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California Energy Commission
Docket Office, MS-4
Re: Docket number 11-IEP-1G
1516 Ninth Street,
Sacramento, CA 95814-5512

RE: **"Renewables" Comments on IEPR Committee Workshop: Distributed Generation – Getting to 12,000 MW by 2020**

Dear IEPR Committee,

Pursuant to a request from the Integrated Energy Policy Report ("IEPR") Committee, the Interstate Renewable Energy Council ("IREC") respectfully submits these comments in response to the questions posed for the May 9th, 2011 IEPR Committee Workshop: Distributed Generation – Getting to 12,000 MW by 2020 ("Workshop").

IREC is a non-profit organization that has worked for nearly three decades to accelerate the sustainable utilization of renewable energy resources through the development of programs and policies that reduce barriers to renewable energy deployment. With funding from the United States Department of Energy's Solar Energy Technologies Program,[1] IREC has participated in renewable energy-related workshops, proceedings and rulemakings in over thirty-five states during the past three years. IREC addresses topics that directly impact the development of renewable energy resources, including net metering rules, interconnection standards for distributed generation and community solar program rules. IREC has also assembled model rules for these topics that reflect "best practices" in these areas.

IREC appreciates the opportunity to file these comments, which focus on the first and second questions posed by the IEPR Committee.

1) *Please suggest a methodology for setting interim and regional targets building to the 12,000 MW goal by 2020. Considerations to address include: state and local policies, the capability of the distribution system, economics, and resource availability. To aid discussion, staff has identified the following options for parsing out the goal: [options omitted]*

[1] http://www1.eere.energy.gov/solar/state_technical.html

IREC strongly supports the development of interim targets to help guide the state towards the identified 12,000 MW goal. Setting interim targets will enable the state to track progress towards the goal and can be used to ensure that it is met in a way that maximizes the benefits to the state. To that effect, IREC would like to encourage the state to consider designing the targets, and the supporting programs and policies, around achieving the specific benefits offered by distributed generation, rather than simply the numeric goal. The California Energy Commission ("CEC") should work closely with the California Public Utilities Commission ("CPUC") to develop targets that support the development of a diversified and sustainable market for distributed generation.

Distributed generation is a term that is widely used without being given a very precise definition, often the term simply refers to projects below 20 MW in size. Distributed generation's numerous benefits, however, are not derived simply from the size of the generating system, though size tends to be a good metric for targeting projects that have those benefits. For example, one of the significant benefits that distributed generation can offer is avoided construction of additional transmission lines. According to the 2009 CSI Impacts Report, currently installed capacity under the CSI program is providing transmission capacity benefits comparable to a 230kW transmission line.[2]

This transmission benefit only exists, however, if a system is connected to a distribution grid and the power generated by the resource is used by those on the distribution circuit near where the generating resource is interconnected. If power flow requires use of the transmission grid to be delivered to distant users then these benefits might be lost or lessened. Location close to load can also reduce the line losses that occur when energy has to be transmitted greater distances, can help defer transmission and distribution capacity upgrades and additions, and may reduce voltage variability and provide reactive power support. Smaller projects are more likely to be able to connect to the distribution grid and can be sited in denser areas where load is located and thus are more likely to offer these benefits. However, these benefits are not limited to small projects, nor are they necessarily achieved by all small projects as small projects may also be connected to the transmission grid or in locations far from load.

In addition, there are potentially significant land use and environmental benefits associated with certain distributed generation projects that are sited appropriately. These projects are less likely to be sited on virgin land and have the potential to make use of brownfield properties in urban and suburban areas that might otherwise remain undeveloped. Smaller projects tend to have more potential to take advantage of these sites, but not all small projects actually are sited in such a manner.

Every potential distributed generation project is not likely to offer benefits in all of these areas, but IREC encourages the state to design programs to implement the 12,000 MW goal that are targeted towards capturing the benefits that distributed generation can offer and thereby provide the most value to ratepayers and the state of California. One

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[2] See CPUC California Solar Initiative 2009 Impacts Report, June 2010, Section 6.2.

of the ways to achieve these goals is to develop a diversified set of programs that support distributed generation growth across market segments. In addition, the state must improve the technical standards that currently act as obstacles to achieving higher penetrations of distributed generation. Without policy improvements in the technical standards it will be impossible to integrate 12,000 MW of distributed generation into our existing system without considerable cost-intensive studies and grid upgrades.

Moreover, careful consideration needs to be given to the types of programs and policies that will be necessary to support achieving the 12,000 MW distribute generation goal. There are important differences between retail and wholesale PV markets that need to be considered in developing the right suite of retail and wholesale programs that can support both segments of the market. To assist stakeholders in considering the important differences between wholesale and retail programs and how those differences can drive program design to fully unlock both of these PV markets, the Solar America Board for Codes and Standards recently released a report on the topic: *Sustainable, Multi-segment Market Design for Distributed Solar Photovoltaics* (Market Design Report).[3] The report is divided into two sections: a Retail Market Policies section which discusses policies that support investment by retail electric customers to provide some or all of their energy needs and a Wholesale Market Policies section which discusses the policies necessary to unlock market investment in distributed generation facilities designed to serve nearby retail electric load. In these comments, we highlight some key findings from that report to assist the Commission in its consideration of the best avenues for achieving the 12,000 MW distributed generation goal.

Retail Programs

Successful retail policies allow customers to generate and use PV power to serve their electrical needs with minimal effort. Among the important policies discussed in the Market Design Report as necessary to unlocking the full potential of retail markets are: net metering, meter aggregation, community solar, and incentive program design. To date, California has invested significant effort in many of these areas including developing a solid net metering program coupled with a well structured incentive program for on-site solar via the California Solar Initiative (CSI). The success of the California Solar Initiative (CSI) has resulted in dramatic growth in the number of customers that participate in net energy metering. However, as noted in the Market Design Report, more can be done to support the ability of retail electricity customers to invest in renewable energy resources for their own use including meter aggregation and community solar. While the Market Design Report provides an outline of these two polices, at this time IREC will highlight a few aspects of these policies that are specific to California.

First, consistent with the findings of the Market Design Report, recent studies conducted in California have concluded that expanding virtual net metering, which is currently limited to the low-income multifamily housing program within the California

[3] Available at www.solarabcs.org/marketdesign.

Solar Initiative, to include other multi-tenant properties can increase opportunities for participation in the CSI and also help drive down costs by supporting development of larger CSI systems.[4] Currently, the California PUC is considering an expansion of VNM within Docket no. 10-05-004. IREC encourages the CEC to support these efforts as one step in expanding net metering to increase the ability of electric consumers to green their energy supplies.

Allowing customers to aggregate their meters via a well-designed meter aggregation program is also an important step for fully allowing all retail customers to invest in renewable energy resources to meet their energy needs. Agricultural customers, universities, municipalities, and other large customers with dispersed operations are currently stymied from developing larger, more cost effective projects in California because current policies prohibit them from sizing a single renewable energy resource to meet their total resource needs because the load exists at multiple locations with different meters. In addition to the discussion of the importance of meter aggregation contained in the Market Design Report, further detail on state policies concerning aggregate net metering and its benefits can also be found in *Aggregated Net Metering in Arizona: Summary of Policies in Other States: First Consultant Report*.[5]

Moreover, community renewables programs, which incorporate VNM, have been developed in Colorado and Delaware as a means to allow groups that have not traditionally been able to fully participate in on-site renewables programs to invest in renewable energy resources to green their energy supply. For example, renters and other occupants of multi-tenant residential and commercial buildings may lack necessary control of their premises to host an onsite PV system. Add to that shading and onsite structural concerns, and it becomes clear that many would-be solar supporters may not be able to install an onsite system. In fact, a 2008 NREL study found that only 22% to 27% of residential buildings are suitable for hosting an onsite PV system.[6] Thus, the market for distributed PV that could be supported by well-designed community solar policies is considerable. Included in any community solar program should be rules that allow for virtual net metering that will enable multiple

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[4] See McCutchan, et al., *Solar PV Retrofits in Multifamily Affordable Housing: Impacts of Virtual Net Metering and MASH Incentives on Project Economics*, March 2011, California Center for Sustainable Energy, available at: https://energycenter.org/index.php/incentive-programs/self-generation-incentive-program/sgip-documents/doc_download/719-impacts-of-vnm-and-mash; California Solar Initiative Cost-Effectiveness Evaluation, April 2011, Energy+Environmental Economics, available at: ftp://ftp.cpuc.ca.gov/gopher-data/energy_division/csi/CSI%20Report_Complete_E3_Final.pdf.

[5] Prepared by Keyes & Fox, LLP for the Arizona Corporation Commission, September 30, 2010, available at: http://www.naruc.org/Publications/SERCAT_Arizona_2010.pdf.

[6] Denholm, P., & Margolis, R. (2008), Supply Curves for Rooftop PV-Generated Electricity for the United States, National Renewable Energy Laboratory, Technical Report NREL/TP-6A0-44073, Retrieved June 23, 2010, from http://www.nrel.gov/docs/fy09osti/44073.pdf.

customers to net meter off of a single system located on the same premises or within a certain geographical area (such as for multi-tenant residential and commercial buildings).[7]

To understand the impact this change would have on the solar market, one can consider the fact that California currently has approximately 5.5 million households who are renters according to the 2010 Census. If 5% of these rental households per year participate in a community solar program by investing in 2 kW of solar capacity, the result would be 550 MW of new solar resources *per year*.

Wholesale Programs

As noted in the Market Design Report, PV system costs have dropped considerably in recent years and are expected to decline for the foreseeable future. In some markets, wholesale PV generation prices have become competitive with other sources of wholesale peaking power.

The Market Design Report notes that utility motivations for entering wholesale contracts with PV facilities are varied. Cost effectiveness and peaking supply are only two of the benefits. Distributed PV systems can also be deployed quickly, scaled to most any size, and sited almost anywhere. The flexibility to locate PV generation where needed, when needed, and in the size needed offers grid benefits that other sources of renewable generation cannot offer. Moreover, the smaller footprint of distributed PV systems means they can be deployed close to the loads they serve, avoiding transmission constraints and lengthy environmental review processes.

Many of these benefits are currently overlooked in utility procurement practices, however, the Market Design Report notes that this paradigm is beginning to shift in many markets. Policy makers and utilities in these markets have begun to appreciate the many benefits of distributed generation. They have also begun to appreciate the need for targeted procurement mechanisms that fully value the range of benefits provided by these resources. The result has been movement in many areas toward policies that increase procurement of wholesale power from distributed generation.

Over the last couple years, the CPUC has endeavored to implement a number of new wholesale programs that target distributed generation up to 20 MW in capacity. These programs include wholesale PV procurement mechanisms for the state's largest IOUs, a Renewable Auction Mechanism ("RAM") for RPS-eligible generation, a feed-in tariff

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[7] While these comments focus on how a community renewables program can enhance participation in state-level efforts to increase adoption of PV technologies, others have also noted that community renewables programs can increase participation in biogas digester technologies by allowing multiple sources of feedstock, such as farmers with manure, to combine their feedstock resources to invest in a larger, more cost-effective biogas digester resource and use VNM to share the economic benefits of their investment.

for high-efficiency combined heat and power systems pursuant to Assembly Bill 1613 (Blakeslee 2007), and a feed-in tariff for RPS-eligible resources up to 3 MW in capacity pursuant to Senate Bill 32 (Negrete McLeod 2009).

To cost effectively achieve a 12,000 MW goal, IREC believes it is essential to fully implement and maintain support for these important wholesale procurement programs. To maintain that support, IREC believes it is important to consider structuring eligibility requirements for program participation that maximize the benefits that projects enrolled in these programs provide to California ratepayers.

2) *Related to the above question, some utilities have noted in the California Public Utilities Commission's Rule 21 Working Group and its Renewable Distributed Energy Collaborative (Re-DEC) that up to 15 percent of peak load for individual circuits could reliably interconnect with minimal system upgrades. Other utilities have said that individual circuits could handle distributed generation additions for up to 50 to 100 percent of minimum load. Could a 15 percent of peak load or 50 to 100 percent of minimum load penetration rate be implemented statewide? If so, how much renewable capacity would be installed per utility?*

Generator interconnection is a critical issue for the IEPR Committee to address in developing its recommendations for achieving a 12,000 MW goal. Achieving a 12,000 MW goal will require the state's electrical grid to accommodate higher penetrations of distributed generation on individual circuits. To efficiently and cost-effectively interconnect distributed generation on circuits that reach higher penetrations, effective screening tools are needed to identify technical concerns that may arise as increasing penetration levels are reached.

Penetration-based screens are important because they limit the size and number of systems that can be interconnected quickly without going through a costly and time-consuming interconnection study process that can be prohibitively expensive for many proposed systems. Currently, California's various interconnection processes use a 15% of peak load screen, meaning that proposed interconnections may be subject to extensive study if they would cause aggregate generating capacity on a line section to exceed 15% of peak load on that line section. California's Rule 21 interconnection procedures and the FERC-regulated interconnection procedures adopted by the CAISO and the state's largest IOUs all require generator interconnections that exceed 15% of peak load to be subject to the possibility of a full study process.

IREC believes this approach is outdated, overly simplistic and inadequate to facilitate a 12,000 MW distributed generation target. IREC proposes that California move immediately to a penetration-based screening approach that uses minimum load instead of peak load as a basis for screening interconnection applications. Specifically, IREC believes it is entirely possible to immediately use 50% of minimum load as a screening tool to fast track interconnection requests without the need for additional study. IREC also believes that it is possible to achieve penetrations greater than 50% of minimum load with appropriate supplemental screens in place and that the state should move quickly to develop an appropriate supplemental screening approach.

Peak vs. Minimum Load Screens

IREC believes that at penetrations below 50% of minimum load (measured when proposed generation is expected to be on line) no additional study or supplemental review of an interconnection request is needed so long as other technical review screens are passed.

Although penetration-based screens are often calculated as a percentage of peak load, this is largely due to the availability of peak load data and not because this is a preferred approach from an engineering standpoint. Distribution system operation, safety, and reliability are more likely to be impacted as generation capacity on a line section approaches and exceeds load on that line section. The probability of generation exceeding load is greatest at times of minimum load, not peak load. So, what matters most from a safety and reliability standpoint is the amount generation capacity on a line section relative to minimum load.

Historically, minimum load data has not been as available to utility planners as peak load data. As a result, technical review screens used in many jurisdictions, including California, are often based on peak load data. However, the intent is to use readily accessible data to create a "rule of thumb" that aims to ensure that generation capacity remains below expected minimum load.

For most distribution systems, a line section's minimum load is in the range of 30 percent of peak load. The 15 percent of peak load screen is derived by taking peak load, applying an assumption that minimum load is likely 30 percent of that figure, and then multiplying that number by 50 percent as an additional safety factor (100% of peak load x 30% expectation of minimum load x 50% additional safety factor = 15% of peak load).[8] Thus, the 15 percent screen is intended to use readily accessible data to conservatively estimate an aggregate generation capacity that is 50 percent of minimum load.

This basic approach is reflected in the California Electric Rule Supplemental Review Guideline developed by the California Energy Commission Rule 21 Working Group.[9] Page 16 of the Supplemental Review Guideline notes:

> "If one can assume as a rule of thumb that the typical line section minimum load

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[8] *See* Sheehan, Michael T., Cleveland, Thomas, Updated Recommendations for Federal Energy Regulatory Commission Small Generator Interconnection Procedures Screens, Solar America Board of Codes and Standards, p. 4, July 2010 (available at: *http://www.solarabcs.org/FERCScreens/docs/ABCS-FERC_studyreport.pdf*)

[9] California Energy Commission Rule 21 Working Group, California Electric Rule Supplemental Review Guideline, CEC (August 26, 2005).

> will be at least 30% of the peak load, at 15% aggregate, the generating capacity would be no more than 50% of the minimum load of the Line Section. In this case, the generation would be adequately swamped out by the load during an islanded condition."

Once generation capacity on a line section reaches 15 percent of peak load, IREC believes safety and reliability are better served by screening interconnection requests using minimum load characteristics. Minimum load data is not currently available on all circuits in California but the utilities have data for many circuits and could be required to begin gathering that data for all circuits. In addition, this data should become available as the Smart Grid is fully implemented.

For PV systems the relevant period for measuring minimum load is between the hours of 10 a.m. and 3 p.m. If the goal is to ensure that aggregate generation on a distribution feeder does not exceed 50 percent of minimum load on that feeder then it makes sense to look at minimum load during daytime hours when PV systems will be generating. IREC proposes the hours of 10 a.m. to 3 p.m. as a reasonable approximation of the time period when installed PV capacity may come anywhere near its maximum generating capacity.

Setting feeder penetration at 50% of minimum load (measured between the hours of 10 a.m. and 3 p.m. for PV systems) is intended to use a more precise measure of minimum load data as penetration reaches higher levels. This proposal simply eliminates the assumption that minimum load is likely to be 30 percent of peak load and instead sets allowable penetration levels that can be accommodated without additional study based on actual data instead of assumptions. Therefore, this screen is entirely appropriate at this time and requires no further study in order to be adopted. Indeed, PG&E and SCE have recently agreed to begin applying the 50% of minimum load screen to projects that fail the current 15% of minimum load screen under their newly revised generator interconnection procedures.[10]

<u>Going Above 50% of Minimum Load</u>

IREC believes that a penetration-based screening approach that uses 50% of minimum load (measured between the hours of 10 a.m. and 3 p.m. for PV systems) is achievable immediately. However, the discussion should not end there. Screening interconnection requests using 50% of minimum load is no less conservative than the present 15% of peak load approach. As explained above, these two approaches can be directly derived from each other and as a result they achieve largely the same result. In fact, SCE noted in comments filed recently at FERC that "SCE has consistently stated to stakeholders

[10] Pacific Gas & Electric, Motion for Leave to File Answer and Answer of Pacific Gas and Electric Company, Federal Energy Regulatory Commission Docket No. ER11-3004-000 at 12; Southern California Edison, Southern California Edison Company's Motion to File Answer and Answer to Motions, Comments, and Protests, Federal Energy Regulatory Commission Docket No. ER11-2977-000 at 18-19.

that for many of its distribution circuits, 50% of the minimum load approximates 15% of peak load".[11]

IREC believes penetrations above 50% of minimum load can be easily accommodated without significant system upgrades. Here in California, the Sacramento Municipal Utility District has begun to allow for penetration levels above 50% of minimum through the implementation of its feed-in-tariff program. There is a circuit on the island of Kauai that is at 100% of minimum load and loading on circuits in other parts of the country support the ability to accommodate penetrations above 50% of minimum load without significant system upgrades.

To facilitate penetrations above 50% of minimum load (measured at the time generation is expected to be online), IREC believes appropriate supplemental review screens should be developed. Below 50% no additional study or system upgrades should be needed. Between 50% and 100% of minimum load, IREC proposes that the CEC work with the CPUC, California's utilities and interested stakeholders to identify technical concerns that may arise at specific penetration-based thresholds and that parties identify specific solutions to address these concerns. Supplemental review screens can then be devised to identify system upgrades that may be necessary as specific penetration levels above 50% of minimum load are reached.

The Potential Pole of Electricity Storage

IREC also believes it is important to highlight that the entire question of penetration limits for distributed generation on a given circuit can be obviated by an appropriate investment in distributed storage resources. The IEPR Committee devoted an entire day last month to the potential value of deploying electricity storage technologies to facilitate the integration of renewables. Curiously, however, the May 9 workshop barely touched on the role that storage could play in facilitating the achievement of the Governor's goal of achieving 12,000 MW of distributed (primarily renewable) generation within the same time frame (*i.e.*, by 2020).

We understand that the IEPR Committee is considering issuing a subsidiary volume to the 2011 IEPR that will focus on three main topics that relate directly to the achievement of the state's 33% RPS goal: (1) renewables integration technologies, including storage; (2) what is needed to meet the 12,000 MW distributed generation; and (3) transmission planning and siting issues associated with expanded reliance on renewable energy. As the Committee understands, these issues are all closely related, and the state's renewable energy goals are in danger of not being met if efforts on all of these fronts do not move forward. However, the issue of meeting the 12,000 MW distributed generation goal is particularly at risk if the Committee does not marry its consideration of the technical issues that need to be addressed in order to meet this goal

[11] Southern California Edison, Southern California Edison Company's Motion to File Answer and Answer to Motions, Comments, and Protests, Federal Energy Regulatory Commission Docket No. ER11-2977-000 at 19.

with an active consideration of the role that storage can play in facilitating the resolution of these technical issues.

By way of an example, a number of the strongest concerns articulated by the utility representatives at the May 9 workshop revolved around the potential system reliability concerns that they would face if "too much" distributed generation was sited within their retail distribution systems. One such representative indicated that his company was not particularly concerned with new distributed generation installations close to substations, but that reliability concerns grow the further the DG resources are sited from substations. However, such comments ignore the value that the robust development of distributed storage resources located within a utility's load pocket could provide. If, for example, a circuit on which significant new distributed generation resources are proposed to be interconnected was also equipped with appropriate distributed storage resources (*e.g.*, 5 megawatts of capacity and 15-to-20 megawatt-hours of energy), all "reliability" issues stemming from utility concerns about potentially overloading that circuit with "too much" distributed generation could be alleviated.

IREC appreciates the opportunity to submit these comments and looks forward to continuing to participate in the state's effort to achieve the 12,000 MW of distributed generation goal.

/s/ Sky C. Stanfield

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