Calpine Comments on Renewable Energy Costs

Docket No. 12-IEP-1D

Matthew Barmack
Director of Market and Regulatory Analysis
Calpine Corp.
925-557-2267
barmackm@calpine.com

Calpine welcomes the opportunity to comment on issues discussed at the May 22, 2012 lead commissioner workshop on renewable energy costs. In recent years, Calpine has provided approximately 20% of the state's RPS energy from its Geysers geothermal plant. In addition, we are involved actively in developing additional geothermal capacity. Further, we have participated in the IOUs' RPS solicitations with offers from existing and new geothermal, solar thermal/CCGT hybrid, and PV resources. Finally, as a large conventional generator, we are fully aware of the technical and policy issues associated with the use of flexible resources, including both conventional generation and potentially dispatchable renewables, to integrate intermittent renewables.

Calpine limits its comments to a subset of the agenda questions related to the valuation of offers in IOU RPS RFOs. Calpine believes that current RPS RFO valuation do not appropriately reflect the value of different types of renewable resources.

How do utilities decide what constitutes a reasonable price for the contract/set of products being offered?

With respect to "market valuation,"IOUs choose offers with the lowest net market value.The determination of net market value involves the comparison of the payments associated with a specific contract to the value that it yields with respect to wholesale energy and capacity.The IOUs determine net market value based on estimates of the energy and capacity value associated with a project's forecast deliveries. Energy values are determined from forward curves, forward curve extrapolations, and/or fundamental modeling. Capacity values are calculated based on the extent to which a resource is expected to count towards the CPUC's Resource Adequacy requirements, i.e., a resource's Net Qualifying Capacity (NQC), and the IOUs' internal projections of avoided capacity costs. These projections typically are based on the levelized fixed costs of a proxy peaking resource, such as a combustion turbine (CT), net of the margins that such a resource could earn from energy and ancillary services markets. Market valuations are adjusted to reflect the transmission costs of a project that would not be born directly by its developer and potentially other factors, such as debt equivalence.[1]

IOUs also consider aspects of renewable offers besides market valuation, such as credit and project viability.

[1] See Section XI of the protocols for PG&E's RPS solicitation (http://www.pge.com/includes/docs/word_xls/b2b/wholesaleelectricsuppliersolicitation/RPS2011/2011_RPSPlanSolicitationProtocol_06072011.doc) for an example of a typical RPS RFO valuation methodology.

How are the quantities and costs/value of dependable capacity, curtailment, (avoided) ancillary services, etc. determined?

As discussed above, the dependable capacity ofa resource typically is calculated according to the CPUC's NQC counting rules.[2]For non-dispatchable resources such as wind and most solar resources, NQC reflects a percentile of a resource's projected output during a set of pre-defined hours. This resource-specific number is adjusted to reflect the benefits of geographic and technological diversity across all intermittent renewable resources. In RPS RFO valuations, the calculation of NQC may not reflect the impact of increasing penetrations of solar generation on the *net* load peak, i.e., it may not reflect the fact that increasing penetrations of solar generation may drive the need for capacity later in the day and hence reduce the capacity value associated with deliveries during the early afternoon hours of the conventional peak period, during which solar generation is typically highest.

Integration costs currently are not considered in IOU RPS solicitations. Despite general support for their consideration, the CPUC repeatedly has deferred the explicit consideration of such costs in RPS solicitations awaiting the outcome of a public and transparent analysis of such costs. For example, in D.11-04-030, the CPUC concluded:

> We decline to adopt non-zero integration cost adders in thisdecision. We have previously rejected proposals for non-zero integrationcost adders. Nothing presented here changes our view. IOUs mustexclude language in Final 2011 Plans that would incorporate use of nonzerointegration cost adders, including their use in LCBF evaluation ofbids.
>
> Moreover, we said before that such costs, if any, need to bedeveloped with public review and comment.CalWEA, LSA and TURNargue that an adder should only be used if it is developed in a publicforum and, in addition, with Commission supervision. We agree. Weare currently assessing renewable integration needs and costs in anotherproceeding (Rulemaking (R.) 10-05-006). If an adder is developed in thatproceeding, then each IOU may file an advice letter seeking to amend its2011 Plan for the purpose of using that adder in its LCBF evaluations.[3]

The extensive analysis of integration issues that is being led by the CAISO and used by the CAISO in the development of its own markets as well as in the CPUC's Long-Term Planning and Procurement proceeding might eventually form the basis for estimates of renewable integration costs that the CPUC would allow the IOUs to use in RPS RFOs.[4] In addition, a recent CPUC ruling proposed to include integration costs in RPS RFO valuation methods, at least conceptually if not numerically,[5] and, in its most recent RPS procurement plan, PG&E has proposed to ascribe an approximately $8.50/MWh ancillary services cost to offers from intermittent resources.[6]

---

[2]The rules are described here: http://www.cpuc.ca.gov/NR/rdonlyres/2526B26C-BEEA-46FE-904F-A99D2F042FD8/0/AdoptedQCmethodologymanualfromD1006036APPENDIXB.doc.
[3]http://docs.cpuc.ca.gov/word_pdf/FINAL_DECISION/133893.pdf
[4] For example, see http://www.caiso.com/Documents/Renewables%20integration%20reports%20and%20studies
[5] See section 7.1 of http://docs.cpuc.ca.gov/efile/RULINGS/163513.pdf.
[6]See section 1.4.2 of PG&E's draft 2012 Renewable Energy Procurement Plan (https://www.pge.com/regulation/RenewablePortfolioStdsOIR-IV/Other-Docs/PGE/2012/RenewablePortfolioStdsOIR-IV_Other-Doc_PGE_20120523_238660.pdf)

How are resources that provide different products/services compared?

To the extent possible, the IOUs use common valuation methodologies to assess offers involving different technologies. At least PG&E uses a different methodology to assess resources that are dispatchable. While as-available resources are modeled as "variable-quantity forwards," i.e., forecasted deliveries are valued based on deterministic projections of forward values of energy and capacity, "dispatchable products are viewed as options," i.e., the valuation of dispatchable resources considers the variability of prices and the potential to shape the output of a resource towards periods in which the highest prices are realized.[7]

To what extent is dispatchablebaseload renewable generation participating in RFOs?

Calpine has submitted offers for baseload geothermal generation and a dispatchable solar thermal/CCGT hybrid into several recent RPS solicitations.

How do costs associated with these resources compare with those of intermittent resources?

Based on anecdotal evidence, Calpine believes that the winning offers in the most recent IOU RPS solicitations were primarily PV and at prices below $80/MWh (on a non-TOD-adjusted basis). The cost of new geothermal capacity varies significantly from project to project but is generally significantly higher, partly because geothermal generation is not eligible for the same tax breaks as solar. For example, the 30% investment tax credit for geothermal expires at the end of 2013[8] and solar projects are sometimes eligible for property tax relief for which geothermal projects are not eligible.[9]

Do existing valuation methodologies properly assess dispatchablebaseload renewable generation in a high intermittent generation setting?

Calpine does not believe that current valuation methods adequately reflect the favorable operating characteristics of geothermal generation (and other renewable technologies such as solar thermal) relative to PV. Calpine believes that there are at least three ways in which valuation methodologies favor PV relative to geothermal: First, with respect to energy value, the forward curves used in valuations may not reflect the impact of increased penetrations of solar on energy value, i.e., forward curves used in valuations may reflect the current diurnal and seasonal shapes of energy prices. As more solar comes on line, the value of additional generation in early afternoon hours when solar generation is the highest is likely to decline. Consequently, the energy value of PV is likely to be lower than estimated using current RPS valuation methods. Second and similarly, as discussed above, capacity value is ascribed to offers based on production during *current* peak hours. As solar penetration increases, peak load *net* of intermittent generation and consequently capacity requirements are likely to shift to the late afternoon and early evening hours. Calpine believes that current valuation methods may fail to account for this shift and consequently overstate the capacity value of PV. Third, as discussed above, based on CPUC direction, valuation methods fail to account explicitly for integration costs, such as the additional

[7] See XI.A.2 of PG&E's *2011 RPS Solicitation Protocol* (http://www.pge.com/includes/docs/word_xls/b2b/wholesaleelectricsuppliersolicitation/RPS2011/2011_RPSPlanSolicitationProtocol_06072011.doc)

[8] http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=US02F

[9] http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=CA25F&re=1&ee=1

regulation and load following capacity necessary to support intermittent renewables such as PV. Consequently, they understate the costs associated with PV. Calpine eagerly awaits the development of publicly vetted estimates of integration costs and the incorporation of such estimates in RPS RFO valuations.