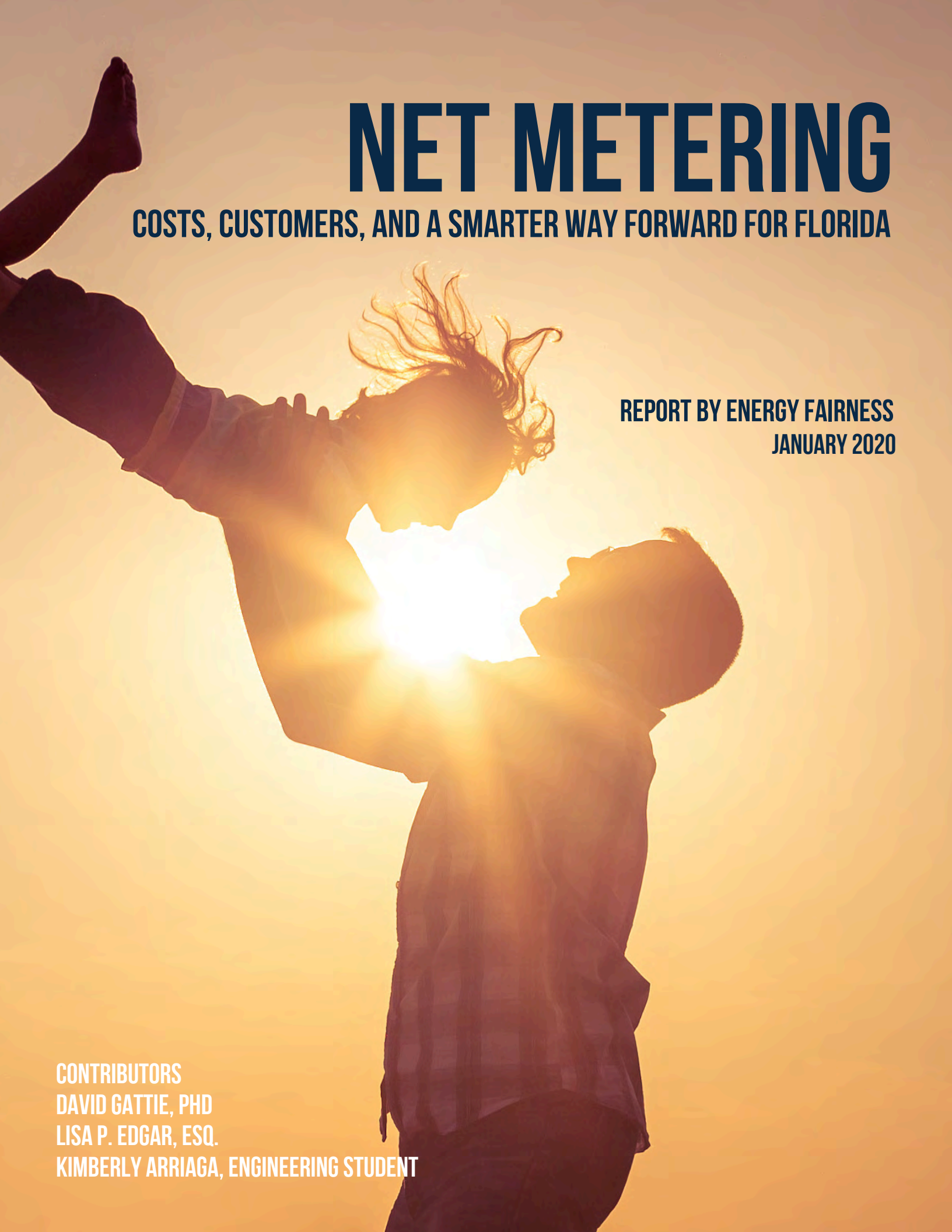

NET METERING

COSTS, CUSTOMERS, AND A SMARTER WAY FORWARD FOR FLORIDA

REPORT BY ENERGY FAIRNESS
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"We believe that electricity customers deserve a strong voice in discussions of our shared energy future."

Paul Griffin // Energy Fairness Executive Director

Energy Fairness is a national not-for-profit organization that advocates for fair and sensible energy policies. Founded in January 2009, Energy Fairness brings together a wide variety of groups who have common concerns about the future of American electricity.

Through our public education efforts, the organization has helped to shape national and state energy conversations. This has included intervening in matters before public service commissions and other regulators, offering testimony to the Environmental Protection Agency in public hearings, submitting comments to state and federal policy makers on various energy proposals, and presenting at national and regional conferences about the importance of energy policy that works for customers.

Our vision is clear. Energy Fairness believes in an energy future that preserves access to reliable, low-cost electric power while continuing the significant environmental progress that has been made in past decades.

Paul Griffin

Energy Fairness Executive Director

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He has 14 years of private industry experience as an energy services engineer and an environmental engineer. His current research and teaching efforts are focused on energy systems and the environment as well as comprehensive energy policy and integrated resource planning for the electric power sector.

All views expressed in this publication are Dr. Gattie's and not necessarily those of the University of Georgia.

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All views expressed in this publication are Professor Edgar's and not necessarily those of the University of Florida.

FOREWORD

Solar power continues to see solid growth nationally as a resource for America's energy consumers. The cost of solar panels and residential installation has dropped dramatically in recent years, making rooftop solar more economically attractive to those who can afford it. In fact, the Solar Energy Industries Association (SEIA) reports that the cost to install solar has dropped by more than 70%[1] over the last decade (Figure 1). As SEIA's president stated, "It's no surprise that the U.S. solar pipeline is surging as costs continue to fall and solar becomes the lowest cost option for utilities, corporations and families."[2]

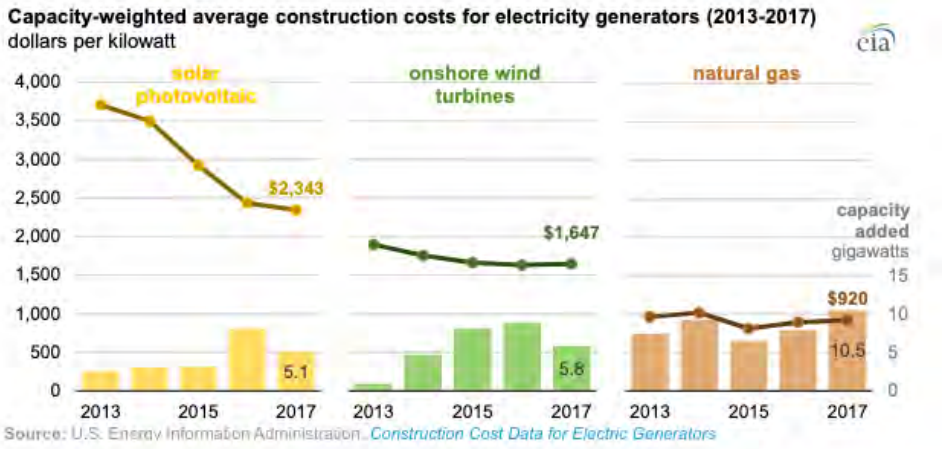


Figure 1 - Average U.S. construction costs for solar generation continue to decrease. Source EIA, 2019

But, as solar costs decline and rooftop installations rapidly grow, previous decisions to incentivize solar adoption through consumer-funded net metering policies have yet to be reviewed in some states. As the cost to use residential solar continues to decrease, regressive policies that impact consumers who choose not to install, or cannot afford to install solar, should receive an appropriate update.

In 2017, Energy Fairness (then PACE) issued a paper entitled *Net Metering: Costs, Customers and a Smarter Way Forward*. In it, Energy Fairness noted that it has been, and continues to be, an outspoken voice on net metering policies in many states. Energy Fairness' perspective then and now is clear - policymakers should develop net metering policies that accomplish three simple goals:

- Treat all customers fairly by avoiding cost-shifting
- Accurately reflect both the benefits and costs to the grid of rooftop or distributed solar
- Don't distort the energy marketplace by paying inequitable rates for excess rooftop generation

Today, net metering remains a major conversation in energy policy across the country. The North Carolina Clean Energy Technology Center's Database of State Incentives for Renewable Energy (DSIRE) reported that in the third quarter of 2019 alone, 42 states plus the District of Columbia took some form of action on distributed solar policy and rate design.[3] The conversation on net metering is fast-moving and ever-evolving.

In Florida, however, the net metering conversation has lagged. Policies that were adopted to incentivize new residential solar by waiving certain costs and fees have not been reviewed since their adoption in 2008. Likewise, compensation for excess self-generation was determined when participation was quite low.

Florida - the Sunshine State - has a very generous net metering policy. While this may have made sense when the policy was developed, the market has changed substantially in the past

ten years. According to a recent report by the Florida Public Service Commission (PSC), the state's customer-owned, renewable electric generation capacity increased 54 percent in 2018, reaching 317,462 kilowatts (kW), a dramatic increase from the 2,765 kW of installed capacity in 2008. In fact, since 2008, when Florida electricity customers were allowed to begin interconnecting their renewable energy systems with the utility grid, the number of systems has increased more than 6,400 percent, from 577 to 37,862 interconnections.[4]

In its June 25, 2019 press release[5] announcing the tremendous growth in renewables, the Florida PSC Chairman said, "After a decade of use, our interconnection rules have more than proven their effectiveness at 'priming the pump' for growing customer-owned rooftop solar."

Energy Fairness agrees. The pump has clearly been successfully "primed," which means it should now run on its own with new, more up-to-date policies that recognize today's economy and energy environment, particularly for cost-effective customer-owned solar.

Energy Fairness believes the Florida conversation is particularly warranted, given that today, the SEIA ranks Florida as the number five state for solar in the nation.[6] Furthermore, SEIA's growth projection for Florida's solar installations over the next five years ranks second in projected capacity installed.[7] If Florida does not modernize its solar and net metering policies soon, this dramatic growth could make it much more difficult to address policy issues in the future.

This updated review of net metering policies and its focus on Florida will hopefully inform a new discussion on how to sustain growth of renewables, particularly solar energy. With investment tax credits, property taxes waived, and no sales tax assessed on solar equipment, Floridians are already paying more than their fair share for the rooftop solar systems of those customers who can afford them. The added incentives in the state's current net metering policy should be reviewed and reconsidered based on updated information.

SECTION I: NET METERING OVERVIEW

Photovoltaic (PV) solar energy systems, commonly in the form of rooftop solar panels, harness available sunlight and convert primary solar energy into electricity, helping to supplement electricity available from the grid.

Under certain conditions, residential rooftop solar systems can provide a substantial portion of a home's electricity needs, and, on occasion, can generate more electricity than the homeowner requires, creating an opportunity to send excess electricity to the grid. When that occurs, sometimes referred to as running the meter backwards, the homeowner becomes both a supplier and a consumer of electricity.

Florida Rule 25-6.065(2)(c), F.A.C. defines net metering as a metering and billing methodology that allows customer owned renewable generation to offset the customer's electricity consumption onsite.[8] The methodology for compensating rooftop solar users for any excess electricity sold to the grid after meeting their own electricity demand varies state to state. The price paid to rooftop solar users for that electricity is the crux of the net metering debate for energy policy makers across the country.

Approximately 39 states, including Florida,[9] currently have net metering. Like Florida, many of these states compensate rooftop solar users at retail rates, meaning they are paid for their excess electricity at the same rate the utility is authorized to charge for electricity supplied to the home.

The second most common compensation rate for rooftop solar users is the wholesale rate- the rate the utility would have otherwise paid to purchase electricity on the wholesale market. This approach is also sometimes referred to as "avoided" or "as available" cost. Other states utilize modified versions of either wholesale or retail rates.

Net metering raises a number of critical questions for policymakers and the energy industry. How do grid operators manage an energy system with an increasing number of small, dispersed, intermittent producers of electricity? What technical problems might arise from

additional electricity flowing independently and unpredictably into a carefully managed electricity distribution system? How does the grid grow and evolve to accommodate these new, decentralized power sources? What are the costs associated with that growth and evolution and who should pay for it? What are the appropriate mechanisms to distribute costs, and what market factors should be considered?

RESIDENTIAL SOLAR IN MARKET CONTEXT

Today, over two million Americans have installed solar photovoltaic systems, and that number is expected to double by 2023[10] (Figure 2). In some states, the term "net metering" has become almost synonymous with a one-for-one exchange of kilowatt-hours added to the grid and taken from it. In those states, the net metering rate is calculated as being basically equal to the utility retail rate or two to six times higher than wholesale electricity market price. For context, the 2018 average residential price of electricity in the U.S. was approximately 12.89 cents per kilowatt-hour [11] while the wholesale cost across all regions of the U.S. was on average approximately 3.9 cents per kilowatt-hour. [12]

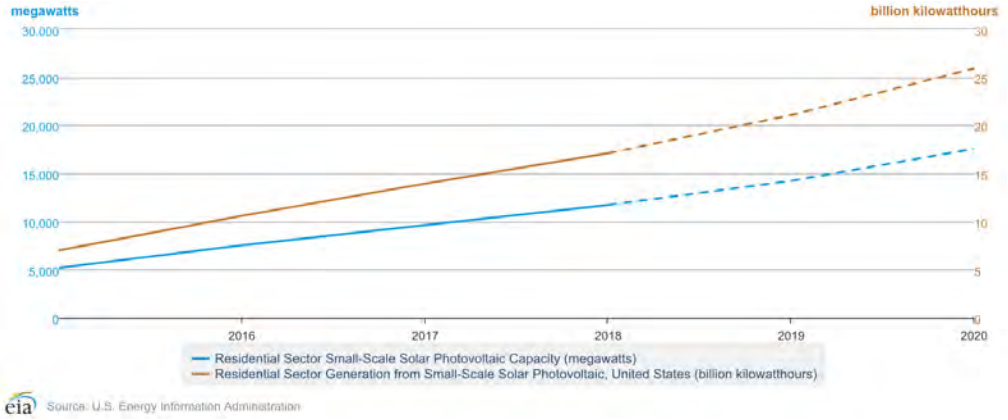


Figure 2- US Residential solar capacity and generation. Source EIA STEO, 2019.

What impact is the growth of solar having and how do net metering policies work in practice? Let's examine a cross-section of states across America to get a deeper look.

FLORIDA

In 2008, the Florida PSC approved a substantial rewrite of outdated net metering and interconnection rules with the stated purpose of "...promoting small customer owned solar generation... while minimizing costs to investor owned utilities and their customers," as part of a larger effort by the Governor and Legislature to update many aspects of statewide energy policy.[13]

During the rule adoption process, some expressed concerns about the lack of data and past similar experience to analyze potential future overall cost and rate impacts from cost shifting incentives added to the rule. However, during public discussion, the Commission noted it was trying to reach a balance with the information then available, and that "...there will be opportunities to revisit some of these issues at future points."[14]

The Sunshine State has seen considerable growth in solar installations, especially in the past four years (Figure 3). Solar accounted for 1.65% of Florida's electricity needs in 2018.[15] Residential rooftop solar customers are credited at the residential retail rate, on average 11.54 cents per kWh in 2018[16], for monthly excess generation. The wholesale price for electricity in Florida in 2018 averaged approximately 3.1 cents per kWh.[17] Any remaining excess kWh credits at the end of each year are credited at an avoided cost rate.[18]

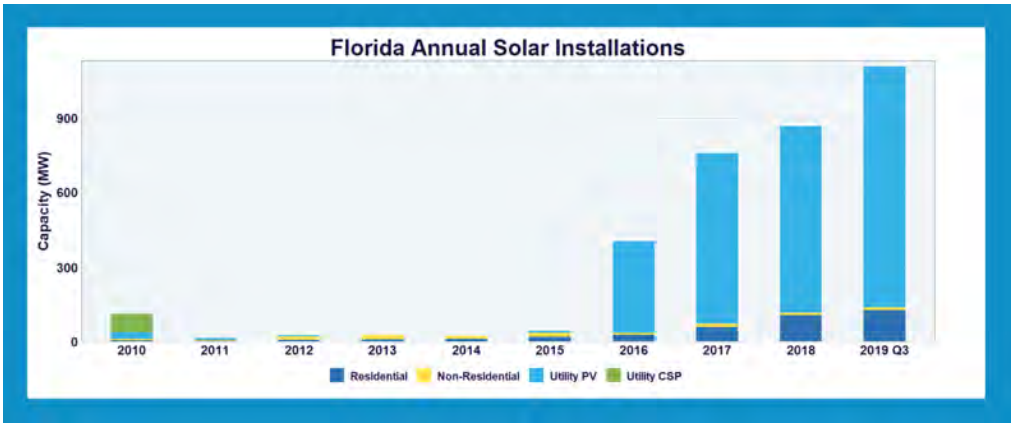


Figure 3- Florida Annual Solar Installations by Sector. Source: SEIA Florida Factsheet (SEIA, 2019).

Florida utilities are making their own strides to support the growth of solar. Florida Power and Light has set a solar installation goal of 30 million solar panels by 2030 and expects to have 8,128 MW of installed capacity by 2028. To help accommodate this additional capacity, they are developing the world's largest solar-powered energy storage center with a capacity of 409 MW scheduled to be online by the end of 2021.[19] Other electric utilities include Tampa Electric Company (TECO) and Duke Energy Florida (DEF), which have also committed to installations of 600 MW and 700 MW, respectively, by 2022.

Shared solar programs are also being implemented for customers unable to install solar systems at their homes. These programs allow customers to invest in utility-scale solar systems installed on the grid and receive credits for electric generation. Programs such as these allow customers to invest in solar systems and receive credits at the residential level without installing their own distributed solar system. In addition, Florida's Public Service Commission passed rules in 2018 allowing customers to lease solar rooftop equipment and receive net metering credits. Previously, leasing options were not available to receive solar credits.[20]

So far, there have been no analyses on the impact of net metering on non-solar customers or the impact of expanding distributed generation on the electric grid in Florida. However, major incentives in the form of a solar tax credit of 30%, a 100% property tax exemption for residential solar, and credits at the retail rate for net metering consumers have equated to an additional 86 MW of residential solar capacity in 2018 alone.[21]

OTHER STATE EXAMPLES

CALIFORNIA

As the nation's most prominent early adopter of net metering policy, California continues to promote rooftop solar and other forms of self-generation by energy consumers. However, by being a leader, the state is also a bellwether for the "cause and effect" of net metering policies.

As noted in the California Public Utilities Commission (CPUC) decision of January 2016 to maintain retail rate net metering through at least 2019, the CPUC stated: "The principal potential disadvantage of continuing the current full retail rate NEM [Net Energy Metering] tariff is economic. The IOUs lose revenue from NEM customers, particularly residential NEM customers, because those customers pay less to cover distribution costs through their volumetric rates. This revenue is recovered through increases in rates paid by all customers."[22]

For example, in recent filings, San Diego Gas & Electric is asking the CPUC to allow the utility to raise its minimum monthly bill. The company contends that when its solar customers use company facilities, they are not paying for the full cost of the system. This means that other customers who do not have solar are paying the difference to maintain the

system. SDG&E says this is about a $450 million per-year cost-shift.[23]

California regulators added a time-of-use provision that compensates solar production at different rates depending on real-time demand for electricity. This somewhat helps to align California's net metering policy more closely with the market in an attempt to reduce cost-shifting and compensating rooftop solar owners at an appropriate level for the value of their generation.

HAWAII

Hawaii, with the highest electricity rates in the nation, implemented a net metering policy for renewable systems in 2001 that credited customers at the retail rate for energy exported to the electric grid. Hawaii's House Bill 623 set a goal of meeting 100% of its electric generation with renewable energy by 2045, making it the first state to establish a 100% renewable energy portfolio as a long-term objective. Solar has played a key role in Hawaii's renewable energy transition, with a residential solar capacity of 434 MW by the third quarter of 2019.[24] In 2018, customer owned or sited renewable generation accounted for approximately 39.6% of Hawaii's renewable portfolio and 10.9% of all electricity sales in the state.[25] However, Hawaii began seeing problems with renewable energy production as peak generation during the day was overloading the system and much of the electricity being generated had to be curtailed, or wasted,[26] as distributed excess generation was exceeding time of use consumption. The Hawaiian Electric Company (HECO), which serves 95% of Hawaii's residents, argues that net metering customers "do not pay their fair share of grid maintenance costs."[27] Furthermore, a study conducted in 2014 found that while distributed residential solar PV systems added value to Hawaii, the shifted costs to non-solar customers exceeded the value provided to the electricity system.[28]

In October 2015, Hawaii's Public Utility Commission (PUC) voted to end net metering and implement two interim tariffs.[29] One tariff is a customer grid supply (CGS) option, by which distributed systems are credited to customer bills at a reduced rate determined by region, approximately 40-75% of the retail rate for net excess generation to the grid. The second tariff was a customer self-supply (CSS) option. Under this tariff, customers were to install inverters that would prevent against exporting excess generation to the grid.[30] Under CSS, residential solar customers are charged a minimum monthly bill of $25 in addition to electricity consumed from the grid.[31] Solar systems enrolled in net metering prior to October 12, 2015 had the option to continue with traditional net metering.

Though these tariffs were intended to offset the amount of electricity being delivered to the grid, HECO met its designed cap limits by September 2016 under the CGS program. In November 2017, the CGS program reached the total capacity allotted for solar systems.[32] In 2018, the CGS program was expanded through the Customer Grid Supply Plus (CGS Plus) Program which allows customers to send excess generation to the grid under the control of utility providers, who use special equipment to manage exports throughout the day to maintain grid stability. This tariff is on a first-come, first-served basis until the aggregate capacity of specified regions is met. Credit rates are determined per region and at a fixed credit rate until October 20, 2022 (Figure 4).

Island	CGS Plus Credit Rate*
Oahu	10.08 cents/kWh
Maui	12.17 cents/kWh
Lanai	20.80 cents/kWh
Molokai	16.77 cents/kWh
Hawaii Island	10.55 cents/kWh

**Export credits will be trued-up on an annual basis and any remaining credits left over at the end of the year expire with the utility cost reductions benefitting all customers.*

Figure 4 - Fixed Export Rates for CGS Plus per Region through October 20, 2022. Hawaii State Energy Office, 2019

KENTUCKY

Kentucky's net metering policy, adopted in 2009, details that distributed solar systems are credited at the residential retail rate, 10.6 cents per kWh for 2018,[33] which is carried over to the next billing cycle. Solar net metering is currently on a first-come, first-served basis as Kentucky offers net metering for a cumulative capacity of 1% of the previous year's single hour peak load. Furthermore, installed systems are capped at a capacity of 30 kW (45 kW beginning in 2020)[34] with the solar system being owned and operated by the customer. Kentucky has approximately 34 MW of distributed renewable resources interconnected of which approximately 30% are net metered for a total of 1,125 interconnections. More than 99 percent of the net metered installed capacity is solar.[35] Solar accounted for 0.1% of electric generation in the state in 2018.[36]

Contending that net metering negatively shifts costs to non-solar customers, Kentucky utilities brought the issue to the attention of Kentucky's Public Service Commission in 2019. In response, Kentucky Senate Bill 100, effective January 1, 2020, will reduce net metering credits from the retail rate to a rate set by the Public Service Commission (PSC). However, PV solar customers that install a system before 2020 will be grandfathered into solar credits at retail rates for the next 25 years. The bill also expands the maximum capacity of installed solar units from 30 kW to 45 kW.

The Kentucky PSC has held hearings to gather input on what future net metering credits should be. The credits will be set at a compensation rate established by the PSC in rate proceedings for each utility in the state. As stated in the new law, an electric utility is "entitled to implement rates to recover from its eligible (net metering customers) all costs necessary to serve" those customers.[37] For context, as noted above, the average residential retail rate in Kentucky in 2018 was 10.6 cents per kilowatt hour[38] while the wholesale rate was approximately 3 cents per kWh.[39]

LOUISIANA

Louisiana has implemented net metering since 2003. Previously, Louisiana provided a refundable income tax credit of 50% of the first $25,000 of purchase and installation costs for residential solar systems. In 2013, this tax credit was capped at net metering purchases comprising 0.5% of the utility peak load. After a study conducted in 2015 by Acadian, *Estimating the Impact of Net Metering on LPSC Jurisdictional Ratepayers*, it was concluded that costs associated with residential solar systems outweighed the benefits when applied to the Louisiana Public Service Commission (LPSC) jurisdictional ratepayers.[40] Total net metering costs impact LPSC jurisdictional ratepayers by $6.5 million and negatively impact Louisiana's economy and ratepayers by $78.1 million.[41] The Acadian study found non-solar customers were subsidizing $2 million of utility costs annually and net metering costs were 1.5 times that of the benefits.[42]

More than 24,000 Louisiana households have installed solar PV systems, totaling a capacity of 140 MW.[43] For 2018, solar PV accounted for 0.13% of the state's electricity demand.[44]

On September 11, 2019, the LPSC voted to lower net metering rates from the retail rate to avoided cost rates. LPSC Docket R-33292 details the Final Proposed Rule, which will eliminate the 0.5% cap on solar customers and begin enforcing net metering rates based on avoided cost (3.5 cents/kWh for 2018), instead of the previous rate based on retail rate (9.3 cents per kWh for 2018).[45] To ease this transition for existing solar customers, LPSC will credit solar customers who have solar PV systems installed before the end of 2019 at the retail rate for fifteen years. After 2034, customers will pay the retail price for electricity consumed from the grid, pay no cost for self-generated electricity consumed, and be credited at the avoided cost rate for electricity sold back to the electric grid. This avoided cost rate will be annually determined and made public via utility and LPSC websites.

Under the credited retail rates, LPSC estimates that solar customers benefit an average of $819 per year. It is estimated that 80% of solar energy produced is consumed by a typical household, which means new solar customers, under LPSC Docket R-33292, will receive an estimated benefit of $700 per year.[46] This Final Proposed Rule is Phase I of a two-phase

process to remediate net metering policy in Louisiana. Phase II of Louisiana's net metering rules will provide long-term standards regarding solar policies in the state. Louisiana currently has the lowest residential electricity price in the U.S. Because of this, Louisiana is seeing fewer savings when compared to other states that have higher electricity prices.[47]

NEW HAMPSHIRE

New Hampshire has a renewable portfolio standard of achieving 25% of its total electricity generation from renewable sources by 2025. To promote growth in the solar industry, House Bill 1116, enacted May 2016, doubled the state aggregate net-metering cap to 100 MW.[48]

Net metering is on a first-come, first-served basis until the aggregate capacity is met. Solar PV systems installed before September 1, 2017 have been grandfathered into the previous net metering policy which credited net excess generation at the retail rate, estimated at 17 cents/kWh in 2017.[49] Otherwise, according to, Eversource, one of New Hampshire's investor-owned utilities, distributed solar PV generation systems smaller than 100 kW are being credited at a rate determined by the default energy service charge, transmission charge, and 25% of the distribution charge, which are determined by the utility. Customer generators that fall in the range of 100 kW to 1 MW receive a credit equal to default energy service charge of 11.25 cents per kWh.[50] Net excess generation credits at the end of the annual period will be carried forward indefinitely or a customer may receive payment at the utility's avoided cost rate.[51]

In 2018 and 2019, Governor Chris Sununu vetoed net metering legislation that would enable siting of electric grid-connected solar installations larger than 1 MW, which is the current limit in place in New Hampshire. The legislation would have raised the net metering cap to 5 MW. Governor Sununu argued the change would raise rates and result in unfair cost shifting to those who do not utilize solar energy. In his 2018 veto message, the Governor said the law would cost ratepayers $100 million over a three-year period in a state that already pays some of the nation's highest electricity rates.[52]

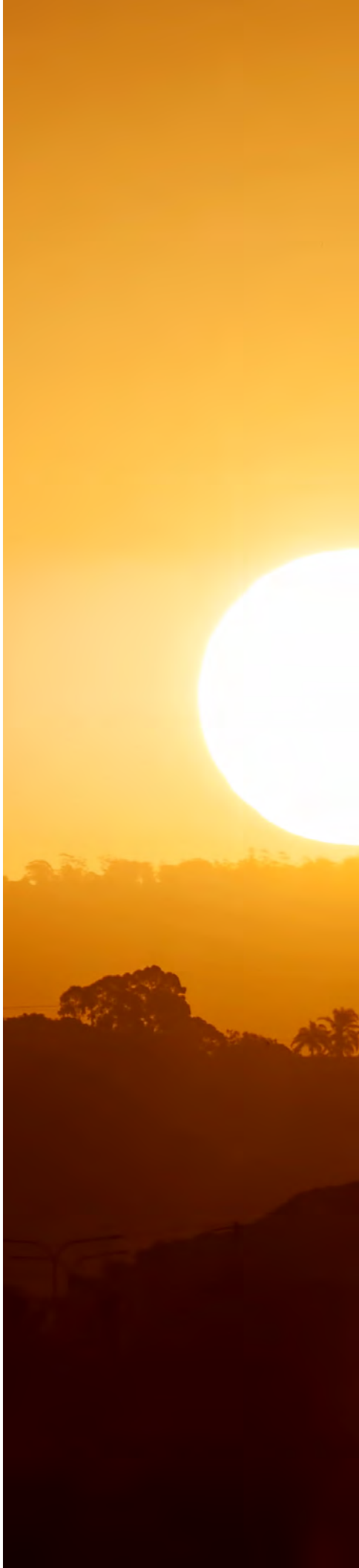
SECTION II: POLICY CHALLENGES AND COMMON ARGUMENTS

Retail rate net metering policies were primarily established by states to kickstart the nascent solar industry. While the solar industry prefers that retail rates remain in place, states are reviewing their net metering policies for good reason.

Solar rooftop PV systems generate electricity, but they shouldn't be compared on a value-to-value equivalency with what full-service utilities.

When a solar rooftop owner becomes a net metering customer, that customer becomes a supplier of electricity. The electrons generated by the solar rooftop are indistinguishable from electrons generated by a utility-scale power plant. The difference being, the net metering customer provides electricity only, while the utility provides far more comprehensive value. Not to mention electricity sent back to the grid often comes during off-peak times when it is not needed, straining the grid and the existing utility infrastructure that was designed to distribute power directly to homes, thus creating costs for utilities to manage. And while the solar rooftop owner provides electricity to the grid voluntarily, whenever it is available, the utility is under federal and state mandates to ensure that electricity is available to customers at all times, irrespective of changes in demand due to weather or other factors. While the electrons from each source might be indistinguishable, the circumstances and costs surrounding generation and delivery, however, are not.

Electricity that is guaranteed to be available is inherently more valuable than electricity that is not. In terms of net metering, this means that payment for electricity that is intermittently available (or even unneeded) should not be valued equally with electricity that is guaranteed. In other words, electricity that is delivered by a generator at unpredictable times, including when it might not be needed at all, should never be valued the same as electricity that is promptly generated when it is needed to meet customer demand.



When rooftop solar customers receive compensation at retail rates higher than the actual value of the energy they generate or higher than the price of energy available from other sources, everyone else pays more. This cost-shift often translates to low and middle-income families subsidizing the electricity usage of wealthier families who can afford rooftop solar.

Despite the sharp rise in private solar installations, the vast majority of homeowners do not have rooftop systems. When Nevada reviewed its net metering policy in 2015, for example, its Public Utility Commission found 2% of homes had rooftop solar.[53] 2019 data for San Diego show 12% of homes have rooftop systems.[54] One reason is that rooftop solar is expensive. That's why nationally, the median income for homes with private solar is nearly $92,000, more than $30,000 higher than the national median income. [55]

Researchers Ashley Brown, Barbara Alexander, and Ahmad Faruqui reviewed net metering rates in Idaho, Arizona, California, and Hawaii, and found rooftop solar homes received an annual median subsidy of $800.[56] The cost-shift appears particularly stark when one considers that the lowest income earners spend 17 times more of their income on their utility bills than do upper income earners.[57] Those who have the least are getting hit hardest.

As with any dispute over costs, efforts by policymakers or regulators to adjust net metering to wholesale rates that better reflect the value of the electricity are regularly met with resistance. Not all observers agree that retail rates overcompensate solar users, particularly the solar industry itself, which desires net metering payments to be as high as possible. High net metering payments, of course, make the decision to purchase a residential solar PV system more financially appealing and are a major tool for incentivizing the growth of rooftop solar. In furtherance of this cause, advocates for high net metering payments have used a variety of arguments to make their case. These arguments are often bundled together to produce a "value of solar" (VOS) calculation that takes into account the perceived benefits of solar integration into the grid.

While VOS models can take into account any number of perceived benefits from solar, the most common include:

- Avoided Capacity
- Avoided Fuel
- Enhanced Reliability
- Hedge Against Price Volatility
- Transmission and Distribution Deferral
- Avoided Line Losses
- Environmental and Social Benefits

Taken together, advocates argue that these multiple benefits yield a VOS much richer than what many utilities would prefer to pay or what regulators would prefer to allow. But do the benefits of distributed rooftop solar power measure up to the value added by utility-scale solar?

In their paper "Valuation of Distributed Solar: A Qualitative View,"[58] Ashley Brown, Executive Director of the Harvard Electricity Policy Group, and Jillian Bunyan, a former attorney for the United States Environmental Protection Agency found many of the perceived benefits from solar simply don't add up. Their conclusions to the most common VOS arguments are summarized below.

Advocates often suggest that solar offsets the need for additional generation capacity. However, in many jurisdictions the most productive periods of the day for solar do not align with periods of overall peak demand for all customers. While rooftop solar normally produces best in the early afternoon, peak demand on most electrical systems occurs later in the afternoon or in the early evening. At other times, when conditions are insufficient for solar production, generation from rooftop solar could be completely unavailable.

Brown and Bunyan argue that this misalignment between solar production and system demand must, by definition, greatly reduce the value of solar generation related to capacity.

Another common argument is that solar enhances grid reliability, particularly in states with frequent disruptive weather events. With limited storage capacity available in the U.S. system, this is a core problematic concern as electricity must be generated just-in-time to meet just-in-time customer demand on a real-time basis. Under these conditions, Brown and Bunyan argue that "solar power's intermittency makes it unable to assure its availability when called upon to deliver energy."

The practical operations of the electrical grid mean that thermal power units, normally quicker-starting natural gas units, would be called on to back up solar power, not the other way around. A solar rooftop system might provide greater peace-of-mind for the individual homeowner in cases where utility power is unavailable, but that solar rooftop does little to assist grid operators in providing reliability value for customers in general. As Brown and Bunyan state, "...absent storage, it is almost certainly the case that the system provides reliability for solar DG [distributed generation], rather than the other way around."

While solar power may help defer some transmission and distribution costs, that amount is likely very small. It is true that solar rooftops don't require any transmission costs to supply energy to the grid, but that doesn't mean customer-owned solar provides cost savings for the transmission system. Indeed, more solar rooftops could actually mean more distribution costs, not less, due to the wear and tear they cause on existing utility infrastructure and the increase overhead required for the utility to manage an intermittent supply of electricity being placed on the grid.

Lastly, advocates argue rooftop solar offers environmental and social benefits. While the claim that increased deployment of solar power leads to quantifiable environmental benefit might seem self-evident, the case may not be as straight-forward as it seems.

Brown and Bunyan argue that "any analysis of the environmental impact of the generation mix should include an examination of the least-cost, most efficient ways to get the desired results." In other words, while replacing some portion of fossil-fuel power generation with solar power might produce fewer emissions, hence creating environmental benefit, there might have been more expedient, and less costly ways of achieving the same result.

As evidence for their point of view, the authors point out that rooftop solar "is the least efficient of all renewable energy resources in common use in this country." Consequently, it is likely that attempting to use solar rooftops to generate broad environmental benefits has the effect of squeezing more efficient forms of renewable energy out of the market, thus making it more expensive to reduce carbon emissions. Viewed through that lens, there might indeed be measurable environmental benefits to be derived from greater use of solar power. However, from a public policy point of view, the choice to use customer-owned solar to achieve carbon reductions may well be misdirected.

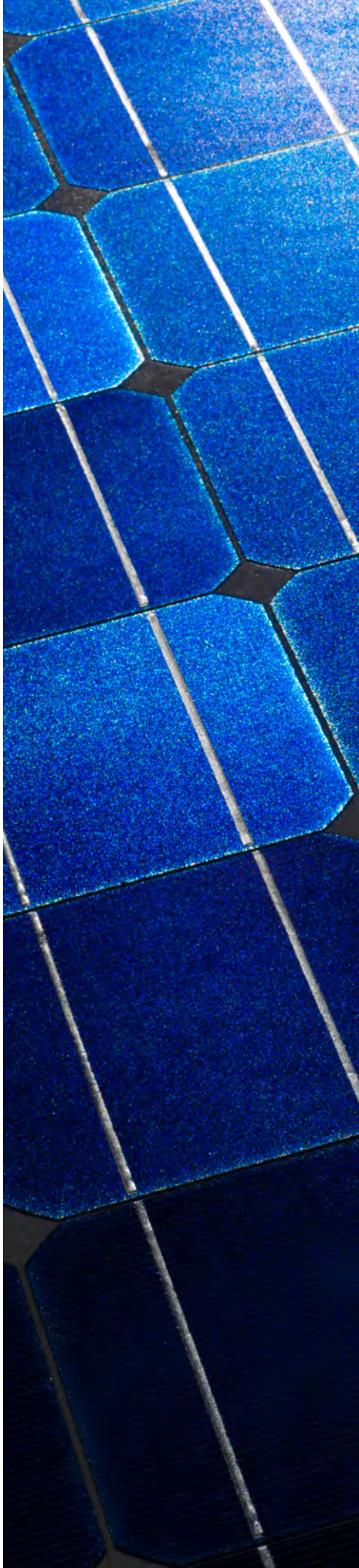
As noted in this report's review of a few select states with varying levels of solar resources, regulators are pursuing solutions for net metering that are in the best interest of all electric customers. It is a complicated task, as it must balance popular arguments in favor of residential solar with market realities, ensuring along the way that all customers - those who use solar and those who don't - are treated fairly by whatever structure is created.

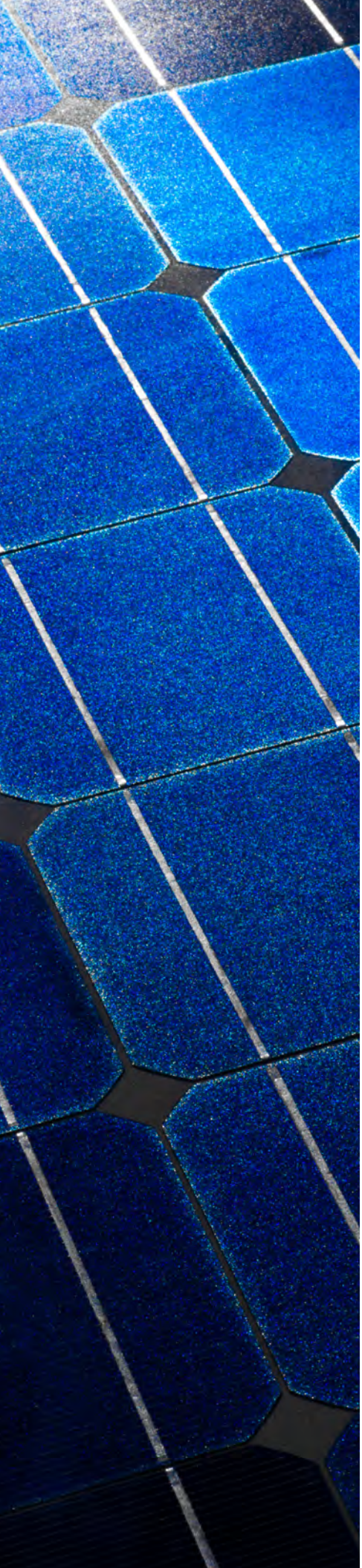
Energy Fairness believes that critical analysis and available real-life evidence strongly point to a quantifiable value for solar that is less than what some solar advocates would desire and that net metering can shift the cost burden to low and middle-income families, forcing them to pay higher electric bills in order to subsidize rooftop solar owners.

SECTION III: A WAY FORWARD

Adjusting net metering policy is both politically charged and financially complicated.

Even the act of entering into discussions about proper net metering rate design is enough to stir the debate. In some states, the work of solar activists and lobbyists creates a political climate that protects a status quo that may have hidden flaws. In other cases, regulators simply choose a wait-and-see approach that defers action.





Speaking of the desire to hold on to a model that makes little sense for anyone except itself and its customers, the Wall Street Journal wrote in December 2015, "Solar energy is no longer in its infancy, but the industry is refusing to grow up."[59]

Given this, what is a state like Florida to do about net metering as it moves forward?

Whatever the political pressures regulators or legislators might face, their responsibilities are multiple when it comes to net metering. At a minimum, those responsibilities include -

- Establishing a path forward for utility customers who wish to install residential solar and connect their generation to the grid.
- Laying a sensible groundwork for solar customers to be paid for the electrical generation they provide to the grid.
- Ensuring that all customers pay their fair share, and only their share, for operating and maintaining the grid.
- Protecting customers who choose not to install solar at their homes from bearing additional costs because of cost shifting from solar customers.
- Creating a net metering framework that allows for relatively accurate forecasting, both for solar customers who depend on net metering payments and for the utilities who are required to compensate them.

Thus, a sensible payment structure for Sunshine State net metering customers will recognize that solar rooftop owners should not be compensated for more than the generation they provide.

A 2015 study from Massachusetts Institute of Technology (MIT) explains -

"In an efficient and equitable distribution system, each customer would pay a share of distribution network costs that reflected his or her responsibility for causing those costs. Instead, most U.S. utilities bundle distribution network costs, electricity costs, and other costs and then charge a uniform per-kWh rate that just covers all these costs. When this rate structure is combined with net metering, which compensates residential PV generators at the retail rate for the electricity they generate, the result is a subsidy to residential and other distributed solar generators that is paid by other customers on the network. This cost shifting has already produced political conflicts in some cities and states - conflicts that can be expected to intensify as residential solar penetration increases."[60]

Preserving the status quo of overly generous payments to solar rooftop owners only serves to deepen the shifting of grid costs to the overall customer base and extends a net metering model with fundamental flaws. On the other hand, recalibrating net metering policies to more accurately reflect the value of solar generation is in the best interest of the overwhelming majority of Floridians.

CONCLUSION

The evidence speaks clearly. Net metering policies, while well-intentioned, have served their goal of jumpstarting rooftop solar in Florida and must be updated in favor of fairness and market alignment. Florida must replace its outdated net metering policy with a more mature and equitable rate structure that compensates rooftop solar users for the actual value of the electricity they place on the grid and does not disproportionately shift costs to non-solar ratepayers.

This report recommends that regulators and policymakers in Florida pursue the following course:

- Objectively quantify and publish annual cost to non-participants in Florida's current net metering policy.

- Abandon any structure that pays the retail rate for net metering in favor of a model that uses avoided cost as its basis and reduces cross-subsidies.
- Adjust fixed charges for customers in a way that sufficiently accounts for the cost of maintaining the electric grid. The fixed cost of service for solar customers, or all customers, should more accurately reflect the true cost of providing grid services.

The solar pump is primed in Florida. It now needs to be allowed to operate under modernized policies that are equitable for all energy consumers and enables continued growth of solar power in the state.

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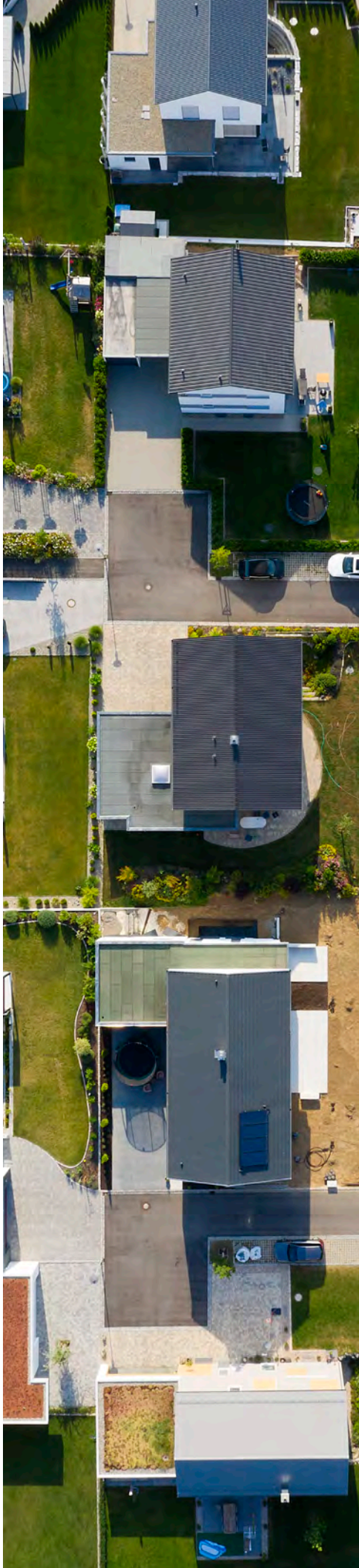

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