Application No.: ____________________
Exhibit No.: ____________________
Witness: Mark Rothleder

Order Instituting Rulemaking to Integrate and Refine Procurement Policies and Consider Long-Term Procurement Plans.	R.12-03-014

TESTIMONY OF MARK ROTHLEDER
ON BEHALF OF THE CALIFORNIA INDEPENDENT SYSTEM OPERATOR CORPORATION

BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking to Integrate and Refine Procurement Policies and Consider Long-Term Procurement Plans.	R.12-03-014

TESTIMONY OF MARK ROTHLEDER ON BEHALF OF THE CALIFORNIA INDEPENDENT SYSTEM OPERATOR CORPORATION

Q. What is your name and by whom are you employed?

A. My name is Mark Rothleder. I am employed by the California Independent System Operator Corporation (ISO), 250 Outcropping Way, Folsom, California as Director, Market Analysis and Development.

Q. Please describe your educational and professional background.

A. I am the Director of Market Analysis and Development for the ISO. Prior to this role, I was a Principle Market Developer for the ISO in the lead role in the implementation of market rules and software modifications related to the ISO's Market Redesign and Technology Upgrade ("MRTU"). Since joining the ISO over ten years ago, I have worked extensively on implementing and integrating the approved market rules for California's competitive Energy and Ancillary Services markets and the rules for Congestion Management, Real-Time Economic Dispatch, and Real-Time Market Mitigation into the operations of the ISO Balancing Authority Area ("BAA"). I also have held the position of Director of Market Operations. I am a registered Professional Electrical Engineer in the state of California. I hold a B.S. degree in Electrical Engineering from California State University, Sacramento. I have taken post-graduate coursework in Power System Engineering from Santa Clara University and earned a M.S. in Information Systems from the University of Phoenix. I have co-authored technical papers on aspects of the California market design in professional journals and have frequently presented to industry forums. Prior to joining the ISO in 1997, I worked for eight years in the Electric Transmission Department of Pacific Gas & Electric Company, where my responsibilities included Operations Engineering, Transmission Planning and Substation Design.

Q. Did you submit testimony on behalf of the ISO in the previous Long Term Procurement Proceeding (LTPP), R. 10-05-006?

A. Yes, I did. In that testimony, filed on July 1, 2011, I described the results of the renewable integration studies that the ISO had performed using four of the CPUC renewable resource scenarios as well as an ISO-developed scenario based on CPUC's high load trajectory sensitivity defined in the CPUC scoping memo. At that time, the ISO scenario showed a need for 4600 MW of incremental upward load following new flexible system resources by 2020 but the other CPUC scenarios did not show needs to this extent.[1] I explained that the ISO intended to conduct further studies that would include the results of the once through cooling (OTC) studies being conducted by the ISO in the 2011-2012 transmission planning process.

Q. Please describe the steps that the ISO has taken to continue its renewable integration studies since you filed that testimony.

A. In September, 2011, the ISO convened a working group of experts representing parties to the LTPP proceeding and this group has been working to update the studies by: 1) incorporating the findings of the once through cooling (OTC) studies to determine residual flexibility needs, 2) incorporating probabilistic analysis to determine the risk of shortages ensure objective reliability planning criteria of 1 loss

[1] R. 10-05-006, ISO Ex. 2400, page 43

of load event in 10 years is achieved, 3) evaluating other planning reserve margins from prior cases, 4) performing load following requirement sensitivities to forecast error assumptions, 5) evaluating whether shortages are observed in simulations with 5-minute interval, and 6) evaluating regional ancillary services modeling and coordination.

Q. Are you familiar with the OTC studies addressed by Mr. Sparks in his testimony?

A. Yes, I am although I did not work on these studies.

Q. Are the OTC studies that he discusses the same studies that have been incorporated into the renewable integration studies?

A. Yes, they are.

Q. How did the ISO use the OTC study results to consider potential residual system needs?

A. The ISO conducted a production simulation using the PLEXOS model used in the previous renewable integration studies, but with local area resource requirements, identified in the OTC studies, added to the study assumptions. The simulation was based on the Trajectory case for year 2020.

Consistent with the OTC findings, 3,137 MW of local area capacity requirement resources were added to the model as a combination of combined cycle gas turbine (CCGT) and gas turbine (GT) units. Specifically, two 500 MW CCGT units and eighteen 100 MW GT units were added to the Los Angeles Basin, Big Creek/Ventura (SCE) local areas. Each of the CCGT units has a 200 MW minimum capacity and 7.5 MW per minute ramp rate. Each GT unit has a 50 MW minimum capacity and 12 MW per minute ramp rate. Furthermore, one 373 MW CCGT unit was added to the SDG&E local area with a 200 MW minimum capacity and 7.5 MW per minute ramp rate. The new local area required resources used in our modeling were more flexible than most of the existing CCGT and GT resources respectively.

Q. Why did ISO use 3,137 MW of local resources as the local area needs for the production simulation run?

A. We used 3,137 MW because it reflected the total low end of the range of needed new or repowered local resources for the Trajectory case in the San Diego (373MW), Los Angeles Basin (2,370MW) and Big Creek Ventura areas (430MW) in the 2021 local area capacity studies. The LA Basin/ Big Creek area needs are set forth on Table 1 in Mr. Sparks' testimony in this proceeding. The San Diego local area capacity need was addressed in Mr. Sparks' supplemental testimony in R.11-05-023 which can be found on the ISO website at http://www.caiso.com/Documents/2012-04-06_A11-05-023_Sparks_SuppTest.pdf. As Mr. Sparks explains, the lower range of needs corresponds to the amount of generation that would be needed if it were located at the existing OTC sites.

Q. What did you learn from these simulation results?

A. Based on the results of the simulation, the resource mix described above and added in the study provided 4,190 GWh of regulation-up, operating reserves, and upward load following; and 3,178 GWh of regulation-down and downward load following. Assuming that the 3,137 MW local area resource requirements are met with the mix of generic resources described above, the simulation results show a 1,051 MW residual system shortage of upward load following resource. To cover the shortage, about 1,200 MW generic resources will be needed because a resource with minimum load can contribute toward load following for the portion of the resources operating range between the resource minimum and maximum operating level.

Q. Did the simulation produce additional information about the resources modeled in the local areas?

A. Yes. The mix of local area generic resources assumed in the simulation produced contributions that are higher than the averages provided by all other CCGT and GT units in the ISO BAA. Additionally, the local area resources added to the model ran more than the average of the same type of resources in the ISO balancing authority area (BAA). The average capacity factor of the two CCGT units added in the SCE local areas was 79.9% and the CCGT added in the local San Diego area was 83.6% while the average capacity factor of all other CCGT units in the ISO BAA is 48.0%. The average capacity factor of the 18 GT units added in the SCE local areas was 12.9% while the average capacity factor for all other GT units in the ISO BAA is 10.1%. The CCGT added in the San Diego area had a capacity factor higher than that of those in the SCE area due to higher demand for resource in the SDG&E local area. Clearly, the mix of generic resources assumed in the simulation were called upon and highly utilized to meet operating conditions produced by the renewables assumed in the portfolio we studied.

Q. How do the additional capacity needs that you identified in the study you describe above compare with the preliminary results of the renewable integration study that you presented last July?

A. As I discussed in my July 2011 testimony in R.10-05-006, a 4,600 MW generic system capacity need was identified in the renewable integration study Trajectory portfolio without adding the local capacity area (OTC) resources discussed above. Thus, the simulation results1,051 MW of residual system need in addition to 3,137MW of local area needs, are very consistent with these preliminary findings.

Q. Were there other modeling changes that might account for the difference between the current results and the previous study that produced the 4600MW system need result?

A. Yes, we did make one change to the demand response assumptions. In the studies I addressed in my July 2011 testimony, high cost demand response resources, equivalent to the ISO emergency demand response resources, have a limited number of hours the resources can be triggered each month. These resources also have a four hour minimum run time. This four hour minimum run time constraint limits the use of these demand response resources when needed for less time. In the simulation we recently performed, the four hour minimum run time constraint was relaxed. Accordingly, the demand response resources were better used during the high load hours and reduced the maximum shortage of load following up, and the need for additional capacity.

The combination of local resource mix and changes in how the demand response was modeled contributed to about 263MW of need reduction which accounts for the difference between the 4,600MW and the approximately 1,200MW of incremental system resources.

Q. Did the simulation results consider emission limitations that may affect the operational capacity factors observed above?

A. No, we did not take into account emission limitations. The ISO has shared the simulation results with other parties and governmental agencies involved in the OTC studies, including the California Air Resources Board, in order to gain insights to determine whether emission limitations may be a binding constraint. However, it is not likely that these constraints would affect the contribution of the resources to the flexibility needs at peak times, and so my recommendations for the purposes of flexible local resource procurement would not change. Emission limitation constraints will be incorporated in further studies as we address incremental system needs during 2013.

Q. Has the ISO completed its studies of potential system flexibility requirements?

A. No, our studies are ongoing in this regard. We will provide the results of further analysis, which is currently ongoing, to the working group and at the workshops that are scheduled in this proceeding starting on June 4.

Q. What is your recommendation for the purposes of this phase of this LTPP proceeding?

A. By incorporating the OTC study results into the renewable integration studies, we found that there will be substantial needs for new, or repowered, generation resources in the Los Angeles Basin, Big Creek/Ventura and San Diego local areas, as early as 2018 when the existing OTC units must comply with the OTC requirements. Mr. Sparks provides information about the need for flexible resources in the local capacity areas in his testimony. Thus, load serving entities should be authorized to procure new or repowered resources with flexibility characteristics that will meet the SWRCB regulations in the local capacity areas as soon as possible in the timeframe set forth in the LTPP settlement agreement.

The ISO recommends that the Commission's assessment of the need for new system resources to meet renewable integration needs should take place in this docket during calendar year 2013 with a decision on system needs by December 2013. This will allow resolution of the local resources needed to be resolved in 2012 and will provide clarity for determining whether residual flexibility capability is necessary to meet system flexibility needs. This timing will accommodate updated study assumptions and will allow additional time for the study group to complete the renewable integration analysis. Furthermore if there are identified flexibility needs, an assessment of best location for such resources can be performed.

Q. Have you submitted testimony in the San Diego proceeding, A.11-05-023, involving the request for approval of certain power purchase tolling agreements?

A. Yes. I provided testimony in that docket addressing the need for new resources in the San Diego local area, similar to the testimony that I am providing in this proceeding. It is my understanding that the Commission will consider local needs in the San Diego area as part of that proceeding.

Q. What do you mean by "flexible" resources?

A. A flexible resource is a resource that has the ability to be dispatched and will respond to such dispatches based on the resources registered ramp rate. Flexible resources are different from base load resources that are not responsive to dispatch instructions or variable energy resources whose production is based on the availability of a variable energy sources such as wind and solar. Flexible resources provide dispatch flexibility between minimum and maximum operating level for the resource. The lower a resources minimum load relative to its maximum operating limit the more flexible the resource is. Flexible resources should also have low minimum operating levels. Flexible resources can be used to respond to quick changes in load and variations of generation from renewable resources. Flexible resources can also provide ancillary services. The SCE-SDG&E sub-region has minimum ancillary service procurement requirements to meet and has relatively limited supply. Resources that have inertia or governor control can also automatically respond to changes in frequency and provide system stability. In addition, a faster start enables the resource to respond more quickly when needed without having to be online prior to the change in condition.

Q. Are there alternatives to flexible thermal resources that would also meet the ISO's operational needs in the local capacity areas?

A. There may be alternatives such as dispatchable demand response, but at this point, the ISO is not aware of a viable alternative to flexible conventional generation that has all the attributes of such resources, including voltage support, flexibility, frequency response, sustained energy supply, reliable responsiveness, no significant use limitations, and the ability to provide energy regulation, operating reserves, and load following.

Q. Does this conclude your testimony?

A. Yes, it does.