BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking to Continue Implementation and Administration of California Renewables Portfolio Standard Program.	Rulemaking 11-05-005 (Filed May 5, 2011)

COMMENTS OF CALPINE CORPORATION ON SECOND ASSIGNED COMMISSIONER'S RULING ISSUING PROCUREMENT REFORM PROPOSALS

Jeffrey P. Gray
Olivia Para
Davis Wright Tremaine LLP
Suite 800
505 Montgomery Street
San Francisco, CA 94111-6533
Tel. (415) 276-6500
Fax. (415) 276-6599
Email: jeffgray@dwt.com

November 20, 2012

Attorneys for Calpine Corporation

BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking to Continue Implementation and Administration of California Renewables Portfolio Standard Program.	Rulemaking 11-05-005 (Filed May 5, 2011)

COMMENTS OF CALPINE CORPORATION ON SECOND ASSIGNED COMMISSIONER'S RULING ISSUING PROCUREMENT REFORM PROPOSALS

Pursuant to the *Second Assigned Commissioner's Ruling Issuing Procurement Reform Proposals and Establishing a Schedule for Comments on Proposals* ("*2nd ACR*"), Calpine Corporation ("Calpine") submits the following comments[1] on procurement reform proposals. Specifically, Calpine's comments focus on the manner in which capacity from intermittent renewable resources is valued for purposes of least cost/best fit ("LCBF") evaluations.[2] This issue implicates several of the questions raised in the *2nd ACR*[3] and is critical to determining the relative capacity benefits and overall market value of different types of renewable resources.[4]

I. CAPACITY VALUATION MUST ACCOUNT FOR EXPECTED CHANGES IN SYSTEM CONDITIONS

For purposes of renewables portfolio standard ("RPS") procurement, the investor-owned utilities currently calculate "capacity value" based on static estimates of capacity that reflect a resource's availability during a set of traditional peak hours. For example, in its 2011 RPS

[1] On November 5, 2012, Administrative Law Judge Simon extended the date to file comments to November 20, 2012.

[2] Calpine reserves the right to address other issues raised in the *2nd ACR* in reply comments.

[3] *See e.g.*, *2nd ACR* at 20 (Question 9), 24-25 (Question 11), 29 (Question 14). Questions 9, 11 and 14 address net market value issues. *See also,* 2nd *ACR* at 36 (addressing Capacity Value for LCBF evaluations), 27 (addressing implementation of new LCBF requirements).

[4] It should be noted that determining the appropriate capacity value associated with different types of renewable resources is separate and distinct from the issue of including integration cost adders in renewables portfolio standard valuation methodologies - an issue that has been addressed by the Commission on several occasions.

request for offers ("RFO"), Pacific Gas and Electric Company ("PG&E") calculated the "capacity benefit" associated with intermittent renewable resources as follows:

> **Capacity benefit** for Resource Adequacy (RA), for year of availability, is the monthly quantity of qualifying capacity multiplied by the monthly capacity value, discounted to 2011 dollars and summed across years. The total discounted capacity benefit is then divided by total discounted MWh of energy, expressed in terms of present value per MWh. PG&E will use the most current, CPUC-adopted methodology for calculating net qualifying capacity. The methodology at the time of RFO issuance was established in D.09-06-028. Pursuant to this decision, for intermittent energy (e.g., wind and solar) products, the qualifying capacity for each month is determined by the capacity that has an exceedance factor of 70% for the five on-peak hours. That is, for 70% of the time, per hour energy generation for the five RA counting peak hours (HE14-HE18 for April through October, and HE17-HE21 for the rest of the year) is greater than or equal to the qualifying capacity.[5]

The current use of static estimates of capacity across a set of traditional peak hours is flawed because it does not account for shifts in system peaks to the early evening hours that are likely to occur with increased penetrations of certain types of intermittent resources, such as solar photovoltaic ("PV") resources. As shown in Figure 1 below, capacity needs are expected to shift away from traditional peak hours and towards early evening hours as the penetration of solar PV increases.

[5] *See* PG&E 2011 RPS RFO, Attachment K at 5 ("PG&E's Description of its RPS Bid Evaluation, Selection Process and Criteria"). Attachment K can be found at: (http://www.pge.com/includes/docs/word_xls/b2b/wholesaleelectricsuppliersolicitation/RPS2011/Attachment_K_LCBF_06102011.doc); *see also* Southern California Edison Company ("SCE") 2011 RPS RFO at 25 ("Capacity Benefit"). SCE's 2011 RPS RFO can be found at: http://asset.sce.com/Documents/Shared/2011_SCERFPProcurementProtocolv4.doc.

Figure 1:
Historical load less the generation from PV and hourly energy prices on three peak days with increasing PV penetration[6]

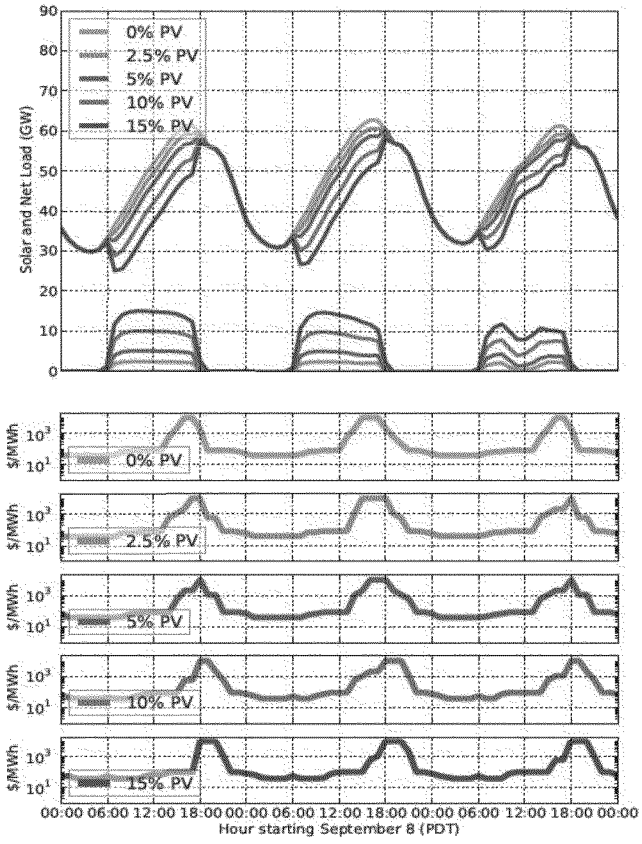


Figure 1 shows how the system peak shifts to the early evening hours with the increased penetration of solar PV. The availability of solar PV during these early evening hours, however, is lower than its availability during traditional peak hours. Thus, as increasing levels of solar PV act to shift peak hours, solar PV becomes less effective at helping meet needs during these hours. Table 1 shows that the "effective marginal capacity credit" for solar PV decreases as the penetration of variable renewable generation increases. In other words, the capacity value of solar PV could dramatically decline as such penetration increases.

[6] *Changes in the Economic Value of Variable Generation at High Penetration Levels: A Pilot Case Study of California* ("*Variable Generation Pilot Case Study*"), Andrew Mills and Ryan Wiser, Lawrence Berkeley National Laboratory at 63 (June 2012). The *Variable Generation Pilot Case Study* can be found at: http://emp.lbl.gov/sites/all/files/eetd.lbl_.gov_EA_EMP_reports_lbnl-5445e.pdf.

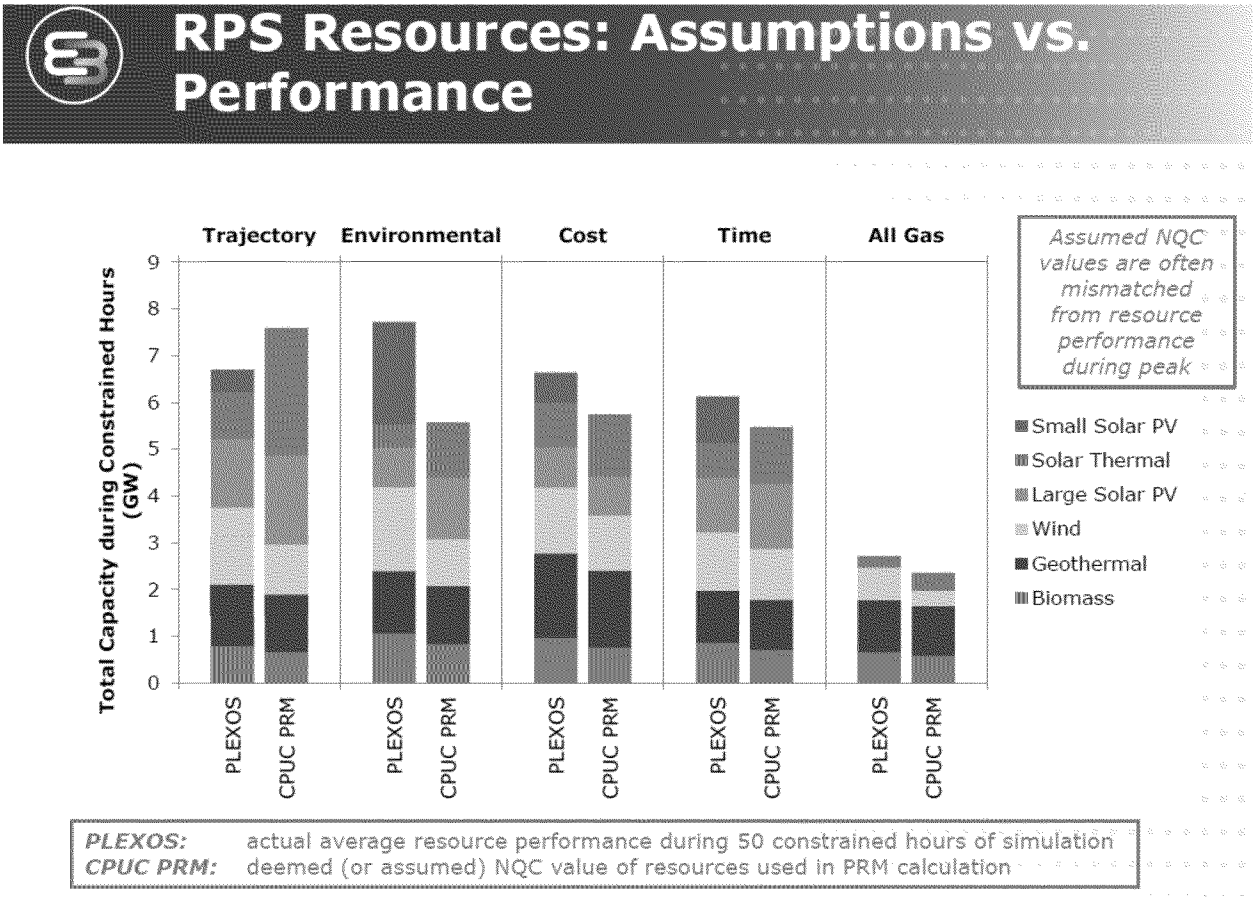
Table 1:
Effective incremental capacity credit of variable renewable generation at low and high penetration[7]

Technology	Low Penetration of VG 0% → 5%			High Penetration of VG 15% → 20%		
	Incremental Reduction in Non-VG Capacity (GW)	Incremental Increase in VG Capacity (GW)	Effective Marginal Capacity Credit	Incremental Reduction in Non-VG Capacity (GW)	Incremental Increase in VG Capacity (GW)	Effective Marginal Capacity Credit
Flat Block	2.1	2.1	100%	1.6	1.6	100%
Wind	1.0	5.7	18%	0.7	4.7	15%
PV	2.8	5.8	48%	0.4	5.9	7%
CSP_0	2.7	7.3	37%	0.2	7.4	2%
CSP_6	4.3	5.1	84%	2.5	4.8	52%

In its review of the renewable integration modeling conducted by the California Independent System Operator ("CAISO") in the Commission's 2010 long term procurement proceeding (R.10-05-006), Energy + Environmental Economics ("E3") observed the same pattern shown in Table 1. Specifically, E3 found that solar PV underperforms relative to its net qualifying capacity ("NQC") calculated according to the currently used methodology:

[7] *Variable Generation Pilot Case Study* at 44.

Figure 2:
RPS Resources: Assumptions vs. Performance[8]



Given the underperformance of solar PV identified in Figure 2, the current methodology used to determine RPS capacity value likely overstates the extent to which solar PV can be used to satisfy prospective capacity needs, particularly relative to resources that can either generate in the early evening hours or have the capability to shift production to those hours, such as biomass, geothermal, and solar thermal resources. Furthermore, the costs associated with the failure to ensure that the capacity value assigned to an intermittent renewable resource accurately reflects the capability of the resource to meet shifts in peak hours are potentially significant.

[8] *Contextualizing Need in Step 2 of the CAISO's LTPP Analysis* ("*Step 2 Need Analysis*"), Arne Olson & Nick Schlag, E3 at 14. The *Step 2 Need Analysis* can be found at: http://www.caiso.com/Documents/Presentation_E3_CAISO_Step2NeedAnalysis_Feb10_2012.pdf.

For example, as Table 1 shows, the increased penetration of solar PV can result in the "effective marginal capacity credit" for solar PV resources to fall from 48% to 7% of nameplate. If capacity value is based on an estimate of avoided capacity cost of $100/kW-year and solar PV generates with a 27% capacity factor, the annual capacity value of solar PV would be overstated by $41/kW-year (the difference between 48% and 7% multiplied by $100/kW-year). Normalized by solar PV's annual output of approximately 2,365 kWh per kW, the capacity value for solar PV would be overstated by approximately $0.01733/kWh or $17.33/MWh, which is more than double the renewable integration cost adder that has been used in the RPS calculator and was recently proposed by PG&E for its inclusion in its LCBF valuation methodology.

To ensure that the capacity value assigned to an intermittent renewable resource accurately reflects the capability of the resource to meet shifts in peak hours, the methodology used to calculate capacity value must be revised to account for expected changes in system conditions and the associated diminution in the capacity value of certain types of resources, such as solar PV, as a result of such shifts in the peak.

II. CONCLUSION

Calpine supports the Commission's efforts to refine and improve the RPS procurement process, and looks forward to continuing to participate in this effort. In particular, Calpine supports changes in the evaluation methodology used to determine the capacity value of

///

///

///

intermittent renewable resources. Specifically, as RPS procurement increases under Senate Bill 2 (1X), it is critical that the evaluation methodology used to determine the relative capacity benefits and overall market value of different types of renewable resources accurately reflects expected changes in system conditions.

Respectfully submitted,

/s/ Jeffrey P. Gray

Jeffrey P. Gray
Olivia Para
Davis Wright Tremaine LLP
Suite 800
505 Montgomery Street
San Francisco, CA 94111-6533
Tel. (415) 276-6500
Email:jeffgray@dwt.com

Dated: November 20, 2012

Attorneys for Calpine Corporation

VERIFICATION

I am the attorney for the Calpine Corporation, and I have been authorized to make this verification on the behalf of Calpine Corporation. Said party is located outside of the County of San Francisco, where I have my office, and I make this verification for said party for that reason.

I have read the foregoing document and based on information and belief, believe the matters in the application to be true.

I declare under penalty of perjury that the foregoing is true and correct and executed on November 20, 2012, at San Francisco, California.

/s/ Jeffrey P. Gray
Jeffrey P. Gray