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 12-03-014 (Filed March 22, 2012)

CALIFORNIA ENVIRONMENTAL JUSTICE ALLIANCE'S INFORMAL COMMENTS TO THE RENEWABLE DG TECHNICAL POTENTIAL WORKSHOP

SHANA LAZEROW
Staff Attorney
Communities for a Better Environment
Franklin Street, Suite 600
Oakland, CA 94612
Telephone: (510) 302-0430
Facsimile: (510) 302-0437
slazerow@cbecal.org

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DEBORAH BEHLES
Environmental Law and Justice Clinic
Golden Gate University School of Law1904
536 Mission Street
San Francisco, CA 94105-2968
Telephone: (415) 369-5336
Facsimile: (415) 896-2450
dbehles@ggu.edu

Attorneys for California Environmental Justice Alliance

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The California Environmental Justice Alliance (CEJA) respectfully submits these informal comments to respond to the California Public Utilities Commission (Commission) Energy Division's July 5, 2013 request for comments related to a workshop that focused on the technical potential of renewable distributed energy. CEJA responds to the July 5, 2013 Energy Division questions in the order presented.

Question 1: Which of these scenarios can be adequately run with substation data, and which would require significantly more load data (e.g., circuit level load information for all circuits) to provide reasonable estimates?

Question 2: If substation level data is all that is available, can you recommend adjustments that would improve the accuracy of the scenario?

Question 3: How can the DG potential study incorporate transmission level constraints?

Response to Questions 1-3: Each of these questions request information related to whether and how the potential for distributed generation (DG) in the study should be constrained based on current distribution and transmission limitations.[1] Before considering these questions, it is important to examine the purpose of this study. As the Energy Division's questions describe,

[1] Energy Division, July 5, 2013 Questions Related to DG Workshop.

"this [DG] analysis is not designed nor intended to be used to site individual projects; the analysis will be used to inform statewide planning and procurement."[2] To best inform planning and procurement, as this study intends, the DG potential should not be limited by static assumptions related to the distribution and transmission system. The entire transmission and distribution system will need to dramatically change to meet the State's GHG goals.[3] California has committed to mitigating the impacts of climate change by reducing greenhouse gas emissions to 1990 levels by 2020,[4] and by reducing GHG emissions by 80 percent below 1990 levels by 2050.[5] Several well-respected scientists recently published a roadmap that identifies where GHG reductions need to occur to meet the State's 2050 goal.[6] Two of the primary measures necessary to meet the 2050 goal are directly related to energy usage. Specifically, the study found that "energy efficiency had to improve by at least 1.3% per year over 40 years" and that "electricity supply had to be nearly decarbonized, with 2050 emissions intensity less than 0.025 kg CO_2e/kWh."[7] Thus, to further reduce GHG emissions from 1990 levels in 2020 to 80 percent below 1990 levels in 2050, significant action will be necessary that will change and transform the grid.

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[2] Energy Division, July 5, 2013 Questions Related to DG Workshop.

[3] To institute these changes, the following principles should be followed: encouragement of the use of existing rights-of-way by upgrading existing transmission facilities where technically and economically justifiable; when construction of new transmission lines is required, encouragement of expansion of existing rights of ways; provide for the creation of new rights-of-way when justified by environmental, technical, or economic reasons; and where there is a need to construct additional transmission, seek agreement among all interested utilities on the efficient use of that capacity. See Garamendi Principles, described at p. 33, http://www.energy.ca.gov/2010publications/CEC-600-2010-007/CEC-600-2010-007-D.PDF.

[4] California Assembly Bill 32, the Global Warming Solutions Act of 2006, Chapter 488 (2006).

[5] California Executive Order S-3-05.

[6] *See* J. Williams, et. al, The Technology Path to Deep Greenhouse Gas Emissions Cuts by 2050: The Pivotal Role of Electricity, Science, Vol. 335, no. 6064 at p. 53 (January 2012).

[7] J. Williams, et. al, *The Technology Path to Deep Greenhouse Gas Emissions Cuts by 2050: The Pivotal Role of Electricity*, SCIENCE, Vol. 335, no. 6064 at p. 53-59 (January 2012).

The system is already constantly changing as reflected by this Commission's decisions. For example, based on a future decision in R.10-12-007, it is likely that significantly more energy storage will be installed on the system. The June 6, 2013 Assigned Commissioner's Ruling Proposing Storage Procurement Targets and Mechanisms in R.10-12-007 proposed over 1,300 MW in procurement targets for energy storage resources for the three IOUs.[8] Energy storage can alleviate some of the transmission and distribution concerns including, but not limited to: transmission peak capacity support, transmission congestion relief, and distribution peak capacity support.[9]

Therefore, due to the constant changes of the grid and the inevitable changes necessary to meet environmental requirements, the overall approach of this study should be to identify the overall DG technical potential, and then, to examine the specific transmission and distribution level constraints that exist to make decisions of where to invest resources.

Question 4: How can the DG potential study evaluate the value to ratepayers of avoided transmission upgrades associated with renewable DG developed on a portfolio level?

Response to Question 4: This question requests information about how to calculate the avoided transmission and distribution costs associated with distributed generation. Determining the avoided transmission and distribution costs is an essential step to quantify the benefits of distributed generation and ensure that distributed generation is evaluated on a level playing field with other resources. Importantly, solar distributed generation, which this study is examining, provides reliable on-peak energy and thus reduces the need for construction of additional peak resources. This, in turn, reduces the transmission needs of the system. In addition, an important

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[8] R.10-12-007, June 6, 2013 Assigned Commissioner's Ruling at p. 9.
[9] R.10-12-007, June 6, 2013 Assigned Commissioner's Ruling at p. 13.

aspect of distributed generation is that it avoids transmission and distribution system line losses, which can be between 9 and 11 percent during peak demand periods.[10]

Several different ways to calculate avoided transmission and distribution (T&D) costs separate from line losses have been described in the literature. T&D avoided costs can be calculated based on the historical annual proportional T&D investment or be evaluating planned future T&D investments for specific sites.[11] As a report prepared for New York provides, a calculation of specific sites for avoided planned future T&D investments could be useful for determining the most effective location for DG resources.[12] This type of approach, however, has significant data needs, which may hinder using this methodology. Using averages during peak periods can be useful to avoid inaction by failing to account for avoided costs provided by DG, when more specific data is unavailable or too burdensome to develop.

For purposes of this study, it may be more manageable to determine an average value of avoided T&D costs. Although this is not as accurate as the location specific calculation, it still provides a valuable benchmark for determining the cost-effectiveness of DG deployment. In fact, one report posits that an average T&D should be used for exactly this purpose: "an average value estimated using the projected embedded analysis does provide an indicator of T&D

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[10] E3, California Solar Initiative Cost-Effectiveness Evaluation, Appendix B, B-15 and Table 5 (prepared for CPUC, April 2011), *available at* http://ethree.com/documents/CSI/CSI%20Report_Complete_E3_Final.pdf [hereinafter CSI Study].

[11] *See* NYSERDA, et. al, Deployment of Distributed Generation for Grid Support and Distribution System Infrastructure: A Summary Analysis of DG Benefits and Case Studies, at p. 9, *available at* http://www.synapse-energy.com/Downloads/SynapseReport.2011-02.NYSERDA.DG-Benefits-and-Case-Studies.07-081-Task%201.pdf

[12] *See* NYSERDA, et. al, Deployment of Distributed Generation for Grid Support and Distribution System Infrastructure: A Summary Analysis of DG Benefits and Case Studies, at p. 9. http://www.synapse-energy.com/Downloads/SynapseReport.2011-02.NYSERDA.DG-Benefits-and-Case-Studies.07-081-Task%201.pdf

avoided costs sufficient for evaluating DG/CHP for an energy future scenario that assumes significant amount of DG/CHP deployment statement."[13]

A June 2010 study of the California Solar Initiative (CSI) examined the T&D savings associated with the CSI program. This study summarized some of the T&D benefits associated with DG PV:

> CSI PV systems reduce loading on the distribution and transmission lines by displacing remote sources of electricity that would otherwise have to be delivered over the T&D systems to electricity customers. Reduced line loading at the time of peak demand potentially alleviates the need to expand or build new transmission and distribution infrastructure, thereby saving utility and ratepayer monies.[14]

This study examined the T&D benefits associated with the 237.1 MW installed and the 136.1 MW estimated solar output at the 2009 summer peak.[15] Using these values, it found that the Transmission Capacity Benefit was around 500-900 MW, which is comparable to the capability of a 230 kV line.[16] It further found that when CSI penetration doubles its 2009 level, the statewide Transmission Capacity Benefit will be around 1000-1500 MW, which is comparable to the capability of a 500 kV transmission line.[17]

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[13] *See* NYSERDA, et. al, Deployment of Distributed Generation for Grid Support and Distribution System Infrastructure: A Summary Analysis of DG Benefits and Case Studies, at p. 9 *available at* http://www.synapse-energy.com/Downloads/SynapseReport.2011-02.NYSERDA.DG-Benefits-and-Case-Studies.07-081-Task%201.pdf

[14] *See* CPUC California Solar Initiative 2009 Impact Evaluation, Executive Summary p. 17 (June 2010), *available at* http://www.cpuc.ca.gov/NR/rdonlyres/70B3F447-ADF5-48D3-8DF0-5DCE0E9DD09E/0/2009_CSI_Impact_Report.pdf.

[15] *See* CPUC California Solar Initiative 2009 Impact Evaluation, Section 6 (June 2010), *available at* http://www.cpuc.ca.gov/NR/rdonlyres/70B3F447-ADF5-48D3-8DF0-5DCE0E9DD09E/0/2009_CSI_Impact_Report.pdf.

[16] *See* CPUC California Solar Initiative 2009 Impact Evaluation, Section 6, p 6-11 (June 2010), *available at* http://www.cpuc.ca.gov/NR/rdonlyres/70B3F447-ADF5-48D3-8DF0-5DCE0E9DD09E/0/2009_CSI_Impact_Report.pdf.

[17] *See* CPUC California Solar Initiative 2009 Impact Evaluation, Section 6 , p. 6-11 (June 2010), *available at* http://www.cpuc.ca.gov/NR/rdonlyres/70B3F447-ADF5-48D3-8DF0-5DCE0E9DD09E/0/2009_CSI_Impact_Report.pdf.

The report further explained why the Transmission Capacity Benefit was higher than the MW of PV installed, stating: "the presence of this distributed PV on the distribution system reduces the loading on all of the "upstream" components of the statewide transmission system all the way back to the central generating stations . . .Each decrement in line loading on all of these transmission elements in series with other upstream and downstream elements, adds to the aggregate capacity benefit captured in the TCB [Transmission Capacity Benefit] calculation."[18] Line loss reduction is not included in these TCB impact, and also needs to be considered.

One other area of avoided costs that does not appear to have been addressed is the ability of smart PVs to provide reactive support and to adjust for fault ride-through. The ability of smart PV to provide reactive power should be taken into account as it could reduce costs of providing these capabilities from centralized facilities and from gas power plants. For example, CAISO has recently identified reactive support as a key issue for replacement of SONGS. The ability of PV to provide reactive power has been proven in Germany, as recognized by the Commission,[19] but Germany also incurred significant expenditures to retrofit the PV systems which do not have this capability.[20] It is be important to plan for inclusion of smart inverters ahead of time, especially in this time of high PV growth and to account for the avoided costs in reactive support

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[18] *See* CPUC California Solar Initiative 2009 Impact Evaluation, Section 6 , p. 6-11(June 2010), *available at* http://www.cpuc.ca.gov/NR/rdonlyres/70B3F447-ADF5-48D3-8DF0-5DCE0E9DD09E/0/2009_CSI_Impact_Report.pdf.

[19] CPUC, Advanced Inverter Technologies Report, Grid Planning and Reliability Energy Division, Elizaveta Malashenko (editor), Stephen Appert, Wendy al-Mukdad, PE, 18 January, 2013, http://www.cpuc.ca.gov/NR/rdonlyres/6B8A077D-ABA8-449B-8DD4-CA5E3428D459/0/CPUCAdvancedInverterReport2013FINAL.pdf

[20] SDG&E website, Enhanced Inverter Functions, Executive Summary, August 7, 2013, https://www.sdge.com/sites/default/files/documents/1167748181/Inverter%20Executive%20Summary%20Aug%207%202013.pdf

provided by smart PVs, while avoiding the unecessary costs that would occur if California upgraded later.

In addition to the transmission benefits, the CSI study identified the following distribution benefits: "[r]eduction in overall feeder demand and energy requirements," "[i]mpact on feeder electrical losses," "[t]he effect on voltages seen by customers on the feeder," and "[i]mpacts on utility voltage control equipment wear and tear."[21]

This CSI report provides an example for how T&D impacts can be calculated. At the very least, the DG report should include the benefits identified in this report in its analysis of T&D avoided costs.

Questions 5: If the state continues to focus on 'easy to interconnect' locations without regard to locating renewable DG in favorable places on the distribution grid: (a) what are the main attributes of an 'easy to interconnect' site? ….

Question 6: If, instead, the state also worked towards targeting renewable DG where it can provide distribution capacity benefits: (a) What would the implementation process look like? . . .

Response to Questions 5-6: These questions discuss two approaches to installing distributed generation. The first approach is to install distributed generation where it is easy to connect, and the second is to install distributed generation where it can avoid capacity costs. CEJA supports installing distributed generation where it is needed to avoid other sources of generation. CEJA also urges that distributed generation be targeted specifically for environmental justice communities. In addition, CEJA notes that the question leaves out a number of the benefits of

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[21] *See* CPUC California Solar Initiative 2009 Impact Evaluation, Section 6, p. 6-17 (June 2010), available at http://www.cpuc.ca.gov/NR/rdonlyres/70B3F447-ADF5-48D3-8DF0-5DCE0E9DD09E/0/2009_CSI_Impact_Report.pdf.

DG that should be considered in relation to location including resiliency of the grid in case of an emergency, reduction of pollution, and economic and environmental benefits if located in EJ community. Consideration of these factors supports installing DG in places to avoid building infrastructure.

Importantly, avoided environmental costs need to be considered. California explicitly requires consideration of environmental compliance avoided costs when determining feed in tariffs.[22] The applicable statute also provides some direction about how environmental avoided costs should be calculated, by providing that the tariff:

> shall include all current and anticipated environmental compliance costs, including, but not limited to, mitigation of emissions of greenhouse gases and air pollution offsets associated with the operation of new generating facilities in local air pollution control or air quality management district where the electric generation facility is located.[23]

Avoided environmental costs can be broken down into three general categories: (1) avoided environmental fees, such as emission offset and allowance requirements; (2) avoided costs for installation of pollution control equipment / compliance costs; and (3) avoided externalities / societal fees. The first two categories both are the costs of compliance with environmental laws and requirements that meet the Energy Division's standards of review set forth in the July 5, 2013 questions.

To calculate the avoided environmental fee, the following would need to be determined: (a) the location of the fossil fuel generating facility that the utility is avoiding having to call on; (b) the applicable local, state and federal requirements for offsets, allowances and/or emission credits; (c) an estimate of the quantity of emissions avoided; and (d) a forecast of the price of the emission offsets, allowances and/or emission credits. To calculate generic values that could be

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[22] *See* Cal. Public Utility Code § 399.20(d)(1).
[23] *Id.*

used in the model, E3 could use a recently approved power plant from each of the relevant air districts or at least the Bay Area, San Diego, and South Coast air districts as the basis to determine the forecast of the emission offsets, allowances, and/or emission credits. The avoided emissions from distributed generation can be calculated based on an emissions factor determined by MWhr.

Another element of avoided environmental costs is the costs related to the installation of required pollution control equipment. This is separate from the societal costs that result from other forms of generation. Some adder for pollution control equipment costs may be included in the market price for fossil fuel facilities. If it is not, an estimate of required pollution control equipment should be considered.

To start this evaluation, E3 could again examine a recently permitted fossil-fuel facility in the relevant air district. This recently permitted fossil-fuel facility will provide a basis for calculating the pollution controls necessary to meet environmental requirements. Clean Air Act costs are likely not the only costs relevant to a determination of avoided pollution control costs. Facilities may also need to pay costs to comply with Clean Water Act requirements. Permitting costs depend on the facility's location.

CEJA also continues to urge the Energy Division to evaluate the societal benefits of distributed generation. Quantifying these benefits is critical for providing a reliable metric to make policy decisions.

Question 7: Given the current CAISO process for evaluating local capacity zones, can we capture the impacts of local, non-dispatchable renwable DG in the assessment of capacity requirements? Is the answer different for 'behind the meter' systems versus merchant RDG?

Question 8: What level of reliability must be met for local peak load reduction, or is there a "Quantifying Capacity' methodology?

Response to Questions 7-8: These questions request information about how to calculate the avoided cost associated with renewable energy. CAISO models have already shown that constructing more DG lowers LCR need. This was seen in the last TPP study, which consistently found a lower need for the environmentally constrained scenario that assumed a higher level of distributed generation. These types of studies can provide useful metrics for determining the avoided capacity cost associated with the development of distributed generation. It is also important to note that the markers of reliability for DG often underestimate the true reliability of DG. This was illustrated by Mr. Power's solar penetration analysis for the LA Basin, which showed over a 90% availability of DG during the top 100 peak hours.[24]

Respectfully submitted,

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/s/ Deborah Behles

DEBORAH BEHLES
Environmental Law and Justice Clinic
Golden Gate University School of Law
536 Mission Street
San Francisco, CA 94105-2968
(415) 442-6647 (Telephone)
dbehles@ggu.edu

SHANA LAZEROW
Communities for a Better Environment
1904 Franklin Street, Suite 600
Oakland, CA 94612
(510) 302-0430 (Telephone)
slazerow@cbecal.org

Attorneys for
CALIFORNIA ENVIRONMENTAL JUSTICE ALLIANCE

[24] *See* Bill Powers' Expert Report for CEJA, R.12-03-014, Track I, Appendix.