



The Statewide Benefits Of Net-Metering In California

& the Consequences of Changes to the Program

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Summary

Net Metering is a policy that allows commercial and residential electricity customers to receive credits on their utility bills for on-site renewable energy generation in excess of their electric load that is exported to the state's electric grid.³ This program contributes to the state's energy supply diversity and to meeting the clean energy mandates under California's Global Warming Solutions Act, AB32. Under the California program, each month, the utility applies bill credits accumulated by a net metering customer "against charges for hours when the customer's load exceeds the customer's generation."⁴ In California, customers can carry excess credits over to the next month's bill. Importantly, until they export more power to the grid than they took from the grid, net metering customers are given bill credits equivalent to the total, "bundled" energy rate, which includes not only the cost of generation, but transmission and distribution as well.

Recently, California's net metering program has been called into question by some electric utilities, most noticeably, the San Diego Gas & Electric Company (SDG&E). According to SDG&E, the program functions

as an unnecessary subsidy for on-site renewable energy generation – unnecessary because local renewable energy projects might be able to gain a market share even without it, and a subsidy because net metering customers may pay less than others for use of the energy grid. Traditional utility customers pay for energy taken from the grid, as well as the transmission and distribution services needed for its delivery. On the other hand, when net metering customers provide excess energy back into the grid, the meter runs in reverse, offsetting transmission and distribution charges that would otherwise apply for power taken from the grid. Some utilities have expressed concern that traditional electricity customers experience higher costs as a result. Further, SDG&E, in particular, asserts that residential net metering customers are usually wealthier, and that

the costs associated with the residential program are borne by poorer customers. SDG&E has argued that net metering "subsidies are protecting wealthy customers with competitive alternatives at the expense of others."⁵

This paper addresses these important questions about

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- 3 See Net Energy Metering Cost-Effectiveness Evaluation, Energy and Environmental Economics, Inc., 2 (Jan. 2010), available at http://www.cpuc.ca.gov/NR/rdonlyres/0F42385A-FDBE-4B76-9AB3-E6AD522DB862/0/nem_combined.pdf [hereinafter E3 Report]. This report was prepared for the California Public Utilities Commission in compliance with Public Utility Code 2827, which requires the CPUC to submit a report on the costs and benefits of NEM to the Governor and Legislature.
- 4 Id.
- 5 California Solar Future: Growing Solar Power in a Sustainable Way, San Diego Gas & Electric.

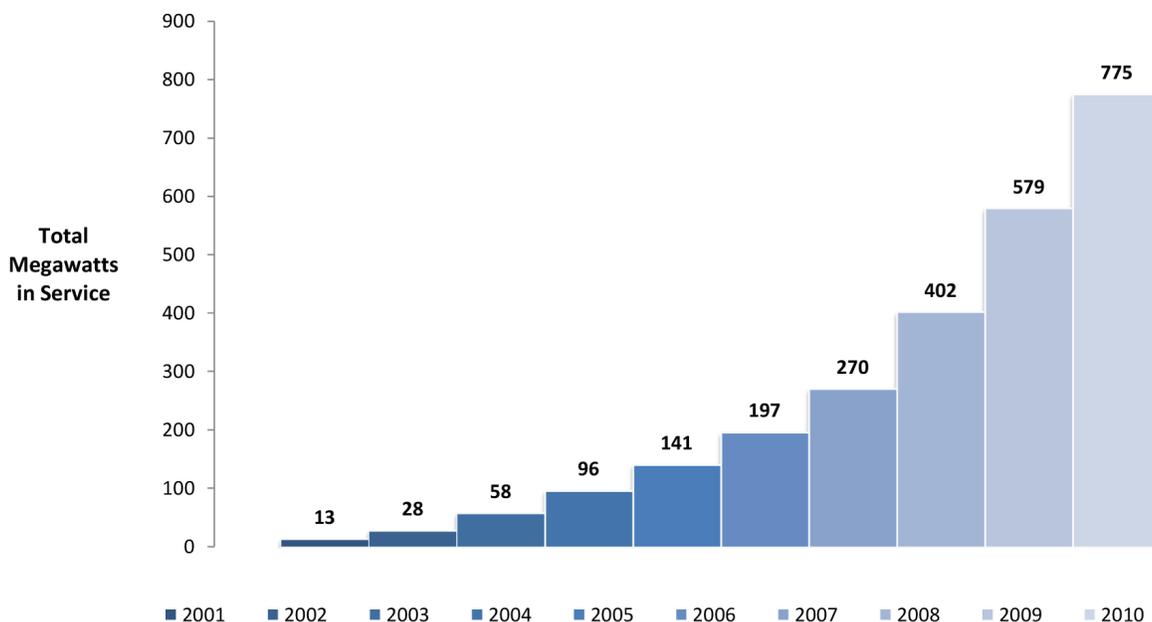
the net metering program, as well as the implication that the costs associated with the program outweigh the benefits. We find that while it is critically important to ensure that rates remain just and reasonable, recent criticisms of the net metering program may paint a misleading picture of the costs related to the net metering program and the distribution of its benefits and burdens, while ignoring the value added to the state by stimulating local renewable power development. We find that in order to make a meaningful assessment of the role net metering plays in advancing the state's renewable energy goals and creating jobs, it would be necessary to conduct research that could successfully isolate net metering effects from those stemming from other concurrent programs intended to stimulate renewable energy development, such as state and federal tax credits, utility rebates, and rate design strategies. We have found no research to date that accomplishes this objective. In the absence of more reliable research results, one cannot say with confidence that growth in the renewable energy

industry and greater deployment of local renewables could continue apace if net metering benefits were weakened or eliminated.

Forty-three states have net metering programs.⁶ With the benefit of net metering and other policies to promote renewable energy, California leads the nation in terms of installed solar capacity, followed by New Jersey, Colorado, and Arizona.⁷ California has experienced significant benefits from these efforts - in particular the availability of peak-coincident solar energy that can offset the most expensive hours of other forms of generation, and enhanced resilience to unexpected supply interruptions. Nonetheless, California's "market dominance is eroding."⁸ In 2009, California held nearly half of the country's market share in the solar industry; in 2010, that number fell to 28%.⁹

The net metering law in California was originally enacted in 1996 and applies to all three of the major investor-owned electric utilities serving the state.

FIGURE 1 . California's Progress in Installing Local Photovoltaics ¹⁵



6 Freeing the Grid, the Vote Solar Initiative and Network for New Energy Choices, 5 (2011), <http://www.newenergychoices.org/uploads/FreeingTheGrid2011.pdf>.

7 Id. at 6.

8 Id.

9 Id.

California policy has been amended several times since 1996, most recently by SB 489, which expanded the definition of eligible technologies to include all energy sources that qualify for California's Renewable Portfolio Standard.¹⁰ California has established an aggregate limit for net metering systems in a utility's territory at 5% of peak demand.¹¹

The net metering program can help diversify California's energy generation infrastructure by stimulating development of many smaller power sources using renewable fuel. As the Legislature found when it enacted the state's first net metering policy in 1996, it "is one way to encourage substantial private investment in renewable energy resources, stimulate in-state economic growth, reduce demand for electricity during peak consumption periods, help stabilize California energy supply infrastructure, enhance the continued diversification of California's energy resource mix,

reduce interconnection and administrative costs for electricity supplies, and encourage conservation and efficiency."¹²

Through June of 2011, more than 77,000 residential and non-residential customers had installed on-site solar systems in the service territories of California's three largest utilities, Pacific Gas and Electric (PG&E), Southern California Edison (SCE), and SDG&E.¹³ Upwards of 99% of California's net metering customers use photovoltaic solar power.¹⁴ With the benefit of net metering and other incentive programs, the state has witnessed a dramatic increase in the number of solar installations (Figure 1). In the future, net metering should support greater use of other renewable energy technologies in light of recent amendments that harmonize net metering regulation with state's existing renewable energy portfolio standard mandate.

10 Cal. Pub. Util. Code § 2827, 2827.10 (2011). The previous definition limited eligible technologies to solar, wind, or some hybrid of both. Small hydroelectric facilities are still excluded from the definition of "renewable electrical generation facility" in California law.

11 cal. pub. util. code § 2827.

12 Id.

13 <http://www.cpuc.ca.gov/PUC/energy/Solar/apa2011.htm>

14 E3 Report, supra note 1, at 3.

15 Figure created from data published in the Energy Commission's Preliminary California Energy Demand Forecast 2012-2022.

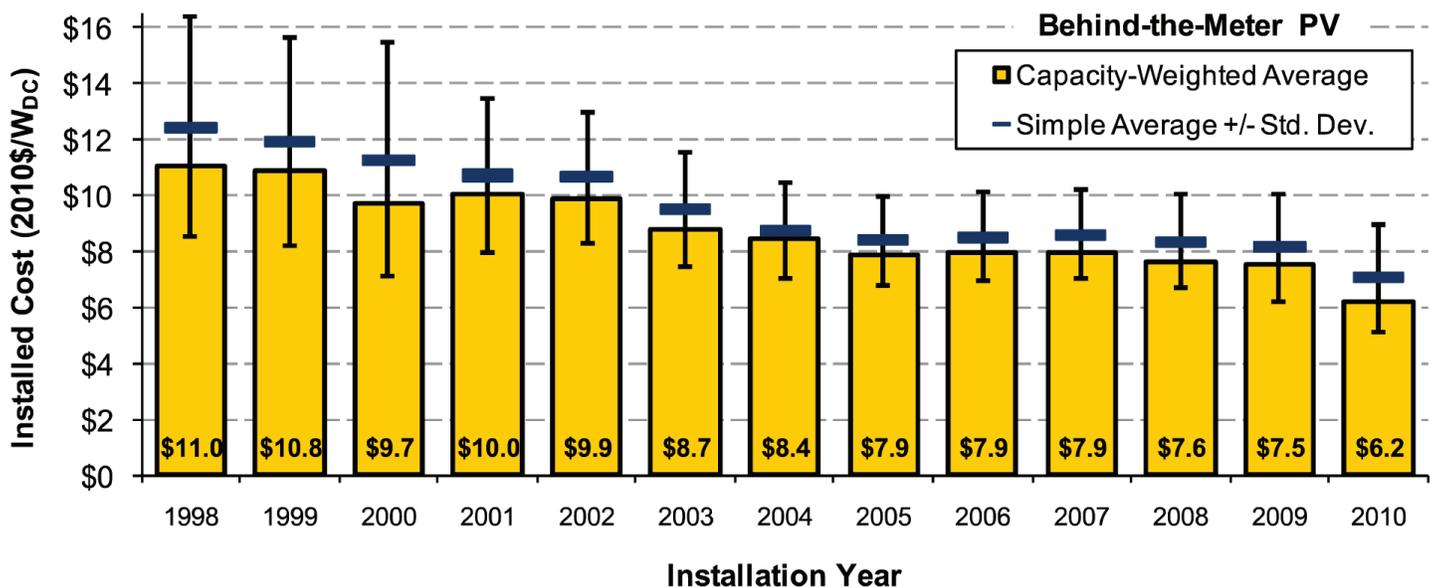
How Net Metering Fits into California's Energy Future



New metering is just one of a series of programs California offers that comprise one of the country's most ambitious renewable energy policies. For a good description of the regulatory policies promoting renewable energy, see the California Public Utilities Commission Division of Ratepayer Advocate's publication called *The Renewable Jungle*.¹⁶ Under Governor Brown, the state accelerated its Renewable Portfolio Standard (RPS) and it now "requires investor-owned utilities, electric service providers, and community choice aggregators to increase

procurement from eligible renewable energy resources to 33% of total delivered energy by 2020."¹⁷ Moreover, Governor Brown has set a goal of 20,000 megawatts of renewable energy capacity in the state by 2020, with 12,000 megawatts coming from local renewable energy systems, such as roof-top photovoltaic solar panels for residential or commercial buildings.¹⁸ As Governor Brown explained earlier this year, distributed solar power is "resilient and secure because it is so distributed."¹⁹

FIGURE 2 . Installed Cost Trends over Time for Customer-Sited PV²⁰



16 *The Renewable Jungle* <http://www.dra.ca.gov/DRAjungle.htm>

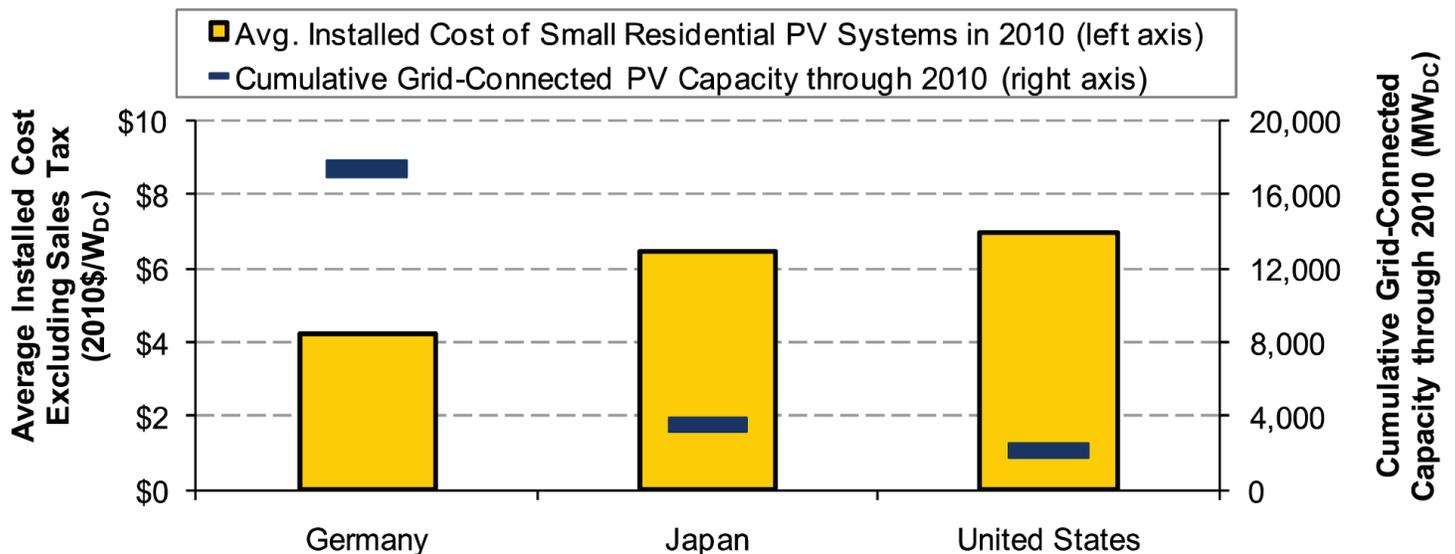
17 RPS Program Overview, California Public Utilities Commission, <http://www.cpuc.ca.gov/PUC/energy/Renewables/overview.htm> (last updated Sept. 7, 2011).

18 http://gov.ca.gov/s_energyconference.php

19 Id.

20 Galen Barbose, et al., *Tracking the Sun IV*, Lawrence Berkeley National Laboratory, 13 (Sept. 2011), available at <http://eetd.lbl.gov/ea/ems/reports/lbnl-5047e.pdf>.

FIGURE 3 . Comparison of Average Installed Costs (Pre-Sales Tax/VAT) for Small Residential PV Systems in Germany, Japan, and United States ²¹



While the centralized, large-scale geothermal, wind, and solar power plants already proposed in California will position the state among the world's leaders in installed renewable capacity, maintaining a leadership role in the deployment of local renewable power will be much more difficult.

Net metering is not the only California program driving the development of distributed solar in the state. The California Solar Initiative (CSI), for example, offers systematically declining cash rebates for customers of the state's major investor-owned utilities. CSI primarily funds solar power development for "existing homes, existing or new commercial, agricultural, government and non-profit buildings."²² Running from 2007 through 2016, CSI has an overall budget of \$2.167 billion and an installation goal of 1,940 megawatts of new solar generation capacity.²³

During the run of the CSI, net metering, and other

incentive programs, Californians have witnessed a significant decline in the cost of solar installations and a concomitant increase in the installed capacity of solar power (Figure 2). According to the California Public Utilities Commission (CPUC), the installed capacity for solar rose 47 percent from 2009 to 2010 alone.²⁴

The importance of state incentives to the development of the industry in California is informed by the example of support provided by the German government to its distributed solar industry. While it does not offer net metering, Germany has an extensive feed-in tariff (FIT) system through which customers with rooftop photovoltaic solar generation are paid for the cost of generation plus a reasonable profit.²⁵ Based on recent data, despite strong government support for distributed solar power, Californians and others in the United States still pay substantially more for on-site solar generation (Figure 3).

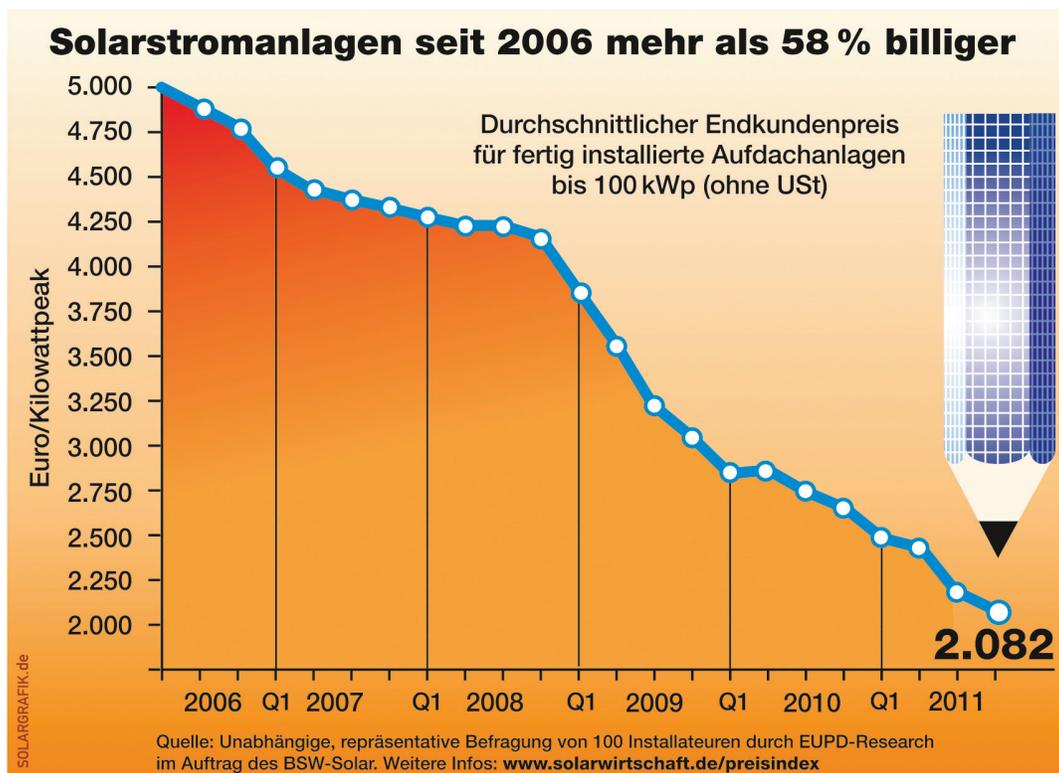
21 Galen Barbose, et al, supra note 24, at 20

22 About the California Solar Initiative, California Energy Commission and California Public Utilities Commission (2011), <http://www.gosolarcalifornia.org/aboutcsi.php>.

23 Id.

24 See Press Release, California Public Utilities Commission, CPUC Report Shows Record Growth in Rooftop Solar Installs (July 5, 2011), available at http://docs.cpuc.ca.gov/PUBLISHED/NEWS_RELEASE/138482.htm.

25 See Paul Gipe, Should California Adopt the German Solar Model, *grist* (July 6, 2011), <http://www.grist.org/solar-power/2011-07-06-should-california-simply-adopt-german-solar-tariffs>.

FIGURE 4 . Declining Costs of German Solar Installations less than 100 kilowatts ²⁷

And the cost for German solar installations continues to fall dramatically. In Germany, the average installed cost for rooftop solar photovoltaic projects less than 100 kilowatts has dropped to a mere \$3.20 per watt (Figure 4). The latest information from the California PUC pegs the cost of installed solar for projects less than 10 kilowatts at \$8.29 per watt.²⁶

Costs for photovoltaic solar in California are certainly declining, but so are the rebates offered through the CSI program. From the outset, CSI was designed to provide rebates that were smaller as time goes by so that when the program ends, there will not be a sudden significant change in the economics of distributed solar energy. So far, this approach appears to be successful, as the distributed solar energy market continues to grow in the face of reducing CSI rebates. As the CSI winds down, the state will face difficult choices on how to continue supporting the solar industry at a level

sufficient to compete with other states and countries for solar energy deployment and related jobs. And as the CSI moves toward completion, net metering remains constant, offering a continuing and predictable ongoing stimulus. What is less clear is whether the distributed solar energy market in California would continue its pattern of growth if the net metering incentive were reduced or eliminated.

It should be noted, as well, that if multiple incentive offerings change at the same time, it will likely not be possible to understand cause and effect. If growth in the solar industry should decelerate or become negative after both eliminating CSI rebates and reducing the net metering benefit, to what would policy makers attribute the change? Changing only one variable at a time (as is already the case with pre-determined reductions in CSI rebates) can help overcome this problem.

²⁶ Go Solar California, California Energy Commission and California Public Utilities Commission (last visited Nov. 20, 2011), <http://www.gosolarcalifornia.org/>.

²⁷ See Bundesverband Solarwirtschaft, <http://www.solarwirtschaft.de/preisindex>. Currently, €2.199/watt converts to roughly \$2.83/watt. See MSN Money, Euro to US Dollar, <http://investing.money.msn.com/investments/currency-exchange-rates/?symbol=%2fEURUS> (last visited Jan. 17, 2012).

The Benefits of Net Metering

Net metering is part of a package of policies and incentives that support the development of distributed solar technology directly in line with Governor Brown's plan to install 12,000 megawatts of local renewables by 2020. The benefits of such development are diverse and fundamental, including jobs, grid stability, and environmental sustainability.

In the current economic climate, with extreme levels of unemployment, the most immediate and substantial benefit of local renewable energy is that it provides jobs to Americans, and Californians in particular. For example, as of August 2011, the American solar industry employed over 100,000 solar workers.²⁸ Overall, solar employment was up 6.8% from August 2010. And the future for the solar industry is just as bright: almost 50% of the country's solar companies expect to add jobs, while only 2% expect to make employment cuts. By way of comparison, the overall rate of job growth in the United States is roughly 1%. The solar industry is generating jobs at a rate 680% faster than the overall economy.

Of the 100,000 American jobs in the solar industry, roughly 26,000 are in California. At the same time, there is substantial room for growth. California is ranked 6th in the country in solar industry jobs per capita, behind several states including Colorado, New Mexico, and Oregon. With an unemployment rate hovering around 12%, California benefits from the job growth generated by distributed solar installations.

The solar industry has been exceptionally successful at generating jobs because of the diversity of positions available in the industry. Companies have emerged that design, manufacture, sell, install, and maintain solar power systems throughout the United States. There are employment opportunities ranging "from skilled laborers to customer service and sales representatives."²⁹



Nationally, the solar industry expects to add 24,000 jobs in the coming year.

Further, distributed renewable power properly managed can enhance the stability of the state's energy infrastructure. It can reduce the likelihood of major power outages by diversifying the fuel mix and locations of power generation, and reducing the load on overtaxed transmission lines.

Additionally, California has yet to fully realize the net metering program's potential to bolster broader renewable energy generation in the state. With SB 489 passed in October 2011, all renewable energy types other than small-scale hydroelectric power generation will qualify for the program. This expansion of the program should particularly benefit California's farmers, who (according to Jeanne Merrill, Policy Director of the California Climate and Agriculture network) currently lead the country in on-farm renewable energy production.³⁰ Under SB 489 and the net metering program, farmers will find it easier to connect to the energy grid with on-site renewable energy generation from sources including biomass and biogas.

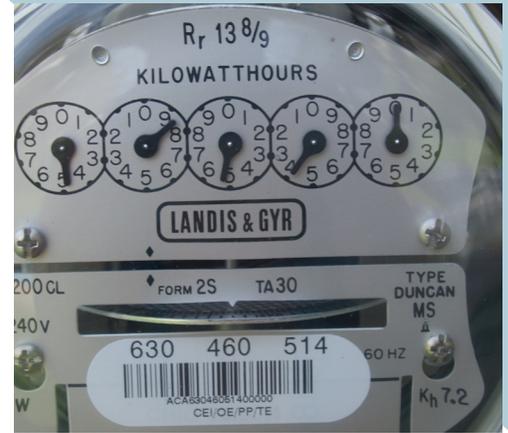
Beyond the economic benefits, such as job creation, grid stability, and technological competitiveness, net metering, along with other California policies like CSI and RPS, serves to encourage energy generation with minimal environmental impact. Renewable energy – especially in the forms most conducive to local deployment – allows for electric generation that reduces local pollution and greenhouse gas emissions. A major environmental drawback with renewable energy generation is the space required for utility-scale solar and wind generation facilities. By facilitating distributed renewable energy development on-site, net metering accesses the greatest benefits of renewable energy without one of its most significant environmental costs.

28 National Solar Jobs Census 2011, the solar foundation, 11 (Oct. 2011), available at http://thesolarfoundation.org/sites/thesolarfoundation.org/files/TSF_JobsCensus2011_Final_Compressed.pdf. "Solar workers" are defined as workers who spend at least half of their time on solar-related activities.

29 Id.

30 California Law Opens Door for Farmers to Develop Clean Energy, *Western Farm Press* (Oct. 13, 2011), <http://westernfarmpress.com/government/california-law-opens-door-farmers-develop-clean-energy>.

The Effects of Net Metering on Electric Bills



Net metering serves as a credit per kilowatt hour for power delivered to the grid that offsets charges from power taken from the grid by the same customer. In effect, the utilities pay the net metered customer for those kilowatt hours at a bundled retail rate, when it could buy power elsewhere at wholesale. Unless the wholesale price significantly exceeds the cost of power embedded in retail rates, the utility is paying more for net metered power than it is paying for power derived elsewhere. In a report to the California Public Utilities Commission the consulting firm Energy and Environmental Economics Economics, Inc. (E3) estimates that the net total cost to California ratepayers for the for the systems installed as part of the program program through 2008 is approximately \$20 million per year, an amount that represents less than one-tenth of one percent of utility revenues.³¹

E3 estimates that the net total cost to California ratepayers for the program is approximately \$20 million per year... But this \$20 million per year figure must be considered in context.

But this \$20 million per year figure must be considered in context. First, it is important to note that in developing its net cost numbers, E3 considered the benefits to the grid from the power delivered by the net metered customer. E3 has not taken into account the energy savings benefits stemming from the fact that when the sun shines, the customer is demanding less power

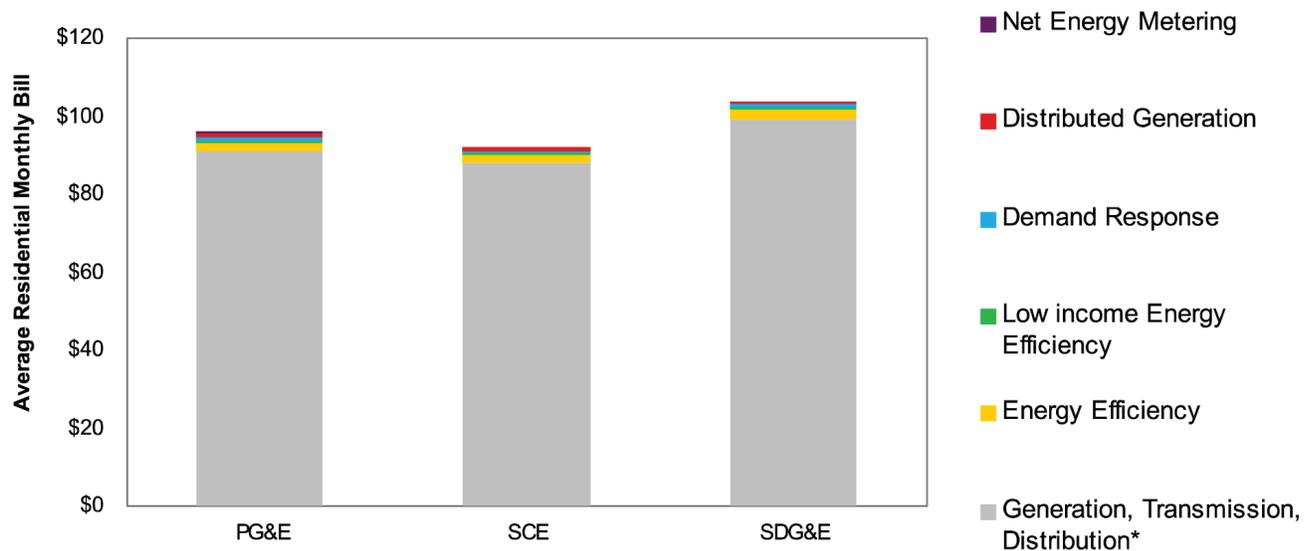
from the grid. There is the potential for additional cost savings from this net reduction in demand that is not reflected in E3's calculations. In addition, E3's analysis relies on residential rates in effect when the study was written. Because those rates are higher as the customer uses more power, E3 logically assumes that the customer would avoid purchasing power in the most expensive tier. At the time, Pacific Gas and Electricity, for instance, imposed five residential rate tiers, with the highest level costing 44 cents per kilowatt hour. Now, the utility only offers four tiers, with the rate in the highest level set at 33 cents. Since high-energy-using net metered customers would offset a 33 cent charge per kilowatt rather than the 44 cents assumed by E3, the net cost of net metering should be lower.

For these and other reasons, the numbers offered by E3 likely overstate the net cost of the net metering program.³² With this in mind, the \$20 million number offered by E3 becomes a conservative representation of the program's impact for installations through 2008. \$20 million represents approximately 0.08% of total utility revenues calculated on an annual basis.³³ In other words, assuming an average rate of electricity in California of \$.144 per kilowatt-hour, net metering

31 E3 report, supra note 1, at 6. This number is calculated on a "net present value" basis, i.e. "all of the costs that will ever be incurred over the next 20 years as a result of the cumulative total generation that was installed through 2008 were captured in this report."

32 We note that neither E3, nor Crossborder, in a study discussed below, included in its calculations the net cost effect when net metering customers rely on time-of-use rates. These rates impose higher charges during defined periods of the day when overall demand is likely to be highest, and less during other periods. To the extent that a local solar installation delivers net power to the grid during the time when peak rates are in effect, a net metering customer experiences a greater benefit and might impose a greater net cost on other customers. However, the power sent to the grid during peak periods is more valuable to all customers, as is the power generated during peak periods and used by the net metering customer onsite. We have not determined the overall effect of these offsetting factors.

33 E3 report, supra note 1, at 6.

FIGURE 5 . Demand Side Programs as a Percentage of Average Residential Bill ³⁷

*Remaining 93% of bill also recovers bonds and regulatory fees

costs as calculated by E3 have an average impact of one one-hundredth of one cent per kilowatt-hour.³⁴ For additional context, E3 observed that the net metering program is but one component of demand-side controls in California that attempt to maximize efficiency and reduce consumption. Demand side programs overall contribute about 7% to an average customer's monthly electricity bill, far more than the 0.08% that E3 assumes is added by net metering.³⁵ Net metering contributes to electric bills, but its impact is hardly noticeable (Figure 5). In addition, the full complement of demand side controls, including net metering, "provide a net benefit to ratepayers."³⁶

The cost of net metering will increase over time as more customers qualify for the program and solar panel installation costs continue to decline. E3 concluded that if the total installed capacity in California of solar generation qualifying for net metering reached the goals established in CSI of 2,550 megawatts by 2017, the total cost per year would rise to approximately

\$137 million in 2020.³⁸ Given a projected rate of \$0.168 per kilowatt-hour in 2020, this increase in costs would imply an average rate impact of \$0.00064 per kilowatt-hour.³⁹

Other installations resulting from Governor Brown's goal of achieving 12,000 megawatts of installed local renewable energy capacity by 2020 would add to the overall cost of net metering, as well, although the exact impact would be affected by several variables. For example, the Governor's goal includes renewable energy installations as large as 20 megawatts, while net metering is limited to installations that are between 1 kilowatt and 1 megawatt. Because of the emphasis on large installations on public lands and on business sites, it is likely that a great portion of the 12,000 megawatts would be represented by projects too large to qualify for net metering. In addition, some or all of the installations resulting from CSI and other existing programs may count toward the 12,000 megawatt goal. Conservatively, we consider the potential that

34 Id.

35 CPUC NEM Report Introduction, California Public Utilities Commission, 6 (Mar. 2010), available at http://www.cpuc.ca.gov/NR/rdonlyres/0F42385A-FDBE-4B76-9AB3-E6AD522DB862/0/nem_combined.pdf.

36 Id.

37 Id.

38 E3 report, supra note 1, at 7.

39 Id. at 8.

net metering -qualifying installations could rise to over 5,000 megawatts by 2020.⁴⁰ Based on this estimate, and using E3's conservative assumptions, the cost per year would be roughly \$269 million with an average rate impact of roughly one-tenth of one cent per kilowatt-hour.

In a recent study yet to be published, Crossborder Energy argues for reconsideration of many assumptions underlying E3's study results and offers its conclusion that the net cost to residential customers from net metering is one-seventh the amount suggested by E3 in 2008. And on the non-residential side (where tiered rates do not steer the outcome), Crossborder concludes that net metering leads to modest overall cost savings. We do not assess the merits of this recent work, which has not been subjected to extensive public scrutiny. However, if the truth lies anywhere between the results of the two studies, the net costs of the net metering program are very modest – in the context of the utilities' overall revenue requirements, and the

context of California's many demand-side and supply-side programs.

These costs must be set against the backdrop of potential benefits to the transmission and distribution systems by encouraging on-site solar generation. As noted above, on-site solar generation has substantial benefits for the electric grid. By producing energy on-site, transmission and distribution losses, wear-and-tear on utility equipment, and vulnerability to fuel cost increases are all reduced. We have not found a definitive study that attempts to quantify this added value. Using numbers that were not necessarily derived from California experience, one study found these benefits add up to as much as 14 cents per kilowatt-hour of energy produced by distributed solar systems.⁴¹ The California Solar Energy Industry Association commissioned a study that specifically focused on California and found benefits ranging from five to 12 cents, depending on location.⁴²

40 33% Renewable Portfolio Standard: Implementation Analysis Preliminary Results, California Public Utilities Commission, 19 (2009) <http://www.cpuc.ca.gov/NR/rdonlyres/1865C207-FEB5-43CF-99EB-A212B78467F6/0/33PercentRPSImplementationAnalysisInterimReport.pdf>. This assumption is drawn from the State's analysis of implementation of the 33% Renewables Portfolio Standard. The analysis assumed potential penetration of 5,000 MW of distributed generation renewable technology as the high-end estimate. This scenario assumed "limited new transmission corridors" and "extensive smaller-scale renewable generation."

41 Richard Perez, Ken Zweibel & Thomas E. Hoff, *Solar Power Generation in the U.S.: Too Expensive, or a Bargain?*, Perez, Zweibel, and Hoff, <http://www.ascr.cesm.albany.edu/perez/2011/solval.pdf>.

42 *Implementing the Feed-in Tariff for Small Scale Photovoltaics in California* <http://calseia.org/wp-content/uploads/2010/05/pv-above-mpr-methodology-final-20100423.pdf>



Proposed Changes to Net Metering

SDG&E, as part of an effort to address its concerns related to net metering, recently asked state regulators at the California Public Utility Commission to allow the utility to “unbundle” electricity charges by splitting the cost of generating electricity from transmission and distribution of energy.⁴³ By unbundling the generation, transmission, and distribution components of electricity charges, SDG&E proposed to add a “network use charge” for net metering customers as a fee for using the energy grid.⁴⁴ for on-site electricity generation distributed back to the grid.⁴⁵ The utility argues that solar customers are not paying for transmission and distribution costs such as “maintenance of the wires, public use charges, and other charges.”⁴⁶ Although the assigned commissioner recently rejected SDG&E’s network usage charge proposal⁴⁷, the utility continues

to express concern and will be submitting a new rate design proposal.

Further, the utilities suggest that the majority of customers taking advantage of the program are wealthier customers who are more able to afford the up-front costs of solar panel installation.⁴⁸ More specifically, SDG&E notes that residential distributed solar power is installed primarily by customers who own a home, can afford the investment, and/or have a credit rating sufficient to qualify for a solar lease.⁴⁹ Having assumed that the program’s costs exceed its benefits, SDG&E and SCE conclude that less wealthy customers are left to pay a subsidy for local renewable energy enjoyed primarily by richer customers.⁵⁰

SDG&E has asked state regulators at the California Public Utility Commission to allow the utility to “unbundle” electricity charges by splitting the cost of generating electricity from transmission and distribution of energy.

43 Eric Wolff, Utilities Start Paying Customers for Extra Power, north county timEs (Oct. 19, 2011), http://www.nctimes.com/blogsnew/business/energy/article_b548a8c7-46a8-5e3b-961a-2c530374a6a2.html.

44 Id.

45 Market Strategy and Resource Planning, Southern California Edison.

46 Wolff, supra note 47.

47 Assigned Commissioner’s Scoping Memo and Ruling in Application 11-10-002, dated January 18, 2012, <http://docs.cpuc.ca.gov/EFILE/RULC/157634.PDF>.

48 San Diego Gas & Electric, supra note 5.

49 Id.

50 Id.

The Distribution of Net Metering Costs Among Utility Customers



The costs associated with net metering are distributed among every customer that purchases power from a utility, including the net metering customers to the extent they draw excess power from the grid. Because the cost of the program is reflected in the charge per kilowatt hour, support for the program varies by level of energy usage, not by wealth.

This point is made clear by SDG&E's discussion about the customers that use enough power to experience the higher rate charges in Tier 3 and Tier 4. As the utility explains, "[e]lectricity rates rise progressively as your electricity use reaches the second, third and fourth tiers."⁵¹ SDG&E does not offer specific information about whether customers in Tier 3 and Tier 4 are less wealthy on average than other customers; but observes that lower tier customers are less likely to take advantage of net metering.

While it is logical to expect that wealthier residential customers would be more likely to invest in photovoltaic systems for their homes, the utilities have not offered to the public the specific data necessary to support such a finding. While we do not have income information about specific photovoltaics purchasers, some have tried to develop a sense of income distribution by sorting participants by zip code. For instance, SunRun recently offered its analysis using a sample of 1,639 zip codes and produced the geographical income distribution found in Figure 6.⁵²

This analysis suggests that if CSI solar purchasers

had incomes equal to the average earnings in the local zip code, then a majority of the participants (who also would benefit from net metering) would have been from median income homes, not upper income homes. Further, these numbers would suggest more participants with income levels below \$39,999 than those above \$160,000. While it is possible that the program participants within a given zip code could have

higher than average incomes in their communities, publicly-available information does not help us establish that point.

The equity argument offered by the utilities tends to overly-simplify a complex issue. The net metering program is not primarily designed for the benefit of participating customers. Instead, the goals are to:

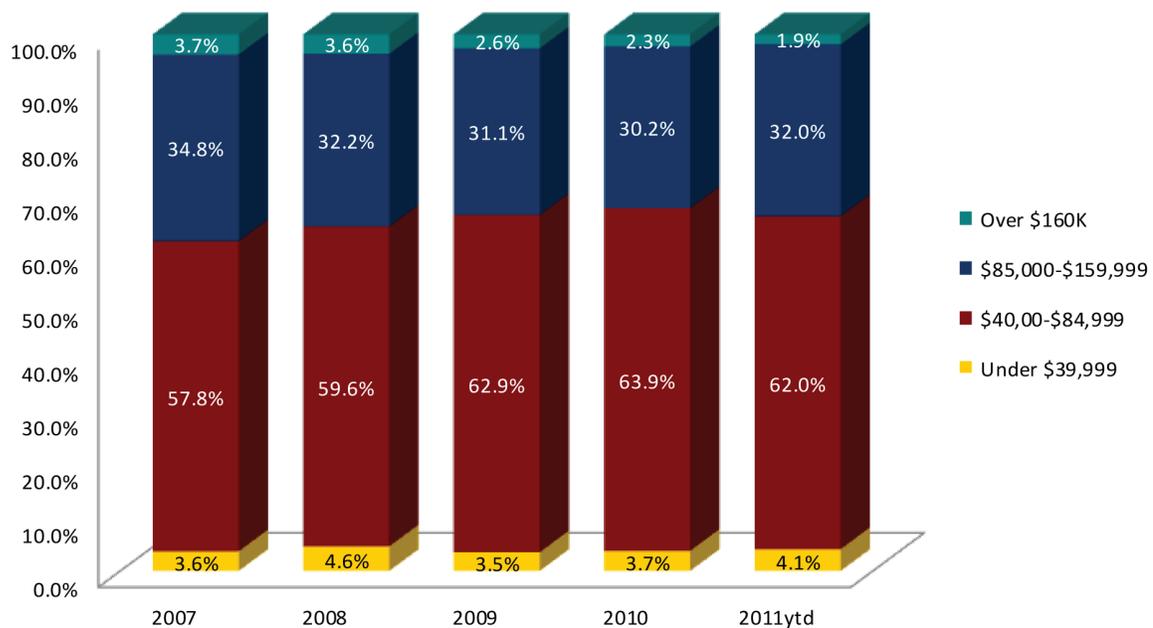
1. "Encourage substantial private investment in renewable energy resources,
2. Stimulate in-state economic growth,
3. Reduce demand for electricity during peak consumption periods,
4. Help stabilize California's energy supply infrastructure,
5. Enhance the continued diversification of California's energy resource mix,
6. Reduce interconnection and administrative costs for electricity suppliers, and
7. Encourage conservation and efficiency."⁵³

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51 Tiered Rates and How They Affect Your Bill, San Diego Gas & Electric, <http://www.sdge.com/customer/rates/tierCosts.shtml>.

52 PV Solar Report, Solar Adoption is Highest in Median Income Zip Codes (Nov. 15, 2011), <http://www.pvsolarbuzz.com/images/stories/PDFs/solarbyincome.pdf>.

53 California Public Utilities Code Section 2827

FIGURE 6 . Percent of Total Installs by Zip Code Median Income ⁵²

Any benefits that accrue to the participating net-metered customer are incidental to the purpose of the program while arguably necessary to its success. The Legislature has determined that a net metering program is an important element of the state's effort to meet these various objectives. All customers contribute, to one extent or another, to the cost of the program. However, the program cannot succeed unless some residential and non-residential customers choose to participate despite the costs they must bear. Direct participants take on the risk of either a direct investment in renewable energy equipment, a commitment to a long-term lease or (in some cases) an ongoing special tax assessment to pay for the equipment. Where the customer owns the equipment, the customer bears much of the risk of non-performance. In any event, the customer takes on the physical change of accommodating the equipment on a rooftop or other property and must assume maintenance obligations or the extra work of arranging for maintenance, as well as absorbing any civil liabilities related to the installations. At the same time, the net metered customer has the role of an early adopter, and provides other benefits to all customers in the form of lower system demand, lower peak requirements, less need for transmission capacity, lower renewable energy costs, and additional in-state employment.

To understand the role of wealth in the functioning of the net metering program, consider a hypothetical program that only offered incentives to low income customers. This would be a very expensive way to pursue the Legislature's goals because, by definition, the program participants would not be able to buy the systems on their own. In order to achieve residential installations under this approach, it would be necessary for the greater body of ratepayers (including low income customers) to pay considerably more – perhaps the entire net cost of the system. Payment to the direct program participants is a way to encourage them to participate. As a matter of adopted public policy, the State wants the utilities to make those payments not because the direct participants will benefit, but because everyone else stands to benefit through pursuit of the goals of the legislation.

A rational direct program participant will have weighed all of the risks and benefits, including the existence of the net metering program in its current form, when making its decision to install a renewable energy system. By imposing new charges on net metering customers who acted in detrimental reliance on state incentive programs, the utilities' proposals would teach net metering customers that they have taken on an additional risk: government officials who have offered long-term incentive to adopt innovative technologies might later change their minds.

The Effects of Net Metering Changes on California's Local Renewable Energy Development



No one, during the current debate, has asked for complete elimination of the net metering program. Instead, SDG&E has asked state regulators for a network use charge that would apply to net metering customers. This charge would not prohibit net metering, but instead reduce the incentive provided by the program for prospective solar customers. The difficult question to answer is, what would be the consequences to the California solar industry from such a change?

A fundamental consideration for prospective on-site renewable energy generators is how long it will take for the customer to realize direct economic benefits from on-site energy generation. For residential and small commercial installations, the E3 study used an estimate for the total cost for a photovoltaic solar project of roughly \$9.41 per watt of installed capacity.⁵⁴

While this number is now somewhat out-of-date,⁵⁵ E3's analysis still remains instructive. It considered CSI incentives as offsetting part of the cost, with rebates ranging from \$1.10-\$2.30 per watt of installed capacity at the time, depending on the type

of installation.⁵⁶ E3 found that net metering offered a benefit of about \$0.88 per watt of installed capacity.⁵⁷

Net metering has the distinct advantage of benefiting a participating customer over the lifetime of the installation. By providing an incentive over time, net metering encourages customers to maintain their solar power systems, make investments in efficiency, and practice conservation.⁵⁸ In other words, while direct financial incentives like CSI "are the engine of market development, interconnection and net metering policies are the road. In the current landscape, it is much easier for a market to accelerate on the smooth, finished roads of Colorado, New Jersey and California."⁵⁹

"Unbundling" the charges associated with net metering would significantly alter the cost calculation of on-site renewable installations and could deter some prospective generators from following through with installation.⁶¹ For example, under current pricing schemes, some suggest that customers can expect their diminished electricity bills to pay off a solar system in seven to ten years.⁶² But

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54 E3 Report at 12–13.

55 See Barbose, et al., supra note 24, at 51–53 tbl. B-2 (showing a capacity-weighted average installed cost for 2010 of \$6.20 per watt).

56 E3 Report, supra note 1, at 12–13.

57 Id. at 13.

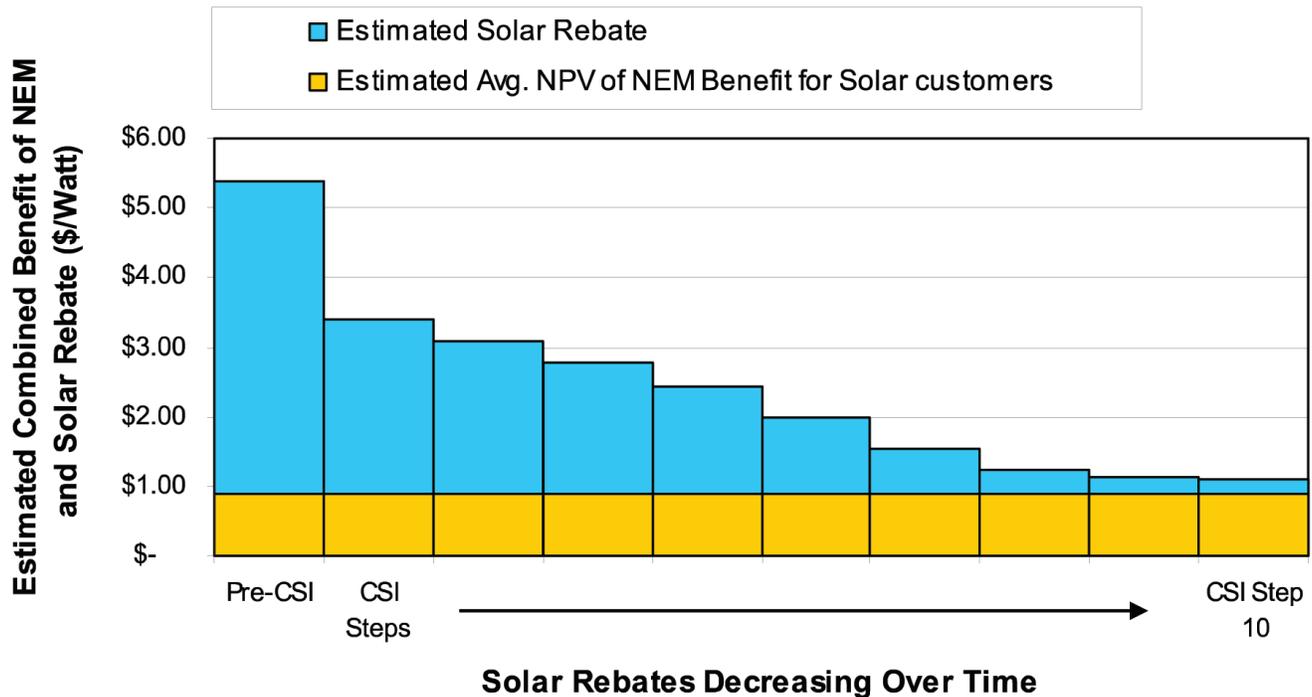
58 Id.

59 The Vote Solar Initiative and Network for New Energy Choices, supra note 6, at 7.

60 California Public Utilities Commission supra note 40, at 8.

61 The Vote Solar Initiative and Network for New Energy Choices, supra note 6, at 77 ("The imposition of additional charges, such as standby charges or access fees, on net metering customers can have a significant negative impact on the economics of distributed, clean energy systems.").

62 Eric Wolff, *SDG&E Asks for Higher Rates for Customers who go Solar*, North County Times (Oct. 4, 2011), http://www.nctimes.com/blogsnew/business/energy/article_49671e51-02b5-58a4-9384-10752bb50fa1.html.

FIGURE 7 . Estimated Combined Benefit of Solar Program Rebates and NEM.⁶⁰

under the SDG&E proposal, those customers would pay an average of \$11 per month in transmission and distribution charges.⁶³

While the actual cost to net metering customers is currently unclear, and will vary depending on the size of the installation, this level of network use charge by SDG&E would force participating customers to pay roughly \$1,000 more on their electric bill over the first seven years of the installation's lifetime. Because a 4 kilowatt distributed solar installation at \$6.20 per watt of installed capacity, costs roughly \$25,000, this decline in net metering support throws a wrench in the value calculations of prospective solar generators.

Changing the effect of the net metering program now would send mixed signals to California's solar industry at a critical time in its development. The solar industry is not immune from general economic turmoil, especially

when state support for the industry falters.

Inconsistency in policies can contribute to confusion among consumers, undermines efficiency across utility territories, and increases costs for all market participants.⁶⁴ California's recent adoption of the most aggressive renewable portfolio standard in the country has sent a signal of stability to the state's renewable energy industry that inconsistency in other policies could jeopardize.

Solar industry executives have explained that "stalled legislative initiatives" in 2010 led to "slower-than-expected" job growth in the industry.⁶⁵ In particular, the industry suffered from "decreased funding for state-level consumer incentives" such as the nationwide freeze on local implementation of the Property Assessed Clean Energy (PACE) program for residences.⁶⁶

63 *Id.*

64 The Vote Solar Initiative and Network for New Energy Choices, *supra* note 6, at 11

65 The Vote Solar Initiative and Network for New Energy Choices, *supra* note 6, at 5.

66 *Id.* PACE is a popular financing program conducted by municipalities for on-site residential solar generation that originated in Berkeley, California. PACE was effectively halted by a May 2010 policy letter from the Federal Housing Finance Agency restricting homeowner participation in the program. See Rosalind Jackson & Annie Carmichael, Will Fanny and Freddy Stop PACE?, Green Tech Media (June 8, 2010), <http://www.greentechmedia.com/articles/read/will-fanny-and-freddy-stop-pace/>.

Government signals are important to burgeoning industries, such as solar and wind power.⁶⁷ If a reduction in incentives would be perceived by the solar industry, as a retreat from the state's otherwise strong support while other states such as Colorado and New Jersey, continue to implement best net metering practices that encourage local clean energy development, California could be faced with a loss of renewable energy technology manufacturers, installers, and financiers.

And, as experience with solar and wind power development has amply demonstrated, new technologies trying to establish themselves as cost-competitive options in the marketplace depend heavily

on the consistent support of government entities. The "long-term" stability that renewable energy executives hope to enjoy with passage of the most-recent renewable portfolio standard targets might be called into question by proposals to dilute the incentive inherent in the net metering program.⁶⁸

The question we need to ask ourselves is whether reducing renewable energy incentives might undermine the state's progress toward worthwhile goals like job creation, electric grid stability, and environmental sustainability, and whether the modest rate impact related to the program justifies taking on such risk.

67 See California Renewable Energy Gets Major Boost in New Law, LA Times (Apr. 12, 2011), <http://latimesblogs.latimes.com/greenspace/2011/04/renewable-energy-rps-california-electricity-jerry-brown.html>.

68 See LA Times, *supra* note 76.

Conclusion

California is one of 43 states providing a net metering program. In concert with other public policy offerings such as the California Solar Initiative and various state and federal tax incentives, net metering has enabled California to lead the nation in the installation of local photovoltaic systems and the creation of solar-industry jobs. With the recent legislative expansion of the program, it stands ready to encourage the installation of facilities utilizing other forms of local renewable energy. As the utilities continue to ramp down the per-watt rebates offered through the California Solar Initiative, net metering becomes an even more critical component of the public policy structure.

Recently-expressed concerns that the program represents a transfer of wealth from lower income to higher income customers appear misplaced for several reasons: 1) the net cost of the program to non-participating utility customers is generally overstated, 2) regardless of whose net cost estimate one uses, the impact of the program on the cost of electricity is very

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small, 3) net metering program participants assume risks and costs that create benefits for the greater body of ratepayers, and 4) we lack the information necessary to know whether the solar and other local renewable industries can continue to prosper and grow after reduction in net metering benefits.

As more and more people and firms choose to install photovoltaic systems, the solar industry is continuing to grow and production costs continue to decline. It is hoped that similar successes could occur in other sectors of the renewable energy market. Nonetheless, as would be the case in any maturing industry, it is likely that there will be successes and failures as some renewable energy firms gain market share, and others fall to the side. Policy leaders must decide whether, in the face of these types of business cycles, it is important to maintain a stable policy environment around which the markets will adjust. Reducing net metering benefits now or in the near future could contribute to policy instability.

