**BEFORE THE PUBLIC UTILITIES COMMISSION**

**OF THE STATE OF CALIFORNIA**

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| Order Instituting Rulemaking to Integrate and Refine Procurement Policies and Consider Long-Term Procurement Plans. | FILED<br>PUBLIC UTILITIES COMMISSION<br>MAY 6, 2010<br>SAN FRANCISCO, CALIFORNIA<br>RULEMAKING 10-05-006 |

# FIT COALITION COMMENTS ON RENEWABLES INTEGRATION MODELS 3RD PHASE 1 WORKSHOP


Kenneth Sahm White
FIT Coalition
16 Palm Ct
Menlo Park, CA 94025
(805) 705 1352


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**FIT COALITION COMMENTS ON RENEWABLES INTEGRATION MODELS 3RD PHASE 1 WORKSHOP**

The FIT Coalition respectfully submits these comments pursuant to the Administrative Law Judge's Initial Ruling ("ALJ Ruling"), dated December 23rd, 2010, and pursuant to Rules 1.9 and 1.10 of the California Public Utilities Commission's ("Commission") Rules of Practice and Procedure.

The FIT Coalition is a California-based advocacy group focused on smart renewable energy policy. The FIT Coalition's mission is to identify and advocate for policies that will accelerate the deployment of cost-effective renewable energy. We believe the right policies will result in a timely transition to renewable energy while yielding tremendous economic benefits, including long-term energy security, cost savings and stability, new job creation, increased public and private revenue, and the establishment of an economic foundation that will drive growth for decades. Toward these goals, we advocate primarily for vigorous feed-in tariffs and "wholesale distributed generation," which is generation that connects to distribution lines on the supply-side of the meter close to demand centers. Our members are active in proceedings at the Commission, Air Resources Board, Energy Commission, the California Legislature, Congress, the Federal Energy Regulatory Commission, and in various local governments nationally.

## I. General Comments

The Commission is to be commended for conducting an extensive review of the CAISO and RIM modeling approaches. As the FIT Coalition has noted in prior comments, these modeling approaches, while powerful and innovative, are still in need of major improvements before either can be used to effectively guide procurement decisions, or even compare alternative scenarios – as the Lawrence Berkeley Lab/NREL analysis demonstrates. Both of these models produce results that, when compared to the best current studies, appear to overestimate the costs of integration by at least 100%, and perhaps 300% or more. As such, the current step 2 results should be considered highly exaggerated. We look forward to revised results.

We also note that approaches for load time-shifting have great potential to reduce the need for additional capacity. Figure 9 in the LBL/NREL report, for example, demonstrates that daily storage of 15% of solar production would allow solar resources to increase their penetration and peak load reduction from 12 GW to 24 GW. While storage may or may not currently be the most cost-effective method of integrating additional renewables, the opportunity to model and evaluate such scenarios is critical for effective long-term planning.

In reviewing the step 2 results from both RIM and CAISO modeling, it is apparent that the detailed Plexos simulation in the CAISO model is superior to RIM and avoids the inherent methodological liabilities previously identified in the RIM's incremental additive approach to determining resource need. The RIM model also fails to capture the load reduction realized by solar generation profiles due to its inability to account for base year system flexibility even in off-peak periods. As the LBL/NREL report concludes, this is a major flaw in the RIM model and must be corrected.

Accordingly, the FIT Coalition feels that the current RIM model is inappropriate for comparing alternative renewable resource scenarios – and this is, of course, one of the primary purposes of the model. Nevertheless, we believe that the capacity of the RIM to allow parties to easily compare variations in scenarios is of such value that further development of the RIM model is justified, rather than scrapping the model entirely. If an Excel-based approach such as RIM can closely approximate the results of a more accurate but less flexible modeling approach such as used by CAISO, it would effectively remove the programming limits of the CAISO model that create extreme barriers to evaluation of alternative scenarios by intervenors and other parties.

## II. Responses to Questions for Party Comment Following October 22, 2010 Workshop

***I. CAISO 33% Integration Study***

***A) CAISO Step 1 Inputs, Assumptions and Methodologies:***

*At the workshop, CAISO staff discussed potential changes to the CAISO model's treatment of solar forecast error and solar PV output variability, as discussed in Section 2 of CAISO's workshop presentation. In addition, Tom Hoff of Clean Power Research presented on new research seeking to develop a method for estimating the effects of even small amounts of spatial dispersion in reducing the expected aggregate output variability for dispersed PV deployments, when variability is measured over different timeframes.*

*1. Solar Forecast Error:*

*i) Please comment on CAISO's proposal to use the T-2 persistence method to estimate the standard deviation of hour-ahead solar forecast errors for future model runs, as opposed to its current estimates of solar forecast errors (details of CAISO's current approach can be found in the CAISO Technical Appendices). Please describe and justify any other currently available method that would be preferable.*

*ii) Please comment on the appropriateness of using a T-1 persistence method for estimating "Improved Error" values. Please describe and justify any other currently available method that would be preferable.*

The CAISO model's prior error values were high and error prediction is widely expected to greatly improve with the experience that will be developed many years in advance of any additional generation facilities required. Research by the Clean Power Institute, nearing completion, is a prime example of improved data and methods. As such, the use of a T-1 persistence method does result in more realistic error values and is a preferable interim approach pending further modeling improvements.

*2. Variability in Solar PV Output:*

*i) Do Hoff's different methodology and potentially lower PV portfolio output variability estimate warrant changes to CAISO's and PG&E's methodologies for developing intra-hour PV generation profiles at this time? Alternatively, should CAISO and PG&E proceed with modeling the updated renewables portfolios using existing methods for developing PV generation profiles, and conduct a comparison with Hoff's validated results after the new profiles have been developed, and/or in future phases of integration analysis?*

The FIT Coalition strongly supports Hoff's research and its inclusion in future models. We do not feel that inclusion is immediately necessary, however, largely due to the limited suitability of the current version of the models regardless of Hoff's potential improvements to those models.

*ii) In what ways should the LTPP proceeding's use of integration study results should take into account the potential value of Hoff's research on the effect of geographic diversity on PV portfolio output variability?*

Hoff's research establishes both an improved methodology and a corrective metric for use in interpreting the results of the existing versions of both modeling approaches. <u>In particular, the reduced error correction and voltage regulation needs of distributed generation should be adopted in the proceeding's analysis of comparative renewable integration scenario flexible resource needs and associated costs</u>.

***B) CAISO Step 2 Inputs, Assumptions, and Methodologies***

*1. Please comment on the key inputs, assumptions and methodologies used in the Step 2 portion of the CAISO model.*

The FIT Coalition believes that these issues are adequately addressed by other parties.

***C) Use of CAISO Renewable Integration Study Results in the LTPP Proceeding***

*Based on your review of Step 2 portions of the CAISO model, please discuss:*

*1. What are the CAISO model's primary strengths as a tool for (1) estimating renewable integration-related resource requirements for different renewables scenarios, (2) estimating associated renewable integration costs for such scenarios, (3) estimating the relative difference in integration resource requirements between renewables scenarios, and (4) estimating the relative difference in associated renewable integration costs between renewables scenarios?*

The consideration of the Net Qualifying Capacity of renewables is a critically important strength of both models in estimating both the integration-related resource requirements and costs. The Plexos-based chronological simulation of production used by CAISO further supports the highest available accuracy.

*2. What are the CAISO model's primary weaknesses as a tool for (1) estimating renewable integration-related resource requirements for different renewables scenarios, (2) estimating associated renewable integration costs for such scenarios, (3) estimating the relative difference in integration resource requirements between renewables scenarios, and (4) estimating the relative difference in associated renewable integration costs between renewables scenarios?*

*3. Overall, is CAISO's model a valuable tool for a) estimating renewable integration-related resource requirements and costs for different renewables scenarios, and b) estimating the relative difference in resource requirements and/or costs between various renewables scenarios? Please discuss in what precise ways the model should or should not be used for this purpose.*

While CAISO's model has significant accuracy advantages in certain aspects, and the potential to correct areas in which it fails to demonstrate accuracy, it is clearly impractical to run all but the most limited set of scenarios and it is inaccessible to other parties both for testing alternative scenarios or for testing the model itself.

As such, where it is shown to be accurate, CAISO’s model can establish a limited number of scenarios which can serve as predictive standards to which other more flexible models (like RIM) can be calibrated. We wish to again emphasize however that no model can be used with any confidence prior to back-testing its outputs against the empirical evidence of varied historic examples actually encountered.

## III. Conclusion

As noted elsewhere, many effective methods are potentially available for addressing integration of variable resources without the addition of new generation, including consolidation of balancing areas within and beyond state borders, and through increased implementation of sub-hourly scheduling. This is especially true where variability follows highly predictable and consistent patterns that approximate load requirements.

While the modeling tools considered have high potential value for comparing integration requirements of alternative RPS scenarios, initial results clearly indicate the necessity of much more accurate information for distributed generation profiles and forecasting, recommended by multiple parties. Recent improvements in the RIM are commendable and serve to underscore the importance of further improvements, since these refinements alone reduced the estimated resource adequacy requirements by 1,000 MW.

Modifying certain operating protocols, and/or incorporating balancing and ramping resources such as short period electric storage capacity, may greatly help with the integration of variable resources at much lower cost than adding conventional generation capacity. Likewise, improved forecasting and management of operational flexibility will likely be far most cost-effective than adding dispatchable generation capacity. Incorporation of such alternatives into further model development will make it far more useful for evaluating needs under alternative integration scenarios.

Estimation of integration costs is not possible without first determining the relative marginal costs of alternative portfolio components. Because the optimal integration portfolio will vary substantially based on the generation scenario, and costs will vary based on the integration portfolio, it is inappropriate to use gas generation as the actual basis for cost analysis.

Changes in the operation of existing resources, as mentioned above, are a critical factor in optimizing renewables integration to meet system needs for additional flexibility. Along these lines, we reiterate our support for Vote Solar's recommendation that this proceeding should examine operating California's hydroelectric resources in a manner that promotes renewables integration congruent with the conclusions of the Western Wind Study[1] cited previously. We will provide additional comments on cost estimation at a later stage in this proceeding.

Our current understanding of the operational challenges and system flexibility requirements necessary to successfully integrate different renewable technologies is evolving significantly. Furthermore, the supporting technologies that promise to provide additional control and balancing capability to offset the type of variability associated with renewable resources are also rapidly evolving. As such, we continue to recommend that the Commission exercise a very cautious approach toward applying results of any modeling toward authorization of additional facilities solely for the purpose of meeting uncertain system needs.

In the interim, integration assessment should strive to ensure that integration costs associated with each generation and supply source are treated equally.

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[1] Western Wind and Solar Integration Study (WWSIS), NREL 2010 http://www.nrel.gov/wind/systemsintegration/pdfs/2010/wwsis_final_report.pdf

From a technical perspective this should include full consideration of costs, benefits and locational significance associated with all generation including increased distributed generation, transmission, congestion, localized balancing and short duration storage options. Beyond this, the varying impacts of different scenarios on State and local emissions and air quality goals, economic development, employment, and public revenues should be made apparent for consideration in procurement policy selection.

Respectfully submitted,

Sahm White

_______/s/___________

FIT Coalition
16 Palm Ct
Menlo Park, CA 94025

Dated:  January 14, 2010

CERTIFICATE OF SERVICE

I hereby certify that I have served by electronic service a copy of the foregoing **FIT COALITION COMMENTS ON RENEWABLES INTEGRATION MODELS 3RD PHASE 1 WORKSHOP** on all known interested parties of record in R.10-05-006 included on the service list appended to the original document filed with this Commission. Service by first class U.S. mail has also been provided to those who have not provided an email address.

Dated at Santa Barbara, California, this 14th day of January, 2011.

Tamlyn Hunt

***Appearance List for R.10-05-006***

b.buchynsky@dgc-us.com
douglass@energyattorney.com
deana.ng@sce.com
smartinez@nrdc.org
ssmyers@att.net
kristin@consciousventuresgroup.com
mrw@mrwassoc.com
amber.wyatt@sce.com
case.admin@sce.com
GBass@SempraSolutions.com
liddell@energyattorney.com
WKeilani@SempraUtilities.com
sue.mara@rtoadvisors.com
nlong@nrdc.org
AxL3@pge.com
AGL9@pge.com
GxZ5@pge.com
filings@a-klaw.com
MWZ1@pge.com
nes@a-klaw.com
tjl@a-klaw.com
will.mitchell@cpv.com
Diane.Fellman@nrgenergy.com
cem@newsdata.com
RegRelCPUCCases@pge.com
achang@efficiencycouncil.org
dwang@nrdc.org
mnelson@mccarthylaw.com
martinhomec@gmail.com
Danielle@ceert.org
blaising@braunlegal.com
eddyconsulting@gmail.com
atrowbridge@daycartermurphy.com
dsanchez@daycartermurphy.com
clu@cpuc.ca.gov
dbp@cpuc.ca.gov
jws@cpuc.ca.gov
kpp@cpuc.ca.gov
kd1@cpuc.ca.gov
wtr@cpuc.ca.gov
svn@cpuc.ca.gov
vsk@cpuc.ca.gov
claufenb@energy.state.ca.us
mjaske@energy.state.ca.us