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Comments to the California Energy Commission Integrated Energy Policy Report Distributed Generation – Getting to 12,000 MW by 2020

OVERVIEW

Thank you for the opportunity to submit these comments on the goal of getting to 12 GW of distributed generation by 2020.

Environment California Research & Policy Center is a statewide citizen-funded environmental advocacy organization. We've been a leading player in developing the policies needed to bring more renewable energy to California and, specifically, bring about a mainstream distributed generation market in California. We were a leading voice in a campaign to clean up distributed generation via establishing tighter air pollution regulations on micro-power turbines and emergency backup generators. Shortly thereafter, we became the state's leading environmental organization calling for more rooftop solar power via the highly successful Million Solar Roofs Initiative campaign and establishing a rebate program for solar water heaters. And most recently, we have been a leading voice in increasing California's renewable energy mandate via the 33% by 2020 Renewable Portfolio Standard.

Distributed generation, especially distributed solar power (though other distributed renewable technologies also hold a lot of promise) remains a greatly underutilized energy resource in California. Though progress in the past five years has been exceptional, renewable distributed energy has power has the potential to dramatically reduce air pollution, cut the state's dependence on dirty energy resources and help rebuild the state's economy and create new jobs around green technologies.

The market for distributed generation, as is the case for all forms of renewable energy, remains highly dependent on public policy. We believe that policy barriers are far greater than any technical barriers to seeing mainstream deployment of renewable distributed generation in the next nine years.

Our comments are organized as follows:

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Distributed Generation – Getting to 12,000 MW by 2020

I. Top 10 principles to bring about the 12 GW by 2020 goal

As California policy makers delve into the details of mapping out how to achieve the Governor's proposed 12 gigawatts (GW) of distributed generation by 2020, Environment California suggests the following ten principles be followed throughout the planning and implementation process.

- **RENEWABLE ENERGY ONLY:** California should prioritize developing the full 12 GW of distributed generation from renewable energy resources. Non renewable distributed technologies, while having a role in California's energy future, should be additional to this program.
- **PROTECT AND ENHANCE CUSTOMER-OWNED MARKET:** California policy should continue to prioritize supporting a market for customer-owned distributed generation for several reasons. First, customer owned distributed generation can be the "best deal in town" as it leverages private capital to build what is essentially public infrastructure. Secondly, the vast majority of customer owned distributed generation projects will be on buildings and or on land on which siting will not be as big of an issue. Third, customer owned distributed generation has been the driving force of California's distributed generation market to date and can result in rapid deployment of renewable distributed generation. Fourth, when CALIFORNIA homeowners and business owners own their own distributed generation project, they are more likely to invest in energy efficiency and engage in conservation behaviors (like turning off lights) providing the state with additional energy efficiency benefits. Fifth, the customer owned distributed generation market is likely to create more jobs per MW than the other distributed generation markets. For example, as discussed below, California is home to about 30 percent of all solar companies in the United States thanks in large part to the Million Solar Roofs Initiative. More than 1,000 firms are active in California's solar industry. These firms employ more than 30,000

people. Lastly, giving the average Californian a role to play in California's energy future is a key way to engage the public in key policy decisions.

- **INCLUDE SOLAR HOT WATER:** While solar photovoltaics will likely dominate the market over the next nine years, California's renewable distributed generation policies should include all of the other promising distributed generation technologies such as solar hot water that are ready for massive deployment.
- **OUT WITH THE OLD, IN WITH THE NEW:** Time should be given to identifying where the retirement of aging and dirty conventional power plants, fossil fuel and nuclear, can be accelerated and/or eased by strategic placement of distributed generation.
- **TIME IS OF THE ESSENCE:** 2020 is not far off. Therefore, this program should be designed to support those technologies that are ready for massive deployment and to support those markets that are able to rapidly expand.
- **CARROTS AND STICKS:** Policy framework should include a mixture of both carrots (financing availability) and sticks (mandates). For example, mandating solar on new construction as part of building code is what is needed to achieve the state's zero energy homes goal while new financing opportunities for customer-owned solar is needed to drive more consumers toward solar.
- **HOUSE OF STEEL:** While we want rapid deployment, California policy makers need to make sure we are building quality infrastructure for decades to come. This means making sure there are checks and balances, project viability requirements, transparency, consumer protections, quality controls, etc. built into the policies and programs designed to achieve the 12 GW goal.
- **MAXIMIZE CO-BENEFITS:** Energy efficiency and distributed generation go hand. The program should give special consideration toward maximizing those projects that capitalize on this natural relationship. For example, consumers are more likely to invest in efficiency once they've invested in a distributed generation project, or vice versa making consumer-owned projects particularly good at maximizing energy efficiency along with renewable distributed generation.
- **BUILDING INTEGRATED:** The next frontier for renewable distributed generation is to include it in the built environment. Accomplishing this should be a cornerstone of the 12 GW program.
- **NOT ONE SIZE FITS ALL:** California's distributed generation market is big and diverse and policy-driven. To get to the 12 GW goal and move beyond it, California needs a medley of policies that support all of the various distributed generation markets. There is no one size fits all when it comes to distributed generation policy. We need net metering for customer-owned systems. We need an enhanced feed-in-tariff program for medium-sized projects. We need utilities to build/contract with large systems. We need customer-owned projects to be both small (homeowner) and large (industrial facility). We need state building code to incorporate mandates for onsite generation. Etc.

II. Key takeaways from Million Solar Roofs program to date

In 2006 California leaders created the Million Solar Roofs initiative, a plan to use \$3.2 billion in incentives to drive the installation of 3,000 megawatts of solar power by 2016, while also reducing the price of solar power and creating a vibrant, sustainable solar industry in California for the long term.

Four years in, the program is succeeding – though there are some areas for improvement. Overall, California has installed more than 800 megawatts of distributed solar energy – more than all but four other nations in the world. At the same time, the price of solar energy is falling, and the state has built a strong infrastructure of solar energy providers and installers.

However, several key flaws in the program's design will likely prevent it from reaching the 3,000 MW goal on time without corrective action – including a budget increase, alterations to some of the reimbursement formulas, possibly stronger requirements on new homebuilders, and action to accelerate the activity of publicly owned utilities.

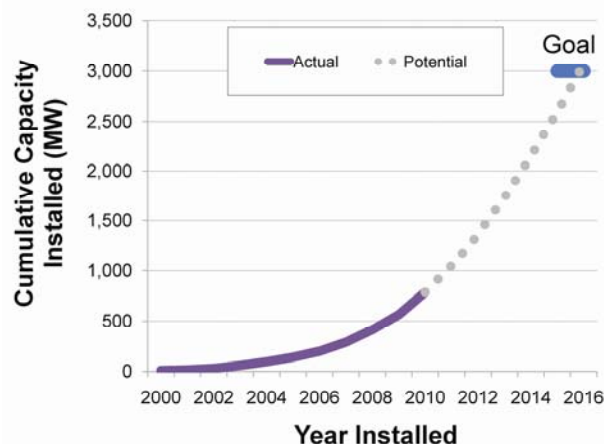
California has made significant progress toward its goal of reaching 3,000 MW of total distributed solar power capacity installed by the end of 2016.

Overall, the program had achieved 26 percent of the goal by the end of 2010.

If installation rates grow by 33 percent in 2011, then gradually decline to 18 percent in 2016, then the state would reach the 3,000 MW goal. (See Figure ES-1.) This growth rate is plausible. Since 2006, overall capacity has grown by about 40 percent per year.

The state will not reach the unofficial goal of having one million separate solar installations (or “roofs”). As of April 2011, the state has about 80,000 installations. Both residential and commercial systems have been trending larger (average residential systems are approaching 5 kW, and average non-residential systems are more than 100 kW). If recent trends continue, the state will have about 300,000 installations by the time it reaches 3,000 MW.

III. *Figure ES-1: Actual (through 2010) and Potential (through 2016) Solar Installations in California*



However, the Investor-Owned Utility portion of the program projects it will run out of incentive funding having only achieved 78 percent of its goal (1,360 MW vs. a goal of 1,750 MW).

The investor-owned utility portion of the program has been installing the most solar capacity at the fastest pace. Just over half of all installations and capacity in the state to date are due to this program, which is now 28 percent of the way toward its goal. Applications in the pipeline will bring it to just over halfway to the goal.

The program is projected to fall short of the goal because incentive payments for non-residential customers have been more generous than planned, depleting the budget faster than expected. The non-residential program has reached 53 percent of its goal (having installed about 625 MW), but funding will likely run out at only 67 percent of the total non-residential goal (793 MW vs. a goal of 1,192 MW). The Public Utilities Commission estimated a budget shortfall on the order of \$170 million.

- Participation from government and non-profit entities has been higher than planned. Since these entities can't take advantage of tax breaks, the program offers them higher incentives. Higher participation rates have dug into the budget.
- Non-residential systems receive performance-based incentives, and systems have been performing about 6 percent better than expected.
- Adding to this effect, the performance-based incentive overestimates the time value of money (because the economic crisis has kept interest rates low since 2008). This makes the performance-based incentive about 22 percent more valuable than the up-front payment. This windfall may have inflated participation and contributed to incentives being a bit more generous than they should have been.
- The PUC evaluated these issues in August/September 2010 and decided to shift \$40 million from the administrative budget into the incentive budget, but declined to make any further corrections in order not to disrupt the market.

These problems generally do not apply to the residential portion of the program. The investor-owned utilities predict that they will reach 98.5 percent of the goal for residential solar with available funding. Currently, residential programs are about 40 percent of the way to the goal (having installed about 240 MW).

Publicly Owned Utility programs and the New Solar Homes Partnership are lagging behind. Detailed information about these programs is not as readily available.

As of 2009, the Publicly Owned Utility program is about 9 percent of the way toward its 700 MW goal. Excluding activity that happened before SB 1 passed in 2006, progress through 2009 is 5 percent of the goal.

- Most POU's appear to be going slowly. The biggest POU's, SMUD and LADWP, had only reserved about 15 percent of their incentive funding by the end of 2009, and spent much less. SB1 data for 2010 won't be available until June, unless we collect it individually from each utility.

The New Solar Homes Partnership is only 3 percent of the way toward its share of the goal. This program has been hampered by the fact that:

- New housing starts in California have declined dramatically, dropping 75 percent in 2009 from 2006. This has resulted in fewer opportunities to add solar systems to new homes.
- Builder participation is pitiful. The industry has added solar systems to only about 2 percent of single-family homes built in the last four years – and an even smaller percentage if you count multi-family units. The Energy Commission loosened some of the eligibility requirements in 2010, which may accelerate participation, but this lackluster participation raises questions about whether incentives are the right policy mechanism for spurring the development of solar on new home construction.

The million solar roofs program has helped to reduce the cost of solar energy.

On average, the total installed cost of solar systems has fallen about 40 percent since the program began – from around \$10 per Watt in 2007 to around \$6 per Watt in early 2011 (in 2011 dollars). The cost decline is much more pronounced for commercial installations than residential installations, because commercial projects have grown larger and captured economies of scale. Commercial prices have fallen more than 45 percent, while residential costs have declined 17 percent. Residential prices remain about 50 percent higher than the break-even point Frontier Group identified in 2006, \$5.25 per Watt in 2011 dollars.

If progress continues at the same rate it has for the last 4 years, residential solar will pass the break-even point in mid-2014.

At that rate, residential solar costs will be 28 percent below break-even costs by the end of 2016 and the market will be sustainable without rebates – assuming that policies aren't getting in the way of solar expansion (i.e. we'll need full net metering, fully-favorable interconnection standards, and/or some kind of feed-in-tariff in recognition of the value of solar for all customers).

For some applications – especially large electricity users in areas with tiered electricity pricing (tiers 3 and above) – solar appears to have already passed the break-even point.

The proliferation of bids for super-large, utility-scale solar fields also suggests that these projects have likely reached a competitive position.

The Million Solar Roofs Initiative has helped to create a strong solar industry in California.

California is home to about 30 percent of all solar companies in the United States. More than 1,000 firms are active in California's solar industry. These firms employ more than 30,000 people. Very roughly speaking, the industry has doubled in size since 2007.

IV. Developing local targets for getting to 12 GW by 2020

A. Load serving entities

All load serving entities in California should play a role in achieving the 12 GW goal by 2020. The amount of distributed generation in each territory should roughly follow the size of each entity's load. Some exceptions could be made to those entities where installing new amounts of distributed generation just are not practical, such as may be the case for some of the very small municipal utilities and cooperatives. But the vast majority of load serving entities should be required to adopt the kinds of policies needed to drive a robust distributed generation market throughout the state.

B. Sector targets

In predicting where California's distributed generation market is headed, it is useful to look at the market growth from the past five years and assume that a similar trend will continue over the next decade. If one performs a simple analysis of Million Solar Roofs data, for example, one finds that 75% of the market when measured by installed capacity is non-residential. Further analysis is needed to break this market further into government/public buildings vs commercial, etc. This leaves 25% of the market on residential housing projects. Of course, if measuring the number of installations, as opposed to the capacity installed, the split is opposite, if not more extreme.

Looking ahead, the discrepancy between residential and non-residential installations could be lessened with some key policies such as building codes requiring solar on all new residential construction. However, it is highly likely that the non-residential sector will continue to dominate the sheer capacity of distributed generation installed in California over the next ten years.

C. Market targets (onsite load vs. wholesale)

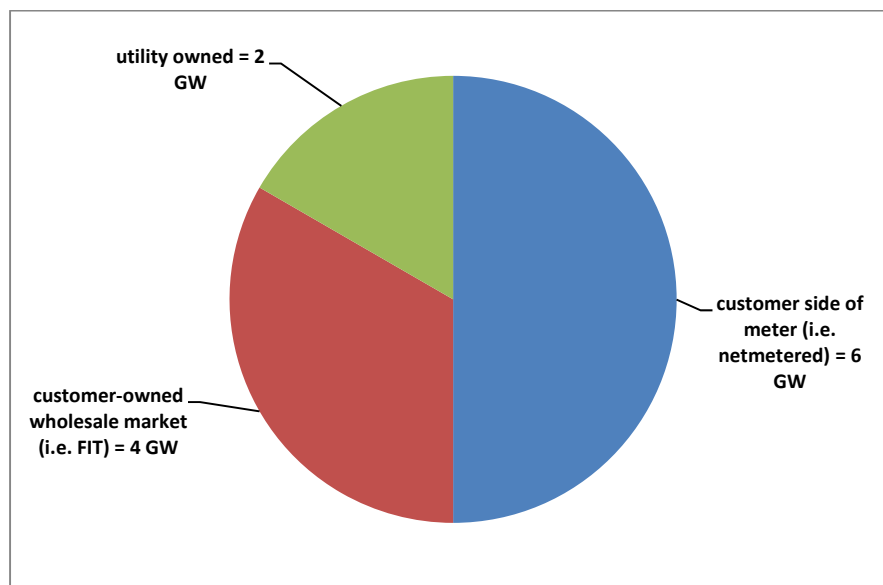
Onsite or customer owned distributed generation should equal at least 6 GW

With existing policies in place and assuming a projected a gradual decline in annual growth from now to 2020, the customer-owned photovoltaic market alone could account for up to 5.5 GW of the 2020 distributed generation market. An additional half GW could be expected from non solar PV installations over the next ten years bringing the customer-side of the meter market to 6 GW, or 50% of the 12 GW market. Additional policies could grow this market even more. For example, this market will be much larger if the utilities achieve their energy efficiency goals of building all new homes with solar power by 2020.

Wholesale market should still be primarily customer owned

At least 60-70% of the installations installed as part of the wholesale distributed generation market should still be customer owned, such as is the case for most feed-in-tariff supported projects. Utility owned systems should be limited to a small segment of this program so as to maximize ratepayer dollars, attract private investment, maximize transparency and evaluation and continue to grow a vibrant distributed generation market in California.

Breakdown of market segments for getting to 12 GW by 2020



D. Peak targeting

Peak targeting should continue to be prioritized as this remains California's Achilles heel to energy stability. And where solar photovoltaics are concerned, coincidence between distributed generation and peak demand is relatively well aligned. Solar hot water technologies can also help reduce demand for natural gas which, once built out, will also help reduce demand for this resource during peak periods. Other distributed generation technologies, such as renewable fuel cells and small-scale wind, can help shape and smooth the rest of the distributed generation market.

With regards to concerns that 15% of peak is the max the grid could handle at any given point in time, Environment California is skeptical that this ceiling exists throughout the state. Utilities should be required to provide detailed evidence that this ceiling exists, that distributed generation doesn't help local grid reliability instead of hurt it, and provide details of what it would cost/take to upgrade the grid to allow for a higher penetration of distributed generation. Within this context, utilities should also clarify why net metering can't be expanded to at least 15% of their peak load.

E. Eligible Resources

California's 12 GW build out by 2020 should come entirely from renewable energy resources including solar photovoltaics, solar hot water, renewable fuel cells and small-scale wind and geothermal systems. Non-renewable fuel cells and combined heat and power units should not be included in this particular program, though they should continue to be prioritized over non-renewable central station projects. Research and demonstration programs, such as PIER, should continue to support emerging technologies such as tidal and wave energy. The 12 GW should be focused on those technologies that can be deployed quickly and efficiently in the next nine years.

F. Regional Estimates

Environment California suggests that regional estimates take into consideration the experience of the distributed generation market over the past six years when mapping out where the market grows in the coming nine. Meanwhile, state and local policies should work to level the playing field between north and south to achieve a greater build out of distributed generation in the greater Los Angeles region.

In determining the build out of customer-owned distributed generation, we suggest the following methodology:

1. Figure out where CSI will bring us between now and the end of 2016
 - Break down current CSI market by county;
 - Figure out the growth rate for the utility serving that county over the past four years;
 - Assume a continued annual growth rate that declines 3% per year between now and 2020;
2. Assume similar growth rates through 2020, with slight increase in growth of the customer-owned/netmetered market in the Los Angeles region.
3. Assume an expanded state-wide FIT program tracks commensurate with the utility's load and population centers. E.g. the counties with the greatest load will have the largest number of FIT projects.
4. Assume the Self-Generation Incentive Program is extended through at least the end of 2016. Assume a handful of 5-10 MW systems are installed in the high desert region, Tehachapi region, San Diego and Los Angeles.
5. Use existing reservations and pending permits to estimate where the utility-owned/RAM supported projects will be located.

If you apply the above summarized methodology, you'll continue to see strong growth in northern California, particularly in the greater Bay Area (including north counties of Sonoma and Napa), and Central Valley (including north valley areas around Sacramento) and San Diego. You'll also see growth in regions like the high desert east of Los Angeles.

V. State and local policies needed to get there

A. Near and long term actions needed to achieve 12 GW goal

No one policy or strategy will be the silver bullet needed to achieve the 12 GW by 2020 goal. Instead, achieving this minimum target for build out of distributed generation in California will require a suite of policies, initiatives and strategies. The following is a list of the most important policies that will be needed to attain the goal.

CONTINUE/EXPAND EXISTING PROGRAMS

- California Solar Initiative: Ensure that the non-residential CSI funds are replenished, the dynamics that lead to the shortfall are corrected and the residential portion of the program is preserved. The state should consider expanding the CSI rebate program to 2020 to continue to

grow the state's distributed generation market, especially for some residential applications that may still be in need of some financial incentives to pencil out.

- Solar Hot Water rebates: The state should ensure full implementation of AB 1470, the solar hot water rebate program, investing more money in consumer education and market development and consider extending these rebates to 2020. The state should look into whether a third party management team is needed to fully expand this market.
- Net metering: expand the state's net metering program to at least 15% of peak load. Net metering should remain retail net metering. The state should also expand net metering to include multi-family dwellings and agricultural applications.
- The state should work with local municipalities to ensure they are meeting their goals, starting with the Million Solar Roofs initiative. Los Angeles Department of Water and Power is of particular concern.
- California should continue to enforce AB 32, the Greenhouse Gas Initiative, as a key driver for renewable energy solutions.
- The state should take advantage of federal tax credits while they are available and advocate for their extension beyond 2020.
- Renew the Self Generation Incentive Program (SGIP) and allow the program to support projects up to 10 MW. Incentives could be of a declining structure but the program needs to open up the system size to allow large industrial facilities entrance into California's distributed generation market.
- Renew the Emerging Renewables Program to continue to support programs such as solar on new construction and to expand to support innovative ways to put distributed generation on low-income housing or multi-family dwellings.
- Last but not least, greater transparency is needed within the utility procurement programs and other programs for which the price of the distributed generation investment is not known to the public.

NEW PROGRAMS

- SB 32 – the state should fully and immediately implement SB 32 establishing a feed in tariff that strikes a balance between being high enough to drive demand but low enough to ensure the price of eligible technologies continues to decline. SB 32 should be expanded to build out 4 GW of distributed generation by 2020.
- The state needs to establish a market for renewable energy credits (RECs) for customer owned distributed generation. This market should include solar hot water technologies as well as solar photovoltaics.
- AB 920: the state should set a reasonable rate for the purchase of surplus solar power. The rate should be no less than that set for "brown power" plus an additional value for the renewable energy attributes of the electricity.
- Alternative to PACE – California should adopt a financing program that can serve as an alternative to the Property Assessed Clean Energy (PACE) financing programs of the past. The most promising of these alternatives would be low-cost on-bill financing through the state's utilities.

MANDATES

- 33% by 2020 RPS – the state should ensure that the 33% by 2020 RPS is properly implemented.

- California should move forward on mandating that all new residential construction be zero energy by 2020. Mandates should kick in sooner for areas in noncompliance for air quality standards and/or areas in which energy demands are slated to exceed or come close to exceeding planned supplies.
- California should mandate that the state's publically owned utilities achieve bare minimum goals including their portion of the million solar roofs initiative goals and their portion of SB 32's goals.
- Mandate that the state's utilities provide low-cost on-bill financing for distributed generation and energy efficiency improvements for homes and small businesses.

LOCAL INITIATIVES

- Cities and counties should be asked to streamline their permitting procedures for distributed generation, reduce permitting fees, increase inspection agents and take other steps to immediately reduce the cost of investing in distributed generation while speeding up the amount of time an investor waits to build distributed generation.

B. Incentives vs. penalties

A mixture of penalties and incentives will be needed to achieve the 12 GW goal. There is no silver bullet policy that will provide a sort of "one stop shop" for achieving this goal. Instead, combining both approaches is the most efficient way to maximize current market conditions (e.g. consumers driven toward distributed generation because of incentives) while holding key players accountable to state goals (e.g. 33% by 2020 RPS). This said, the state should resort to mandates where incentives have fallen short (e.g. zero energy homes).

C. Trading of requirements

Environment California is wary of trading schemes. Such policies are often prone to gaming and manipulation. Furthermore, given the strong role that individual consumers play within the distributed generation market, trading requirements to make incentives such as net metering available to consumers could have a chilling effect on the market.

VI. Economics of getting to 12 GW

It is imperative that the state consider the net costs of building 12 GW of distributed generation. In so doing, the state should consider all of the quantifiable benefits of distributed generation alongside the quantifiable costs. In many cases, distributed generation will have no net cost to ratepayers but instead will provide net savings or be a no net cost investment.