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.	Rulemaking 10-05-006 (Filed May 6, 2010)

COMMENTS OF THE DIVISION OF RATEPAYER ADVOCATES ON THE CALIFORNIA INDEPENDENT SYSTEM OPERATOR'S AND PACIFIC GAS AND ELECTRIC COMPANY'S RENEWABLE INTEGRATION MODEL METHODOLOGIES

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I. INTRODUCTION

Pursuant to the Administrative Law Judge's (ALJ) September 8, 2010 ruling requesting comments on the renewable integration models, the Division of Ratepayer Advocates (DRA) submits the following responses to the questions regarding the two Renewable Integration Model (RIM) methodologies from the California Independent System Operator Corporation (CAISO) and from Pacific Gas and Electric Company (PG&E).

Currently, both PG&E's and CAISO's RIMs raise as many questions as they purport to answer and are simply not mature or sufficient to form the basis for any procurement directive in the 2010 Long-Term Procurement Planning proceeding (LTPP). Reserve margins in the State are at about 30 to 40 percent and renewable resource procurement is at about 15 to 17 percent of retail load for all three investor owned utilities. [1] Therefore, presently, even without reliance on the RIMs, California's

[1] California ISO 2010 Summer Loads and Resources Operations Preparedness Assessment, May 10, 2010, Table 1, p. 4. Planning Reserve calculation shows a 38.5% Planning Reserve for summer 2010.

infrastructure is able to successfully integrate renewable resources at a fairly high level of penetration, and could continue to be adequate through the next LTPP cycle.

At this time, DRA is not endorsing the adoption of either the PG&E or CAISO RIM. On the other hand, the RIMs show the promise of flexibility in the integration of renewable resource assumptions and DRA is encouraged by transparency shown by PG&E in its willingness to make its RIM available parties willing to sign certain necessary non-disclosure agreements or otherwise comply with the Commission's confidentiality protocols for reviewing non-public utility material. These promises of flexibility and transparency should be built upon and used to study the RIM further before the Commission considers directing the utilities make any procurement decisions on the basis of the results that arise from the RIM.

DRA's analysis is intended to apply to both the CAISO and PG&E RIM, even where only one RIM is specifically mentioned. DRA's opening comments do not respond to all of the questions in the ALJ's ruling, but DRA may address these questions in its reply to the opening comments of other parties.

II. DISCUSSION

A. Responses to Questions Posed in the September 8 Ruling

I. Energy Division's Proposed Renewable Integration Data Needs for 2010 and 2011

A) Please describe any modifications to the list needed to determine the appropriate levels and types of procurement to support renewables integration in LTPP through the year 2020.

B) Does the proposed data needs list in any way prejudice the Commission's determination of what types of flexible resources could be authorized for renewables integration purposes?

CEC Report, Summer 2010 Electricity Supply and Demand Outlook, CEC-200-2010-003-SD, May 2010; Table 4: NP 26 California ISO 2010 Summer Outlook (MW) shows the Reserve Margin to range from 30 to 45% in the months of June through September, 2010

II. Importance of Renewable Integration-Related Topics

A) Please discuss the importance of the following renewable generation integration-related topics and how they should inform LTPP.

1. Current System flexibility

The current system is capable of meeting the flexibility needs for incorporating renewables. This appears to be due to both the high level of actual reserves as well as the high level of dispatchable capacity, as demonstrated by both the CAISO and PG&E RIMs.

For example, the CAISO in its presentation slides at the CPUC Workshop on Renewable Integration Model Methodologies ("CAISO Presentation ")[2] held on August 24, 2010, provided a table in Slide 73 summarizing California's resources for the 33% RPS reference case. Slide 73 shows the existing resource categories, capacity in MW, and whether the resources are dispatchable. In Slide 73, the existing hydro capacity is set at 7,227 MW with 33,994 GWh/year of energy production. In Slide 78, the CAISO provides Net Qualifying Capacity of dispatchable and run of river hydro. Based on Slide 78 data, the existing dispatchable capacity of PG&E, SCE, and SMUD hydro totals 6,526 MW. Taking into consideration the information from both of these slides, DRA has prepared Table 1 below, which provides the dispatchable capacity of the existing resources in California based on Slide 73 and 6,526 MW hydro dispatchable resources.

[2] California Independent System Operator Study of Operational Requirements and Market Impacts at 33% RPS, Proposed Methodology and Selected Simulation Results available as of August 24, 2010 (Presentation Slides).

DRA Table 1 – Existing California Dispatchable Capacity (MW)

Resource Category	**Dispatchable Capacity (MW)**
Thermal	23,047
Hydro	6,526
Pumped Storage	3,057
Demand Response	2,863
Net Interchange	13,000
Total Dispatchable	**48,493**

As shown in Table 1, the total dispatchable capacity is 48,493 MWs. The total capacity of existing resources (based on Slide 73) is 56,450 MW. This means that 85.9% of resources that are currently available in California are dispatchable.[3]

PG&E in page 9 of their presentation,[4] shows that for summer 2009 the operating flexibility requirements for regulation, load following, and day-ahead commitment was 7,095 MW. As we know, California was able to reliably meet its need for electricity during summer 2009. In this workshop, PG&E pointed that the flexibility requirements for 2009 were met as California had over 30% reserve margin. DRA believes that a more important factor than the level of PRM was the mix of California's resources and the fact that currently at least 78% of resources are dispatchable and can meet the requirements

[3] Slide 73 of CAISO Presentation does not mention the capacity of the existing nuclear power plants in California. If we assume that they were included in Thermal resources, then it would not be correct to call all of the thermal resources dispatchable. DRA suggests that CAISO modify Slide 73 and provide the capacity for nuclear resources that will not be dispatchable resources. The capacity for nuclear plants, including share of California in Palo Verdes in Arizona, is roughly 4,500 MW. So the capacity of dispatchable resources in Table 1 may be reduced to approximately 44,000 MW, which is still 78% of the total existing generation capacity.

[4] Pacific Gas and Electric Company - Long Term Procurement Plan Proceeding – Renewable Integration Model and Methodology.

for load following, regulation, and uncertainties regarding forecasting of production from intermittent renewable resources.

2. Changes to existing resources that will either increase or decrease ancillary services (A/S) availability

Slide 73 of the CAISO presentation also provides information on retirements, planned unit additions, and generic thermal additions between now and 2020 to achieve 15% PRM.

The CAISO's total forecasted unit retirements are comprised of 14,925 MW of Once Through Cooling (OTC) units and 1,406 MW of other thermal units for a total of 16,331 MW. Based on information in Slide 73, DRA will assume that all of these units are dispatchable. The "Planned Unit Additions" based on Slide 73 of CAISO presentation includes planned Thermal and Demand Response (DR), which are dispatchable and then additional non-dispatchable renewable resources. The total new dispatchable resources are 9,404 MW of Thermal and 937 MW of DR for a total of 10,341 MW.

To meet peak load plus a 15% planning reserve margin, CAISO makes the assumption that 2,343 MW of generic dispatchable resources will be added to the system. Table 2 is developed based on these retirement and additions from Slide 73 of CAISO Presentation, and the 44,000 MW existing dispatchable resources.

DRA Table 2 – Dispatchable Resources Available in 2020 (MW)

Resource Category	**Capacity MW**
Existing	44,000
Retirements	(16,331)
Planned Addition	10,341
Generic Addition	2,343
Total Dispatchable	**40,353**

DRA Table 2 shows that there will be about 40,353 MW of dispatchable resources available to California in 2020. This means that California may lose approximately 3,650 MW of dispatchable resources in the next 10 years. However, one must make a correction regarding current availability vs. 2020 availability of these resources. The retirement of the 16,331 MW will be of old units, many of them reaching 50 more than years of operation. These older units have availability factor of approximately 85%; whereas, 12,684 MW of planned and generic resources will have at least 95% availability.

The availability difference between old units retiring and new units being added may impact the available dispatchable capacity of units serving load and ancillary services by about 1,600 MW. In other words, the decrease of 3,650 MW nameplate installed capacity of dispatchable resources may only be equivalent to 2,000 MW.

DRA suggests that with over 40,353 MW of dispatchable resources in 2020 (approximately 50% of the total 80,787 MW in 2020, Slide 73 CAISO Presentation), the California power system will have ample capability to integrate the addition of new intermittent resources for the next few years.

3. What timeframe is appropriate for authorization to procure resources providing additional flexibility?

The operational flexibility requirements provided in PG&E 's presentation increases from 7,095 MW for summer 2009, to 9,360 MW for summer 2020 when target for renewable resources will be at 33% of the total energy requirements. This is approximately 2265 MW over 11 years or about 200 MW increase per year. Since most of the OTC units retirements will occur in the latter part of this 10-year period, there is a good chance that if there is any need at all for additional dispatcable capacity, it will also be in the latter part of this 10-year period.

Furthermore, as DRA suggests that there is are great deal of uncertain assumptions used as inputs to both the CAISO and PG&E models. This is especially true regarding the generation profile for the Solar. There is very little California historical data to determine the accuracy of these inputs to the models.

DRA recommends that at minimum, use of the renewable integration models to determine the level of operation flexibility requirements should be delayed until next LTPP as:

- Current system has sufficient dispatchable resources to meet requirements for foreseeable future
- Under the current down economy, California load growth is minimal
- Additional renewable resources are added to the CAISO grid in a slow and gradual process as issues such as permitting and transmission constraints will limit the rate of growth
- There are many uncertainties regarding the timing for the OTC units retirements and/or system upgrades and whether those retirements will be delayed
- By the next LTPP cycle there should be adequate historical data on generation profile of the solar plants
- It is critical to verify and validate the CAISO and/or the PG&E model prior to using the models output to authorize utility procurement (this will take time)
- Decision on tradeable renewable energy credits (TRECs) is not yet final, and the final percentage of TREC's authorized could greatly impact CAISO renewable integration needs

4. Frequency (e.g., hours per year) and timing (e.g., what year) of flexibility requirements? (e.g., regulation requirements)

DRA believes that to answer the question of frequency of flexibility requirements, the model must use correct generation profiles for renewable resources, i.e., precise production levels reflecting changes over the hours. Furthermore, location of intermittent renewable resources and MW distribution over California has to be forecasted with a high degree of accuracy. Currently the PG&E and CAISO models rely on many assumptions that may prove wrong as these new resources come on-line. Fortunately, with over 44,000 MW of dispatchable resources, California can wait several years to get more accurate input data to these models and then be in a position to answer questions regarding frequency and timing of flexibility requirements.

5. What key drivers of flexibility requirements need to be better understood, forecasted and/or controlled?

DRA suggests that key drivers include:

a) Generation Profile, especially for Solar PV

b) Mix and Location (including in-state or out-of-state) of intermittent resources

c) Retirement schedule of OTC units

d) Capability of existing dispatchable resources to meet the need for load following and other services

e) RPS target for 2020

6. The uncertain makeup of future renewable generation portfolios

As stated in question 5 above, the mix of renewable resources, especially how much will be located out-of-state are important key drivers of how much California will need combustion turbines ,combined cycle and storage facilities to meet the flexibility requirements.

7. Out-of-state source of renewables and flexible resource.

The out-of-state renewable resources include wind, mostly from Northwest, solar from Southwest, and perhaps some geothermal from Nevada. The decision on the maximum level of renewable resource imports will greatly impact the requirements for the operational flexibility. Likewise the RIMs must accurately be able to model these resources if the results of the models are to be relied on for procurement authority decisions.

The Northwest has a great deal of hydro capacity that may be used to provide operational flexibility. Therefore, most of the capacity needed for operational flexibility will be provided by utilities in the Northwest. This means that the intermittent resources procured in the Northwest will be delivered at COB or NOB as block energy or that this renewable energy will be sold in Northwest energy market without selling their green attribute. Again, the RIMs must accurately be able to model these resource differences if the results of the models are to be relied on for procurement authority decisions.

For intermittent resources produced in Southwest, the situation will be different as a significant amount of energy produced in this region is from base load units such as nuclear or coal plants. The Combined Cycle units in this region will also operate at high capacity factors. Therefore, there will be limited ability for Southwest utilities to provide operational flexibility at reasonable cost. There is, of course, a possibility to directly connect some of the renewable resources to California grid system and have dynamic dispatch since California may be able to satisfy the operational requirements of intermittent resources at lower cost than Southwest. Due to the higher cost for operational flexibility of Solar PV compared to Solar Thermal, it may become more preferable to procure mostly Solar Thermal from Southwest instead of Solar PV.

8. Other

The CAISO and PG&E models do not take into account technological changes that may occur to reduce intermittency level of renewable resources. Techniques that may develop to store the power before it enters the grid system may become more economical than solving the problem by adding Combustion Turbine at capital costs of around $1,000/kW.

There is a strong likelihood that forecasting error in generation from wind and solar units will decrease over time rather than increase which will reduce the operational requirements.

Finally, the input in the two CAISO and PG&E models do not include any addition to the existing pump storage hydro. There are several projects that are being advanced by PG&E and independent power developers. These additions will provide a great deal of operational flexibility to the California power system and must be considered and included in the RIM analysis.

III. and IV. CAISO 33% Renewable Integration Study and PG&E Renewable Integration Model

A) CAISO and PG&E Step 1 Inputs, Assumptions, and Methodologies

1. Upon review of the written materials[2] and verbal presentations regarding the models at the workshop, how clear and reasonable are the key inputs, assumptions and methodologies are used by Step 1 of the CAISO model in its calculation of operating flexibility requirements? Please be specific about any necessary changes or additions to the model's key inputs, assumptions and methodologies (i.e., those that would have a material impact on the results) for future case runs, considering at a minimum the following:

a. Imports and exports allowed from other balancing authorities

It is not clear to DRA how either model treated assumptions for imports and exports allowed from other neighboring balancing area authorities (BAAs). DRA suggests that both CAISO and PG&E provide a detailed description and model inputs for resource availability from and to neighboring BAAs.

b. Load profiles

c. Wind profiles

DRA asserts that both CAISO and PG&E need to provide more detail regarding the wind generation profiles. Both CAISO and PG&E appear to have used National Renewable Energy Laboratory (NREL) simulated profiles for new wind profiles in the model. CAISO specifies on slide 28 of their workshop presentation that the profiles for new wind plants are based upon NREL wind mesoscale speed/production data for 19 wind sites in CA and other states. Geographic diversity of wind site locations is important to model and will benefit the accuracy of an aggregated forecast because wind forecast errors in one location could be offset by the wind picking up in another location. Data from other ISOs indicate that aggregating forecasts across a whole region can cut

the error rates of forecasting day-ahead wind output in half or better.[5] Recognizing that the location of wind resources is a key driver of flexibility requirements, DRA suggests that both CAISO and PG&E provide more specific details regarding which wind sites are incorporated into their respective wind profiles.

d. Solar profiles

Similarly to the wind profiles, DRA is concerned with the assumptions regarding the solar generation profiles. This is especially true because there is very little CAISO system historical data to determine the accuracy of these profiles. To date there only a couple of mid-sized utility scale California solar PV facilities on-line, and there are no solar thermal plants constructed and on-line through the RPS program. Hence, a crucial input to the model is based on parameters that are largely based on speculative estimates rather than actual, historical data. PG&E states that the source of the hourly Renewable Generation Profiles is the CAISO and its consultant Nexant, Inc.[6] It is unclear to DRA how these profiles were developed without using any actual generation production data from large solar PV plants. Therefore, CAISO and PG&E should provide data and graphs on the hourly generation profiles for solar PV for different zones that their respective models utilize so that parties can better understand how these profiles were developed. Furthermore, DRA requests information on any correlation studies that have been carried out by PG&E between the forecast of ground level generation from PV and any actual generation from any existing installed PV generation.[7]

DRA believes that neither model are ready to be used to authorize additional procurement until there is sufficient data available to validate the solar PV generation profiles.

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[5] Burr, Michael T., "Beyond Intermittency: Forecasting Brings Wind Energy Under Control", *Public Utilities Fortnightly*, May 2010, p. 26.

[6] PG&E Renewable Integration Model Appendix A, page 9

[7] PG&E's Renewable Integration Model Appendix A, p. 11. Forecast of ground level generation from PV formula i.e.: FGt+5 = Gt + CIt (I5+t – It).

e. Forecast errors associated with renewable generation

The effect of forecast error for load, wind and solar on the load-following requirement is approximately four times the effect of the inherent variability of load, wind, and solar.[8] Therefore the assumptions for forecast errors are critical to model accurately, as an overestimate of forecast error will lead to a significantly overstated load-following requirement. Specifically, DRA believes that both PG&E's and CAISO's model should build in a decreasing forecast error for wind, rather than the escalating forecast errors currently used as inputs.

As demonstrated by experiences in other ISOs, advancements in wind forecasting in recent years have improved the reliability of day-ahead and hour-ahead estimates of wind generation, and system operators, utilities, and energy traders are increasingly integrating wind forecasts into their planning and operations.[9] The increased use of wind forecasting and the commercial use of weather forecasting services should be an indicator that the uncertainty around wind generation scheduling is decreasing and the forecast errors are not escalating as more ISOs are integrating wind resources.

f. Consequences of the above for calculated flexibility requirements

The above inputs (i.e., items a-e) will have significant consequences on the flexibility requirements calculated by both models. Given the major uncertainties regarding assumptions and inputs into the renewable integration models, and the arguments DRA has presented thus far, the models should not be used to determine the levels of operation flexibility requirements at this point. DRA recommends at minimum, to delay use of the models until next LTPP when more accurate data is available and the models can be developed further.

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[8] CAISO, "Integration of Renewable Resources at 20% RPS", August 2010, p. 50.

[9] Burr, Michael T., "Beyond Intermittency: Forecasting Brings Wind Energy Under Control", *Public Utilities Fortnightly*, May 2010, p. 25.

Specifically, CAISO indicates on slide 27 that the incremental capacity needed for wind generation in 2020 is 8,338 MW for the 33 percent Reference Case and 5,024 MW for the 20 percent Reference Case, which represents a 66 percent increase in wind capacity needed between the two cases. CAISO also indicates that the incremental capacity needed for solar PV generation in 2020 is 3,165 MW for the 33 percent Reference Case and 333 MW for the 20 percent Reference Case, which represents an 800 percent increase in solar PV capacity needed. The drastic size differences in incremental capacities needed for wind and solar PV under the 33 percent Reference Case compared to the 20 percent Reference Case highlight the importance of accurately profiling these inputs and their generation assumptions.

Furthermore, as noted above, the effect of forecast error for load, wind and solar on the load-following requirement is approximately four times the effect of the inherent variability of load, wind, and solar.[10] Hence an overestimate of forecast error will lead to a significantly overstated load-following requirement.

Additionally, a NY ISO study as presented by the Electric Power Research Institute provides an interesting contrast with CAISO and PG&E on wind penetration levels and regulation requirements.[11] Most significant, is the NY ISO finding that a wind penetration level of approximately 10 percent of peak load does not have a significant increase in regulation requirements. On September 19, 2010 wind provided 21,291 MWh of the daily total 601,716 MWh produced in California.[12] This represents a 3.5 percent wind penetration level in California, which is well below the 10 percent level, and provides more support that there is no urgency to prematurely use either model to calculate flexibility requirements.

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[10] CAISO, "Integration of Renewable Resources at 20% RPS", August 2010, p. 50.

[11] Electric Power Research Institute and NY ISO, "Balancing Wind – Embracing the Challenge", August 2010, http://mydocs.epri.com/docs/SummerSeminar10/Presentations/3.4_Mukerji-NYISO.pdf.

[12] CAISO, September 19, 2010, http://www.caiso.com/green/renewrpt/DailyRenewablesWatch.pdf

B) Validation of CAISO 33% Renewable Integration Study and PG&E Renewable Integration Model Methodology

1. How should Step 1 of the CAISO and PG&E model be validated before results are considered for LTPP planning and procurement purposes?

Validation of the CAISO and/or the PG&E RIM is essential if the results are to be used to authorize procurement. Rules 10.3 and 10.4 of the Rules of Practice and Procedure, which were designed to implement Public Utilities Code Sections 1821-1822 (enacted by AB 475, the "No Black Box" legislation) apply in this proceeding, since the results of the RIM computer models may be used as a basis for a Commission decision regarding procurement authority. For the convenience of the parties, those rules provide as follows:

Rule 10.3 Computer Model Documentation

> (a) Any party who sponsors testimony or exhibits which are based in whole, or in part, on a computer model shall provide to any party upon request the following information:
>
> (1) A description of the source of all input data;
>
> (2) The complete set of input data (input file) used in the sponsoring party's computer run(s);
>
> (3) Documentation sufficient for an experienced professional to understand the basic logical processes linking the input data to the output, including but not limited to a manual which includes:
>
> (A) A complete list of variables (input record types), input record formats, and a description of how input files are created and data entered as used in the
>
> sponsoring party's computer model(s).
>
> (B) A complete description of how the model operates and its logic. This description may make use of equations, algorithms, flow charts, or other descriptive techniques.
>
> (C) A description of a diagnostics and output report formats as necessary to understand the model's operation.
>
> (4) A complete set of output files relied on to prepare or support the testimony or
>
> exhibits; and

(5) A description of post-processing requirements of the model output.

(b) If a sponsoring party modifies its computer model or the data base, and sponsors the modified results in the proceeding, such party shall provide the modified model or data to any requesting party who has previously requested access to the original model or database.

(c) Parties shall maintain copies of computer models and data bases in unmodified form until 90 days after the date of issuance of the Commission's last order or decision in the proceeding, including order or decision on application for rehearing, to the extent that those computer models and data bases continue to provide the basis, in whole or in part, for their showing.

Rule 10.4 Computer Model and Data Base Access

(a) Any party seeking access to a computer model or data base shall serve on the

sponsoring party a written explanation of why it requests access to the information and how its request relates to its interest or position in the proceeding.

(b) Any sponsoring party shall provide timely and reasonable access to, and explanation of, that computer model or data base to all parties complying with subsection (a).

(c) If a party requests access to a data base, the sponsoring party may, at its election, either

(1) provide such access on its own computer,

(2) perform any data sorts requested by the requesting party,

(3) make the data base available to the requesting party to run on the requesting party's own computer, or

(4) make the data base available through an external computer service.

(d) If a party requests access to a computer model, the sponsoring party may, at its

election, either

(1) make the requested runs on its own computer,

(2) make the model available to the requesting party to run on that party's own

computer, or

(3) have the requested model run produced for the requesting party by an external

computer service.

(e) The sponsoring party is not required to modify its computer model or data base in order to accommodate a request, or to install its model on the requesting party's

computer, or to provide detailed training on how to operate the model beyond provision of written documentation. The sponsoring party is not required to provide a remote terminal or other direct physical link to its computer for use by the requesting party. The sponsoring party may take reasonable precautions to preclude access to other software or data not applicable to the specific model or data base being used.

5

(f) Within five business days of receipt of a request from a requesting party pursuant to this rule, the sponsoring party shall indicate whether the request is clear and complete and shall provide the requesting party a written estimate of the date of completion of the response.

Likewise, California PUC. CODE § 1822 (g) clearly specifies the

requirements for computer models that are used for planning purposes:

(g)The commission shall verify, validate, and review the computer models of any electric corporation that are used for the purpose of planning, operating, constructing, or maintaining the corporation's electricity transmission system, and that are the basis for testimony and exhibits in hearings and proceedings before the commission.

Given the high bar requirements that either RIM model must be held to if it is used for procurement authority planning, it is unclear whether the Commission intends to attempt to verify, validate, and review both the CAISO and PG&E models or whether the Commission intends to standardize on one of the two RIMs based on parties comments and reply comments. DRA's recommendation is that the Commission, first standardize on one of the two models, prior to implementing a thorough verification, validation, and review of the chosen RIM. DRA sees little value attempting to do the validation process twice, given the substantial resources required to complete the effort.

a. Clarifying certain methods, inputs or assumptions

California Public Utilities Code § 1821 (e) provides that "verify" means to assess the extent to which the computer model mimics reality. At this point, it is too early to determine whether either the CAISO or PG&E model "mimic reality." Given the highly

complex system these RIMs attempt to model, it is quite possible that neither model mimics reality. This would be the first order of business in the process of validating the RIMs. DRA is unaware of any effort to baseline either model against the state of the CAISO system to determine whether the models accurately reflect the reality and resource needs of the CAISO system in 2010. If the validation of the RIMs is to proceed, a third party should run independent model verification.

Model verification answers the basis question: Does the model perform as intended? Specifically, model verification is done to ensure that:

– The model is programmed correctly;

– The algorithms have been implemented properly; and

– The model does not contain errors, oversights, or bugs.

Verification ensures that the specification is complete and that mistakes have not been made in implementing the model. If the results of the verification demonstrate that the models do not mimic reality, then the models would be "sent back to the drawing board," otherwise they could proceed to the validation process.

Model validation also ensures that the model meets its intended requirements in terms of the methods employed and the results obtained. Specifically, do the RIMs meet their intended purpose of predicting the renewable integration needs of the CAISO system in 2020 under a presumed 33% RPS? Again, once the RIMs are independently verified, the process of model validation by an independent 3rd party would be required by California law prior to using the model results for procurement authority.

The input assumptions of both RIMs are highly contentious and would need to be fully vetted by parties before the results of the models have credibility. Specifically, amounts of out-of-state and in-state renewables, amounts of TRECs expected in the utilities' portfolios, levels of demand response expected in 2020, levels of energy efficiency expected in 2020, renewable resource forecast error, and many other assumptions need to be properly accounted for before parties can support either RIMs. In short, DRA's concern over the accuracy of these inputs and assumptions is summed up in the phrase, "garbage in, garbage out." Both CAISO and PG&E need to provide all

supporting work papers and model access to demonstrate what each of the assumption inputs are for every scenario.

b. Testing alternative assumptions

c. Benchmarking against historical or other information

See DRA comments on model verification.

d. Focused inspection of certain portions of the inputs, outputs and their relationship (e.g., for an hour requiring high flexibility)

This effort would be included in the 3rd party independent model validation.

e. Overall, what criteria should be used to determine if and to what extent the methodology and its results should be used for LTPP purposes?

Given the extreme preliminary state of the Commission's efforts in standardizing on either RIM model, verifying, validating, and reviewing a single model, and fully vetting the model input assumptions, it appears that reliable model results may not available for some time. Based on this probable outcome, the Commission should be prepared to go forward with the 2010 Long Term Procurement Planning (LTPP) cycle using the same method that was utilized during the 2007 LTPP which was simply authorizing utility procurement based on a 15-17% Planning Reserve Margin (PRM). This method was used in the last LTPP, new wind and solar resources have come on-line since 2007 (currently California has a 15% RPS), and the CAISO system is still stable.

f. Other

2. How can or should the CAISO's forthcoming study of 20% renewables portfolio standards (RPS) integration in 2012 provide a baseline for, and assist validation of, the calculation of operating flexibility requirements under more distant and unfamiliar conditions represented by a 33% RPS in 2020? Could other information serve such purposes instead, for example an all-gas (i.e., maintaining 2008 renewables levels in 2020) or 20% in 2020 can run using the ISO 33% integration methodology?

It is unclear what the relationship of the CAISO 20% RPS Integration of Renewable Resources Report and the CAISO 33% RIM is, but CAISO should clarify this for parties. DRA is aware that the CAISO 20% RPS Integration of Renewable Resources Report confirms that the current generation fleet is capable of integrating a 20% RPS by 2012.[13] Given this luxury, it is important for the Commission to focus on a single RIM, verifying and validating the selected model, and fully vetting the model input assumptions, even if this process cannot be completed in time for the current LTPP procurement authorization. The risks are too high for potential utility procurement authority based on the results a RIM analysis that does not reflect reality or does not react to sensitivity changes as expected, or includes unreasonable input assumptions. This problems could saddle ratepayers with the costs of covering the costs of unnecessary generation based only on a inadequate or faulty modeling effort.

C) Use of CAISO Renewable Integration Study and PG&E Renewable Integration Model Results in the LTPP Proceeding

1. If not already discussed:

a. What are the model's primary strengths as a tool for estimating renewable integration-related procurement need?

[13] CAISO Integration of Renewable Resources at 20% RPS, August 31, 2010, p. xv. The study confirmed that the generation fleet possesses sufficient overall operational flexibility to reliably integrate 20 percent RPS in over 99 percent of the hours studied. http://www.caiso.com/2804/2804d036401f0.pdf

The primary strength of the RIMs is the flexibility they afford parties to examine the operational impact of several modeling assumptions and input considerations on the overall system infrastructure. During the workshop PG&E was able to show that some of the inputs it used to reach the model results could easily be replaced with different assumptions and the results examined in a transparent manner to understand how they impact the system. Prior to the workshops, PG&E had noted that its primary objective in seeking to develop the model farther than the Brattle Group had done in 2008 was to make the model allow for greater granularity in the examination of input assumptions used in the Energy Division's 33% RPS Implementation Analysis Preliminary Results Report. "PG&E's RIM and the RIM results were identified as an alternative for providing calculated estimates of integration requirements and costs that could be utilized to update the placeholder values used in the original Commission's 33% RPS Implementation Study in advance of availability of final results from the CAISO 33% RPS Integration Study, and to supplement these results once available." However, models can only use detailed information to the extent that they were available for the study. Thus, just as the Brattled Group struggled and failed with the appropriate basis for modeling the impact of the geographic distribution of various renewable technologies and their availability as affected by location and transmission constraints, PG&E's model also struggles in this regard because it aggregated the geographic data, without distinguishing them by technology or –and location, for the sake of simplicity.

b. What are the model's primary weaknesses as a tool for estimating renewable integration-related procurement need?

Both model's primary weakness as a tool for estimating renewable integration procurement needs is that they overestimate the need for conventional load following resources to compensate for the lack of information available to the study. Further, PG&E's model appears to attribute costs to the integration of renewables were those costs would be incurred without regards to the system's need for renewable resource or

their integration. In fact as a general matter, the model is very weak as a cost estimating methodology and should be studied further before being used in that regards.

For instance, PG&E's "model assumes that the system begins in perfect balance, with available generation exactly meeting load and load's own integration needs, due to its variability and forecast uncertainty." This assumption appears to ignore over 2000 MW of new resources authorized in the 2004 and 2006 LTPPs, some of which were scheduled to have already come on line but are currently being delayed or under construction. Most of these new resources are operationally flexible with load following capability that can serve some of the needs of renewable resource integration, but they were primarily procured to serve load not renewable integration and their costs cannot be attributed to renewable integration. It would seem then that the assumption of perfect balance should be adjusted downwards when conclusions are reached about how many new resources are further necessary for renewable integration purposes.

This same assumption of a perfect balance also ignores the roles of energy efficiency, demand response and like resources in achieving that balance, because both the CAISO and PG&E fail to account for how such resources would shape future need before operationally flexible resources become necessary for either need or integrating renewable resources. "Alternatives such as operational changes, demand response, energy storage, or renewable curtailment are not evaluated by RIM." If the Commission uses the RIM as a basis for making procurement decisions in this LTPP, then the failure of the RIM to determine how to factor these preferred resource alternatives in the RIMs' methodology turns the Energy Action Plan II on its head. PG&E argues that its RIM's estimate of costs can be "utlilized as a benchmark against which other integration alternatives can be evaluated" However, such benchmarking would be a poor substitute for developing an assumption within the model that accurately captures the impact of these alternatives on load and how much they reduce the cost of integration.

Further, it appears from the RIMs that part of the fixed costs of meeting load with operationally flexible resources is being attributed to renewables integration, thereby

raising the overall costs of integration. Even the treatment of the cost of operating reserves as an element of renwables integration is unclear and confusing.

c. Is the model an appropriate tool for populating the proposed data needs list and otherwise informing the LTPP record of the need for renewable integration related resources, and if so in what precise ways should the tool be used to do so?

The models are not an appropriate tool for populating the proposed data needs list and informing the LTPP record of the need for renewable integration-related resources because there is no need for it at this time. PG&E noted that in 2009, "California's Investor Owned utilities served their loads with an average of 15.4% of renewable energy", a penetration close to meeting the 2010 Renewable Portfolio Standard program (RPS) goals. The CAISO notes that planning reserve margins are close to 40% in PG&E's service territory. When this data is considered together with the amount of authorized conventional resources with operational flexibility that are yet to be built, even adjusting for the recessionary impact of the economy, it seems clear that existing procurement practices have proved sufficient to address renewable integration needs without the models. At the very least, it is unclear why the models should affect the traditional methods of populating data sets for Regulation Up and down, Spin and Non-spin, without more given the current capabilities of the system's infrastructure.

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September 21, 2010

CERTIFICATE OF SERVICE

I hereby certify that I have this day served a copy of the following document:

COMMENTS OF THE DIVISION OF RATEPAYER ADVOCATES ON THE CALIFORNIA INDEPENDENT SYSTEM OPERATOR'S AND PACIFIC GAS AND ELECTRIC COMPANY'S RENEWABLE INTEGRATION MODEL METHODOLOGIES

to the official service list in **R.10-05-006** by using the following service:

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Executed on **September 21, 2010,** at San Francisco, California.

/s/ ALBERT HILL

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