Woodruff Expert Services

1100 K Street, Suite 204
Sacramento, CA 95814
Voice 916-442-4877
Fax 916-442-2029

Date: August 30, 2011

To: Mark Rothleder, Jack Ellis, Dariush Shirmohammadi, Mark Minick, Antonio Alvarez, Keith White, David Peck, Udi Helman [1]

From: Kevin Woodruff
Consultant to TURN

Re: Renewable Integration Modeling Issues

Pursuant to the Settlement Agreement among numerous parties regarding renewable integration modeling (RIM) in Track I of CPUC Rulemaking 10-05-006, several parties will be meeting to discuss how to "review and adjust…the methodology and assumptions used in the renewable integration analysis" by the end of March 2012. I am providing this memo to this group to identify two critical RIM issues and possible solutions thereto. Please review the following comments and provide your remarks as you see appropriate. I look forward to discussing these issues when we next meet as a group.

Key Issues Limiting Value of RIM Analysis

The RIM results the CAISO submitted July 1 revealed at least two issues that greatly limited the value of RIM analyses to date and also threaten to limit the value of any additional analyses. These are summarized below:

Dubious Results of All Gas Case Cast Doubt on Implementation of RIM

- *All Gas Case Planning Reserve Margin is Unreasonably High:* One key RIM result the CAISO filed July 1 stood out: the finding that the All Gas build-out of the CAISO system will require a Planning Reserve Margin (PRM) of 37 percent in 2020.[2] This result runs counter to decades of real world experience with system planning and operations.

- *Need in All Gas Case Exceeds Need in "33% RPS" Cases:* One key finding implication of comparing the All Gas to the various "33% RPS" cases is counter-intuitive: that new gas resources will be needed if only gas resources are added to the system, but that no additional gas resources are needed if the system is expanded instead to meet a 33 percent portfolio standard is counter-intuitive.

Both these results of the All Gas case cast doubt on just on that case's results, but also the validity of all the other scenario results.

[1] Per transcript of August 16 hearing in Rulemaking 10-05-006, 367:20-368:1.

[2] This figure reflects the adjustment of the 39 percent PRM reported in the CAISO July 1 testimony by the addition of 1,400 MW of "needed" gas resources and reduction of 2,069 MW of intertie capacity included in the resource plan but not modeled in PLEXOS.

Analysis of Overbuilt System Was Unrevealing

Another key issue limiting the value of the July 1 RIM results was the huge PRMs assumed in all scenarios. This level of PRMs was driven in part by the assumption that all existing generators will stay in operation in 2020, regardless of whether they are needed to meet the PRM. Though it is quite possible that capacity in excess of the PRM will continue to be available, incorporating this assumption into all scenarios' data sets meant that substantial capacity was always available to meet integration needs, thus limiting the value of the RIM analysis. Understanding the implications of adding renewable resources to systems that are much closer to load-resource balance may be important to establishing policies to integrate renewables.

Recommendations

To begin to address both of the above matters, I recommend the following modeling steps be taken as soon as reasonably possible to assess how the RIM should be deployed to produce reasonable results by March 31, 2012.

- *Reduce PRM in PLEXOS Data Sets to 15-17 Percent*: Reducing the PRM to its actual value may allow two key tasks to be performed: (a) the testing of the level of resources needed in relation to the PRM, and (b) the calibration of RIM modeling more generally.[3]

- *Test New Ancillary Services Individually and Sequentially*: Once a data set with a 15-17 percent PRM is produced, the RIM should then be tested by imposing new AS requirements sequentially to test their impact on need and the validity of the RIM. Table 1 below illustrates a sequence of simulations that could be performed and, based on industry experience, whether the expected need results of such runs would exceed the PRM.

Table 1

Sequence of Tests for Assessing Need Relative to PRM and Validating RIM

		Ancillary Services Products				Need > PRM? 1/
		Contingency		Load Following (MW)		
Scenario	Description	Reserves (% of Load)	Regulation (MW)	for Load	for Renewables	
15-17% Base Case	Traditional Modeling	Yes	No	No	No	No
Test 1	Add Regulation AS	Yes	Yes	No	No	No
Test 2	Add Load-Driven LF AS	Yes	Yes	Yes	No	No
Test 3	Add Renewable-Driven LF AS	Yes	Yes	Yes	Yes	Possible

Notes: 1/ Based on experience, no integration need beyond Plann ing Reserve Margin likely needed before Test 3.

[3] To remove resources from the data set to achieve this range, I would recommend using a simple rule, such as removing non-renewable resources in inverse order of their installation dates (that is, removing the most recent additions first). Another alternative would be to remove gas-fired Once-Through Cooling (OTC) resources first, and then remove resources by inverse age order if still needed to reach a PRM of 15 to 17 percent. Either scenario would be a reasonable resource plan for testing the ability of a system with a 15-17 percent PRM to integrate renewable resources. The testing and comparison of both scenarios might also assess the relative importance for integration purposes of the OTC resources compared to the newer gas resources.