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APPENDIX A

Making Net Energy Metering Policy More Equitable

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A. Abstract

Net energy metering (NEM) has driven distributed solar adoption in California to significant levels – currently, the state has nearly 10 GW of distributed solar. Customers who install solar panels are enrolled in the NEM program and compensated for exporting energy to the grid. The compensation is set at the retail rate, which includes not only the costs of generation but also the costs of service (e.g., costs to operate and maintain the grid). This means that existing NEM tariffs overcompensate residential solar owners because they do not discount the costs of service that still exist for NEM customers. This overcompensation especially affects energy affordability for low-income customers.

Enhancing affordability in distributed generation going forward requires that the updated NEM policy be structured to adjust the compensation for solar electricity and advance direct clean energy benefits specifically to low-income customers. NRDC tariff design proposal aims to address the former goal. On the other hand, this proposal focuses on the latter objective – we propose the creation of an equity fund that will raise money to be invested in an equal clean energy transition. We demonstrate that a monthly equity fee of \$2.50 per kW_{dc} installed distributed generation capacity can generate approximately \$130 million a year while having a minor impact on rooftop solar customers' investments. Finally, we propose that a new regulatory process should be started to address the funds' appropriation. The CPUC should, with the input of representatives of disadvantaged communities, environmental justice groups, and consumer advocates, decide how these funds should be spent to meet pressing needs of low-income Californians and achieve energy equity through actions such as advancing solar panels installation, providing additional discounts on energy bills, and supporting policy goals aimed to achieve an equitable decarbonization.

B. The Current Situation of Residential Solar Adoption in CA

1. Overview

NEM policy has played a crucial role in California's decarbonization goals as the main driver of rooftop solar adoption. Until recently, California needed clean energy in the middle of the day and rooftop solar adoption was low. In these conditions, NEM provided a needed boost to an emergent industry that met a societal need. However, we are concerned that NEM may now be causing regressive outcomes because its structure hasn't kept pace with California's

changing clean energy needs and grid economics. NEM compensation structures need to be better aligned with California's policy of getting to its clean energy goals in a cost-effective and equitable manner.

Since its inception, NEM compensation has been set at the retail rate of electricity, which includes not only the costs of generation but also the costs of service (e.g., costs to operate and maintain the grid). Setting NEM at the retail rate makes it easy to explain the economic benefits of solar to potential customers and provides a substantial incentive to motivate them to install rooftop solar.

While an easy to explain incentive is necessary to get a fledgling industry started, after two-plus decades and a boom of solar adoption in California this compensation structure needs to be revisited as the value of solar is lower than the current retail rate being paid to participating customers.

As described below, some undesirable outcomes result from the current NEM compensation structure (NEM 1.0 and NEM 2.0). First, paying for solar electricity more than its true value burdens non-NEM customers; and because energy costs represent a bigger portion of low and moderate income customers' budgets, these burdens are relatively harder for these customers. Second, because CARE and FERA customers have a lower retail rate, they receive less compensation for solar energy despite providing the same benefits to the grid. A new NEM structure (i.e., NEM 3.0) and complementary policies are necessary to correct for these impacts.

2. Analysis

i. NEM Overpays for Solar and Adds to the Increase in Retail Rates

The record of this proceeding confirms that NEM needs to evolve so that all Californians have access to affordable and equal clean energy benefits. To summarize, the NEM 2.0 Lookback Study found that the NEM 2.0 program currently fails multiple California Standard Practice Manual (SPM) cost-effectiveness tests. Most importantly, the Lookback Study found that the NEM program isn't fulfilling its statutory mandate to ensure that benefits from NEM are equal to or greater than the costs borne by all ratepayers. The CPUC NEM Successor Tariff

Whitepaper confirmed these findings.1 The California Public Advocates Offices Successor Tariff proposal summarizes the need for NEM's evolution and the state of the current NEM program in detail.

ii. Solar Panels Are Disproportionately Installed on Wealthier Households

CARE and FERA customers face many obstacles to install solar panels, including high upfront costs and relatively lower rates of homeownership. As it is expensive to install solar panels (e.g., a 4-kW panel for a small single family home costs approximately $11,000),[2] the cost of installation is a barrier to the adoption of solar panels or other forms of distributed generation by low-income Californians. Installing solar panels is a major upgrade that requires homeowners consent; in many cases, they may want to raise rent after installing solar panels to recover their expense and as the home now has greater equity and a cheap source of electricity that tenants can use. For these reasons, it is hard for the private industry to install solar panels on homes with CARE and FERA renters in a manner that benefits these renters.

Also, the current compensation structure for NEM represents an additional barrier to the adoption of rooftop solar by CARE and FERA customers. Because NEM export compensation is set at the retail rate, CARE and FERA customers, who pay a discounted electric retail rate, are compensated at a comparatively lower amount for their solar exports even though they provide the exact same benefits to the grid as wealthier NEM customers (and in many cases impose less costs on the grid as they live in smaller and denser housing).

Since they receive a lower compensation,[3] if they decide to install solar panels, the period needed to recoup the investment will be longer than the period faced by wealthier customers. The current NEM rules therefore offer different compensations for the same product. Specifically, both customer classes have the same costs to install solar panels and provide the same benefits to the grid; however, for the reasons noted above, CARE and FERA customers end up receiving

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[1] "The recent Net-Energy Metering 2.0 Lookback Study completed by Verdant Associates, with input from E3 and Itron, found that the compensation given to participating NEM customers for load reductions and grid exports greatly exceeds the incremental benefits. This misalignment leads to higher bills for non-NEM customers, as retail rates must increase to make up for the unrecovered utility costs." E3, *Alternative Ratemaking Mechanisms for Distributed Energy Resources in California: Successor Tariff Options Compliant with AB 327* (January 2021), at 8.

[2] National Renewable Energy Laboratory, *2020 Q2/Q3 Solar Industry Update*, at 19.
NREL collated EnergySage data shows that CA residential system average costs are $2.83/$W_{dc}$. Data at slides 17 and 18 of the same presentation imply that install cost in California could be even higher.

[3] For example, CARE customers receive an average rate discount of 35% off the residential rate. Therefore, the compensation these customers receive for sending excess solar back to the grid is also 35% lower.

lower compensation. In other words, CARE and FERA customers, who already deal with financial distress and need to overcome bigger barriers to install these panels are further discouraged from installing solar. These are some of the reasons why solar panels are disproportionately installed by higher earning households, as shown in Figure 1.

Figure 1 Solar Adoption Demographic Data in California Compiled by Lawrence Berkley National Labs[4]

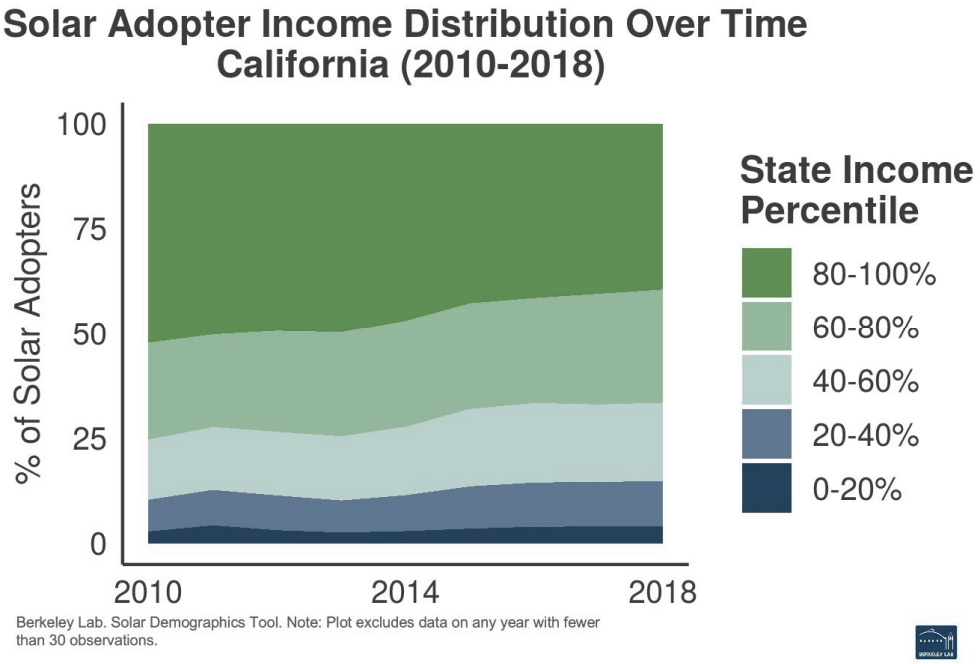


Figure 4 shows that in 2018 less than 5% of the solar adopters in the state come from the bottom income percentile, whereas ~40% of solar adopters come from the top income percentile.

3. Addressing the Unintended Low-Income Inequitable Outcomes with Revised NEM Policy

The data presented in the previous sections reveal that there are specific costs to serve solar customers under the current NEM policy and its compensation structure. These costs are translated into three main problems: (i) leaving NEM policy as is causes a regressive flow of money caused by overcompensation of solar electricity, (ii) CARE and FERA customers receive lower compensation for their solar power even though it provides the same benefits to the grid, and (iii) disproportionately fewer solar panels are installed on low-income households.

[4] See: https://emp.lbl.gov/solar-demographics-tool.

Therefore, a revised NEM program (i.e., setting a new compensation (NEM 3.0) and complementary policies and programs) is needed to address these problems.

The data presented should inform the CPUC's NEM 3.0 proceeding (Rulemaking 20-08-020). The proceeding should aim to achieve the following equity goals:

(i) Prevent the unbalanced flow of money;

(ii) Pay the same compensation to all solar customer classes; and

(iii) Provide more clean energy benefits, such as rooftop solar, to low-income customers.

The tariff design proposed by NRDC will achieve the first two equity goals. Accomplishing objectives (i) and (ii), which correct for current overcompensation of distributed generation, will lead to lower levels of compensation for distributed generation for customers who enroll in the NEM program that we account for in our upfront incentive/ market transition credit proposal. However, the upfront cost of these systems still remains a major barrio for low and medium income customer participation. A dedicated mechanism is needed to promote the equity goal described in (iii) above.[5] To help achieve this goal, we propose the development of an equity fee to create a fund that provides direct clean energy benefits, such as rooftop solar panel installation, to low-income customers.

C. The Equity Fee

1. The Rationale Behind the Equity Fee

The equity goal described in (iii) above (to provide more clean energy benefits to low-income customers) embraces the fact that the equity fund actively promotes clean energy benefits to low-income customers by supporting, for example, the installation of solar panels. The equity fee, thus, is well aligned with the CPUC Environmental and Social Justice Action Plan because it integrates equity and access considerations to this proceeding, increases investment in clean energy resources to benefit low-income communities, and increases climate resiliency in these communities.[6]

[5] Any effort to provide clean energy opportunities directly to low-income customers should be coordinated with other low-income distributed generation (e.g., SOMAH) and energy efficiency programs (e.g., ESAP).
[6] CPUC Environmental and Social Justice Action Plan.

We propose the equity fee to address this two-fold goal as the following:

1. All existing non-CARE and non-FERA residential customers, who profited from the subsidy structure under NEM 1.0 and NEM 2.0, will be required to pay an equity fee of $2.50 per kW_{dc} of distributed generated capacity installed per month.
2. New non-CARE and non-FERA NEM customers, who will be under the forthcoming NEM 3.0 structure, will pay the same equity fee starting after a period of ten years. This gives new NEM 3.0 customers an opportunity to recoup their investment in a timely manner before they contribute toward this equity enhancing fund.

An equity fee of $2.50/ kW_{dc} per month, levied as a fixed, non-generation charge, on these non-low-income residential customers will generate approximately $130 million per year.[7] For now, the equity fee will be incorporated into the retail rate and charged to existing non-CARE and non-FERA customers from IOUs and CCAs.

It is worth noting that the equity fee aims to address the costs to serve specifically solar customers derived from the current compensation structures designed under NEM 1.0 and 2.0 policies. Those costs, which do not exist for non-solar customers, justify (and require) a different rate structure to be applicable to solar customers. The equity fee, therefore, does not violate the non-discriminatory requirement for rates set by the Public Utility Regulatory Policies Act (18 C.F.R. 292.305(a)(1)).

NRDC's proposal, especially the equity fee, also complies with the Rate Design Principles (RDP) established by CPUC through R.12-06-013, the Residential Rate Reform Order Instituting Rulemaking, which established a regulatory pathway for realigning rates to reflect a number of guiding principles. Principle 7 states that "Rates should generally avoid cross-subsidies, unless the cross-subsidies appropriately support explicit state policy goals."[8] The equity fee explicitly aims to allow California to achieve the clean energy goals in an equal and affordable manner. In that sense, it is well aligned with California's RDP.

[7] Per DG stats, IOU NEM customers have ~5,896 MW installed solar capacity. NRDC assumes these estimates are for non-low-income customers. If these estimates include capacity installed on CARE and FERA customers, then the total equity fund will be slightly lower than this estimate.
[8] See Decision 15-07-001 July 3, 2015. Available at: https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M153/K110/153110321.PDF.

In addition, it is important to note that the impacts of the current compensation structures on low-income customers are big enough to justify a change on D.14-03-041, which established a 20-year transition period for customers enrolled in net energy metering tariffs. The scale of these impacts reveals that 20 years is not a "a reasonable expected payback period" and, because of that, it conflicts with Section 2827.1(b)(6) of the California Public Utilities Code.[9] Maintaining the 20-year transition period established by D.14-03-041 is inconsistent with the Public Utilities Code, and would maintain these undesirable impacts on low-income customers for an extended period of time. NRDC, therefore, strongly recommends that the Commission change its previous decision to allow the equity fee to be immediately charged to NEM 1.0 customers (in addition to NEM 2.0 customers for which the CPUC wouldn't have to change previous decisions).

2. The Equity Fee's Impact on Current NEM Customer Earnings from Solar Is Insignificant Relative to Lifetime Earnings

NRDC analyzed how a typical single-family NEM 2.0 customer in SDG&E and PG&E would fare with and without an equity fee. In addition to a simple cash flow analysis, we also conducted an analysis of customer earnings with a discount rate of 4%. These results are presented in

Figure 2.

Per a simple cash flow analysis, a NEM 2.0 customer in PG&E territory earns a little more than $53k in profits over a thirty-year period; existing NEM 2.0 customers still earn more than $48k after paying an equity fee. The same analysis for San Diego customers results in estimates of approximately $47k and $41k without and with the equity fee respectively. The numbers reveal that the impact of the fee on customers' investments is minor (under 5% of lifetime profit) and NEM 2.0 customers would still be compensated at a rate to sufficiently cover their initial investment.

[9] Public Utilities Code, Section 2827.1(b)(6). Establish a transition period during which eligible customer-generators taking service under a net energy metering tariff or contract prior to July 1, 2017, or until the electrical corporation reaches its net energy metering program limit pursuant to subparagraph (B) of paragraph (4) of subdivision (c) of Section 2827, whichever is earlier, shall be eligible to continue service under the previously applicable net energy metering tariff for a length of time to be determined by the commission by March 31, 2014. Any rules adopted by the commission shall consider a reasonable expected payback period based on the year the customer initially took service under the tariff or contract authorized by Section 2827.

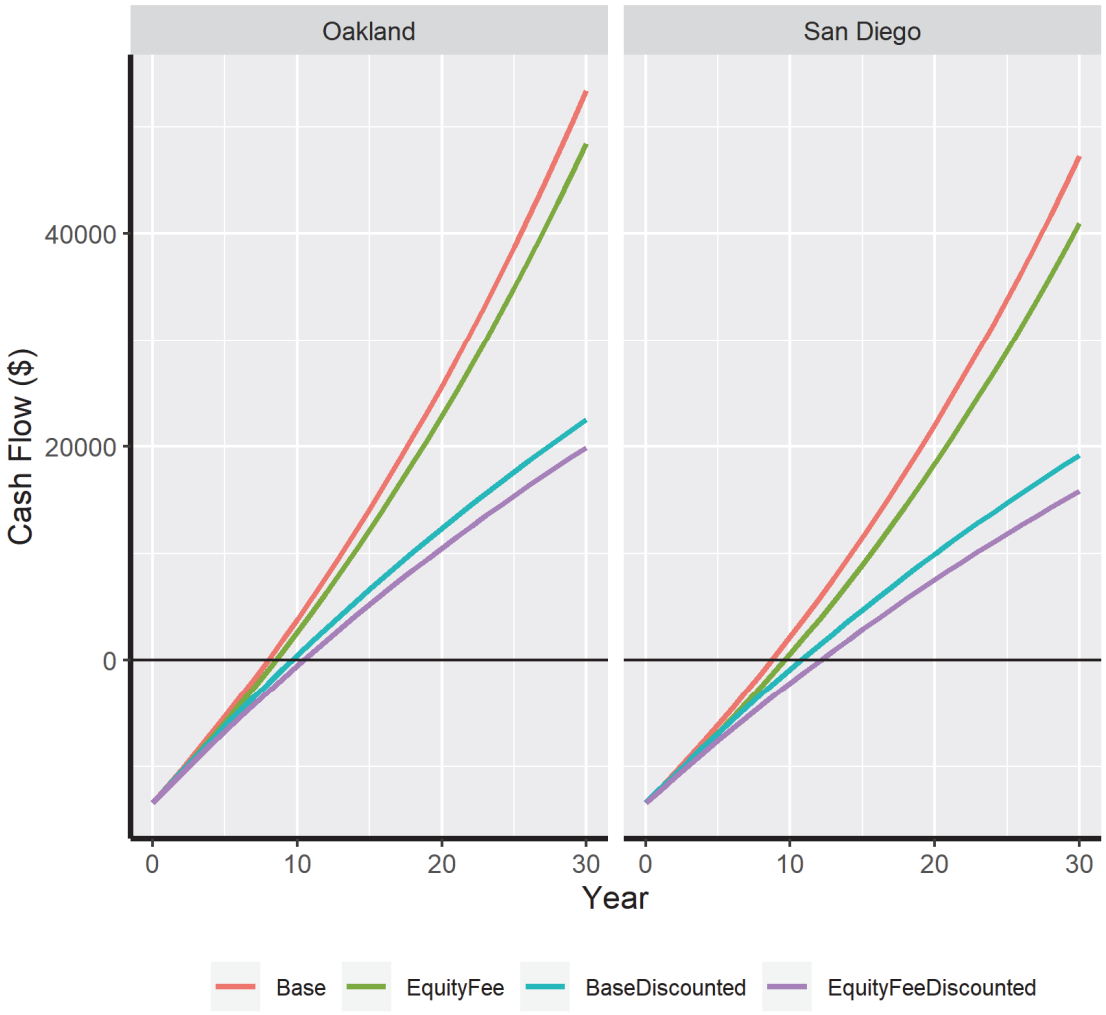
This example illustrates the highest equity payment scenario from a NEM 2.0 customer's perspective where customers pay an equity fee as soon as they install distributed generation. However, most NEM 2.0 and all NEM 1.0 customers have already been earning through their distributed generation for years without an equity fee, meaning that the monetary impact for these customers would be substantially lower.

The analysis assumes a typical single-family home with a well sized solar system, the home avails of NEM 2.0 per PG&E (E-TOU Option A) and SDG&E's (DR-SES) time of use rates. NRDC conducted this analysis using National Renewable Energy Laboratory's System Advisor Model (SAM).[10] SAM is informed by Department of Energy's research on single family home energy consumption patterns, applies customer rate data, solar system characteristics, and accounts for location to analyze the impact a solar panel has on a customer's bills. The customer modeled by NRDC had an annual consumption of ~7,500 kWh and a 4.75 kW_{dc} solar system. We assumed an installed system cost of \$2.83/ kW_{dc}.[2] In addition to a simple cash flow analysis, we also conducted an analysis of customer earnings with a discount rate of 4%. These results are presented in

Figure 2.

[10] See: https://sam.nrel.gov/

Figure 2 NEM 2.0 Single Family Customer Payback with and Without an Equity Fee



3. Appropriating the NEM Equity Fund Effectively: Equity Enhancing Initiatives and Additional Rate Discounts

The NRDC proposal would generate approximately $130 million new funds annually without significantly impacting investments on rooftop solar panels. Because these funds are collected from solar customers to advance clean energy affordability, NRDC recommends that the CPUC prioritize spending these funds on providing direct solar benefits to low-income customers. This can be done by using these funds to buy down or fully subsidize solar panels for installation on CARE households, develop community solar, or to develop solar powered resilience centers in disadvantaged communities. The CPUC should, with extensive and meaningful stakeholder input, ensure that these funds are spent to get tangible equity benefits.

Besides supporting the installation of solar panels for CARE and FERA customers, the fund could be used to benefit low-income customers in other ways. For instance, the money could be used to give extra discounts, in addition to the existing ones like CARE and FERA, to support more affordable bills to low-income customers – i.e., the additional discount provided by the equity fee would not interfere with the current structure and funds from CARE and FERA programs. Also, the fund could be used to support existing or new programs designed for low-income customers. One example is the Percentage of Income Payment Plan (PIPP) currently discussed by the CPUC in the disconnections proceeding (R.18-07-005). Parties' comments to the PIPP clearly show that while there is a sincere intent to help low-income customers, IOUs are facing budget issues that may negatively interfere with the implementation of the PIPP. These additional funds, therefore, would help avoid disconnections and advance energy equity.

Regardless, an overarching goal as complex as enhancing equity needs to be represented in terms of tangible objectives with accompanying metrics that can be used to effectively spend these funds. NRDC recommends that the CPUC initiate a new public process to determine how to spend these funds. An accessible public process will provide an opportunity for impacted communities, environmental justice advocates, and consumer advocates to provide feedback on how these funds should be spent.

Low-income customers, who are the recipients of the money and the target of our proposal, must be the main voice to be heard; they are the ones who can say what their pressing needs are and what energy equity means to them. The new proceeding should also define the eligibility requirements, adjust the equity fee for inflation, update how the fund is spent according, ensure close coordination with other low-income programs, and provide any other definitions needed to ensure that the money raised from the equity fee will be directed to eligible customers, and applied to advance an equitable pathway towards the decarbonization goals.