

Before the State of California Energy Commission  
Carlsbad Energy Center Project

Docket No. 07-AFC-06

Prepared Testimony of Robert Sparks  
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**I. Introduction and Summary of Testimony**

My name is Robert Sparks. I am employed by the California Independent System Operator Corporation (ISO), located at 250 Outcropping Way, Folsom, California 95630. The ISO is a nonprofit public benefit corporation that operates the electric transmission grid serving approximately 80 percent of California's electric load for the benefit of California's citizens. My title is Manager, Regional Transmission. I am a licensed Professional Electrical Engineer in the State of California. I hold a Master of Science degree in Electrical Engineering from Purdue University, and a Bachelor of Science degree in Electrical Engineering from California State University, Sacramento.

On June 30, 2011, the California Energy Commission issued a ruling remanding this matter to the Carlsbad Application for Certification Committee to revise the Presiding Member's Proposed Decision to address, among other matters, grid reliability issues referenced in public comments by the ISO during the CEC's June 30, 2011 business meeting. At that meeting, the ISO provided public comments regarding the fact that the greater San Diego area requires a certain amount of local generation resources, and without construction of the Carlsbad Energy Center Project retirement of existing units at the Encina Power Station may be difficult to accomplish.

My testimony describes the ISO's efforts to determine local capacity needs in the San Diego local capacity area. These assessments help identify the minimum amount of resources within transmission constrained areas such as San Diego that must be available to support the reliable operation of the transmission system. My testimony addresses local capacity needs for 2012 in San Diego based on the ISO's

2012 local capacity technical study as well as projected local capacity needs in the Encina sub-area for 2015 based on a long-term local capacity reliability study published as part of the ISO's 2010/2011 transmission plan. I also describe projected local capacity needs in San Diego for 2020 based on transmission planning studies that the ISO conducted as part of its 2010/2011 transmission planning process in connection with different renewable generation resource portfolios. In addition, my testimony briefly describes the ISO's planning studies underway in connection with implementation of the State of California's policy on the use of ocean and estuarine water for power plant cooling (OTC policy).

The proposed Carlsbad Energy Center Project will satisfy the likely generation needs identified in the ISO's long-term local capacity technical studies and longer-term planning studies. Absent the Carlsbad Energy Center Project, or some comparable project, the ISO will likely need one or more of the units at the Encina Power Station site to continue to operate beyond December 31, 2017 (the final compliance date for the facility in the OTC policy) while additional infrastructure is planned, financed and constructed.

**II. The proposed Carlsbad Energy Center will help meet projected local capacity needs in the San Diego local capacity area and Encina local capacity sub-area and facilitate the retirement of the Encina Power Station.**

Each year, the ISO performs a local capacity technical analysis. This study identifies the minimum amount of resources within transmission constrained areas – known as local capacity areas – that must be available to support the reliable operation of the transmission system. The study also identifies generating units within each local capacity area that must be available to support the reliable operation of the transmission system. The ISO undertakes the study through a process that is open to public participation.

The local capacity technical study determines the minimum amount of resources within a local capacity area needed to address reliability concerns following the occurrence of contingencies on the electric system as identified in the ISO's federally-approved tariff and applicable reliability standards adopted by the

North American Electric Reliability Corporation and Western Electricity Coordinating Council. Among other parameters, the study requires that the ISO plan for contingencies such as the loss of transmission facilities while local generation is out of service. This planning approach ensures that the ISO can contain system impacts that might otherwise result from the loss of transmission and generation facilities.

The ISO completed the 2012 Local Capacity Technical Analysis earlier this year. The study identifies capacity needs in the San Diego local capacity area. The ISO study identifies existing units at the Encina Power Station as qualifying capacity to fulfill this need. A copy of the ISO's Final Report and Study Results is available on the ISO's web site:

[http://www.caiso.com/Documents/Final2012LCTStudyReportApr29\\_2011.pdf](http://www.caiso.com/Documents/Final2012LCTStudyReportApr29_2011.pdf)

The ISO also publishes a long-term local capacity technical study as part of its annual transmission plan. For the 2010/2011 transmission plan, this analysis identifies local capacity needs in the 2013 and 2015 periods. The purpose of this effort is to provide transmission planning process participants with information regarding the trend of future local capacity needs. Among other findings, the ISO's long-term local capacity study reflects a need for generation in a new Encina local capacity sub-area starting in 2015. The most critical contingency for this sub-area is the loss of Encina 230/138 kV transformer followed by the loss of Sycamore-Santee 138 kV transmission line, which could thermally overload the Sycamore-Chicarita 138 kV transmission line. This contingency reflects a local capacity need of 20 MW in 2015 as the minimum capacity necessary to serve load reliably within this sub-area. While the need identified amounts to a limited amount of generation, even a small need can create reliability concerns for the transmission grid. The ISO study identifies existing units at the Encina Power Station as the qualifying capacity to fulfill this need. A copy of the 2013-15 long-term local capacity technical study is available on the ISO web site: <http://www.caiso.com/287c/287ca3cc28a80.pdf>

As identified in the ISO's local capacity technical studies for 2012 and 2015, existing capacity at the Encina Power Station serves to meet local capacity needs in the San Diego local capacity area and Encina local capacity sub-area. The ISO

expects this need to continue to trend upward after 2015. The proposed Carlsbad Energy Center will also satisfy these identified needs.

**III. In addition to the needs projected in its long-term local capacity study, the ISO projects local capacity needs in 2020 at the site of the Encina Power Station or an electrically equivalent location.**

In the 2010/11 transmission planning process, the ISO performed transmission planning studies that examined multiple generation portfolio scenarios under a 33 percent renewable portfolio standard. These planning studies investigated the transmission need under different conditions. More information about the local area transmission assessments is available in Chapter 5 of the 2010-2011 transmission plan posted on the ISO's website:

<http://www.caiso.com/Documents/Board-approvedISO2010-2011TransmissionPlan.pdf>

The ISO performed these studies consistent with applicable reliability standards and ISO grid planning guidelines, including, but not limited to, power flow contingency analysis, post-transient voltage stability analysis and transient stability analysis. Different renewable generation portfolios will cause different dispatch and path flow patterns on the transmission system. The ISO used historical data as a reference to develop base cases for these scenarios and performed production cost simulations for each renewable generation portfolio. The ISO developed base cases to represent stressed conditions according to the production cost simulation results for the 2020 study year for each corresponding renewable generation portfolio.

The studies identified voltage instability following the double outage of Imperial Valley– ECO<sup>1</sup> and Imperial Valley–Central 500kV transmission lines. Under some of the renewable generation portfolios, the ISO also identified voltage instability following single outages of Imperial Valley– ECO, ECO–Miguel, and Imperial Valley–Central 500kV transmission lines. The studies also identified voltage

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<sup>1</sup> ECO is a proposed substation in South West San Diego County near the border of Imperial County and Mexico.

instability following outage of generation units at the San Onofre Nuclear Generating Station.

The ISO identified the re-powering of generation at the Encina Power Station site as the expected mitigation for the identified voltage instability and thermal overloads in its 33 percent RPS transmission studies. The primary reason this mitigation was expected to occur rather than other alternatives is that the integration of intermittent renewable generation requires controllable generation to operate the ISO's balancing authority area reliably.

The ISO's studies project that in 2020 generation dispatch needed within the San Diego area for the various studied scenarios is approximately 2,000 MW to 2,550 MW (520 MW of repowered once through cooling generation and 1,480 MW to 2,030 MW of existing qualifying facilities, peakers and other thermal units). This projection also relies on generation dispatch in the Western Los Angeles Basin of approximately 6,200 MW to 6,700 MW. Under this assumption, the ISO expects the San Diego area can sustain approximately 3,300 MW to 2,800 MW of imports and facilitate full delivery of renewable generation from the Imperial Valley area.

The ISO has also identified an alternative that would maintain system reliability in the event that no repowering occurs at the site of the Encina Power Station. This alternative, however, is a complex transmission solution that does not include a generating resource with flexible operating characteristics such as the Carlsbad Energy Center. Instead, this alternative would require transmission infrastructure additions to limit loop flow through the Comisión Federal de Electricidad system in Mexico and mitigate transmission overloads in the Otay Mesa area. Under this scenario, the ISO assumed a range of internal generation in the San Diego area of 1,500 MW to 1,700 MW and available capacity in the Western Los Angeles Basin of 6,200 MW to 6,700 MW. Under these assumptions, the San Diego import limit is approximately 3,850 MW to 3,700 MW but approximately 700 MVAR of reactive support would be needed at the Sycamore, Talega and Mission 230 kV substations to mitigate unacceptable voltage deviations under applicable planning contingencies. In addition, a new special protection system would be needed to open the Sycamore-Chicarita 138 kV transmission line for the single

outage of the Encina 230/138 kV transformer. The ISO's initial estimate of these transmission upgrades is approximately \$100 million.

Based on the ISO's studies, repowering of generation at the site of the Encina Power Station is a far better means to mitigate reliability impacts resulting from increased levels of intermittent resources. Absent this repowering, the San Diego area would need electrically equivalent capacity additions. The San Diego area may also need to rely on significant transmission upgrades. Both may be necessary to sustain local grid reliability in the San Diego area. For example, through the ISO generation interconnection study process, the ISO has studied proposed capacity additions in the Otay Mesa area and determined that this generation triggers the need for additional transmission upgrades and additional special protection systems. The ISO would need to conduct additional assessments to confirm whether the additional special protection systems are compatible with existing special protection systems already on the San Diego transmission system. Over-reliance on special protection systems may create unintended consequences, including increasing the likelihood of cascading power outages.

Historically, the San Diego load center has been served by a distributed balance of resources. The San Onofre Nuclear Generating Station has served as an anchoring source of power for both the San Diego and the Los Angeles Basin load centers and is ideally located for this purpose. Encina is fairly close to San Onofre and serves a similar purpose.

The recently retired South Bay Power Plant was replaced by the Otay Mesa and Palomar generating facilities. However, hundreds of millions of dollars of transmission upgrades were required in connection with Otay Mesa and Palomar so that South Bay could retire. The Southwest Power Link (SWPL) is another source of power that has historically served San Diego from its southeastern boundary. Currently the Sunrise Power Link is under construction and will essentially create another power injection near the Palomar source. Otay Mesa and SWPL are power injections at the southeastern portion of the San Diego main transmission system, and Palomar and SPL are power injections at the eastern portion of the San Diego main transmission system. Substituting generation at the Encina Power Site with

more power injections in the southeastern or eastern portions of the San Diego transmission system will likely trigger the need for substantial transmission upgrades and/or more special protection systems.

**IV. The ISO's planning studies underway in connection with implementation of the OTC policy will likely identify generation needs at the site of the Encina Power Station or an electrically equivalent location.**

The OTC policy establishes uniform, technology-based standards to implement federal Clean Water Act section 316(b), which requires that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact. Generating units at Encina Power Station must comply by December 31, 2017. The ISO anticipates that the OTC policy will ultimately force the existing units at the Encina Power station to retire. The policy may also have an impact on the relicensing of units at San Onofre Nuclear Generating Station, which also serves to support imports of power into the San Diego local capacity area. The ISO is undertaking additional studies in connection with implementation of the state's OTC policy as part of its 2011/2012 transmission planning process. (See, pp. 38-40 of the ISO's 2011/2012 Transmission Planning Process study Plan available on the ISO's web site:

<http://www.caiso.com/Documents/2011-2012ISOTransmissionPlanningProcessFinalStudyPlan.pdf><sup>2</sup>

As referenced above, the existing Encina power plant, with a total capacity of 950 MW, provides significant capacity to the San Diego area local capacity requirements to meet applicable national and regional reliability standards. But all five units currently utilize once-through cooled generation. The proposed Carlsbad Energy Center would use dry cooling. Based on its current analysis undertaken so far in connection with implementation of the state's OTC policy, the ISO believes that either repowering at the existing Encina Power Station site or development of some project comparable to the proposed Carlsbad Energy Center will be necessary to

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<sup>2</sup> Additional materials describing this effort are available on the ISO web site:  
<http://www.caiso.com/Documents/Once%20through%20cooling%20and%20Assembly%20Bill%201318%20studies>

allow the generating units at the Encina Power Station to comply with the OTC policy.

The ISO, moreover, is also including sensitivity studies to address contingencies associated with the OTC policy to address the loss of a major transmission facility serving the San Diego local capacity area, and the risk that relicensing of the San Onofre Nuclear Generating Station is unsuccessful. Under these sensitivity studies, the importance of generation either located at the Encina Power Station, or an electrically equivalent location will only increase.

Finally, an important consideration arising from the OTC policy is the connection between generating units using once-through cooling and renewable integration. Many of the units using once-through cooling technology, including generating units at the Encina Power Station, have characteristics that support renewable integration. Replacement infrastructure will need to retain or improve these capabilities (whether by the repowered plants or replacement capacity).

**V. Absent the development of generation at the current Encina Power Station site or some electrically equivalent location, the ISO will likely require one or more of the existing Encina units to operate beyond December 31, 2017.**

Absent development of the Carlsbad Energy Center project or some comparable project, it is likely that the ISO will need one or more of the units at the Encina Power Station to continue to operate after December 31, 2017, while additional infrastructure is planned, financed and constructed. Based on the ISO's long-term reliability assessments, it appears as if resources that are electrically equivalent to some of the capacity at the Encina Power Station site will be necessary to sustain voltage levels in the San Diego area. The Carlsbad Energy Center could fulfill this need. If necessary, however, the ISO may use a reliability-must-run agreement or backstop capacity procurement mechanism under its federally approved tariff to secure capacity from existing units at the Encina Power Station unless the Carlsbad Energy Center or another comparable project is commercially operational. This approach would require an extension of the current compliance schedule in the OTC policy for the Encina Power Station.