



Assembly Committee on Utilities & Commerce
Briefing Paper for Oversight Hearing

Local Electric Reliability and Once-Through Cooling

More than 10,000 megawatts (MW) of electricity generation facilities located along the California coastline will be required to retire or repower by the end of 2020, many by the end of 2017. Nearly half of these facilities are located in or near Los Angeles. Appendix A provides a list of the facilities affected by the State Water Resources Control Board (SWRCB) rules and their status, if known.

The requirement to retire or repower these facilities is based on the Federal Clean Water Act. In California, the State Water Resources Control Board (SWRCB) is the state agency that enforces the Federal Clean Water Act. The coastal generation facilities use seawater, in a system referred to as "Once-Through-Cooling" (OTC) to remove heat from their facilities. Because of the impact to marine life, the SWRCB requires that most of the coastal fossil-fuel plants control and/or mitigate entrainment and impingement of marine life by the end of 2020, with some exceptions. Compliance can be addressed by no longer using once-through cooling or by reducing entrainment by 93%. Most generators have indicated that they are pursuing the first option, which implies retirement or repowering of the facility. This information excludes approximately 4,490 MW of additional generation from California's nuclear power plants, which are also included in the SWRCB rules. They are scheduled to repower or retire by 2024 (Diablo Canyon, 2323 MW) and by 2022 (San Onofre, 2,254 MW). On June 7, 2013, Southern California Edison (SCE) announced the permanent closure of San Onofre.

Unlike other regions in California, the Los Angeles area has both local reliability constraints and a number of OTC plants that are impacted by the SWRCB rule.

This informational hearing will examine the extent to which the state energy planners and local public agencies are collaborating to ensure that the current regulatory process and environment will:

- 1) Provide sufficient electricity supplies in the Los Angeles region for both the near term and the long term;
- 2) Ensure that potential OTC retirement does not adversely impact local area electric reliability;
- 3) Maintain affordability of electricity to utility customers; and
- 4) Maintain compliance with local air quality rules.

I. Background

Californians rely on electricity for health, comfort, economic productivity, and essential communications. Now, more than ever, electric system reliability impacts all Californians.

In California, electric system reliability is accomplished via a combination of federal standards, western-state regional, state, and local rules governing generators, traders, transmission system operators, load serving entities (utilities, independent energy providers, etc.), local distribution companies, and end users (energy efficiency, time of use rates, demand response, etc.). This "orchestra" of participants must coordinate to match electricity supplies with electricity demand – on a minute by minute basis.

The supply of electricity must continuously meet demand. When demand exceeds supply, voltage and frequency can drop. When demand for electricity increases suddenly a momentary drop in voltage can cause lights to dim. If supply exceeds demand, voltage levels can increase. If the voltage is too high, devices, such as lights, can burn out because too much electricity is being delivered. In California, and most of the United States, the fundamental power frequency is 60 Hertz.

California Independent System Operator¹ (CAISO) provides market opportunities for entities to sell wholesale bulk power to the grid. One of the market services provided through CAISO is "ancillary services." One type of ancillary service is regulation energy –the type of energy supplied that is used to maintain system frequency around 60 hertz.

¹ Note that CAISO is a regional entity that provides bulk wholesale electricity services to about 75% of California's Load Serving Entities (LSEs). CAISO's region includes PG&E, SCE, and SDG&E service areas.

Because electricity is needed round-the-clock, in order to maintain system reliability CAISO must plan for the highest amount of demand. Sufficient electric generation must be available for the moment that the system needs electricity. In 2012, summer electricity loads peaked at 46,847 MW. In 2012, the system load exceeded 40,000 MW for 151 hours of the year. This is compared to 61 hours in 2011. Thus the system must plan for sufficient electric generation to be on standby and available for when the system load is at its peak. Depending on the weather, demand for electricity, and status of the system, the system peak can be larger, smaller, extend for more hours or be few hours.

Because the overall demand for electricity changes from minute-to-minute, power system operators continually adjust electric supply to maintain voltage and frequency within operating limits to prevent damage to equipment or blackouts.

Specific to OTC plants, according to a report by the California Energy Commission (CEC),² aging electric generation facilities³ comprised 34% of all gas-fired capacity but contributed only 6% of all electric generation from natural gas in 2011.

II. Ensuring Adequate Electric Generation to Meet Local Demand

Throughout most of California, existing and planned electric generation facilities will meet demand. According to a recent PUC white paper,⁴ fundamental changes to the electric system present challenges to future electric system reliability and identifies reliability concerns inherent in the transition of California's electric system toward increased renewable generation, away from OTC and other aging generation. The PUC's white paper highlights four specific areas of concern:

- "Oversupply of System Capacity: A large oversupply of generic system capacity exists, although some local areas may need new local capacity to meet reliability needs.
- Insufficient Revenue and Certainty for Generators: The existing Resource Adequacy (RA) and Long Term Procurement Planning (LTPP) policy frameworks are criticized for not always sending sufficient, timely and accurate signals to generators to invest in new power plants, plant upgrades, or maintenance of existing generators.
- Need for Certainty around Flexible Resource Needs and Flexibility Definition: There may be insufficient flexible capacity in future years. The resource modeling for future flexible capacity

² California Energy Commission Thermal Efficiency of Gas---Fired Generation in California: 2012 Update, March 2013, CEC-200-2013-002

³ Aging power plants are defined as constructed prior to the 1980s.

⁴ PUC Briefing Paper: A Review of Current Issues with Long-Term Resource Adequacy, February 20, 2013

needs, particularly in light of the large quantity of renewable resources expected in the future, is ongoing. The definition of which resources should be labeled flexible is uncertain.

- Insufficient Certainty on the Future Quantity of Capacity available for Reliability: The looming possibility that existing capacity resources (including relatively new and efficient ones) without long term contracts will not be available to the system in the future."

In this same briefing paper, the PUC states that since 2006, the PUC "has been authorizing the construction of new replacement generation – largely in order to replace retiring, mostly OTC, generation. At the same time only a limited amount of generation has actually retired." The PUC attributes this, in part, to older generation. While less efficient than newer generation is still economically viable older generation is well suited to meet the need of standby capacity and it is usually less expensive to keep older generation available than build new generation.

But from a local perspective, it is important to consider that certain California regions have significant load impact, particularly during periods of peak electricity demand.

- SCE's service territory represents 51% of total local capacity loads. Loads in the Los Angeles Basin account for 81% of the potential peak load in SCE's service area.
- Pacific Gas & Electric's service area represents 39% of total local capacity loads. Loads in the greater Bay Area account for 53% of the potential peak load in PG&E's service area.
- San Diego Gas & Electric's service area is comprised of a single local capacity area.

According to the CEC draft 2014-2022 forecast,⁵ for the SCE and Los Angeles Department of and Power (LADWP) planning areas, electricity consumption and peak demand are expected to grow.

Table 1: 2012-2024 Preliminary Forecast, Low to High Forecast Estimate

Utility Planning Area	Consumption	Peak
	Range of Average Annual Growth Rate	Range of Average Annual Growth Rate
SCE	0.60-1.37%	0.70-1.75% 21,606-26,602 MW
SDG&E	0.07-1.96	0.84-1.92 4,592-5,772 MW
LADWP	0.49-1.16%	0.41-1.51% 5,131-6,860 MW

⁵ <http://www.energy.ca.gov/2013publications/CEC-200-2013-004/CEC-200-2013-004-SD-V2.pdf>

Growth rates are impacted by weather, the overall economy, and increases or decreases in population, electricity rates, and energy consumption.

To address local area need, in February 2013 the PUC authorized⁶ SCE to procure between 1400 and 1800 Megawatts (MW) of electrical capacity in the West Los Angeles sub-area of the Los Angeles (LA) basin to meet long-term local capacity requirements by 2021. The PUC also authorized SCE to procure between 215 and 290 MW of the Moorpark sub-area of the Big Creek/Ventura area. In addition, the PUC required that the capacity be located in a specific transmission-constrained area in order to ensure adequate available electrical capacity to meet peak demand, and ensure the safety and reliability of the local electrical grid. The PUC also specified for the LA basin area at least 1000 MW, but no more than 1200 MW, of this capacity must be procured from conventional gas-fired resources; at least 50 MW must be procured from energy storage resources; and at least 150 MW of capacity must be procured through preferred resources consistent with the Loading Order in the Energy Action Plan, or energy storage resources. The PUC also authorized SCE to procure up to an additional 600 MW of capacity from preferred resources and/or energy storage resources.

The PUC expects that long term local capacity requirements due to retirement of thousands of MW from current OTC generators due to compliance with SWRCB requirements can be filled by preferred resources, either through procurement of capacity or reduction in demand. Preferred resources include energy efficiency, demand response, and distributed generation including combined heat and power. Energy storage resources may also be available. The PUC will evaluate this expectation in its 2014 Long Term Procurement Planning process.

III. Local Air Quality Rules: South Coast Air Quality Management District

The South Coast Air Quality Management District (SCAQMD) is the air pollution control agency for all of Orange County and the urban portions of Los Angeles, Riverside and San Bernardino counties. By law, SCAQMD has jurisdiction over businesses and other stationary sources of emissions to meet the requirements of the Federal Clean Air Act and the California Clean Air Act.

In the Los Angeles region, the Alamitos, El Segundo, Huntington Beach, Redondo Beach power plants use OTC technology.

⁶ PUC Decision 12-02-015

In order to comply with federal and state air quality requirements, all major and non-major sources in the SCAQMD region are required to apply for a permit from SCAQMD to construct for new or relocated projects or to modify existing equipment.

SCAQMD adopted a program called Regional Clean Air Incentives Market (RECLAIM) in 1993, setting an emissions cap and declining balance for many of the largest facilities emitting nitrogen oxides (NO_x) and sulfur oxides (SO_x) in the South Coast Air Basin. RECLAIM is an air emissions cap and trade program. RECLAIM allows participating facilities to trade air pollution while meeting clean air goals. NO_x and/or SO_x allocations were issued to RECLAIM facilities based on their historical activity levels and applicable emission control levels specified in the subsumed rules or in the local Air Quality Management Plan. Facilities within the RECLAIM program have the option of complying with their allocation allowance by either reducing emissions or purchasing RECLAIM Trading Credits from other facilities.

All power plants constructed in the SCAQMD are required to offset emissions per SCAQMD Rule 1303. Emission offsets must either be purchased in the open market as Emission Reduction Credits (ERCs) or are made available through the SCAQMD internal bank of emission offsets, provided a new power plant project meets specific eligibility criteria under SCAQMD rules. SCAQMD adopted Rule 1304(a)(2) (Rule 1304) to ensure that businesses and public utilities could modernize and expand within the SCAQMD region. Rule 1304⁷ provides that the SCAQMD receive any and all emission offsets created from the affected generators as well as credit for demonstrating progress in implementing federally required State Implementation Plans.

To qualify under Rule 1304, replacement generating equipment must be of one of the following technologies:

- Combined cycle gas turbine(s)
- Intercooled or chemically-recuperated gas turbines
- Other advanced gas turbine(s); or
- Solar, geothermal, or wind energy equipment

If an Electric Utility Steam Boiler Replacement project results in an increase in basin-wide generating capacity, then the incremental increased capacity must be offset through the ERC market. SCAQMD is not obliged to offset the new additional generation. Projects that rely on

⁷ Rule 1304 applies only to boilers existing on July 19, 1991, owned or operated by any one of the following: Southern California Edison (SCE), Los Angeles Department of Water and Power, City of Burbank, City of Glendale, and City of Pasadena, or any of their successors. With the divestiture of SCE's generation assets following the deregulation of the industry in 1996, the exemption provided by Rule 1304 is available to the owners of the formerly owned SCE utility boilers.

Rule 1304 are ineligible from creating sellable ERCs from the retired equipment and any emission offsets that result from surplus or orphaned MWs are placed into the SCAQMD internal bank and tracked under Rule 1315.⁸

Current SCAQMD Rule 1304 requires that "new equipment must have a maximum electrical power rating (in megawatts) that does not allow basin-wide electricity generating capacity on a per-utility basis to increase. If there is an increase in basin-wide capacity, only the increased capacity must be offset."

In 2009 AB 1318 (Perez, 2009) was enacted and requires the State Air Resources Board, in consultation with the CEC, PUC, CAISO, SRWCB to evaluate the electric system reliability needs of the South Coast Air Basin, According to a draft of this report, published in 2011,⁹ "While SCAQMD's Rule 1304 exemption allows existing facilities to be repowered, it effectively limits development of merchant facilities in the basin to the owners of existing facilities: AES, NRG and Reliant¹⁰. As owners of existing electric utility steam boilers in the area under SCAQMD jurisdiction, they may develop replacement capacity in the form of combined cycle or advanced gas turbines at a far lower cost than parties who must buy ERCs on the open market."

IV. SCAQMD Proposed Rule 1304.1

In January 2013, SCAQMD proposed an annual fee for electric generation facilities to use offset exemptions corresponding to increases in capacity for new replacement units. Fees would be based on the pollutant type and quantity of offsets required.

The proposed rule affects all electrical generating facilities that elect to use the offset exemptions described in Rule 1304 but not those facilities that have already been issued a final Permit to Construct by the District or meet their emissions offset obligations through providing privately held ERCs.

SCAQMD is concerned that repowered OTC facilities will potentially run more often because new technology will be more efficient. SCAQMD estimates that if an existing power plant rated at 500 megawatts is replaced with a newer combined cycle of the same rating the actual annual

⁸ Rule 1315 maintain SCAQMD's ability, through December 31, 2030, to issue permits to major sources that obtain offset credits from the SCAQMD Priority Reserve Rule and/or that are exempt from offsets under Rule 1304.

⁹ Assessment of Electrical System Reliability Needs in South Coast Air Basin and Recommendations on Meeting those Needs, http://www.arb.ca.gov/energy/esr-sc/0215-workshop/ab_1318_draft_work_plan.pdf, January 2011. A draft final report was expected in March 2013 but has not been published

¹⁰ NRG purchased Reliant in 2009

output of the plant may potentially increase from about 21 megawatts to over 251 megawatts; an increase of about 12 fold, resulting in increased emissions from the power plant.

SCAQMD estimates that if the rule is adopted the annualized cost relative to an estimated wholesale cost of electric generation of \$0.04 per kilowatt-hour, the fee would increase generation costs by approximately 2.5%. After the initial proposal was made SCAQMD revised and significantly reduced (more than half) the proposed fee which would lower the potential impact on generation costs.

Appendix A OTC Facilities¹¹

SCE Area OTC Facilities	MW	2012 Capacity Factor (%)	Year to retire or repower (December 31)	Owner	Year expected to achieve compliance (if known)
El Segundo Unit 3	335	9	2015	NRG	2013
El Segundo Unit 4	335	12%	2015	NRG	---
Alamitos Units 1	175	2	2020	AES	---
Alamitos Units 2	175	4	2020	AES	---
Alamitos Units 3	326	13	2020	AES	---
Alamitos Units 4	324	10	2020	AES	---
Alamitos Units 5	485	10	2020	AES	---
Alamitos Units 6	485	7	2020	AES	---
Huntington Beach 1	215	13	2020	AES	---
Huntington Beach 2	215	28	2020	AES	---
Mandalay 1	217.6	5	2020	NRG	---
Mandalay 2	217.6	6	2020	NRG	---
Ormond Beach Generating Station 1	806.4	3	2020	NRG	---
Ormond Beach Generating Station 1	806.4	1	2020	NRG	---
Redondo Beach Generating Station 5	178.9	3	2020	AES	---
Redondo Beach Generating Station 6	175	5	2020	AES	---
Redondo Beach Generating Station 7	505	8	2020	AES	---
Redondo Beach Generating Station 8	495.9	1	2020	AES	---

LAWDP Area OTC Facilities	MW	2012 Capacity Factor (%)	Year to retire or repower (December 31)	Owner	Year expected to achieve compliance (if known)
Harbor 1	85.3	5	2029	LADWP	2013
Harbor 2	85.3	4	2029	LADWP	2013
Harbor 5	75	4	2029	LADWP	2013
Haynes 1	230	15	2029	LADWP	2013
Haynes 2	230	21	2029	LADWP	2015
Haynes 5	343	17	2013	LADWP	2013
Haynes 6	343	16	2013	LADWP	2013
Haynes 8	264.4	22	2029	LADWP	2024
Haynes 9	182.8	25	2029	LADWP	---
Haynes 10	182.8	26	2029	LADWP	---
Scattergood 1	163.2	4	2024	LADWP	2020
Scattergood 2	163.2	30	2029	LADWP	2024
Scattergood 3	496.6	14	2015	LADWP	2015

¹¹ Sources: MW and Capacity Factors, California Energy Commission, Retirement and Ownership CAISO 2013 Summer Loads & Resources Assessment, and SWRCB

SDG&E Area OTC Facilities	MW	2012 Capacity Factor (%)	Year to retire or repower (December 31)	Owner	Year expected to achieve compliance (if known)
Encina Power Station 1	107	14	2017	NRG	---
Encina Power Station 2	104	16	2017	NRG	---
Encina Power Station 3	110	17	2017	NRG	---
Encina Power Station 4	300	15	2017	NRG	---
Encina Power Station 5	330	19	2017	NRG	---

PG&E Area OTC Facilities	MW	2012 Capacity Factor (%)	Year to retire or repower (December 31)	Owner	Year expected to achieve compliance (if known)
Morro Bay Units 3 and 4	600	3-4	2015	Dynegy	---
Pittsburg Units 5 and 6	650	3-4	2017	NRG	---
Moss Landing 1 and 2	1080	47	2017	Dynegy	---
Moss Landing 6 and 7	1404	5	2017	Dynegy	---
Contra Costa Units 6	340	0	2017	NRG	2013
Contra Costa Unit 7	340	4	2017	NRG	2013