reliability assessments that reflect local capacity areas for 2021 under different

¹¹ The CPUC is currently examining needs for the San Diego local area in connection with San Diego Gas & Electric's Application 11-05-023. <http://docs.cpuc.ca.gov/EFILE/A/135778.htm>

resource portfolios.¹² Local capacity areas that currently have generation using once through cooling that are subject to the statewide policy include the Greater Bay Area, Big Creek/Ventura, Los Angeles Basin and San Diego areas. As reflected in Table B, the ISO identified a range of needs in these local capacity areas.

Table B - Identified 2021 Capacity Needs for Specific Local Capacity Areas

LCR Area	Local Capacity Requirements (MW)				New Generation Need? # If Yes, Range of New Generation Need (MW)			
	Trajectory	Environmentally Constrained	ISO Base Case	Time Constrained	Trajectory	Environmentally Constrained	ISO Base Case	Time Constrained
Greater Bay Area	5,773	4,728	5,778	6,572	No			
Big Creek/Ventura (BC/V) Area	2,371	2,604	2,438	2,653	Yes (for Moorpark, a sub-area of the Big Creek/Ventura LCR area)			
LA Basin (this area includes sub-area below)	13,300	12,567	12,930	13,364	2,370 – 3,741	1,870 – 2,884	2,424 – 3,834	2,460 – 3,896
Western LA Basin (sub-Area of the larger LA Basin)	7,797	7,564	7,517	7,397				
San Diego / Imperial Valley (this area includes sub-area below)	3,291	3,104	2,968	3,272	Yes (*Lower values correspond to new generation need when including SDG&E-proposed generation for LTPP)			
San Diego **	2,883	2,854	2,864	2,856	531* - 950	231* - 650	231* - 650	421* - 840

Table B Notes:

* Lower values correspond to new generation need when including SDG&E-proposed generation for LTPP

** Load curtailment of 366 MW is included for G-1/N-2 outages (i.e. loss of Otay Mesa, Sunrise Powerlink and Southwest Powerlink).

New generation need assumes existing generation using once through cooling generation will retire.

¹² ISO Draft 2011-2012 Transmission Plan dated January 31, 2011 at 214-252.

http://www.caiso.com/Documents/Draft2011_2012TransmissionPlan.pdf

The resource portfolios included a trajectory scenario representing the then-current renewable energy procurement path; an environmental scenario focused on reducing land-use impacts; a time constrained scenario to meet the 33 RPS requirement as rapidly as possible; and an ISO base case scenario that reflects modifications to an earlier cost constrained scenario.

The low level of the range corresponds to the generation located in more effective locations to relieve contingencies caused by outages of transmission lines and/or other power plants. The high level of the range corresponds to less effective locations to relieve these contingencies. If a sub-area has only one generation facility using once through cooling technology, the results do not reflect a range but a specific capacity need (i.e., Moorpark sub-area of the Big Creek/Ventura area). The ISO also assessed known generation alternatives alongside generation using once through cooling. In these cases, the ranges reflect the need for generation at once through cooling sites with and without the proposed generation alternatives. (See e.g., San Diego area).

The ISO conducted this study effort in collaboration with various state agencies and stakeholders. In 2010, with assistance from the CPUC and CEC, the ISO posted a load and resource analysis tool. The ISO uses the tool to screen and identify time frames in which resources may be insufficient to maintain local and zonal reliability under a range of resource scenarios.¹³ The ISO also performed technical evaluations to determine local capacity requirements in 2021 for areas that currently have generating units using once through cooling technology.¹⁴ As part of its study efforts, the ISO quantified the impact of some alternative study assumptions, including new generation locations, potential transmission element upgrades, and forecasted demand side management as well as other contracted resources. The assessments determined the range of generation requirements needed to maintain applicable reliability criteria in local capacity areas.

Separately, the ISO conducted a local capacity technical analysis for 2016.¹⁵ The ISO modeled the existing transmission system and generation resources, including projects estimated to reach commercial operation on or before June 1, 2016. Consistent with all previous local capacity assessments, the ISO used a 1-in-10 year

¹³ These are the same four scenarios as described previously: trajectory, environmental, time constrained, and ISO base case (modified cost constrained) scenarios.

¹⁴ The ISO conducted these technical evaluations using power flow and transient stability programs. A power flow program analyzes the power system in a normal steady-state operation. A transient stability program analyzes the ability of the power system to return to a stable operating condition after a disturbance.

¹⁵ http://www.caiso.com/Documents/Final2016LCTStudyReportJan30_2012.pdf

summer peak load from the 2010 – 2020 California Energy Demand forecast that was adopted by the CEC in December 2009.¹⁶ These studies continue to reflect the local capacity needs as of 2016 in areas that contain generating capacity currently using once through cooling technology.

The ISO utilized different portfolio assumptions for its 2016 and 2021 studies. As a result, SACCWIS does not recommend comparing the results from these studies on a time horizon between 2016 and 2021. Although not exactly comparable, the ISO's 2016 and 2021 study results both reflect a need for capacity within local capacity areas that contain generation using once through cooling technology. Retirements of generating capacity in these local capacity areas could limit California's ability to respond to the situations modeled in these studies. SACCWIS will ask that the CEC, CPUC, and ISO work together to refine calculations for local, zonal and system capacity needs to enable SACCWIS to make specific recommendations for individual OTC power plants.

V. The Water Board should consider recommended changes to the statewide policy during the second and third quarters of 2012.

As part of the report provided to the Water Board in September 2011, SACCWIS advised that the Water Board should address the recommendations set forth in SACCWIS' report during the second and third quarters of 2012. SACCWIS affirms this recommendation and recommends that the Water Board direct its staff to initiate a process to propose changes to the statewide policy consistent with the recommendations in this report. These changes should reflect a compliance schedule on a unit-by-unit basis at existing power plants rather than on a facility-wide basis and a requirement that generators supplement their implementation plans annually, or sooner, if a major change¹⁷ occurs. The Water Board should issue these proposed changes for public review and comment and consider their adoption no later than the Water Board's September 2012 Board Meeting. Adopting changes to the statewide policy by this date will provide generator owners with sufficient time to explain in writing later this year the status of any necessary permitting activities to repower, retrofit or

¹⁶ 2009 IEPR, and the 2010-2020 California Energy Demand forecast are available at:
http://www.energy.ca.gov/2009_energypolicy/

¹⁷ A major change is anything that would change when an existing or planned unit is operationally available, and/ or would impact the ability to comply with the statewide policy's compliance dates.

retire generating units. This information will facilitate any recommended modifications SACCWIS may make to the Water Board in 2013.

VI. Conclusion

The Water Board should weigh positive developments in implementing its statewide policy with projected capacity needs in the ISO balancing authority area that may require extensions of final compliance dates for generating units using once through cooling technology. SACCWIS intends to provide a report to the Water Board in 2013 to address changes to the final compliance schedule if changes are required to meet local, zonal or system reliability needs, including permitting constraints. In the interim, the Water Board should direct its staff to require generator owners to explain in writing by December 1, 2012 the status of any necessary permitting activities to repower or retrofit these generating facilities. The Water Board should also adopt the recommendations made in SACCWIS September 2011 report: (1) develop a compliance schedule on a unit-by-unit basis at existing power plants rather than on a facility-wide basis; and (2) require generators to supplement their implementation plans annually or sooner, if a major change occurs.