

# Consequences of Proposed Repurposing of California's Retail Solar Industry

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Introduction. Many California residential and commercial customers see customer-generated solar electricity as an opportunity to lower their carbon footprints and stabilize their energy bills by investing in rooftop systems and recovering upfront costs at low but positive rates of return over time.

Thanks to California's leadership and successful experience, legislation in most US states authorizes "net energy metered" (NEM) solar. Valuing customer generated electricity at the rate charged when it comes back to the customer as grid electricity has been the norm in California. Other states have followed California's lead.

The California Public Utilities Commission (CPUC) is considering a proposed decision, under the guise of encouraging solar adopter investments in on-site energy storage, that would make on-site solar far less economically attractive to both current and prospective adopters.

The utility narrative, which the CPUC embraces in its PD, is that electricity generated on roofs is as valuable, and no more valuable to the grid as bulk electricity generated at solar power plants before it is transported and distributed to communities and customers. A competing narrative is that 1) when homeowners' solar systems generate more electricity than their homes consume, the electricity spreads around their neighborhood and community, and other customers pay full retail price for it, and 2) because the utility does not incur additional generation, transmission and local grid infrastructure costs as a result of NEM "over-generation" and actually avoids some new transmission costs, the price the utility pays should be based on the revenues it collects.

These are profoundly different narratives. In California, there is factor of at least five difference in the value that they attribute to rooftop solar electricity. The second higher value narrative has prevailed for decades until now. What if it is replaced with the first? That is what the PD will accomplish. What then? Payback periods for NEM solar will approximately double. Appropriately sized solar plus storage installations will cost at least fifty percent more than "solar only" systems of the past. Depending on yet-to-be-determined peak rates for solar electricity stored in batteries, solar plus storage adopter investments may pay back, or not, and sales of NEM solar systems in California will likely plummet.<sup>2</sup> Let's try to understand why.

Energy democracy<sup>3</sup> for California's zero carbon future. Over the past decade, NEM solar deployment enabled by California's NEM program expanded rapidly in California as shown in Figure 1. Residential and commercial solar adopters pre-pay for the electricity their solar arrays produce over two or three decades into the future. As ratepayers they also make monthly payments to utilities that enable parallel investment in new renewable power plants.

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<sup>1</sup> Colleagues Robert Perry, Chris Soderquist and Richard McCann provided invaluable review and information.

<sup>2</sup> Industry insiders estimate that annual sales will decline by as much as eighty to eighty-five percent.

<sup>3</sup> "Energy democracy calls for expanding public participation in the renewable energy transition and the broader functioning of the energy sector." Source: Wikipedia

A thousand local solar installers and retailers and nearly 1.4 million home and business owners helped California achieve ambitious goals for local solar energy production and decarbonization. California’s residential and commercial solar deployment goals were achieved ahead of schedule, thanks to volume-driven, experience-based panel and installation cost reductions. California now has a \$76 billion investment in a combination of local and “utility scale solar generation capacity.”<sup>4</sup> Its retail solar industry has experienced a decade of steady, cost-efficient expansion and has contributed roughly half of the total investment.<sup>5</sup> Solar installers, retailers and adopters also helped California avoid investing many additional billions in new high voltage transmission.<sup>6</sup>

Battery storage for the California grid. As California generates and uses more solar electricity, a portion must be stored for use at night, or in the winter when daily solar production decreases and is more variable. Battery storage can be co-located with solar arrays, resulting in more

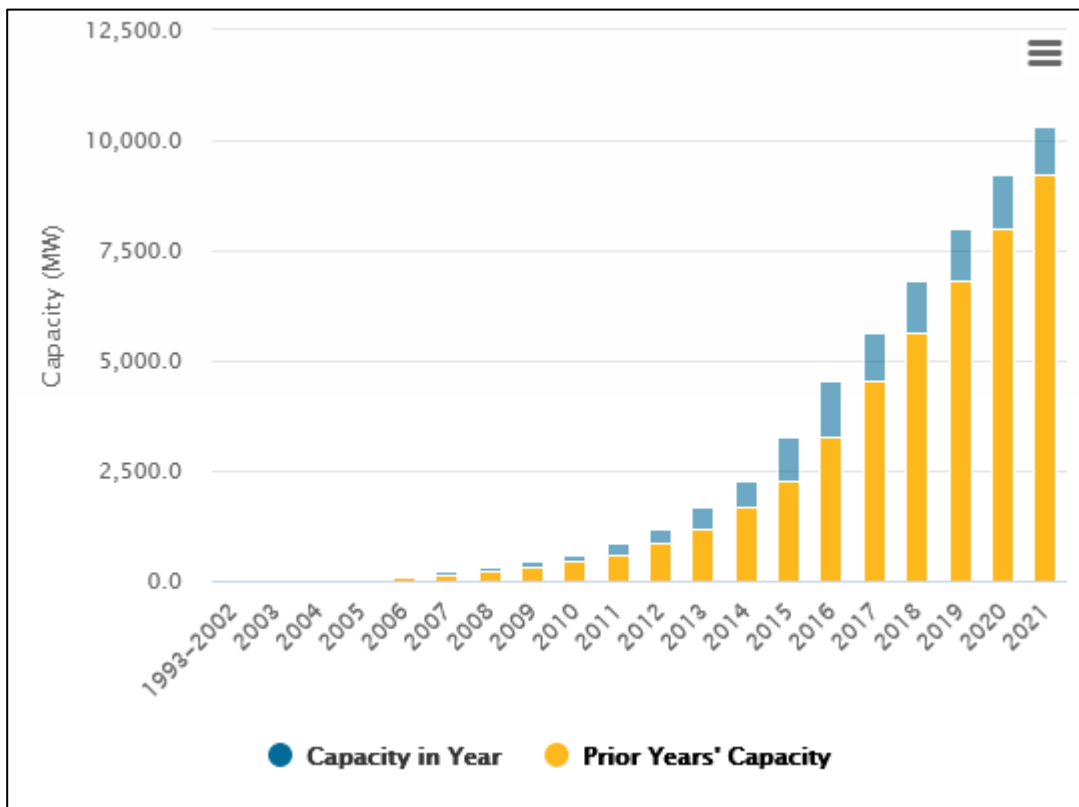


Figure 1. NEM solar deployment in California's large electricity company service areas<sup>7</sup>

<sup>4</sup> Source: [SEIA](#)

<sup>5</sup> The per kW cost of utility scale solar generation is now about half that of on-site solar, while the per kW cost of utility scale generation plus transmission is roughly double.

<sup>6</sup> Transmission costs per kWh now exceed solar generation costs in California. The transmission share of electricity bills has increased to about \$.04/kWh while solar generation costs have decreased to about \$.01/kWh for utility scale and between \$.015-.03/kWh for on-site solar. Source: [Wood MacKenzie](#)

<sup>7</sup> Source: <https://www.californiadgstats.ca.gov/charts/>

timely, predictable and “dispatchable” flows of electricity into the local or state-wide grid. Energy storage co-located with on-site solar arrays has energy resilience benefits<sup>8</sup> to people, businesses and communities in addition to benefits to local and state-wide grid operations.

California has a functioning wholesale electricity market that rewards investment in bulk solar electricity production and storage. Because California’s large energy utilities are state-regulated monopolies, California currently does not have a functioning retail electricity market that rewards storage investments. While storage integration at the wholesale level is addressed by market design, storage integration at the energy user level requires other strategies, including rate incentives and smarter electricity distribution systems.

Rate incentives for battery storage. The proposed decision (PD) awaiting approval by the California Public Utilities Commission (CPUC) is intended to reward appropriate investments in on-site solar electricity and storage. Table 1 below provides a top level summary. The PD aims to encourage storage retrofits at existing solar sites and pairing of storage with new on-site solar installations as well.

**Table 1. Major Provisions of the Proposed Decision**

1. Compensation (in the form of bill credits) for net hourly generation is 80% lower for new NEM residential customers than for current NEM residential customers.
2. Grid access fees are imposed on NEM residential customers and are indexed to array rating. A new monthly residential fixed (“grid participation”) charge is levied at \$8 per kilowatt (kW) of installed solar capacity.
3. New NEM residential customers are allowed to “oversize” their systems to meet up to 150% of historical usage. Currently the limit is 100%.
4. Higher but unspecified (per kWh) prices will be offered to new NEM residential customers selling stored solar electricity to the grid between 6 and 9 pm.
5. New PG&E and SCE NEM residential customers will be eligible for a ten year fixed monthly “transition” credit starting at \$10/month for PG&E that steps down to zero over 4 years and is higher for low income customers.
6. Eligibility for NEM-1 and NEM-2 compensation for net generation is reduced from 20 to 15 years. (This enables faster imposition of grid access fees.)
7. NEM 2.0 customers who transition to NEM 3.0 within the next four years become eligible for storage rebates. (They give up their eligibility for NEM 2.0 compensation for net generation.)
8. No annual billing for net over/under-generation. Only monthly.
9. Effective date: 5/28/2022

<sup>8</sup> The term “energy resilience” means the ability to avoid, prepare for, minimize, adapt to, and recover from anticipated and unanticipated energy disruptions.

According to the commissioner in charge of the CPUC decision process, *“the state wants the solar industry to keep growing, but net metering needs to evolve to provide what the grid really needs, and that involves energy storage.”*<sup>9</sup>

What the grid needs. The main premise of the PD seems to be that the state-wide electricity grid and its owners need current solar array owners to invest in energy storage 1) that can be used to deliver electricity during peak periods or 2) that utilities and grid operators can use to flatten load profiles. Also, In a net energy metering (NEM) context, electricity users need to be incentivized to purchase, not solar per se, but rather solar plus storage.

Most new solar power plants in California are coupled to massive battery banks which store electricity produced during the day and feed it into the statewide grid during peak usage hours. Overall electricity storage costs depend on how much solar electricity would otherwise feed into the grid when it is not needed. The PD in effect apportions part of overall electricity storage costs to NEM solar ratepayers. They will pay if they can afford to.

“The grid” also needs balance. Utility scale solar plus storage systems are necessary to reliable grid electricity service. On average they will become more costly as longer duration storage becomes necessary and as additional solar capacity is devoted to charging storage. Overbuilding centralized capacities is not the most environmentally responsible path, nor is it a path to local energy resilience. Increased reliance on variable centralized renewable sources will require additional investment in local energy resilience by energy users and communities.<sup>10</sup>

The best long term balance between utility scale and local paired solar and storage remains a critically important unknown. Get it right and markets and rates can be complementary tools. Get it wrong and lose flexibility and adaptability.

What “the grid” needs to provide. Future grid operators will need all the flexibility they can get as California’s electricity system becomes increasingly dependent on variable zero carbon sources. Utilities have yet to make distribution system investments necessary to use the flexibility potential customer owned and solar paired batteries could provide. Until distribution systems are smarter and more interactive with electricity users and customer sited generation assets, the cart of customer investment in energy storage infrastructure will be in front of the smart grid horse.

Ironically, there is an on-going CPUC proceeding<sup>11</sup> that targets “high DER<sup>12</sup>” deployment while the NEM proceeding appears to target “low DER” deployment. This proceeding’s outcomes and recommendations might helpfully inform consideration of the PD, were they known. For example, how will a rapid transition to electric vehicles impact an industry incented to pair solar

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<sup>9</sup> Ref: <https://www.sacbee.com/news/california/article256552966.html>

<sup>10</sup> Ref: G. Braun, [Inventory and Integration of California’s Local Energy Resilience Assets](#), 2021

<sup>11</sup> Ref: <https://www.utilitydive.com/news/california-begins-brainstorming-approaches-to-a-high-der-grid-of-the-future/605309/>

<sup>12</sup> DER = Distributed Energy Resource

with stationary batteries? How will the industry be incented to take on pairing solar with vehicle batteries?

The proposed decision (PD). Section 11 of AB 327 (2013), says “the commission shall develop a standard contract or tariff, which may include net energy metering, for eligible customer-generators with a renewable electrical generation facility<sup>13</sup> that is a customer of a large electrical corporation...The commission may revise the standard contract or tariff as appropriate to achieve the objectives of this section.” Currently proposed revisions are summarized in the table on page 3. Click [here](#) to view the PD.

Members of the public can comment on the proposal and view documents related to the proceeding [here](#). The CPUC and its staff have already heard from organizations who favor or oppose changes in current NEM contracts and tariffs. Because the proposed changes may discriminate and/or shift costs unfairly between customer classes, or fail tests of cost causation, transparency, and/or compliance with Federal law, they may be subject to legal challenge once approved.

What to expect. The PD, if it is approved and survives legal challenges, will make cost recovery for solar investments much harder for retailers and property owners to forecast. Worse, it will make cost recovery for solar paired energy storage investments impossible to credibly forecast. The CPUC offers no forecast of future on-peak rates. No other source of accurate, reliable long term forecasts is available to solar retailers and their prospective customers.

If the PD is approved, California’s retail solar industry will contract rather than grow, installed system prices will go up, competitive bids will be unavailable in many areas, and more areas will lack locally trusted solar retailers. The current industry has delivered consistently high but manageable growth in every recent year because it had a stable and increasingly attractive value proposition. The PD’s main consequence will be to prevent solar retailers from continuing to give prospective customers a simple, clear, and accurate forecast of how the cost of their investment in NEM solar will be recovered, and how long it will take to pay back.

What stakeholders want. California legislators and regulators want electricity to be reliable, affordable and environmentally beneficial. NEM solar adopters and local solar retailers<sup>14</sup> want the same, plus they want their communities to benefit from continued NEM solar deployment and for community members lacking access to NEM solar to gain access to resilient community solar deployment.<sup>15</sup> Developers and retailers specializing in large renewable power plants, transmission systems, and energy efficiency and electrification retrofits may see NEM solar as unwanted competition and want to see its growth curtailed.

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<sup>13</sup> A “renewable electrical generation facility” may include electricity storage.

<sup>14</sup> Of course, solar retailers want to be in a profitable business in a stable market.

<sup>15</sup> Utilities and labor unions that represent utility employees falsely claim without supporting evidence that wealthy NEM solar customers are over-compensated for electricity that spills over into the grid at the expense of low income customers.

What stakeholders will get. Arcane, dependent on untested theory, and uninformed by independent market research or collaborative engagement between utilities and solar retailers, the PD is a blunt instrument that attempts too much, too fast, while plunging NEM solar adopters and local solar retailers into uncharted territory. If the PD is approved without major modification, California’s retail solar industry will be severely disrupted. Surviving retailers and their specialized sub-contractors will need reason, resources and access to venture capital to reorganize themselves to function in a radically altered business environment. Many will be unable to retain stable, experienced staff able to see a future in their current job in their current community.

Intentions and unintended consequences. The PD needs to be considered in a broader context than unspecified needs of “the grid”. A fundamental flaw in the current PD is that a hypothetical, unsubstantiated cost shift from low income non-NEM residential customers to NEM residential customers is used to rationalize a huge cost shift from all utility customers to NEM residential customers.<sup>16</sup> The CPUC’s intention – to incentivize stationary battery adoption by residential NEM customers – may be aligned with the natural future evolution of electricity systems, but its unintended consequences will be disruptive rather than transformative.

Shifting the cost of local decarbonization and energy resilience from all electricity customers to NEM residential customers could have serious unintended consequences. By making solar retailers’ proposals to prospective customers suddenly much less attractive and by making payback of future up-front investments unpredictable, the CPUC undermines the plausibility of a preferred scenario in which solar retailers and installers gain experience selling and installing solar paired storage batteries.

Repurposing California’s retail solar industry at least requires a plan. Government decisions have in some cases led to the creation of entire industries. In emergencies governments can temporarily direct an existing industry’s attention to urgent societal needs. Has California’s governor decided the need to pair battery storage with on-site solar arrays merits a decisive and risky market intervention?

The CPUC has commissioned analysis of historical data.<sup>17</sup> But with the fate of a strategically important and consequential industry at stake, the CPUC needs a model that provides a proper and transparent forecast of how PD implementation is likely to play out. Use of such a model could inform creation of a more beneficially transformative plan and answer basic questions. For example, how would the PD shift the mix of residential and commercial sales<sup>18</sup> and the

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<sup>16</sup> Low income California ratepayers are eligible for rate discounts of 25% to 35% and can access other energy efficiency and rooftop solar funding. The claim that they are subsidizing other ratepayers is false.

<sup>17</sup> [https://www.cpuc.ca.gov/-/media/cpuc-website/divisions/energy-division/documents/net-energy-metering-nem/nemrevisit/nem-2\\_lookback\\_study.pdf](https://www.cpuc.ca.gov/-/media/cpuc-website/divisions/energy-division/documents/net-energy-metering-nem/nemrevisit/nem-2_lookback_study.pdf)

<sup>18</sup> Many California solar retailers specialize in residential systems and lack experience with commercial system permitting and installation. Under current time of use tariffs, on-site battery economics are unattractive. So, most retailers have not offered battery sales and installation and have no experience with grid-tied solar/battery integration.

share of the market captured by national vs. local retailers? How deep would be the dip in annual sales and how long, if at all, would it take for the industry to recover?

It is time to check assumptions. The CPUC may be overlooking the difference between minor incremental changes affecting utility monopolies and abrupt and radical changes that could potentially cripple a maturing but still young and promising retail solar industry. The PD appears to be premised on an assumption that the solar industry's loss of revenues from its current core business can be made up from revenues from battery storage installation services convenient to the CPUC's need to mitigate future utility service rate increases. The retail solar industry, though certainly capable of adaptation, needs to continue to generate the same or greater revenues every year if it is to take on the additional responsibility of designing, financing and installing the building blocks of residential nanogrids. Lack of attention to this reality could dash California's hopes for a resilient, zero carbon and affordable energy future.

Pause, rethink and broaden the conversation. With possible consequences better understood, the CPUC should, at a minimum, take time to consider solar industry recommendations. Likewise, cities and counties have a major and rapidly increasing stake in solar enabled energy resilience and community-wide economic benefits. The CPUC should take time to hear from them as well. Further, the CPUC should engage with other state agencies whose missions will be impacted, including CalEPA, the CEC<sup>19</sup> and CAISO. Striking the right balance between centralized and local renewable energy supply and storage will require imagination, vision and policy coordination by and among state agencies. Striking the right balance should be on the Governor's and legislature's agendas as well.

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<sup>19</sup> The CEC and CPUC appear to be pulling in opposite directions, with the CEC mandating solar and electrification for new homes and the CPUC undermining solar and electrification of existing homes.