



ANALYSIS OF THE NEED FOR GENERATING CAPACITY at the REDONDO BEACH GENERATING STATION

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Acknowledgment

This paper has used up-to date information available at the time of its analysis (Aug-Sep of 2011) and as such does not include any data that may have become available afterwards. However, it is acknowledged that the CAISO has recently released preliminary results of a new LCR study (discussed below). Also, AES has recently released the results of its power flow analysis purporting to show that generating capacity at the Redondo Beach Generating Station is needed to mitigate reliability standard violations that would otherwise occur. At this point, the preliminary review of these two documents does not change this paper's findings and conclusions. The CAISO plans to publish its final 2021 OTC study report in early 2012. A planned update of this paper would address those two studies in more detail.

On December 8, 2011, in connection with its 2011/2012 Transmission Planning Process, the CAISO presented its preliminary Once through Cooling study for year 2021. This study includes the results of the LCR analysis for the LA Basin and its sub areas. Our preliminary analysis shows two major differences between the CAISO's most recent data and the assumptions used in the paper. The CAISO's most recent data, however, does not change our findings or conclusions regarding the lack of need for generating capacity at the Redondo Beach Generating Station to meet the LA Basin LCR or the Western LA Basin sub-area LCR for period 2012 through 2020. According to a CAISO representative, the CAISO has now defined the Western LA Basin sub-area, but the list of the substations comprising this LCR area has yet to be made public. Nevertheless, the CAISO has provided a better estimate of the ratio between load in the Western LA Basin sub-area and load in the LA basin area; 60% as opposed to the 50% estimate used for this paper. The impact of using 60% would be to increase the LCR in Western LA Basin sub-area by about 150 MW in 2020, the year with the lowest resource margin. Accordingly, the resource margin without the Redondo Beach units in 2020 would be reduced from 1010 MW to about 860 MW (1010 MW – 150 MW). Therefore, the 150 MW increase in LCR can be absorbed by the resource margin calculated in the paper.

For year 2021, the CAISO reports that the Western LA Basin sub-area LCR is 7325 MW (7517 MW minus 192 MW that the CAISO estimates would be supplied by Distributed Generation) in the CAISO's expected case ("Base Case").¹ This is about 600 MW higher than the 2020 LCR estimated for the year 2020 in this report, and within the revised resource margin of 860 MW discussed above. Therefore, it appears that the Western LA Basin sub-area LCR for year 2021 could still be met in 2021 without any generating capacity at the Redondo Beach Generating Station. This assumes resources anticipated to be available in 2020 remain unchanged in 2021, or are replaced within the Western LA Basin sub-area with an equivalent amount of new generating capacity.

¹ It is expected that the upper range of the LCRs for the year 2021 is less applicable to the Redondo Beach Generating Station since the effectiveness factor for generation at this location is among the lowest compared to the other generating units in the Western LA Basin sub-area.

EXECUTIVE SUMMARY

- Prior to 2015, examination of the Local Capacity Requirements (LCRs) and available generation capacity in the LA Basin shows that the LCR can easily be met by existing generation inside the LA Basin (Table 4). Therefore, to meet the LA Basin LCR, there is no need for any generation at the location of the existing Redondo Beach Generating Station.
- The CAISO has indicated that by year 2015, due to construction of the Colorado Rivers-Devers-Valley #2 line and the transmission included in the Tehachapi Transmission Project, the LA Basin LCR area will be eliminated such that the most limiting LCR area will be the Western LA Basin sub-area.
- Examination of LCRs and existing generation capacity in the Western LA Basin sub-area shows (Table 1) that if the existing units at the Redondo Beach Generating Station were retired in any year after 2012, with no other retirements (a purely theoretical assumption), there would be enough remaining existing generation in the Western LA Basin sub-area to satisfy the projected LCR at least through year 2020. This conclusion holds even if no new generation is added and AES-SL builds none of the new combined-cycle facilities it references in its June 16, 2011 implementation plan for the Redondo Beach Generating Station.
- If all of the existing Once-Through-Cooling (OTC) units in the Western LA Basin sub-area are retired (a purely theoretical assumption), except for the generation at SONGS,² the amount of additional generation capacity (new or repowered) needed in the Western LA basin sub-area to meet the LCRs varies between 2100 MW and 2800 MW in the 2012 to 2020 time frame. Adding two new units (i.e., Canyon Power, already in service, and Walnut Creek, under construction and scheduled to be in service in 2014), and assuming the 530 MW El Segundo combined cycle project (currently under construction) is completed by 2013, the amount of additional generation capacity (new or repowered) needed in the Western LA basin sub-area to meet the LCRs is reduced to less than 1500 MW in 2020 (Table 2).
- Under an "expected" scenario (that is based on the latest information available on the OTC generation retirements on the schedule depicted in CTPG's report, generation that is currently under construction or that has recently started operations, and other OTC generation retirements required as a condition for building new generation at OTC sites), the existing units at the Redondo Beach Generating Station could be retired in any year after 2011 and there would still be enough remaining existing

² According to the ICF Jones & Stokes, Global Energy Decisions *and* Matt Trask report prepared for California Ocean Protection Council and SWRCB, SDG&E and SCE have strong incentives to bring the existing nuclear plants into compliance with cooling policy.

generation in the Western LA Basin sub-area to satisfy the projected LCR through at least year 2020 with the surplus capacity varying between 2100 MW to 1000 MW.

- Incremental energy efficiency, demand response, and/or distributed generation could help further reduce the need for generation capacity in the Western LA basin sub-area.³
- According to the CAISO, there is a potential shortage of flexible generation needed for integrating intermittent renewable resources. Assuming all existing OTC units are retired, and using a high load assumption for 2020, this shortage could reach 4600 MW for upward-flexible generation and 800 MW for downward-flexible generation.
- This flexible generation capacity can come from any new units within the CAISO BA or, under certain conditions (dynamic scheduling), from the outside the CAISO BA area.
- There is currently about 3800 MW of new non-renewable generation contracted to the IOUs in California. All of this generation appears to be flexible. Some of this new generation is already in service or under construction. (Table 7).
- According to CTPG’s interpretation of the OTC owners’ implementation plans, and based on the likely construction of new generation outside of the existing OTC sites and within the CAISO BA, there will be enough flexible generating capacity added to meet the CAISO’s projected need for 4600 MW of new flexible generation capacity in 2020.
- The need for generation at Redondo Beach Generating Station site to provide operational control, voltage support and/or inertia is not supported by any publically available data or studies conducted by the ISO or by the plant owner.

Conclusions

1. No generation at the Redondo Beach Generating Station location is needed to meet either the LA Basin LCR or the Western LA Basin sub-area LCR through 2020. This conclusion is based on analysis of two extreme cases (i.e., no retirement and complete retirement of OTC units in the Western LA basin sub-area starting in 2012), and one “expected” case.
2. Except for the two SONGS units, most of the OTC units in the Western LA Basin sub-area can retire, without any on-site replacement or repowering, and the projected Western LA Basin sub-area LCR through year 2020 can still be met.

³ To the extent the CAISO allows these incremental impacts to either reduce the LCR or to be counted towards the LCR.

3. From 2013 through 2020 no generation capacity at the Redondo Beach Generating Station location is required to integrate intermittent renewable resources.

Recommendations

The results show that, based on the assumptions made, there is no requirement that generation be available at the Redondo Beach Generating Station site during the period 2013 through 2020. The results are based on the best information available at this time. The CAISO has indicated that it is completing more detailed studies of LCRs and that the results of these studies should be available by the end of 2011. Accordingly, it is recommended that the analysis discussed herein be reviewed at the time the CAISO releases its in-progress LCR studies to determine if any of the underlying assumptions⁴ or conclusions needs to be revised. It is also recommended that the report be expanded to include independent analysis (as opposed to the CTPG's analysis) of the owners' latest OTC implementation plans, individually and in combinations.

If the need for voltage and/or import support is used as justification for having generation at the Redondo Beach Generating Station, power flow analysis is recommended to study the validity of such claims.

Finally, if future analyses show a possible shortage of generation in the Western LA Basin sub-area it is recommended that other alternatives be studied, and their relative costs and benefits be compared against the costs and benefits of repowering or replacing generation at the Redondo Beach Generating Station. Such other alternatives should include new generation at other OTC sites in the Western LA Basin sub-area, or other measures at those sites that would comply with SWRCB policies concerning the use of coastal and estuarine waters for power plant cooling; and other generation in the West LA Basin area, including distributed generation from renewable and non-renewable sources.

It is noted that while there does not appear to be any *requirement* that generation be available at the Redondo Beach Generating Station site, it should be understood that decisions as to the retirement of the existing generators, and the on-site repowering or replacement of that generation, are subject to the generation owner's commercial opportunities. AES-SL has stated that if "If AES-SL is not able to secure PPAs, preferably with terms longer than 10 years, AES-SL will likely be permanently retiring units as of their compliance dates as opposed to retrofitting the existing facilities with alternative cooling systems." (page 2 of AES-SL's June 16, 2011 submittal to the SWRCB.)

⁴ It is assumed that the Western LA Basin sub-area load is 50% of the LA Basin load and LCRs increase annually by an amount equal to the load growth assumed in this area.

Summary of Results

Prior to year 2015, the Local Capacity Requirement (LCR) for the LA Basin can easily be met by existing generation inside the LA Basin (Table 4). The CAISO has indicated that by year 2015 with construction of the Colorado River-Devers-Valley #2 line and the transmission included in the Tehachapi Transmission Project, the LA Basin LCR area will be eliminated such that the most limiting LCR area will be the Western LA Basin sub-area.

Table 1 below shows the estimated Western LA Basin LCR based on published CAISO studies and existing generation capacity in the Western LA Basin sub-area that is eligible to be counted towards the LCR and towards system RA requirements.⁵ According to the analysis summarized in the table 1, if the existing units at the Redondo Beach Generating Station were retired in any year after 2012, and if AES-SL builds none of the new combined-cycle facilities it references in its June 16, 2011 document for the Redondo Beach Generating Station, but all existing OTC units in the area remain unchanged – a theoretical assumption, there would be enough remaining existing generation in the area, at least through 2020, to satisfy the projected LCR. In addition, the results show a surplus of generating capacity ranging from 1600 MW to 900 MW⁶ between 2012 and 2020 without any generation at the Redondo Beach Generating Station, based on the available capacity assumptions provided in Table 5.

Under another set of theoretical assumptions (the other extreme) , assuming all Once-Through-Cooling (OTC) units located in the Western LA Basin sub-area are retired except for the generation at SONGS, Table 2 below shows that the amount of additional generation (new or repowered) needed in the Western LA Basin sub-area to meet the LCR in year 2020 could reach about 2700 MW. Adding the Canyon Power plant (already in service), and assuming the El Segundo combined cycle project and Walnut Creek units (currently under construction) are completed by years 2013 and 2014 respectively, the remaining amount of new generation capacity that will be needed in the Western LA basin sub-area to meet the LCRs ranges from 700 MW to 1450 MW between 2013 and 2020. This generation capacity does not have to come from any particular generation plant or unit, but can be provided by any generating unit located in the Western LA basin sub-area.

Under an "expected" scenario (Table 3) that is based on the latest information on the OTC generation retirement schedules available and depicted in CTPG's report, generation that is currently under construction or that has recently started operations, and other OTC generation retirements required as a condition for building new generation at OTC sites, the existing units at the Redondo Beach Generating Station could be retired in any year after 2011 and there would still be enough remaining existing generation in the Western LA Basin sub-area to satisfy the projected LCR through at least year 2020. Under this

⁵ The CAISO requires each load serving entity within the CAISO BA to make annual demonstrations that they own or have under contract enough generating capacity or qualifying demand response capacity to meet the load serving entity's forecast peak demand for the upcoming year plus a planning reserve margin of between 15% and 17%. This is known as the system RA requirement. Generally speaking, this generating capacity can come from anywhere in the WECC provided the CAISO has determined it is "deliverable."

⁶ The surplus/shortage of generation capacity can be more or less based on the change in OTC's retirements/repower and or new generation addition schedule.

“expected” scenario, without the Redondo Beach units, the surplus capacity in Western LA basin varies from 2100 MW to 1000 MW between 2012 through 2020. The “expected” scenario reflects the retirement of El Segundo unit 3 in 2012, El Segundo unit 4 in 2015, Huntington Beach units 3 & 4 in 2013, the addition of new combined cycle generation (El Segundo units 5, 6 & 7) at the location of the El Segundo generating station in 2013, the addition of the Canyon Power Plant in 2011, and the addition of the Walnut Creek generating facility (under construction)⁷ in 2014.

The 2152 MW of deficiency shown for the year 2020 on Table 2 (assuming the El Segundo combined cycle plant is in-service) is slightly higher than the deficiency discussed in CAISO management’s August 18, 2011 memorandum to the CAISO Board.⁸ In that memorandum CAISO management states on page 8 that “for the year 2020, based on load and resources estimates and previous ISO local requirement studies, an estimated 2000 MW of additional local resources may be needed to meet the local reliability requirements.” The comparison of this study’s results in 2020 against the CAISO’s estimated deficiency confirms that both the study’s assumptions and results are reasonable.

The remaining surplus of local generation over the LCR (the resource margin shown on Tables 1 and 3) could increase or vice versa, the need for additional generation assuming OTC retirements (the deficiency shown on Table 2) could decrease in the area due to the following factors:

- Incremental Energy Efficiency -- on-peak impact
- Incremental behind-the-load-meter solar PV -- on-peak impact
- Incremental distribution level CHP -- on-peak impact
- Incremental demand response program impacts
- Lower load growth due to recent indications of slower economic growth

According to the CAISO memorandum, the potential capacity shortages for renewable integration within the CAISO balancing authority -- based on the “CPUC trajectory high load scenario”⁹ for 2020 -- are 4,600 MW of “Upward Balancing Flexibility” capacity and 800 MW of “Downward Balancing Flexibility” capacity. The CAISO also observed that the “lower load assumptions based on energy efficiency showed no incremental need” for flexible resources.

Based on section 3.5 of the CTPG’s 2011 Phase 2 study plan (summarized on Table 6) and SCE’s LTPP testimony, the 4600 MW deficiency in flexible generation could be met by:

- Flexible generating capacity already under construction at existing OTC sites, namely, El Segundo units 5, 6 and 7 (a 530 MW¹⁰ combined cycle plant).
- Planned flexible generation within certain OTC sites.

⁷ Based on data from the California Energy Commission website.

⁸ Keith Casey’s August 18, 2011 memorandum to the CAISO Board of Governors. (page 2)

⁹ Ibid. CPUC assumption for “High Load Scenario 6 in 2020 (60,828 MW)” versus “for Priority Scenarios 1-4 in 2020 (55,298 MW).” The lower load assumptions based on energy efficiency showed no incremental need.

¹⁰ According to the plant operator the current expected capacity of the plant is 530MW.

- Existing flexible generation within certain OTC sites assuming the existing cooling systems are modified to comply with SWRCB's policies for use of coastal and estuarine waters for power plant cooling.
- Flexible generating capacity already under construction inside or outside of existing OTC sites, namely, the Canyon Power Plant (200 MW), Walnut Creek (500 MW) and the Riverside Energy Resource Units 3&4 (96 MW).
- Planned flexible generating capacity additions contemplated by the numerous proposals for adding flexible generating resources within the CAISO Balancing Authority but outside of the OTC sites. For example, the CTPG and SCE have indicated that, so far, load serving entities have signed Power Purchase Agreements (PPAs) for planned non-renewable generation totaling 3015.6 MW in the SCE, PG&E and SDG&E distribution service areas (Table 7).

Table 1: Meeting Local Capacity Requirements (LCR) with Existing Generation Except Generation at the Redondo Beach Generating Station (theoretical case)

Western LA Basin sub-area	2012	2013	2014	2015	2016	2017	2018	2019	2020
Estimated LCR (MW)	5785	6090	6090	5988	6130	6281	6424	6570	6726
Existing NQC Gen (MW)	8623	8971	8971	8971	8971	8971	8971	8971	8971
Redondo Beach Plant	1356	1343	1343	1343	1343	1343	1343	1343	1343
Redondo Unit 5	178.87	178.87	178.87	178.87	178.87	178.87	178.87	178.87	178.87
Redondo Unit 6	175	175	175	175	175	175	175	175	175
Redondo Unit 7	505.96	493.24	493.24	493.24	493.24	493.24	493.24	493.24	493.24
Redondo Unit 8	495.9	495.9	495.9	495.9	495.9	495.9	495.9	495.9	495.9
NQC Gen without RB Units	7267	7628	7628	7628	7628	7628	7628	7628	7628
Resource Margin without RB Units (MW)	1482	1538	1538	1640	1498	1347	1204	1058	902

Table 2: Amount of Additional Generation Needed to Meet Western LA Basin Local Capacity Requirement (LCR) Assuming Immediate Retirement of All In-Area OTC Units (MW) (theoretical case)

	2012	2013	2014	2015	2016	2017	2018	2019	2020
Estimated Western LA Basin Sub-area LCR	5785	6090	6090	5988	6130	6281	6424	6570	6726
Available Existing Non-OTC Generation	1437	1799	1799	1799	1799	1799	1799	1799	1799
SONGS	2246	2246	2246	2246	2246	2246	2246	2246	2246
Non-OTC Plus SONGS	3683	4045	4045	4045	4045	4045	4045	4045	4045
Additional Generation Needed	2102	2046	2046	1944	2086	2236	2379	2525	2682
El Segundo combined cycle project (under-construction)	0	530	530	530	530	530	530	530	530
Additional Generation Needed after El Segundo combined cycle project added	2102	1516	1516	1414	1556	1706	1849	1995	2152
Walnut Creek and Canyon Power units	200	200	700	700	700	700	700	700	700
New Generation needed to satisfy LCR (Deficiency)	1902	1316	816	714	856	1006	1149	1295	1452

**Table 3: Meeting Local Capacity Requirements (LCR)
with Expected Generation Retirements and Additions (MW)**

Western LA Basin sub-area	2012	2013	2014	2015	2016	2017	2018	2019	2020
Estimated LCR	5785	6090	6090	5988	6130	6281	6424	6570	6726
Existing NQC Gen	8623	8971	8971	8971	8971	8971	8971	8971	8971
SWRCB retirement date for El Segundo #4 is 12/31/2015					(335)	(335)	(335)	(335)	(335)
El Segundo #3 retired as a condition of licensing new El Segundo 5-8 CC	(335)	(335)	(335)	(335)	(335)	(335)	(335)	(335)	(335)
El Segundo 5-8 Combined Cycle		530	530	530	530	530	530	530	530
Huntington Beach 3 & 4 retire in 2013 as a condition of licensing Walnut Creek		(452)	(452)	(452)	(452)	(452)	(452)	(452)	(452)
Walnut Creek (under construction)			500	500	500	500	500	500	500
Canyon Power Plant (completed 07/2011)	200	200	200	200	200	200	200	200	200
Assume Redondo Beach Generating Station retired in 2012	(1356)	(1343)	(1343)	(1343)	(1343)	(1343)	(1343)	(1343)	(1343)
Expected NQC Gen without RB Units	7132	7571	8071	8071	7736	7736	7736	7736	7736
Resource Margin without RB Units	1347	1481	1981	2083	1606	1456	1313	1167	1010
Can LCR be met w/o RB Units?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

INTRODUCTION

Background

The analysis described below is undertaken to independently investigate the LA Basin load pocket and its sub-areas to determine if any generation at the Redondo Beach Generating Station location will be required during the 2013 through 2020 time period to maintain grid reliability. Grid reliability requirements are established by applicable reliability criteria applied in a specific reliability area (i.e., an LCR area) or system wide. Applicable operating standards (e.g., management of Area Control Error, maintaining 60 Hertz frequency) dictate the need for flexible generation needed to integrate intermittent renewable resources. A generating unit's location is important for meeting locational requirements, but less so for meeting system-wide operational requirements.

Until recently, the CAISO mitigated generators' ability to exercise undue local market power and assured local reliability within the state's ten identified Local Reliability Areas (LRAs) through its RMR process. That process has now been overhauled and renamed the Local Capacity Requirements (LCR) process, though it still can result in imposing RMR contracts on generators. The process operates in parallel with the CPUC's Resource Adequacy (RA) process. The CAISO will continue with its annual LCR assessment and, if load serving entities fail to contract for enough generating capacity within a LCR area, may impose one-year RMR contracts.

The existing Redondo Beach Generating Station is comprised of four conventional gas-fired boiler/steam units with a combined generating capacity of about 1350 MW. It is not known whether the electrical output of any of these units is under contract to any party since this is considered commercially sensitive information and is generally not public.

Most of the old and inefficient coastal units within the CAISO BA were initially owned by the three California IOUs. In connection with deregulation in the 1990s most of these units were sold to third parties. To mitigate the ability to exercise undue local market power, and to ensure that generators determined to be *required* for reliability would not be retired as a result of their inability to effectively compete with more efficient generators, the CAISO imposed RMR contracts on some of these generators. In recent years, most of the RMR contracts have been replaced with bilateral contracts between the generation owners and load serving entities.

Because these units are old and inefficient they tend to run infrequently, and when they do, often at their minimum output level. The annual energy production (annual capacity factor) for these units is usually quite low. Their *capacity* (the *ability* to produce energy rather than actual energy production), however can be used to meet load serving entities' local and system RA obligations and to provide ancillary services (spinning reserve, non-spinning reserve, regulation up, regulation down) via the CAISO's ancillary services markets.

In doing this investigation, an effort has been made to use up-to-date information that is available in the public domain from the California Independent System Operator (CAISO), the California Transmission Planning Group (CTPG),¹¹ SCE's Long Term Procurement Plan (LTPP) filing, and AES Southland (AES-SL). Where assumptions were needed due to a lack of publicly-available data, worst-case scenarios have been used to assure the validity of the results.

The main sources of information for the LCR analysis are:

- The CAISO's April 29, 2011 document entitled *2012 LOCAL CAPACITY TECHNICAL ANALYSIS FINAL REPORT AND STUDY RESULTS*,
- The CAISO's December 30, 2010 document entitled *2013-2015 LOCAL CAPACITY TECHNICAL ANALYSIS REPORT AND STUDY RESULTS*

¹¹ Members of the CTPG are: California Independent System Operator (ISO), Imperial Irrigation District (IID), Los Angeles Department of Water and Power (LADWP), Pacific Gas and Electric (PG&E), Southern California Public Power Authority (SCPPA), Southern California Edison (SCE), San Diego Gas and Electric (SDG&E), Sacramento Municipal Utility District (SMUD), Transmission Agency of Northern California (TANC), Turlock Irrigation District (TID) and the Western Area Power Administration (Western).

Study Methodology

This study involves the following steps:

1. Analyze the CAISO's estimates of Local Capacity Requirements for the LA Basin area and the Western LA Basin sub-area. The CAISO has provided LCR estimates through year 2015.
2. Determine if there is enough generating capacity to meet these requirements through year 2015.
3. Analyze the new transmission projects and their impacts on the LCRs. It is determined that these transmission additions impact the LA Basin LCR area in 2015 and beyond.
4. Estimate the annual LCRs for the Western LA Basin sub-area for the years 2016 through 2020.
5. Determine the available generation within the Western LA Basin sub-area that can meet the LCR assuming:
 - a. all OTC plants remain, except for the OTC units at the Redondo Beach Generating Station,
 - b. all OTC units within the Western LA Basin sub-area are retired immediately,
 - c. Expected retirement or repower of OTC units, and addition of new generation within the Western LA Basin sub-area that is currently under construction
6. Determine the difference between the Western LA Basin sub-area LCR and available generating capacity within the Western LA Basin sub-area. This difference is the deficiency or surplus of qualifying capacity in the area.
7. Determine the need for new flexible generating capacity to integrate renewable resources by year 2020, based on the CAISO's preliminary study results.
8. Determine generating capacity likely to be available to satisfy the need for new flexible generation assuming there is no generation at the Redondo Beach Generating Station.
9. Analyze AES-SL's OTC implementation plan for the Redondo Beach Generating Station to determine whether AES-SL has identified any specific studies demonstrating the need for generation at the Redondo Beach Generating Station site for any reason.

ANALYSIS

Primary Assumptions and the Impact of those Assumptions on Results and Conclusions

The primary assumptions for the analysis are:

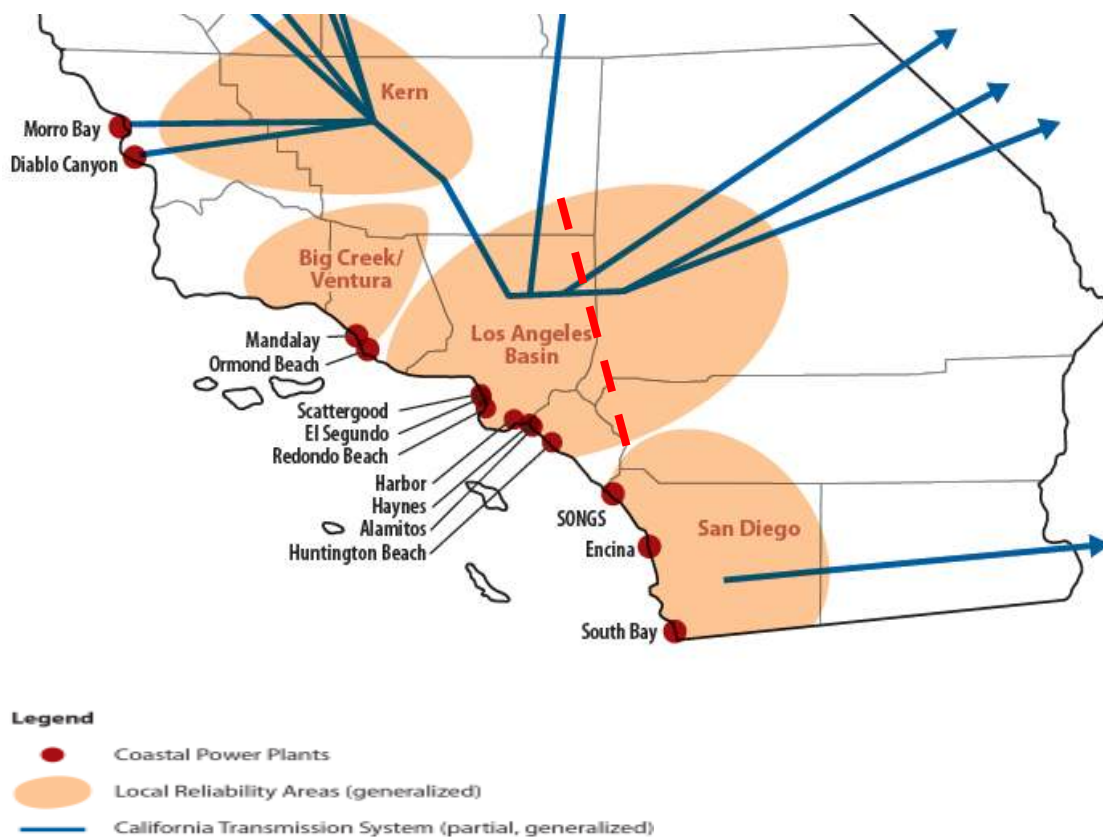
- The Western LA Basin sub-area load is assumed to be 50% of the LA Basin load. This assumption appears reasonably accurate since the results can be verified based on the CAISO's determination of the amount of new generation capacity needed in the Western LA Basin sub-area by year 2020 ("an estimated 2000 MW") as reported in Keith Casey's August 18, 2011 memorandum to the CAISO Board.
- The Western LA Basin sub-area LCR will increase annually by an amount equal to the load growth assumed in this area. This assumption is conservative since it assumes that, beyond the Colorado River-Devers-Valley #2 project and the Tehachapi Transmission Project, there will be no transmission additions that will increase the amount of power that can be reliably imported into the Western LA Basin sub-area. Should such transmission upgrades take place, the LCR for the Western LA Basin sub-area would be lower than is assumed in the analysis conducted for this paper.
- The load forecast used in the CAISO's LCR studies is more accurate than the load forecast adopted by the CEC for its 2009 IEPR. Because the differences between these two load forecasts are small (the CAISO's load forecast is 31 MW lower than the CEC's in 2013 and 175 MW lower in 2015), the impact on the analysis conducted for this paper is not significant.
- The CTPG's interpretation of the owners' OTC implementation plans, as documented in CTPG's September 19, 2011 Phase 2 study plan, is reasonably accurate. Given the amount of new generation proposed for the Western LA Basin sub-area, differences in interpretation of the owners' implementation plans are unlikely to lead to a conclusion that generation at the Redondo Beach Generating Station is required in order to meet the projected Western LA Basin sub-area LCR.

Local Reliability Analysis

The Local Capacity Requirement (LCR) studies performed by the CAISO each year identify specific areas within the CAISO Balancing Authority that have limited import capability such that a minimum amount of generation must be available within those areas to ensure that loads can be met under extreme weather conditions and contingency conditions established by NERC and CAISO reliability criteria. These areas are called Local Reliability Areas (also Local Capacity Requirement (LCR) areas) and the ones located in southern California are shown on the figures below. The CAISO's LCR study results are used by the CPUC in establishing jurisdictional load serving entities' "local" Resource Adequacy (RA) requirements.

An LRA may contain several sub-areas. For years 2012, 2013 and 2015 the CAISO has identified a LA Basin LRA area as well as Western LA Basin, Ellis, and El Nido sub-areas.¹² The CAISO has indicated that with construction of the Colorado River-Devers-Valley #2 line and transmission included in the Tehachapi Transmission Project, the LA Basin LRA and its corresponding LCR will be eliminated by year 2015 such that the most limiting LRA area will be the Western LA Basin sub-area.

Figure1. Southern California Local Reliability Areas & Coastal Units¹³

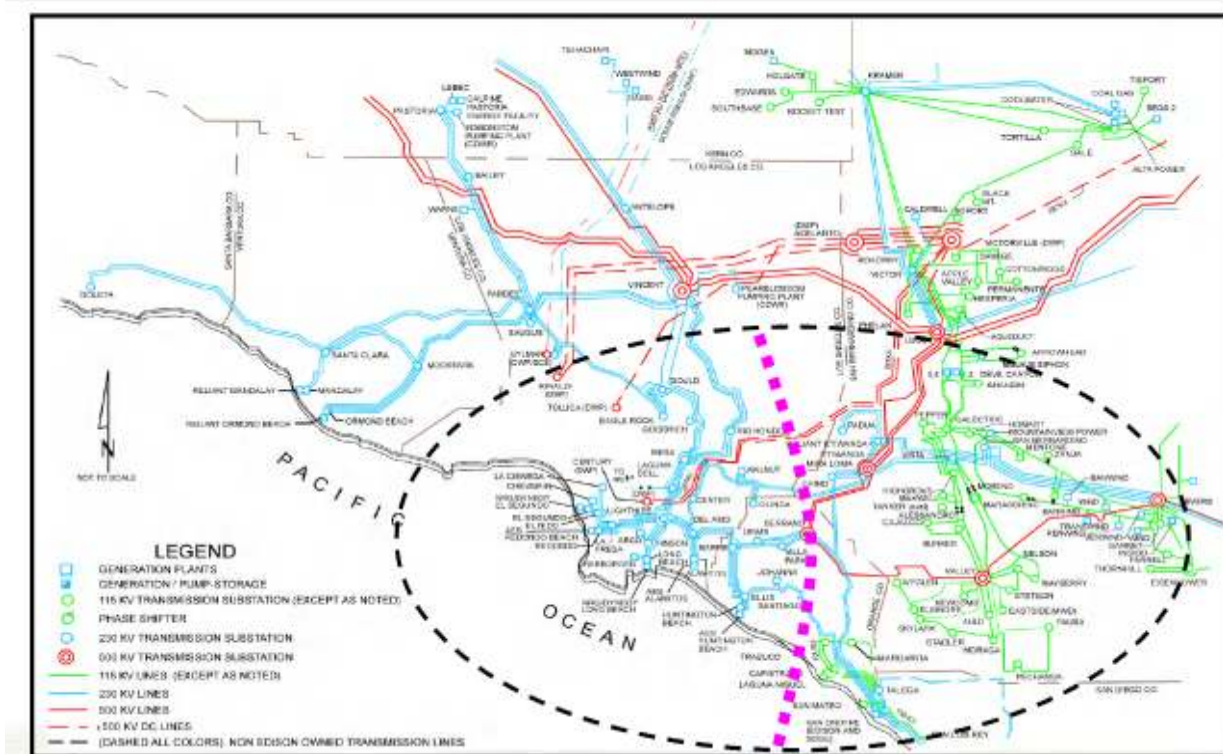


The above figure shows the CAISO-designated LRA areas (or LCR areas) in southern California. It also shows the location of OTC units, and a highly generalized transmission configuration in the area. A more detailed transmission configuration is depicted in Figure 2 below.

¹² Generation at the Redondo Beach Generating Station is not effective in meeting the LCRs for the Ellis and El-Nido sub-areas.

¹³ Figure from *Electric Grid Reliability Impacts from Regulation of Once-Through Cooling in California*, Prepared for: California Ocean Protection Council and State Water Resources Control Board, April 2008.

Figure 2. LA Basin and Western LA Basin sub-area Detailed Map¹⁴



The area within the dashed oval and to the west of the vertical dashed lines on Figures 1 and 2 constitutes the Western LA basin sub-area.

In general, the LCR for each LRA is the difference between (1) the annual peak load forecast under extreme weather conditions (summer weather conditions that would experienced, on average, only once every ten years), and (2) the maximum amount of power that can be reliably imported into the area under critical contingency (outage) conditions.

The LCR varies when any of the underlying components change (peak area loads and/or the maximum amount of power that can be imported into the area). The CAISO bases its LCR analysis on the CEC's adopted load forecast. Import limits into the area are a function of the existing transmission configuration, planned grid modifications and expansion, and the application of NERC and WECC reliability criteria.

¹⁴ The April 14, 2011 presentation by CAISO engineer Yi Zhang entitled *2012 Final LCR Study Results, Big Creek/Ventura and LA Basin*.

Reliability (Contingency) Analysis for the LA Basin

According to the CAISO's April 29, 2011 document, the most critical contingency for the LA Basin LCR area is the loss of one SONGS unit followed by the outage of the 500 kV Palo Verde-Devers line during the one-year-in-ten peak load hour. Under this contingency condition, flows could exceed the approved 6400 MW rating for the South of Lugo path. This limiting contingency establishes an LA Basin LCR of 10,865 MW in 2012 as the minimum generation capacity necessary for reliable load serving capability within this area. *(Page 83)*

According to the CAISO's December 30, 2010 document the most critical contingency for the LA Basin LCR area in year 2013 is the loss of the 500 kV Palo Verde-Colorado River line with SONGS #3 already out of service during the one-year-in-ten peak load hour. Under this contingency condition there is a potential overload on the South of Lugo path. This limiting contingency establishes a local capacity need of about 11,304 MW as the minimum capacity necessary for reliable load serving capability within this area.

For 2015, due to the addition of the 500 kV Vincent-Mira Loma line (part of the Tehachapi Transmission Project) and the 500 kV Colorado River-Devers #2 line, the maximum reliable level of imports into the LA Basin is increased considerably. It is estimated that about 10,800 MW of the LA Basin capacity is needed to serve load and reserves in the southern system during the one-year-in-ten peak load hour. However, in the 2015 timeframe, due to the addition of new transmission, the LA Basin is no longer a "load pocket" (i.e., transmission-constrained) and the Western LA basin sub-area becomes the most stringent and binding local area constraint. At that time it is envisioned by the CAISO that the LA Basin LCR area will be eliminated.

Reliability (Contingency) Analysis for the Western LA Basin sub-area

For 2013, the most critical contingency for the Western LA Basin sub-area is the loss of one of the 230 kV Serrano – Villa Park lines followed by the loss of the 230 kV Serrano – Lewis line. This contingency condition would result in the thermal overload of the remaining 230 kV Serrano – Villa Park line during the one-year-in-ten peak load hour. This limiting contingency establishes a local capacity need of 6090 MW as the minimum capacity necessary for reliable load serving capability within this sub-area.

For 2015, the most critical single contingency for the Western LA Basin sub-area is the loss of the 230 kV Sylmar-Gould line with SONGS #3 out of service. This results in a thermal overload of the 230 kV Sylmar-Eagle Rock line during the one-year-in-ten peak load hour. This limiting contingency establishes a local capacity need of about 5988 MW as the minimum capacity necessary for reliable load serving capability within this area. *(Pages 72-73).*

The CAISO's has not, to date, performed a LCR study for the Western LA Basin sub-area for the year 2014 or any year past 2015.

The CAISO study results are summarized in the Table 4 below.

Table 4: LA Basin and Western LA Basin - Local Capacity Requirements (CAISO LCR Study) Summary

	2011	2012	2013	2014	2015
LA Basin LCR (MW)	10,589	10,865	11,304		n/a
Net Qualifying Capacity in LA Basin LCR area (MW)	12,309	12,083	12,537		12,537
Surplus Capacity over LA Basin LCR (MW)	1720	1218	1233		n/a
Western LA Basin sub-area LCR (MW)		5,785	6,090		5,988
Net Qualifying Capacity in Western LA Basin sub-area (MW)		8,623	9,166		9,166
Surplus Capacity over Western LA Basin sub-area LCR (MW)		2,838	3,076		3,178

Note: The LA Basin LCR is satisfied by the line labeled “Net Qualifying Capacity in LA Basin LCR area (MW)” plus/minus any new power plants scheduled to come on line or retire in the LA Basin LCR area in any year from 2011 through 2015 (see Table 7)

Loads and Resources

Load Analysis

The CAISO’s LCR analysis uses the statewide load forecast adopted in the California Energy Commission’s (CEC’s) 2009 Integrated Energy Policy Report (IEPR).¹⁵ To estimate the LCR for the Western LA Basin sub-area in the years 2016 through 2020, this paper starts with the LCR estimated by the CAISO for year 2015 and increases this number by the amount of load growth in the Western LA Basin sub-area in each succeeding year. Unfortunately there is no official forecast of load in the Western LA Basin sub-area. Accordingly this paper develops an independent estimate of load (and load growth) in the Western LA Basin sub-area.

This independent estimate is developed by assuming the load in the Western LA Basin sub-area is equal to 50% of the load in the LA Basin LCR area as shown in the CEC’s adopted 2009 IEPR (see Form 1.5d in the CEC’s adopted 2009 IEPR). Loads in the Western LA Basin sub-area are assumed to grow at the same rate as the LA Basin load grows.

This study makes a small adjustment to the CEC’s adopted load forecast for the LA Basin LCR area. This adjustment scales the CEC’s forecast load for years 2016 through 2020 by the ratio of the CEC’s forecast load in the LA Basin LCR area for year 2015 to that used by the CAISO for year 2015 in its December 30, 2010 report. It is unclear why this difference in year 2015 loads exists, though the difference is relatively minor.

The details behind the forecast of load growth for the Western LA Basin sub-area are shown on Table 8 in the Appendix.

¹⁵ The CEC’s adopted demand forecast incorporates the impact of committed (funded) energy efficiency and demand response programs, as well as projections of behind-the-load-meter solar PV impacts and behind-the-load-meter combined heat and power (CHP) impacts.

Resource Analysis

To determine if there are adequate resources in the Western LA Basin sub-area to meet the Western LA Basin sub-area LCR, the total available Net Qualifying Capacity (NQC) of existing generation in the Western LA Basin sub-area is examined based on the calculations shown on Table 5 below. The 2013 through 2015 data is from the CAISO's December 30, 2010 "2013-2015 Local Capacity Technical Analysis, Report and Study Results." The 2012 data is from the CAISO's April 7, 2011 "2012 Local Capacity Technical Analysis, Draft Report and Study Results."

**Table 5: Generators in the Western LA Basin Sub-area Load Pocket
Net Qualifying Capacity (NQC)
(MW)**

Resource ID	CAISO Tag	SWRCB Compliance Date	2012	2013	2014	2015	2016	2017	2018	2019	2020
ALAMIT UNIT 1	Market/OT C	12/31/2020	174.56	174.56	174.56	174.56	174.56	174.56	174.56	174.56	174.56
ALAMIT UNIT 2	Market/OT C	12/31/2020	175.00	175.00	175.00	175.00	175.00	175.00	175.00	175.00	175.00
ALAMIT UNIT 3	Market/OT C	12/31/2020	332.18	332.18	332.18	332.18	332.18	332.18	332.18	332.18	332.18
ALAMIT UNIT 4	Market/OT C	12/31/2020	335.67	335.67	335.67	335.67	335.67	335.67	335.67	335.67	335.67
ALAMIT UNIT 5	Market/OT C	12/31/2020	497.97	497.97	497.97	497.97	497.97	497.97	497.97	497.97	497.97
ALAMIT UNIT 6	Market/OT C	12/31/2020	495.00	495.00	495.00	495.00	495.00	495.00	495.00	495.00	495.00
ANAHM CT	MUNI		40.64	46.00	46.00	46.00	46.00	46.00	46.00	46.00	46.00
ARCOGN UNITS	QF/Selfgen		56.62	62.72	62.72	62.72	62.72	62.72	62.72	62.72	62.72
ARCOGN UNITS	QF/Selfgen		56.62	62.72	62.72	62.72	62.72	62.72	62.72	62.72	62.72
ARCOGN UNITS	QF/Selfgen		56.62	62.72	62.72	62.72	62.72	62.72	62.72	62.72	62.72
ARCOGN UNITS	QF/Selfgen		56.62	62.72	62.72	62.72	62.72	62.72	62.72	62.72	62.72
ARCOGN UNITS	QF/Selfgen		28.31	31.37	31.37	31.37	31.37	31.37	31.37	31.37	31.37
ARCOGN UNITS	QF/Selfgen		28.32	31.37	31.37	31.37	31.37	31.37	31.37	31.37	31.37
BARRE QF	QF/Selfgen		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BARRE PEAKER	Market		45.38	45.38	45.38	45.38	45.38	45.38	45.38	45.38	45.38
BRDWAY UNIT 3	MUNI		65.00	65.00	65.00	65.00	65.00	65.00	65.00	65.00	65.00
CENTER QF	QF/Selfgen		17.99	25.28	25.28	25.28	25.28	25.28	25.28	25.28	25.28
CENTER RHONDO	QF/Selfgen		1.91	1.91	1.91	1.91	1.91	1.91	1.91	1.91	1.91
CENTER PEAKER	Market		44.57	44.57	44.57	44.57	44.57	44.57	44.57	44.57	44.57
CHEVMN UNITS	QF/Selfgen		0.15	1.58	1.58	1.58	1.58	1.58	1.58	1.58	1.58
CHEVMN UNITS	QF/Selfgen		0.16	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61
CHINO QF	QF/Selfgen		9.30	10.26	10.26	10.26	10.26	10.26	10.26	10.26	10.26
CHINO CIMGEN	QF/Selfgen		25.07	25.89	25.89	25.89	25.89	25.89	25.89	25.89	25.89
CHINO SMPPAP	QF/Selfgen		25.07	39.08	39.08	39.08	39.08	39.08	39.08	39.08	39.08
CHINO_6 SOLAR	Market		0.00								
CHINO MILIKN	Market		1.26	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90
ELLIS QF	QF/Selfgen		0.11	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29
ELSEGN UNIT 3	Market/OT C	12/31/2015	335.00	335.00	335.00	335.00	335.00	335.00	335.00	335.00	335.00
ELSEGN UNIT 4	Market/OT C	12/31/2015	335.00	335.00	335.00	335.00	335.00	335.00	335.00	335.00	335.00

GLNARM UNIT 1	MUNI		22.30	22.30	22.30	22.30	22.30	22.30	22.30	22.30	22.30
GLNARM UNIT 2	MUNI		22.30	22.30	22.30	22.30	22.30	22.30	22.30	22.30	22.30
GLNARM UNIT 3	MUNI		44.83	44.83	44.83	44.83	44.83	44.83	44.83	44.83	44.83
GLNARM UNIT 4	MUNI		42.42	42.42	42.42	42.42	42.42	42.42	42.42	42.42	42.42
HARBGN UNITS	Market		11.86	11.86	11.86	11.86	11.86	11.86	11.86	11.86	11.86
HARBGN UNITS	Market		76.28	76.28	76.28	76.28	76.28	76.28	76.28	76.28	76.28
HARBGN UNITS	Market		11.86	11.86	11.86	11.86	11.86	11.86	11.86	11.86	11.86
HINSON CARBGN	Market		22.67	29.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00
HINSON LBECH1	Market		65.00	65.00	65.00	65.00	65.00	65.00	65.00	65.00	65.00
HINSON LBECH2	Market		65.00	65.00	65.00	65.00	65.00	65.00	65.00	65.00	65.00
HINSON LBECH3	Market		65.00	65.00	65.00	65.00	65.00	65.00	65.00	65.00	65.00
HINSON LBECH4	Market		65.00	65.00	65.00	65.00	65.00	65.00	65.00	65.00	65.00
HINSON SERRGN	QF/Selfgen		27.67	28.10	28.10	28.10	28.10	28.10	28.10	28.10	28.10
HNTGBH UNIT 1	Market/OT C	12/31/2020	225.75	225.75	225.75	225.75	225.75	225.75	225.75	225.75	225.75
HNTGBH UNIT 2	Market/OT C	12/31/2020	225.80	225.80	225.80	225.80	225.80	225.80	225.80	225.80	225.80
HNTGBH UNIT 3	Market/OT C	12/31/2020	225.00	225.00	225.00	225.00	225.00	225.00	225.00	225.00	225.00
HNTGBH UNIT 4	Market/OT C	12/31/2020	227.00	227.00	227.00	227.00	227.00	227.00	227.00	227.00	227.00
JOHANN QFA1	QF/Selfgen		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LACIEN VENICE	QF/Selfgen		4.39	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68
LAFRES QF	QF/Selfgen		2.89	3.28	3.28	3.28	3.28	3.28	3.28	3.28	3.28
LAGBEL QF	QF/Selfgen		10.90	10.92	10.92	10.92	10.92	10.92	10.92	10.92	10.92
LGHTHP ICEGEN	QF/Selfgen		45.72	48.09	48.09	48.09	48.09	48.09	48.09	48.09	48.09
LGHTHP QF	QF/Selfgen		0.95	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
MESAS QF	QF/Selfgen		1.15	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17
OLINDA COYCRK	QF/Selfgen		3.13	3.13	3.13	3.13	3.13	3.13	3.13	3.13	3.13
OLINDA QF	QF/Selfgen		1.02	3.39	3.39	3.39	3.39	3.39	3.39	3.39	3.39
OLINDA LNDFIL	QF/Selfgen		4.50	4.90	4.90	4.90	4.90	4.90	4.90	4.90	4.90
PWEST UNIT	Market		0.22	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27
REDOND UNIT 5	Market/OT C	12/31/2020	178.87	178.87	178.87	178.87	178.87	178.87	178.87	178.87	178.87
REDOND UNIT 6	Market/OT C	12/31/2020	175.00	175.00	175.00	175.00	175.00	175.00	175.00	175.00	175.00
REDOND UNIT 7	Market/OT C	12/31/2020	505.96	493.24	493.24	493.24	493.24	493.24	493.24	493.24	493.24
REDOND UNIT 8	Market/OT C	12/31/2020	495.90	495.90	495.90	495.90	495.90	495.90	495.90	495.90	495.90
RHONDO QF	QF/Selfgen		1.62	1.27	1.27	1.27	1.27	1.27	1.27	1.27	1.27
RHONDO PUENTE	Market		0.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
SANTGO COYOTE	Market		4.22	9.99	9.99	9.99	9.99	9.99	9.99	9.99	9.99
SONGS UNIT 2	Market/OT C	12/21/2022	1122.0	1122.0	1122.0	1122.0	1122.0	1122.0	1122.0	1122.0	1122.0
SONGS UNIT 3	Market/OT C	12/31/2022	1124.0	1124.0	1124.0	1124.0	1124.0	1124.0	1124.0	1124.0	1124.0
TIFFNY DILLON	Wind		6.37	7.72	7.72	7.72	7.72	7.72	7.72	7.72	7.72
VERNON GONZL1	MUNI		5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75
VERNON GONZL2	MUNI		5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75
VERNON MALBRG	MUNI		42.37	42.37	42.37	42.37	42.37	42.37	42.37	42.37	42.37
VERNON	MUNI		42.37	42.37	42.37	42.37	42.37	42.37	42.37	42.37	42.37

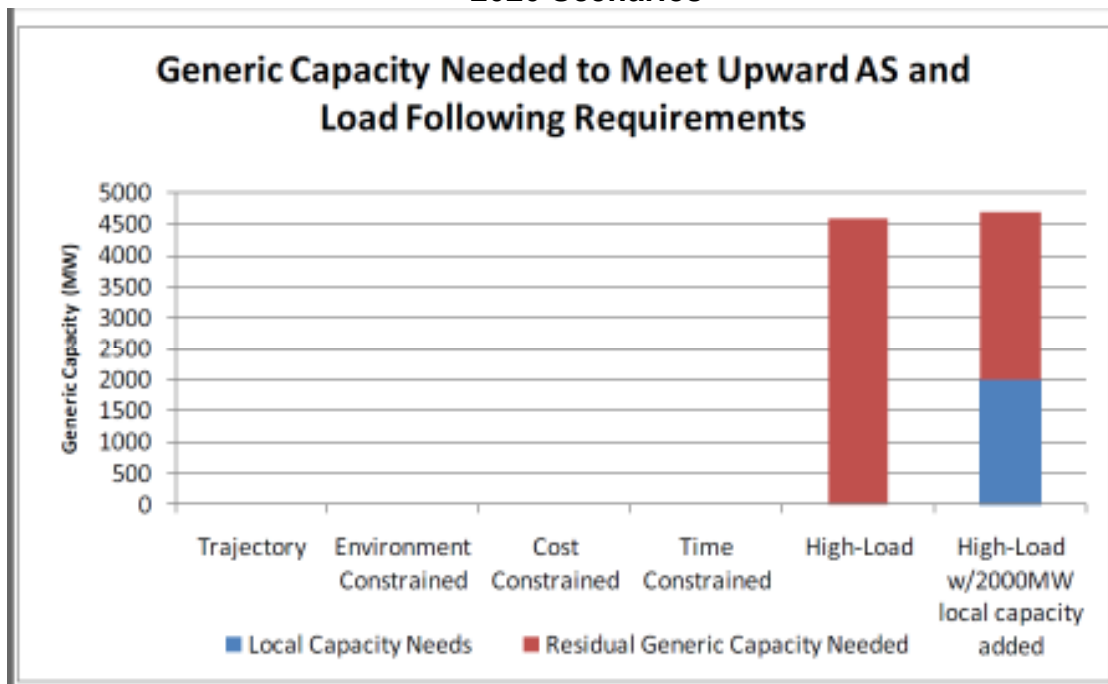
MALBRG											
VERNON MALBRG	MUNI		49.26	49.26	49.26	49.26	49.26	49.26	49.26	49.26	49.26
VILLPK VALLYV	QF/Selfgen		4.10	4.10	4.10	4.10	4.10	4.10	4.10	4.10	4.10
VILLPK MWDYOR	MUNI		4.30	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.90
WALNUT HILLGEN	QF/Selfgen		46.68	47.00	47.00	47.00	47.00	47.00	47.00	47.00	47.00
WALNUT WCOVST	Market		2.98	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96
WALNUT WCOVCT	Market		3.43	3.19	3.19	3.19	3.19	3.19	3.19	3.19	3.19
ARCOGN UNITS	Market		0.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00
HINSON QF	QF/Selfgen		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MOBGEN UNIT 1	QF/Selfgen		20.20	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00
NA ("COLDGEN")	Market			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NA ("GROWGEN")	Market			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NA ("ORCOGEN")	QF/Selfgen		0.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
NA ("THUMSGEN")	QF/Selfgen		0.00	49.00	49.00	49.00	49.00	49.00	49.00	49.00	49.00
NA ("OUTFALL1")	QF/Selfgen		0.00	17.00	17.00	17.00	17.00	17.00	17.00	17.00	17.00
NA ("OUTFALL2")	QF/Selfgen		0.00	17.00	17.00	17.00	17.00	17.00	17.00	17.00	17.00
NA ("PALOGEN")	QF/Selfgen		3.20	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00
NA ("VENICE")	QF/Selfgen		0.00	10.10	10.10	10.10	10.10	10.10	10.10	10.10	10.10
NA ("COYGEN")	QF/Selfgen		18.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00
NA ("FEDGEN")	QF/Selfgen		0.00	24.70	24.70	24.70	24.70	24.70	24.70	24.70	24.70
NA ("REFUSE")	QF/Selfgen			12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
NA ("SIGGEN")	QF/Selfgen			29.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00
PULPGN UNIT	Market			35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00
	Subtotal:		8623.0	8971.4	8971.4	8971.4	8971.4	8971.4	8971.4	8971.4	8971.4
Planned Retirements, Repowering and Replacements											
ELSEGN UNIT 3	Market	Plant Owner's OTC plan	-	(335.0)	(335.0)	(335.0)	(335.0)	(335.0)	(335.0)	(335.0)	(335.0)
ELSEGN UNIT 4	Market	Plant Owner's OTC plan if unable to repower	-					(335.0)	(335.0)	(335.0)	(335.0)
El Segundo Unit 5 GT			-	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0
El Segundo Unit 6 GT			-	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0
El Segundo Unit 7 ST			-	130.0	130.0	130.0	130.0	130.0	130.0	130.0	130.0
	Total:	NQC	8623.0	9166.4	9166.4	9166.4	9166.4	8831.4	8831.4	8831.4	8831.4
		Non-OTC	1437.4	2328.5	2328.5	2328.5	2328.5	2328.5	2328.5	2328.5	2328.5
		Nuclear	2246	2246.0	2246.0	2246.0	2246.0	2246.0	2246.0	2246.0	2246.0
		OTC	4940	4592	4592	4592	4592	4257	4257	4257	4257

Renewable Integration Analysis

Generating capacity that has the ability to quickly increase (“Upward Balancing Flexibility”) or decrease output (“Downward Balancing Flexibility”) as directed by the CAISO, is needed in order to integrate increasing amounts of intermittent renewable generation. Available data shows that the output of wind and solar generators can change quickly, and by large amounts, as ambient weather conditions change (e.g., fluctuating wind speeds, transient cloud cover). In order to maintain a balance between load and generation, fluctuations in the output of wind and solar resources (assuming no on-site storage facility) must be offset by corresponding changes in the output of other generators whose real-time operations can be controlled through CAISO-direction. This controllable generation is sometimes referred to as “flexible generation” or as generation that is needed for “renewable integration.”

Based on the CAISO’s renewable integration analysis--which assumes all existing OTC units will be retired--4,600 MW of new flexible generating capacity will be needed by year 2020 (see Figure 3).

Figure 3: Capacity Needed to Meet Upward Balancing Shortages – 2020 Scenarios



The “2011 CTPG Final Study Plan” dated September 19, 2011 sets forth CTPG’s assumptions as to the disposition of the existing coastal generating units using coastal or estuarine waters for cooling (Once-Through-Cooling or “OTC” units). As shown in Table 6, CTPG assumes that there will be 3,118 MW of new combined cycle generating capacity

added within the CAISO balancing authority at sites with existing OTC units; 2,618 MW if no combined cycle generating capacity is added at the Redondo Beach Generating Station site. In addition, Table 6 shows that the CTPG is assuming another 1,427 MW will come from repowering and gas turbine additions at existing OTC generating stations; 981 MW if there are no new gas turbines built at the Redondo Beach Generating Station site.

Table 6: Generation Owners’ Implementation Plans for OTC Units in the Western LA Basin sub-area (as interpreted by the CTPG)¹⁶

Generating Units	Existing Generation	New Generation		
	Compliance Assumed without New Generation (MW)	Combined Cycle Addition (MW)	Repower or Gas Turbine Addition (MW)	Total New Generation (Combined Cycles + Gas Turbines + Repowers) (MW)
Morrow Bay units 1-4			164	164
Moss Landing 1-2	1020			
Moss Landing 6-7			100	100
Pittsburgh 5-6	660			
Encina 1-3		558		558
Encina 4-5	628			
AES Redondo Beach 5-8		500	446	946
AES Alamitos 1-6		1000	417	1417
AES Huntington Beach 1-4		500	300	800
El Segundo 1-2 (renamed 5, 6 and 8)		560		560
Mandalay 1-2	430			
Ormond Beach 1-2	1500			
Subtotal	4238	3118	1427	4545
less AES Redondo Beach 5-8		-500	-446	-946
Total assuming no generation at RB	4238	2618	981	3599

Assuming the existing generation at the Redondo Beach Generating Station is retired and that no new generation is built at that location, the CTPG is assuming there will be 3,599 MW (2,618 MW + 981 MW) of new combined cycle and repowered/gas turbine generating capacity at existing OTC unit locations. On this basis, 1,001 MW would still be needed for “system operational requirements.” (4600 MW – 3599 MW = 1001 MW)

Based on CTPG’s assumptions, this deficiency could be met with generation from other OTC sites as shown on Table 6 above: Moss Landing 1 and 2 (1020 MW), Pittsburgh 5 and 6 (660 MW), Encina 4 and 5 (628 MW), Mandalay 1 and 2 (430 MW) and Ormond Beach 1 and 2 (1500 MW). This generation totals 4238 MW. Of course, the actual amount of flexible generating capacity available at these sites will depend on how compliance with the SWRCB’s policy on the use of coastal and estuarine waters for power plant cooling is achieved.

In addition to the above resources, the renewable integration need could also be met with flexible generating capacity additions contemplated by the numerous proposals for adding

¹⁶ CTPG’s interpretation of the generator owners’ implementation plans for OTC units is described in the CTPG’s 2011 Phase 2 study plan at section 3.6. The study plan is available on the CTPG website at www.ctpg.us under “Plan Development.”

flexible generating resources within the CAISO balancing authority but outside of the existing OTC generating stations. CTPG’s 2011 Phase 2 study plan and SCE’s LTPP filing,¹⁷ for example, indicate that Power Purchase Agreements (PPAs) totaling 3875.6 MW have been signed in the SCE¹⁸, PG&E and SDG&E distribution service areas. Some of these generation additions are listed on Table 7.

Table 7. New Non-Renewable Generating Facilities Contracted or Under Construction in California (excluding the El Segundo combined cycle plant)

Local Capacity Area	Facility Name	NQC (MW)	COD
Western LA Basin Plant (Under Construction)	Canyon Power	200	2012
LA Basin Plant (Under Construction)	Riverside Energy Resource Units 3&4	96	2011
LA Basin (Contracted)	Sentinel	850	2015
Western LA Basin (AFC Permitted)	Walnut Creek Energy Center	500	2013
PG&E Area	Marsh Landing	774	2013
PG&E Area	Oakley	672	2016
PG&E Area	Mariposa	200	2013
PG&E Area	GWF Tracy Expansion	50	2012
PG&E Area	Los Esteros Expansion	120	2013
SDG&E Area	Pio Pico	304.8	
SDG&E Area	Escondido Energy Center	9	
SDG&E Area	Quail Brush (“Cogentrix”)	99.8	
Total PPA		3875.6	

Note 1: Any of the units listed on the Table 7 in the Western LA Basin sub-area, they would count towards the Western LA Basin sub-area LCR.

Note 2: If any of the units listed on Table 7 are “flexible” resources, they would count toward the flexible capacity need for integrating renewable resources. Based on observations of the types of new fossil-fired generation being proposed recently, virtually all of it is gas-fired and could be dispatched by the CAISO. This generation would therefore be considered “flexible.” It is reasonable to count all of it towards the 4600 MW flexible resource need.

Note 3: There are other dispatchable generators under construction or in the permitting process that are not listed here. In addition, there may be other dispatchable generators not subject to the CEC AFC process (e.g., thermal generators under 50 MW) that will be built.

¹⁷ TESTIMONY OF SOUTHERN CALIFORNIA EDISON COMPANY ON TRACK I ISSUES, Before the Public Utilities Commission of the State of California, July 1, 2011.

¹⁸ According to SCE’s testimony, “Generators are classified as either ‘Contracted,’ ‘Application For Certification (AFC) Permitted,’ or ‘Under Construction’.”

Existing Generation at the Redondo Beach Generating Station and AES-SL's OTC Implementation Plan

The existing Redondo Beach Generating Station is comprised of four conventional gas-fired boiler/steam units, unit #5 (178.87 MW), #6 (175 MW), #7 (493.24 MW) and #8 (495.9 MW), totaling about 1343 MW.

AES Southland, LLC (AES-SL) submitted a June 16, 2011 revision to its original April 1, 2011 document entitled "*Implementation Plan, Statewide Policy Use of Coastal and Estuarine Waters, Power Plant Cooling.*" The revision describes AES-SL's plan for the existing Redondo Beach Generating Station (RBGS) as follows:

"AES-SL's current plan for RBGS would replace the four existing units at the facility in two separate phases with each phase involving the retirement of two units at the site. The first phase would initially place 300 MW in operation in the third quarter of 2018, another 300 MW in the fourth quarter of 2018 and 300 MW in the second quarter of 2019, for a total of 900 MW of new generation in the first phase....Units 7 and 8 would be permanently retired and rendered inoperable approximately 90 days prior to the commercial operations of the first (2018) and last (2019) units in order to provide time for commissioning activities....

The second phase of the plan would entail the construction and commercial operations of 270 MW of new generation by the second quarter of 2024. The footprint for Phase 2 would use the property freed up due to the demolition of Units 7 and 8....

...In total, RBGS is anticipated to be repowered to 1170 MW – all of which is contemplated to be combined cycle technology."¹⁹ (page 6)

AES-SL states that their "three generating stations provide critical capacity to the Los Angeles Basin and are an integral part of the LCR..." AES-SL indicates that the new units will provide "operating flexibility to effectively integrate increasing amounts of renewable energy into the electrical transmission and distribution system....and will be effective in meeting California's future needs forecasted for the 2020 planning horizon within the Los Angeles Basin LCR." (page 2). As discussed earlier, the CAISO expects that the LA Basin LCR area will be eliminated by year 2015 such that the Western Los Angeles Basin sub-area will become the binding LCR area.

AES-SL indicates that it believes "flexible, load following generation, with adequate contingency reserves, ramp speed and duration and start/stop capabilities is needed to maintain electrical system reliability and integrate the desired renewable resources." (page

¹⁹ A combined cycle power plant is comprised of (i) one or more gas turbines that generate electricity directly and that supply exhaust heat to a boiler, whose steam then drives (ii) a separate steam turbine that generates additional electricity.

3) AES-SL observes that “due to our location in critical local reliability areas, AES-SL recognizes the need for its generating capacity to maintain certain minimum levels during the transition and in the future.” AES-SL states that “grid stability and reliability includes energy and ancillary needs, resource adequacy, local voltage support, and inertia to facilitate higher levels of imported power.” (page 5)

In summary, AES-SL states that it:

“...understands the critical value of operational flexibility as opposed to just reserve margins. Generation with flexible operating characteristics including quick and frequent start, responsive ramping, massive load shedding, and large load ranges are the right solution for California. As such the RBGS plan includes technology that will supply all of these flexibilities in an environmentally responsible, cost-efficient manner.” (page 9)

The four units at the existing Redondo Beach Generating Station have upward and downward generation dispatch flexibility and may therefore supply ancillary services into the CAISO’s day-ahead and real-time markets. The extent to which the four units currently participate in the CAISO’s markets is considered commercially sensitive information and is therefore not available in the public domain. There is no study provided by AES-SL in their OTC implementation plan indicating that there would be a deficiency of ancillary service capacity in the CAISO BA if there were no generation at the Redondo Beach Generating Station.

When on line, the four existing generators at the Redondo Beach Generating Station provide inertia (rotating or spinning) which contributes to the aggregate amount of inertia in the southern California region. The aggregate amount of inertia in the southern California region establishes the maximum amount of power that can be imported into the southern California region. The relationship between the inertia and maximum imports is set forth in the Southern California Import Transmission (SCIT) nomogram. In certain circumstances, the SCIT nomogram can limit the amount of otherwise economic power that can be reliably imported into the southern California region. Based on the CAISO’s recent annual reports, the SCIT nomogram would not appear to be imposing a significant economic constraint on grid operations.²⁰ No data or studies have been provided by AES-SL to demonstrate whether, and under what conditions, inertia located at the Redondo Beach Generating Station would allow larger amounts of economic power to be imported into the southern California region. Analysis would be required to examine the validity of any such claim (i.e., that elimination of generation at the Redondo Beach Generating Station -- and the corresponding loss of inertia -- would restrict otherwise economic imports into the southern California region).

The four existing generators at the Redondo Beach Generating Station, when on-line, provide voltage support. The extent to which such voltage support is critical at any point in time can only be determined through contingency-based power flow analysis that indicates whether voltage performance would fall outside of the bounds allowed under applicable

²⁰ The CAISO held a stakeholder conference call on October 18, 2011 at which they announced that studies do not show "a significant need for inertia and frequency response."

reliability criteria. The CAISO conducts such analysis on an annual basis for upcoming years. Assuming all of the existing coastal generations using Once-Through-Cooling technology are retired, the CAISO has determined that 2000 MW of new generation will be needed in the Western LA Basin sub-area by year 2020 to ensure applicable reliability criteria are met. However, this additional generation can be located anywhere within the Western LA Basin sub-area. Voltage problems that are only mitigated by generation at the Redondo Beach Generating Station have not been identified by the CAISO. AES-SL has provided no studies of its own to support any assertion that generation at the Redondo Beach Generating Station is required for voltage support. Analysis would be required to examine the validity of any such claim.

GLOSSARY

AES-SL – AES-Southland. The owner of the RBGS and other generation assets in southern California.

AS – Ancillary Services. Within the CAISO BA, ancillary services are comprised of non-spinning reserves (off-line generation that can start-up within ten minutes if additional supply sources are needed to maintain a load-resource balance), spinning reserves (on-line generation that can ramp up immediately if additional supply sources are needed to maintain a load-resource balance), regulation-up (on-line generation that can respond instantaneously to supply additional power in order to maintain a load-resource balance) and regulation-down (on-line generation that can respond instantaneously to reduce output in order to maintain a load-resource balance). Demand response programs that provide effective real-time control over load levels may also be eligible to supply ancillary services within the CAISO BA.

BA – Balancing Authority. A Balancing Authority is comprised of the transmission assets under the control of a single entity, as well as all generators and loads connected thereto.

CAISO – California Independent System Operator. The California Independent System Operator operates the transmission assets of the California IOUs, and certain southern California municipal utilities, using a bid-based market system that provides open access for all market participants. The transmission assets operated by the CAISO form the CAISO BA area. The CAISO BA area includes transmission lines reaching to Palo Verde in Arizona, Eldorado in southern Nevada, and the California-Oregon border. The CAISO BA area includes the distribution service areas of SCE, SDG&E, PG&E, certain southern California municipal utilities and number of other small wholesale entities. It also includes the pumping loads of the MWD and the CDWR.

CDWR – California Department of Water Resources. The California Department of Water Resources is a state agency that delivers water from the Sacramento River delta to southern California. The California Department of Water Resources operates large pumps within the CAISO BA.

CEC – California Energy Commission. The California Energy Commission is a state agency responsible for long-range energy planning for the state of California. These energy plans are formalized biennially in the California Energy Commission's IEPR. The CEC also has licensing authority for thermal power plants over 50 MW.

CHP – Combined Heat and Power. Combined heat and power applications are generally behind-the-load-meter generators that, in addition to electric output, supply heat for other commercial applications.

“Combined Cycle” – A combined cycle power plant is comprised of (i) one or more GTs that generate electricity directly and that supplies exhaust heat to a boiler, whose steam then drives (ii) a separate ST to generate additional electricity.

CPUC – California Public Utilities Commission. The generation procurement and development activities of the California IOUs are subject to the jurisdiction of the California Public Utilities Commission.

CTPG – California Transmission Planning Group.

DA – Direct Access. Direct Access customers are end-use consumers that have elected to have their electric supplies provided by an entity *other than* the IOUs or a municipal utility. Only some end-use consumers have the legal ability to make this election.

GT – Gas turbine. A generator whose prime mover is the combustion of natural gas; e.g. a jet engine.

IEPR – Integrated Energy Policy Report. The formal document adopted by the CEC every two years that sets forth a long-range energy plan for the state of California. The Integrated Energy Policy Report includes the CEC-adopted forecast of electric loads for all of the major distribution service areas within the state of California. These CEC-adopted distribution service area forecasts may be disaggregated by key planning regions, e.g., SCE distribution service area loads within, and outside, the Los Angeles Basin LCR area.

IOUs – Investor Owned Utilities, namely SCE, SDG&E and PG&E.

LA – Los Angeles. As used in this document, the Los Angeles basin refers to that portion of the SCE distribution service area that is electrically south of Lugo substation, east of Palm Springs and north of SONGS.

LCR – Local Capacity Requirement. The CAISO establishes LCRs for transmission-constrained load pockets. The constraints are determined by applying reliability criteria established by the CAISO, WECC or NERC. The Local Capacity Requirement is the aggregate amount of NQC that LSEs within the LCR area are obligated to purchase, own or control within the LCR area. An LSE must provide an annual demonstration to the CAISO that the LSE has secured their load-weighted share of the Local Capacity Requirement for a given LCR area.

LRA – Local Reliability Area. Local Reliability Areas (LRAs), where the ability to import power is limited and the BA must, instead, rely on local power plants to maintain electric service reliability.

LSE – Load Serving Entity. A load serving entity has the responsibility to arrange energy supplies to meet specific end-use loads within utility distribution service areas. SCE, SDG&E and PG&E are load serving entities. DA suppliers such as Constellation Energy and Nobel Energy are also load serving entities.

LTTP – Long Term Procurement Plan. The CPUC periodically directs the California IOUs to prepare and file Long Term Procurement Plans. As approved by the CPUC, the Long

Term Procurement Plans guide the contracting and generation development activities of the California IOUs.

“Market” – In this document, a “market” generator is not owned or controlled by a “muni” and is sensitive to CAISO market clearing prices for energy.

“MUNI” – A municipal utility. In this document, a “muni” generator is owned or controlled by a municipal utility whose transmission assets are subject to CAISO market protocols. For example, a generator owned by the city of Vernon would be a “muni” generator.

MWD – Metropolitan Water District. A special purpose agency that supplies Colorado River water to southern California. The Metropolitan Water District operates large pumps and owns transmission facilities within the CAISO BA.

NERC – National Electricity Reliability Council. The organization that promulgates common reliability criteria applicable to all transmission facilities in the United States.

NQC – Net Qualifying Capacity. The amount of each generator’s installed capacity that the CAISO will permit LSEs to count towards an applicable LCR and/or towards system RA requirements. The CAISO also establishes Net Qualifying Capacity for demand response programs. The NQC for demand response programs may also be counted towards applicable LCR and/or towards system RA requirements.

OTC – Once-Through-Cooling. For purposes of this document, a technology which uses coastal or estuarine waters to cool power plant equipment.

PPA – Power Purchase Agreement. In this document, a Power Purchase Agreement refers to the contractual arrangement whereby a generation developer commits to build a power plant for the benefit of a counter-party LSE.

PG&E – Pacific Gas & Electric Company

PV – Photovoltaic. Solar photovoltaic generators may be located behind-the-load-meter (e.g., residential rooftop applications) or in front-of-the-load meter (e.g., constructed over parking lots).

“QF/Selfgen” – Qualifying Facility/self-generation. As used in this document, a “QF/Selfgen” is either (i) a Qualify Facility that provides both electricity and heat, where—pursuant to federal law—the electric output must be purchased by a utility and the heat must be used for a commercial purpose, or (ii) a behind-the-load-meter generator. “QF/Selfgen” facilities normally operate at their NQC output level, do not offer ancillary services to the CAISO, and are generally insensitive to CAISO market clearing prices for energy.

RA – Resource Adequacy. The CAISO establishes system Resource Adequacy requirements for CAISO LSEs. The CPUC also sets RA requirements for the California

IOUs. Each CAISO LSE must annually demonstrate to the CAISO that it has secured enough NQC to meet the LSE's expected peak load plus a 15% – 17% planning reserve margin.

RBGS – Redondo Beach Generating Station. The existing Redondo Beach Generating Station is comprised of four boiler units.

RMR – Reliability Must Run. The CAISO has the tariff authority to impose Reliability Must Run contracts on generators if the CAISO determines that a generator's ability to exercise undue local market power is not mitigated by a bilateral contract with a load serving entity, or if the CAISO determines a generator critical for local reliability may be uncompetitive in the market and therefore retired.

SDG&E – San Diego Gas & Electric Company

SCAB – South Coast Air Basin. The South Coast Air Basin is the southern California region within which a common set of air pollution control requirements apply.

SCE - Southern California Edison Company

SCIT – Southern California Import Transmission nomogram. The Southern California Import Transmission nomogram establishes limits on the ability to import power into the southern California region (which includes both the Los Angeles and San Diego areas). These limits depend on the aggregate amount of inertia provided by generators within the southern California region.

SP15 – South of Path 15. Path 15 is comprised of the transmission lines between Midway and Gates/Los Banos substations. Path 15 is commonly considered to be the electric connection between northern and southern California.

SONGS – San Onofre Nuclear Generating Station. The San Onofre Nuclear Generating Station is comprised of generating units # 2 (1122 MW) and 3 (1124 MW). It is jointly owned by SCE, SDG&E and the City of Riverside.

ST – Steam turbine. A generator whose prime mover is steam provided by a boiler. The boiler is fed by heat from another source (such as the exhaust of a GT) and/or can be fired directly by natural gas.

SWRCB - State Water Resources Control Board. The state agency responsible for establishing rules governing the use of coastal and estuarine waters for power plant cooling.

WECC – Western Electricity Coordinating Council. The regional reliability organization that directs the implementation of common reliability criteria applicable to all transmission facilities of the interconnected BAs in the western United States, western Canada and northern Baja Mexico.

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APPENDIX

Table 8: LA Basin and Western LA Basin sub-area Load Calculations (2012-2020) ^{a/}

	2012	2013	2014	2015	2016	2017	2018	2019	2020
SCE Service Area - LA Basin	18394	18689	18928	19182	19442	19716	19978	20243	20529
Anaheim	625	634	641	649	657	665	672	680	688
Riverside	671	686	698	712	725	739	753	768	783
Vernon	194	196	198	200	201	203	204	206	207
MWD	22	22	22	22	22	22	22	22	22
Other SP15 LSEs - LA Basin	238	243	247	251	255	260	264	268	273
Pasadena	331	332	331	332	332	333	334	334	334
LA Basin Local Area Load (MW)	20,475	20,802	21,065	21,348	21,634	21,938	22,227	22,521	22,836
LA Basin load w/o MWD	20453	20780	21043	21326	21612	21916	22205	22499	22814
Adjustment based on CAISO	(30)	(31)	(31)	(175)	(177)	(180)	(182)	(184)	(187)
MWD	22	22	22	22	22	22	22	22	22
Adjusted LA Basin LCR Area Load (MW)	20,445	20,771	21,034	21,173	21,457	21,758	22,045	22,337	22,649
Load Growth in LA Basin LCR Area		326	263	139	284	301	287	292	312
Load Growth in Western LA Basin sub-area		163	132	70	142	151	144	146	156
LCR for the Western LA Basin sub-area	5785 ^{b/}	6090 ^{c/}		5988 ^{c/}	6130	6281	6424	6570	6726

^{a/} One-in-ten-year peak demands (MW).

^{b/} From the CAISO's April 7, 2011 "2012 Local Capacity Technical Analysis, Draft Report and Study Results."

^{c/} From the CAISO's December 30, 2010 "2013-2015 Local Capacity Technical Analysis, Report and Study Results."

ATTACHMENT

About Advanced Energy Solutions

Advanced Energy Solutions is a consulting company headquartered in San Diego, California that has been in operation since early 2006. Advanced Energy Solutions has provided consulting services to its clients in the areas of power project development, regulatory policy, economic analysis, California Independent System Operator (CAISO) markets, transmission planning and interconnection expansion, offer preparation and rates.

The principal, Jaleh Firooz, is an energy market and transmission system expert with more than 30 years of experience in the electric utility industry. Ms. Firooz is the founder of Advanced Energy Solutions. She has worked for San Diego Gas and Electric for over twenty four years in the engineering, operations, transmission, resource planning, procurement, and regulatory affairs areas, and is one of the original and key participants in the deregulation of California's electricity industry and the formation of the CAISO.

Advanced Energy Solutions has provided expert testimony and analysis to merchant generators, transmission companies, consumers and environmental groups in California as well as other areas of the United States. It has provided technical and regulatory advice to developers of renewable energy projects, focused on project economics, siting, permitting, transmission interconnection and purchase power agreements. Advanced Energy Solutions has participated in numerous CAISO transmission and other planning activities including, recently, the Renewable Energy Transmission Initiative (RETI), the CAISO Transmission Planning Process (TPP) and the TPP-GIP (Generation Interconnection Process) integration initiative.

Ms. Firooz has authored and published several papers and articles which have received national attention. Ms. Firooz holds an M.B.A and B.S. in Electrical Engineering. She is a registered Professional Engineer in the state of California since 1985.