SOLAR ENERGY FOR THE PEOPLE OF NORTH CAROLINA: NET METERING AFTER THE COMPETITIVE ENERGY SOLUTIONS ACT OF 2017

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I. INTRODUCTION

North Carolina has enough solar infrastructure installed to power 635,000 homes.[1] On July 27, 2017, North Carolina Governor Roy Cooper signed House Bill 589 ("H.B. 589") into law.[2] H.B. 589 was the result of a nine-month stakeholder process and negotiation and "was the first major piece of comprehensive energy legislation passed in North Carolina since . . . 2007."[3] This new energy plan added a "competitive bidding process for solar developers, a statewide rooftop solar leasing program, and the Green Source Rider Program, which allows large utility customers to offset their electricity usage with renewable energy."[4] H.B. 589 also requires electric public utilities to "file for Commission approval revised net metering rates . . . ."[5] "Net metering is a billing mechanism that credits" residential solar owners "for the electricity they add to the grid."[6] In other words, a residential customer with solar panels on their home who generates more electricity than they use during the day will be credited for that excess electricity generated (which is fed into the electric grid) and only charged for their "net" energy use.[7] Prior to H.B. 589, individuals with solar panels who produced more electricity than they used could send their excess electricity onto the grid and received a one-to-one credit for each kilowatt ("kWh") of electricity they put on the grid.[8] The revised net

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[1] *Solar Spotlight – North Carolina*, SOLAR ENERGY INDUSTRIES ASS'N (Mar. 2019), https://www.seia.org/sites/default/files/2019-03/Federal_2019Q1_North%20Carolina.pdf.

[2] *North Carolina Bill to Expand Solar Development Signed into Law*, SOLAR ENERGY INDUSTRIES ASS'N (July 27, 2017), https://www.seia.org/news/north-carolina-bill-expand-solar-development-signed-law.

[3] *North Carolina House Bill 589: Competitive Energy Solutions for North Carolina*, NC SUSTAINABLE ENERGY ASS'N, https://energync.org/hb589/ (last visited Dec. 25, 2019).

[4] Jeffery R. Atkin, *N.C. Governor Signs H.B. 589*, FOLEY & LARDNER LLP (Aug. 4, 2017), https://www.foley.com/en/insights/publications/2017/08/nc-governor-signs-hb-589.

[5] H.R. 589, 2017–2018 Gen. Assemb., Sess. 2017 (N.C. 2017).

[6] *Id.*

[7] *Id.* Under Duke Energy's net metering plan, residential solar customers are credited with the excess kWh their panels have produced during the next month's billing period. In North Carolina, any accrued credits from generating excessive solar energy at the end of the fiscal year expire and cannot be used to offset "Basic Facilities Charges or Demand Charges." *Duke Energy Net Metering*, ENERGYSAGE, https://www.energysage.com/net-metering/duke-energy/ (last visited Dec. 25, 2019).

[8] DSIRE, *Net Metering: Program Overview*, NC CLEAN ENERGY TECH. CTR., http://programs.dsireusa.org/system/program/detail/1246 (last updated Dec. 12, 2019).

metering rates called for by H.B. 589 will adjust the credit to something less than one-to-one.[9] Those retail customers with solar panels interconnected to the electric grid before approval of the revised net metering rate, however, will be grandfathered in at the one-to-one rate until January 1, 2027.[10] There was no deadline set by H.B. 589 or by the Utilities Commission for the revised net metering rates.[11] Duke Energy currently values residential solar energy in North Carolina at approximately 10.6 to 11 cents/kWh.[12]

This note will first give background on the residential solar industry before H.B. 589, on how net metering operates and affects residential solar users, and on the allowance of third-party financing for solar panels in North Carolina. Then, this note will discuss net metering in North Carolina as compared to different approaches taken in other states, particularly South Carolina, Florida, Indiana, Kentucky, and Ohio. Lastly, this note will conclude with an opinion of whether or not net metering acts as an incentive for residential consumers to use solar energy and analyzes how net metering in other states has affected residential consumers entering the solar energy market.

II. BACKGROUND

A. Residential Solar – PV Systems

The most popular type of solar system for residential homes is the photovoltaic system ("Solar PV") using solar panels on rooftops or on the ground.[13] Solar panels capture the sun's radiation and convert sunlight into electrical currents, which then can power homes or businesses and all the electrical devices within those homes and buildings.[14] The amount of electricity generated depends on several factors, such as the size of the solar panels and how many solar cells

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[9] *Id.*

[10] H.R. 589, 2017–2018 Gen. Assemb., Sess. 2017 (N.C. 2017).

[11] LAYLA CUMMINGS, LEGISLATIVE ANALYSIS DIV., H589-SMTS-21(CSTSf-7)-v-3, HOUSE BILL 589: COMPETITIVE ENERGY SOLUTIONS FOR NC 10 (2017), *available at* https://www.ncleg.gov/documentsites/committees/house2017-40/Meetings/6-06-2017/H589-SMTS-21(CSTSf-7)%20v3.pdf (providing a nonpartisan bill analysis).

[12] *Duke Energy Net Metering*, *supra* note 7.

[13] *Solar 101: How Solar Really Works*, ALTERNATIVE ENERGY, http://www.altenergy.org/renewables/solar/how-solar-really-works.html (last visited Dec. 25, 2019).

[14] *Id.*

are on the panels.[15] The type of solar cells on the panel can also affect the efficiency of the system.[16] Most solar panels are mounted on rooftops according to local building codes, but they can also be installed on the ground.[17] Each method of mounting and the different types of solar cells and sizes of solar panels all contribute to the efficiency and amount of electricity that a resident can produce, use, or sell back to the utility.[18] Solar installation is a costly and time-consuming process due to the permitting process, inspections,[19] and upfront costs of panels, whether buying or leasing.[20]

B. Solar Before H.B. 589

Before the Competitive Energy Solutions Act was signed by Governor Cooper in 2017, North Carolina offered a Renewable Energy Investment Tax Credit ("ITC"), among other incentives, but the ITC was allowed to expire in 2015.[21] The program allowed state residents to claim a 35% tax credit on investments in renewable energy projects, the vast majority of which were commercial solar installations.[22] The way the ITC program was structured allowed for investors in solar energy to still claim their credits on the taxes they owe, but they had to claim the credits within five years.[23] Investors in solar facilities worth at least $400 million and comprised of at least three renewable facilities were allowed ten years to claim their credits.[24] Since investors are still allowed to claim these credits (with the ITC expiring at the end of 2015), claims have now surpassed the $1 billion mark in ITC

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[15] *Id.*

[16] *Id.*

[17] *Id.*

[18] *See generally id.*

[19] *Local Solar Permitting*, SOLAR ENERGY INDUSTRIES ASS'N, https://www.seia.org/initiatives/local-solar-permitting (last visited Dec. 25, 2019).

[20] *See Solar Leases & Solar PPAs*, ENERGYSAGE, https://www.energysage.com/solar/financing/solar-leases-and-solar-ppas/ (last updated Dec. 12, 2019); Josh Garskof, *The Real Cost of Leasing vs. Buying Solar Panels*, CONSUMER REP. (June 30, 2016), https://www.consumerreports.org/energy-saving/real-cost-of-leasing-vs-buying-solar-panels/.

[21] Dan Way, *State Has Issued More Than $1 Billion in Renewable Energy Tax Credits*, LAURINBURG EXCHANGE (June 12, 2019), https://www.laurinburgexchange.com/news/26398/state-has-issued-more-than-1-billion-in-renewable-energy-tax-credits.

[22] *Id.*

[23] *Id.*

[24] *Id.*

credits issued.[25] In 2018 alone, tax credits exceeding $1 million were awarded to thirty-four entities, only two of which were from individuals.[26] Duke Energy and Blue Cross NC accounted for 32% of all tax credits in the five years from 2014-2019.[27] Prior to H.B. 589, Duke Energy billed customers using net metering, but residential systems up to 20 kWh were not allowed to be charged additional metering charges or standby charges.[28] Standby charges are extra fees charged by the utility when a connected residential solar system experiences a scheduled or emergency outage and has to use power from the grid.[29] Residential customers were paid the retail rate for their net excess generation of solar energy.[30] If the customers had excess credits during a month, then the credits rolled over from month to month.[31] However, the credits would expire annually at the beginning of the summer billing season.[32] The Utilities Commission first established net metering rules for investor-owned utilities in 2005, but the last revision before H.B. 589 was in 2009.[33] H.B. 589 will allow for revised net metering rates based on a cost and benefits study conducted by Duke Energy and will also allow for utilities, like Duke, to charge a fixed monthly energy fee and demand/standby fees.[34]

III. SOLAR NOW

A. Net Metering – Operation and Fixing the New Rates Under H.B. 589

Net metering, as briefly discussed in the Introduction, is a billing mechanism used by utilities to value the electricity produced by

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[25] *Id.*

[26] *Id.*

[27] *Id.*

[28] DSIRE, *supra* note 8.

[29] *Standby Rates*, AM. COUNCIL FOR AN ENERGY-EFFICIENT ECON., https://aceee.org/topics/standby-rates (last visited Dec. 25, 2019).

[30] DSIRE, *supra* note 8.

[31] LAYLA CUMMINGS, LEGISLATIVE ANALYSIS DIV., H589-SMTS-21(CSTSf-7)-v-3, HOUSE BILL 589: COMPETITIVE ENERGY SOLUTIONS FOR NC 6 (2017).

[32] *Id.*

[33] *Id.*

[34] DSIRE, *supra* note 8.

residential solar customers.[35] The "main requirement of net metering"[36] is that the solar system be connected to the utility's grid, so that solar energy can be transferred from the solar system to the utility.[37] If you produce much more energy than you consume, this can be a great incentive financially because your monthly electricity bill can be reduced.[38]

"[A]s of March, 2015, [forty-four] states and Washington D.C., had some form of net metering . . . ."[39] According to DSIRE, in April 2019, forty states, Washington, D.C., and four territories including, American Samoa, Guam, Puerto Rico, and the U.S. Virgin Islands all have some form of mandatory net metering.[40] However, six states are transitioning to another model.[41] As illustrated in the figure below,

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[35] *Duke Energy Net Metering*, *supra* note 7.

[36] AllEarth Renewables, *What Is Net Metering and How Does It Work?*, NC SOLAR NOW, https://ncsolarnow.com/what-is-net-metering-and-how-does-it-work/ (last visited Dec. 25, 2019).

[37] *Id.*

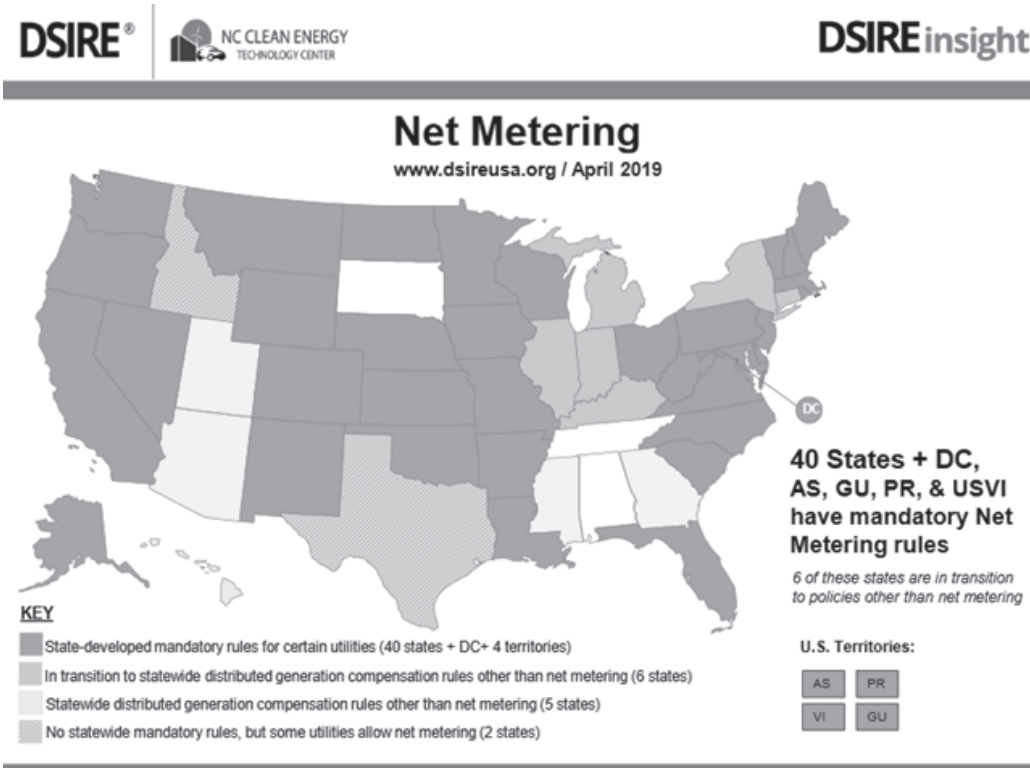
[38] *Id.*

[39] *Id.*

[40] DSIRE, *Net Metering*, NC CLEAN ENERGY TECH. CTR. (Apr. 2019), https://s3.amazonaws.com/ncsolarcen-prod/wp-content/uploads/2019/07/DSIRE_Net_Metering_April2019.pdf.

[41] *Id.*

there are very few states that either do not use net metering or have no mandatory rules.[42]



DSIRE, April 2019.[43]

"Traditional net energy metering ("NEM") is fundamentally a bill credit that represents the full retail value of distributed electricity delivered to the distribution system . . . ."[44] Different state legislatures, changing regulatory decisions and implementation policies, all play into the mechanisms that compensate solar customers across the country.[45] There are three other commonly used forms of net metering including, Aggregated Net Metering ("ANM"), Virtual Net Metering ("VNM"), and

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[42] *Id.*

[43] *Id.*

[44] Solar Energy Industries Ass'n, *Principles for the Evolution of Net Energy Metering and Rate Design*, 1 (MAY 2017), *available at* https://www.seia.org/sites/default/files/NEM%20Future%20Principles_Final_6-7-17.pdf.

[45] *Duke Energy Net Metering*, *supra* note 7.

Community Net Metering ("CNM").[46] Aggregated Net Metering "allows for a property owner with multiple meters on one property or adjacent properties to implement net metering . . . ."[47] For example, neighboring farm properties with solar panels could aggregate their electricity production or university buildings that are grouped together on a school campus would be able to aggregate their net metering.[48] Virtual Net Metering "expands aggregated net metering, allowing a property owner with multiple meters to distribute net metering credits to different individual accounts . . . ."[49] For example, if you were a tenant living in a multi-family property or a condominium owner you could transfer credits between tenants who use more or less energy and this allows the owner to manage the energy use of the building and make the most of their credits.[50] Community Net Metering "allows for multiple users to purchase shares in a single net metered system, either on-site or off-site."[51] This allows persons without the capability of installing solar panels to take advantage of renewable energy and better manage their energy use and maintain a lower energy bill.[52]

While H.B. 589 did not expressly create CNM, Section 6.1 of the Bill did include requirements for a community solar project.[53] Subscribers to the [community solar] program would be required to be in the same county or a county contiguous to the facility."[54] The bill credit for this program will be valued at the avoided cost rate and the utility would have had to get approval within 180 days of the effective date of the section.[55] An "avoided cost" value is the marginal cost for a public utility to produce one more unit of power.[56] Since another energy producer has reduced the need for the utility to

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[46] AllEarth Renewables, *supra* note 36.

[47] *Id.*

[48] *Id.*

[49] *Id.*

[50] *Id.*

[51] *Id.*

[52] *Id.*

[53] LAYLA CUMMINGS, LEGISLATIVE ANALYSIS DIV., H589-SMTS-21(CSTSf-7)-v-3, HOUSE BILL 589: COMPETITIVE ENERGY SOLUTIONS FOR NC 7 (2017).

[54] *Id.*

[55] *Id.* at 8.

[56] *Glossary of Energy Terms*, INDEP. ENERGY PRODUCERS ASS'N, https://iepa.com/glossary-of-energy-terms/ (last visited Dec. 25, 2019).

produce this power themselves, the price the utility pays for the renewable energy is set to the avoided, or marginal, cost.[57]

In North Carolina, Duke Energy's net metering structure differentiates between residential and nonresidential customers with solar PV systems.[58] For residential solar PV customers, Duke Energy requires that they be 20 kW or less and nonresidential customers are capped at 1,000 kW.[59] Duke Energy values the electricity rate at approximately 10.6-11 cents/kWh.[60] For perspective on how much energy a house might consume in a day and how that energy translates to cost, a simple calculation can be illustrated. The Environmental Protection Agency has set typical wattage levels of everyday devices and for purposes of this illustration, a 125-watt television is going to be used as the example.[61]

A consumer uses the 125-watt television for three hours per day. Multiply the watts (125) by the hours used (3), so the television is using 375 watts per day.[62] Electricity bills are measured in kilowatt-hours on the bill,[63] not watt-hours, which is what was just calculated. One kilowatt is equal to 1,000 watts,[64] so to calculate how many kWh the television uses, divide the watt-hours used (375) by 1,000. This amounts to 0.375 kWh per day that the television used. The electricity bill comes each month and the typical month is 30 days, so multiply 0.375 by 30 days to get the total monthly usage. The television the consumer used for three hours every day for a month used 11.25 kWh. In this example, to find the cost of this usage using Duke Energy's North Carolina rates at the lowest end of 10.6 cents per kWh, the bill for just the television would be approximately $1.19 per month. This calculation is just for one common device in a home that only runs for a few hours a day, so a device like a refrigerator that runs all day and uses more energy may cost closer to $20 per

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[57] *Id.*

[58] *See Duke Energy Net Metering*, *supra* note 7.

[59] *Id.*

[60] *Id.*

[61] *Calculate Your Power Consumption*, SAVEONENERGY.COM, https://www.saveonenergy.com/energy-consumption/ (last visited Dec. 25, 2019).

[62] *Id.*

[63] *Id.*

[64] *Id.*

month. The average residential solar customer with rooftop solar panels will produce just over 7,000 kWh of electricity per year.[65]

The rates at which kWh are valued are important to ensure that net metering customers are paying their full fixed cost of service.[66] The public utilities, like Duke Energy, want to ensure that the cost of infrastructure and other fixed costs are not shifted to non-solar customers, since solar customers purchase less electricity than other ratepayers.[67] However, the theory that solar customers are not paying their fair share of the fixed costs of electricity infrastructure is not completely founded on demonstrable evidence, since studies have shown that rooftop solar is not yet widespread enough to require utilities to make major upgrades to the grid or raise prices for all customers.[68] If rooftop solar contributed at least ten percent of the retail sales of electricity, then there could be a significant impact on retail rates for all customers, but the national average in 2018 was approximately less than half of a percent.[69] The average value of solar in the United States was found to be over sixteen cents per kWh, and the average retail rate was thirteen cents per kWh.[70] Studies done by utilities, and not by an independent third party, have found that the value of solar electricity produced is closer to an "avoided cost" value.[71] An "avoided cost" value is determined by the utility by calculating the net value of solar to the utility (i.e., benefits minus costs) relative to the utility's average cost of service.[72] A utility will commit the required amount of its power plant system to ensure there will be enough energy to power the daily peak energy needs

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[65] Elizabeth Ouzts, *Will South Carolina's Net Metering Fight Spread North to Raleigh?*, ENERGY NEWS NETWORK (June 12, 2018), https://energynews.us/2018/06/12/southeast/will-south-carolinas-net-metering-fight-spread-north-to-raleigh/.

[66] LAYLA CUMMINGS, LEGISLATIVE ANALYSIS DIV., H589-SMTS-21(CSTSf-7)-v-3, HOUSE BILL 589: COMPETITIVE ENERGY SOLUTIONS FOR NC 6 (2017).

[67] Ouzts, *supra* note 65.

[68] *Id.* (referencing a study done by Lawrence Berkeley National Laboratory).

[69] *Id.* (Again, Ouzts is referring to the study done by Lawrence Berkeley National Laboratory).

[70] *Id. But see generally* Gideon Weissman & Bret Fanshaw, *The Value of Rooftop Solar Power for Consumers and Society*, ENV'T AM., *available at* https://environmentamerica.org/sites/environment/files/reports/AME%20ShiningRewards%20Rpt%20Oct16%201.1.pdf.

[71] Ouzts, *supra* note 65.

[72] Galen Barbose, *Putting the Potential Rate Impacts of Distributed Solar into Context*, ELECTRICITY MKTS. & POL'Y GROUP, *available at* http://eta-publications.lbl.gov/sites/default/files/lbnl-1007060-es.pdf.

and include a "reserve margin" to maintain that service in the event of a power plant failure.[73] When residential or commercial renewable energy systems feed electricity onto the grid, the utility will reduce the amount of energy the plant produces and the cost of that avoided energy (like the cost of fuel and a portion of operation and maintenance costs) accounts for part of the avoided cost formula.[74] Another component to the avoided cost formula is the avoided cost of building larger, new power plants to handle increased capacity needs because consistent renewable energy feeding onto the grid increases the electricity in small amounts and not all at once.[75] Duke Energy would value the solar energy at closer to the avoided cost in order to describe retail net metering as a subsidy.[76]

Language in the new statute (H.B. 589) instructs Duke Energy to recalculate the retail net metering rates using a cost-benefit analysis to ensure they are not creating cross-subsidies, but the language also assumes that cross-subsidies exist.[77] Specifically, the North Carolina statute that was enacted as a result of H.B. 589 states that the new net metering rates shall be established to "ensure that the net metering retail customer pays its full fixed cost of service."[78] Cross subsidies are a result of a pricing strategy that underprices one product in order to promote its sales and increases the cost of a different product in order to make up for any lost profits.[79] The statute assumes that solar customers on the net metering pricing are paying a lower than cost rate and offsetting that price by making non-solar customers bear the "full fixed cost of service."[80] The "full fixed cost

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[73] *Glossary of Energy Terms*, *supra* note 56 (defining "reserve margin" as "[t]he percentage of installed capacity exceeding the expected peak demand during a specified period").

[74] *Id.* ("There are two parts to an avoided cost calculation: the avoided capacity cost of constructing new power plants and the avoided energy cost of fuel and operating and maintaining utility power plants.").

[75] *Id.*

[76] Ouzts, *supra* note 65.

[77] NC Sustainable Energy Ass'n, *Analysis of House Bill 589, "Competitive Energy Solutions for NC" (Version 3), available at* https://energync.org/wp-content/uploads/2017/06/H589-v3_NCSEAs-Bill-Analysis_legislators.pdf.

[78] N.C. GEN. STAT. § 62-126.4 (LEXIS through Sess. Laws 2019-227 of the 2019 Reg. Sess. of the Gen. Assemb.).

[79] Kristen R. Price, *What Is Product-Cost Cross-Subsidization?*, HOUS. CHRON., https://smallbusiness.chron.com/productcost-crosssubsidization-81079.html (last visited Dec. 25, 2019).

[80] N.C. GEN. STAT. § 62-126.4 (LEXIS through Sess. Laws 2019-227 of the 2019 Reg. Sess. of the Gen. Assemb.). *See generally* SARA HARARI & NATE KAUFMAN, YALE CTR. FOR BUS. & ENV'T., ASSESSING THE VALUE OF DISTRIBUTED SOLAR 1, 4 (Sept. 2017),

of service" can include the infrastructure of transmission and distribution lines, operation and maintenance fees of generators and lines, and construction or upgrades of new generators.[81] Since solar customers actually benefit the utilities by avoiding some of these costs, it can be difficult to value the excess solar energy to ensure the solar customers are receiving a fair value for the energy produced while still ensuring that non-solar customers are not being overcharged.[82]

N.C. Gen. Stat. § 62-126.4(b) generally states the method of establishing the new net metering rates, but does not specify how the costs and benefits should be weighed or calculated.[83] The statute says the rates shall be "nondiscriminatory" and "an investigation of the costs and benefits of customer-sited generation" shall be done to establish the rates.[84] Once Duke Energy has conducted this investigation it will turn its findings over to the Commission, which will set the rates based on a "full fixed cost of service."[85] While some benefits, like a reduction in the total electricity demand are easily quantifiable, there are some benefits and costs that are difficult to value like avoided losses and locational benefits.[86]

Since Duke Energy has not completed their analysis yet for the Commission to consider in revising the net metering rates, it is unclear what methodology the company will use and what factors it will take into account in calculating costs and benefits. Some components of solar value that are common are the following:[87]

Component:	**Description:**
Avoided Energy Costs	Avoidance of energy produced by other sources

https://cbey.yale.edu/sites/default/files/2019-10/Distributed%20Solar_FINAL.pdf (discussing the costs and benefits of various net metering schemes).

[81] *See* HARARI & KAUFMAN, *supra* note 80.

[82] *See id.* at 1–2.

[83] N.C. GEN. STAT. § 62-126.4(b) (LEXIS through Sess. Laws 2019-227 of the 2019 Reg. Sess. of the Gen. Assemb.).

[84] *Id.*

[85] *Id.*

[86] HARARI & KAUFMAN, *supra* note 80, at 7–8.

[87] *Id.* at 4.

Avoided capital and capacity investment in generation infrastructure	Deferment of upgrades to or construction of generation resources
Avoided capital and capacity investment in T&D infrastructure	Deferment of upgrades of transmission and distribution (T&D) lines
Avoided O&M costs	Savings of operations and maintenance costs for generation, transmission, and distribution assets.

Other factors have also been included in studies of solar value; however, these are viewed as more contentious or more difficult to calculate.[88] These include:

Component:	**Description:**
Increased grid resiliency and reliability	Alleviation of pressure and increased resiliency and reliability on the local grid
Avoided losses and other locational benefits	Avoidance of electrical losses associated with delivery from centralized plants
Environmental Benefits	Avoidance of greenhouse gas emissions, reduction in air pollution, and avoidance of environmental compliance costs
Job Creation	Benefits from local development and job security

Each of these categories can be calculated individually and then aggregated to determine the approximate monetary value to the grid from residential solar PV consumers.[89] These values are also determined based on the current electrical grid, however, with more market penetration these values may be diminished and need to be recalculated.[90] When the residential solar market penetration is low, the

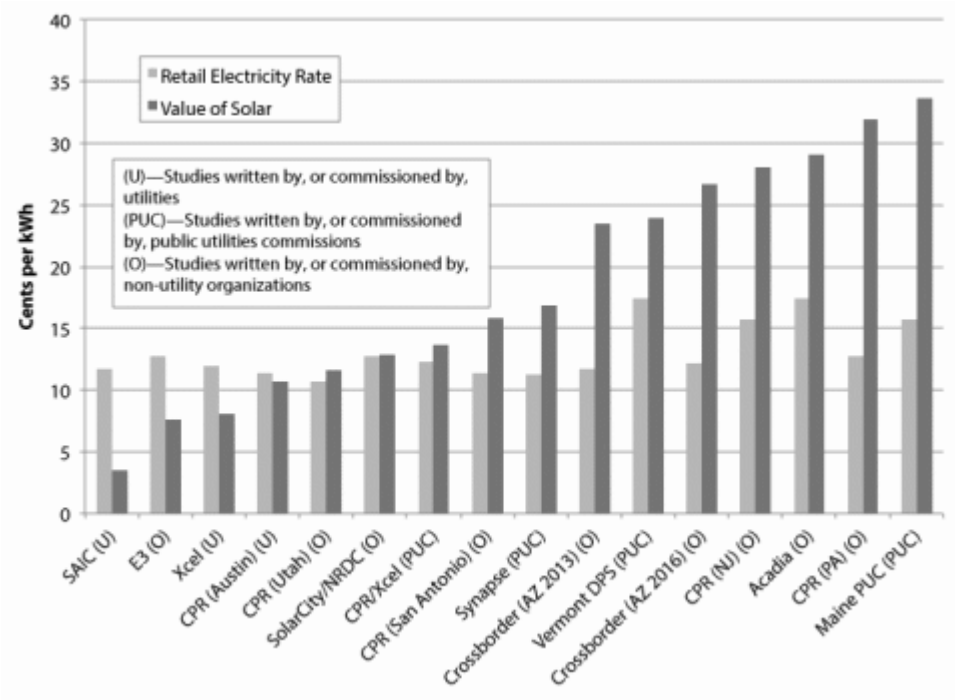
[88] *Id.* at 5.

[89] *Id.*

[90] *Id.* at 9.

utilities' generation, operation, and maintenance costs most likely decrease because there is a decrease in power demand resulting from electricity being added to the grid from residential PV customers.[91] However, when the residential solar market penetration becomes more frequent and a large amount of homes have connected to the grid, utility infrastructure upgrades may be needed or upgrades and construction of transmission and distribution systems may be needed.[92] So, the value of the solar energy being added to the grid may change over time and legislation that provides value to multiple stakeholders will also benefit the solar energy market as a whole. When legislation provides a fair method for utilities to value renewable energy while also protecting the customer from unfair fees and unnecessary obstacles to enter the market, the stakeholders involved will benefit from fair prices and fair return on investments and be more willing to continue investing in the solar energy market.

Figure 1:



[91] *Id.*

[92] *Id.*

Figure 2:

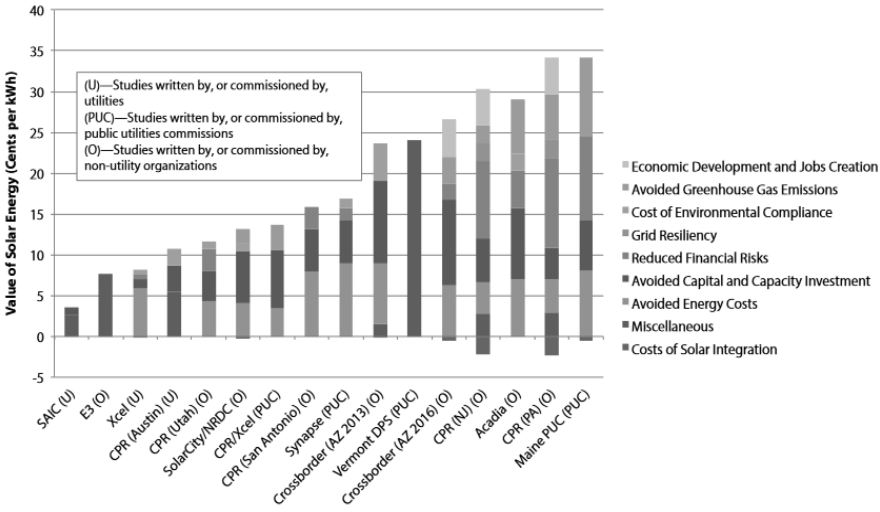


Figure 1 above illustrates the rates at which different entities have valued solar energy.[93] Specifically, the chart compares the cost-benefit analysis of solar energy compared to the retail rates of electricity by study and category.[94] Studies written or commissioned by utilities are marked by "U"; studies written or commissioned by public utilities commissions are marked by "PUC"; studies written or commissioned by non-utility organizations are marked by "O".[95]

Figure 2 above illustrates the specific cost-benefit analysis using the factors mentioned above. Each study in Figure 2 values different factors of the cost-benefit analysis differently because each study conducted will take into account their local regulatory scheme and location specific obstacles. For example, Maine "PUC" valued solar energy more than the retail rate of electricity in Figure 1 and two of the largest benefits in Figure 2 that pushed the solar value higher was the avoided greenhouse gas emissions and reduced financial risks. In comparison, the Crossborder "O" study still found solar to be valued more than the retail rate for electricity, but two of their biggest

[93] Weissman & Fanshaw, *supra* note 70, at 3.

[94] *Id.*

[95] *Id.*

benefits for solar were avoided energy costs and avoided capital and capacity investments. This further demonstrates that different locations in the country will value costs and benefits with changing weight. However, to maintain the solar field's growth, it is important that state and local governments evaluate the cost and benefits using a full range of benefits and costs, "including environmental and societal."[96] If state and local governments want to encourage solar energy growth, then they need to ensure customers are compensated for the benefits they provide and ensure that more than single-family homes like, apartment complexes and multifamily homes, can also take advantage of solar energy.[97]

B. Duke Energy's Net Metering in Different Territories

Duke Energy uses different forms of net metering within their territories: Florida, Indiana, Kentucky, Ohio, North Carolina, and South Carolina.[98] In Florida, Indiana, and Ohio, Duke uses a three-tiered system for net metering rates dependent on the amount of total energy that can be produced.[99] Kentucky, North Carolina, and South Carolina are all on a two-tier system, also dependent on the maximum amount of energy able to be produced.[100] However, North Carolina and South Carolina are specifically broken up by residential and non-residential systems and these systems are capped at what their maximum allowed production.[101]

In North and South Carolina, the residential and non-residential solar PV systems have the same caps on kW.[102] Residential systems must be twenty kW or less and non-residential systems are capped at 1,000 kW.[103] The differences come into play in the value of solar and how unused credits are allocated. In South Carolina, "[n]et metering credits are allocated monthly at a rate of 10 to 11 cents/kWh" and any "[u]nused credits are paid out annually in March at a rate of

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[96] *Id.*

[97] *Id.*

[98] *Duke Energy Net Metering*, *supra* note 7.

[99] *Id.*

[100] *Id.*

[101] *Id.*

[102] *Id.*

[103] *Id.*

4.83 cents per kWh."[104] In North Carolina, "residential solar panel systems typically have an electricity rate of approximately 10.6 to 11 cents [per] kWh."[105] Duke Energy's policy in both North and South Carolina is to roll over month to month any unused credits.[106] However, a big difference in the policies is that if there are any credits left at the end of the fiscal year, a North Carolina customer does not get paid for those credits and their account is reset to zero.[107] In North Carolina, solar customers are also responsible for a monthly fee of $11.80.[108] North Carolina is currently the only state within Duke Energy's net metering territory that does not pay the solar customers back for any unused credits at the end of the year.[109]

In South Carolina, Duke Energy and the state regulations and policies allow for a Shared Solar Program that gives Duke Energy customers with no way of installing or affording solar panels to take advantage of renewable energy.[110] The Shared Solar program is offered to anyone who already gets their electricity from Duke Energy and is not already on a net metered plan or using a purchased power agreement.[111] To participate, the customer must be up to date on all payments owed to Duke Energy.[112] Under this Shared Solar system, a customer, either residential or non-residential, would pay a subscription fee in addition to their usual electricity bill to Duke Energy and the customer would receive a monthly credit equal to the amount of solar energy their share produced.[113] The additional fee helps support the operation of a solar facility located in South Carolina and the electricity produced by that facility is fed into the grid instead of used in the customer's home or office.[114]

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[104] *Id.*

[105] *Id.*

[106] *Id.*

[107] *Id.*

[108] *Id.*

[109] *Id.*

[110] *Duke Energy Carolinas Program Will Provide South Carolina Customers a New Choice for Solar Energy*, DUKE ENERGY (Feb. 7, 2019), https://news.duke-energy.com/releases/duke-energy-carolinas-program-will-provide-south-carolina-customers-a-new-choice-for-solar-energy.

[111] *Id.*

[112] *Id.*

[113] *Id.*

[114] *Id.*

In Kentucky, Duke Energy provides net metering and time-of-use metering for billing purposes.[115] Time-of-use billing is a rate structure that varies depending on the demand for electricity at different times of the day.[116] During peak hours, electricity rates will be higher due to a high demand for electricity.[117] For example, in the middle of the afternoon in a warm climate, air conditioners will need more electricity to keep houses cool. In the evenings, when customers are home, houses will naturally consume more electricity because customers will be using appliances and such. During this peak time, the rate for any kWh sent back to the grid will be worth more, because the demand is higher.[118] This means that during the off-peak hours, if a customer is sending back more kWh than they are using, that electricity is not worth as much.[119] Customers that have the ability to utilize time-of-use metering should install solar panels that collect as much sunlight as possible throughout the day to ensure they can send back kWh during the peak hours. Becoming aware of how much electricity a customer uses and when they use their electricity is a positive result from net metering and time-of-use rates, because customers will use this knowledge to consume less electricity and be more efficient with usage and how they install and maintain their solar panels.

In North Carolina, Duke Energy only offers time-of-use billing to nonresidential, qualifying customers.[120] This billing structure is currently used in California, which moved from a traditional net metering billing structure to a time-of-use structure.[121] A study done by Aurora Solar in 2017 predicted that California residents previously on the traditional net metering structure would experience a decrease in utility bill savings by 3.5% as a result of the change to the time-of-

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[115] Duke Energy Ky., *Rider NM: Net Metering Rider* (Sheet No. 89 at 1–2) (Sept. 30, 2010), https://www.duke-energy.com/_/media/pdfs/for-your-business/generate-your-own-renewable/kentucky/sheetno89ridernm.pdf?la=en [hereinafter *Rider NM*].

[116] Sara Matasci, *Solar and Time-of-Use Electricity Rates: What You Need to Know*, ENERGYSAGE (July 27, 2017), https://news.energysage.com/solar-time-use-electricity-rates-need-know/.

[117] *Id.*

[118] *Id.*

[119] *Id.*

[120] *Rate Options*, DUKE ENERGY, https://www.duke-energy.com/partner-with-us/economic-development/the-carolinas/programs-and-incentives/rate-options (last visited Dec. 25, 2019).

[121] Matasci, *supra* note 116.

use structure.[122] The study also anticipated that the period it would take solar customers to break even on their expenses was about four months longer under this billing structure.[123] This is most likely because instead of getting a one-to-one ratio for the energy the customers transfer to the grid, the rates are changing throughout the day, and most customers will use electricity during the peak hours to cool their homes and run their appliances.[124] Instead of giving electricity back to the grid during the most valuable time, the customers are using the energy.[125] This feature of time-of-use billing, differentiating rates based on demand, makes the process of choosing where to install and what type of panels to install very important.[126] By choosing an optimal placement and type of panel, the customer can maximize the savings under time-of-use billing.[127]

In Florida, Duke Energy is required to offer their residential solar customers in their first tier (based on amount of electricity capable of being produced)[128] the option of either traditional net metering or time-of-use metering.[129] The Florida Public Service Commission has required that Duke Energy provide the option of billing structure to the qualifying solar customer and if the customer ever decides to leave Duke Energy's system, the unused credits are paid to the customer.[130] In Kentucky, any unused credits that the customer has when closing the account with Duke Energy will be credited to Duke Energy.[131] In North Carolina, this practice of not paying the customer for unused credits is exemplified in that Duke Energy takes any unused credits "at the end of the fiscal year" as well.[132] Additionally, if you are a solar customer in North Carolina and you do not use the time-of-use rate schedule, "any renewable energy credits

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[122] *Id.*

[123] *Id.*

[124] *Id.*

[125] *Id.*

[126] *Id.*

[127] *Id.*

[128] *Duke Energy Net Metering*, *supra* note 7 (explaining the tier system in Florida).

[129] Duke Energy, *General Rules and Regulations Governing Electric Service* (Sheet No. 4.011) (Apr. 29, 2013), https://www.duke-energy.com/_/media/pdfs/rates/peratesrulesandregs.pdf?la=en.

[130] *Id.* (Sheet No. 4.085).

[131] *Rider NM*, *supra* note 115, at 2.

[132] *Duke Energy Net Metering*, *supra* note 7.

("RECs") shall be retained by" Duke Energy.[133] The RECs will be further explained in the Solar Incentives Section of this article.

C. Third Party Financing before and after H.B. 589

Prior to H.B. 589, electric public utilities in North Carolina had the "exclusive right to sell electricity in a designated franchise area."[134] This meant that there could be no third-party financing for solar energy in North Carolina because solar developers could not sell the energy "back to the consumer in the State" because they were not a "regulated public utility."[135] Retail customers that wanted solar energy under the previous law had to own their renewable energy system and connect to the public utility's grid.[136] In many states, the state regulations offer the ability to enter into either a Power Purchase Agreement ("PPA") or "leasing agreements with third party solar developers."[137] "Under a PPA, the customer agrees to purchase all the energy produced by the system."[138] Under a leasing agreement, the customer usually pays "a fixed monthly fee to the third-party for the equipment [(solar panels, converter, etc.)] that is not directly based on the amount of on-site electricity" produced.[139] Both financing models are still subject to net metering policies with the public utility when there is excess energy generated.[140]

Section 6.1 of H.B. 589 enacted the Distributed Resources Access Act which allows for third party leasing of solar energy facilities and for a community solar program to be implemented by a utility.[141] This section allows for retail customers of a public utility or a utility to enter into leasing agreements with third-party "solar developers or the electric public utility for the lease of solar facilities."[142] The purpose

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[133] Duke Energy Carolinas, *Rider NM (NC): Net Metering*, DUKE ENERGY 1 (June 22, 2018), https://www.duke-energy.com/_/media/pdfs/for-your-home/rates/electric-nc/ncridernm.pdf?la=en.

[134] LAYLA CUMMINGS, LEGISLATIVE ANALYSIS DIV., H589-SMTS-21(CSTSf-7)-v-3, HOUSE BILL 589: COMPETITIVE ENERGY SOLUTIONS FOR NC 5 (2017).

[135] *Id.*

[136] *Id.* at 6.

[137] *Id.* at 5.

[138] *Id.*

[139] *Id.*

[140] *Id.*

[141] *Id.* at 6.

[142] *Id.*

of allowing third-party leasing is, theoretically, to make it easier for the average person to create renewable energy, because they now do not have to pay the substantial up-front costs of solar development.[143] The section also mandates certain customer protections for the leasing system, including requiring the lessor to "list the cost, fees, payments, interest, etc. over the life of the agreement" and "identify[ing] State and [F]ederal tax incentives that are included in the lease payments."[144] Lessors are also required to be certified by the Utilities Commission before offering any services.[145] Because the section allows for utilities to also be lessors of solar facilities, Duke Energy and municipalities may become lessors so long as they are certified and comply with the new regulations.[146] As mentioned previously, lessors must be certified by the Utilities Commission, subjecting them to the Commission's oversight.[147] However, if you are only selling rooftop solar equipment, you are not subject to this regulation and are under the Attorney General's oversight.[148] The consumer protections for leasing solar energy systems, while possibly enacted with good intentions, may create a large burden on smaller companies.[149] The enacted consumer protections include disclosing costs of maintenance and operation for the solar power systems the consumers want to lease, however, these costs may be difficult both to determine and to then put into a contract that must then be approved by the Commission.[150] Specifically, the disclosure may be more difficult to calculate and put into contract terms for smaller companies with fewer resources, although it does provide more transparency for the consumer.

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[143] *See generally id.* at 5–6 (demonstrating that owning an entire solar system versus making payments on a fixed monthly fee eliminates any up-front costs for panels and installation).

[144] *Id.* at 6.

[145] *Id.* at 7.

[146] *See generally id.* at 6–8; N.C. Gen. Stat. § 62-3(23) (2019) (illustrating that this was a logical conclusion, because Duke Energy is a public utility as defined by N.C. Gen. Stat. § 62-3(23)).

[147] H.B. 589, 2017 Gen. Assemb. (N.C. 2017); H589-SMTS-21(CSTSf-7)-v-3.

[148] H.B. 589, 2017 Gen. Assemb. (N.C. 2017); H589-SMTS-21(CSTSf-7)-v-3.

[149] This is my analysis generally of the consumer protections provisions. *See* H.B. 589, 2017 Gen. Assemb. (N.C. 2017). *See generally* H589-SMTS-21(CSTSf-7)-v-3, at 6–7 (there are many requirements that could take smaller businesses more resources than a larger company may need to comply); Brandon Cheshire, *New Solar Bill, SB1417, Will Harm Small Business*, ARIZ. CAP. TIMES (Feb. 18, 2016), https://azcapitoltimes.com/news/2016/02/18/new-solar-bill-sb1417-will-harm-small-business/.

[150] H589-SMTS-21(CSTSf-7)-v-3, at 6-7.

Additionally, Section 6.1 does not create third-party energy sales, only third-party leasing of solar facilities.[151] The difference can be illustrated by a recent North Carolina case, *State ex rel. Utils. Comm'n v. N.C. Waste Awareness & Reduction Network*[152] ("N.C. WARN"), where an environmental nonprofit organization, N.C. WARN, installed a small 5.25 kW solar energy system on a Greensboro church's rooftop using a PPA.[153] As part of the agreement, the church leased the solar facilities from N.C. WARN by paying five cents per kWh for the solar energy produced.[154] N.C. WARN could have transferred ownership of the solar facilities to the church, but that was not a mandatory provision.[155] Duke Energy filed an opposition with the N.C. Utilities Commission and the Commission fined N.C. WARN $60,000, which was later dismissed.[156] Duke argued that N.C. WARN was acting as a utility by selling energy in violation of the Public Utilities Act because Duke had exclusive rights to sell energy in the church's territory.[157] N.C. WARN argued that they were not selling energy to "the public" and that the agreement was just a financial arrangement.[158] The Court, in its 2017 opinion, held that N.C. WARN was acting as a "public utility" because N.C. WARN desired to serve customers of its own choosing within Duke Energy's territory and was being compensated for the amount of energy being produced.[159] Had the Court found that N.C. WARN was not acting as a public utility, then the Commission would not have oversight and control over the arrangement with the church.[160]

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[151] *Id.* at 5 ("Third-party financing models are not available because solar developers are not authorized to sell power back to the consumer in the State unless they are the regulated public utility serving that franchise area.").

[152] 805 S.E.2d 712 (N.C. Ct. App. 2017).

[153] Lisa Sorg, *Duke Energy, NC WARN in Power Struggle Over the Right to Sell Solar Energy*, NC POL'Y WATCH (Mar. 9, 2017), http://www.ncpolicywatch.com/2017/03/09/duke-energy-nc-warn-power-struggle-right-sell-solar-energy/.

[154] *Id.*

[155] *Id.*

[156] *Id.*

[157] *Id.*

[158] *Id.*

[159] State ex rel. Utils. Comm'n v. N.C. Waste Awareness & Reduction Network, 805 S.E.2d 712, 717 (N.C. Ct. App. 2017).

[160] *See* N.C. Gen. Stat. § 62-30 (2015). The Public Utilities Act gives the N.C. Utilities Commission the power to supervise and control the "public utilities" in the state.

The decision by the N.C. Court of Appeals precludes any solar developer from entering the same kind of arrangement with the public that are already served by Duke Energy or another public utility.[161] The options available to solar developers to become lessors is to rent rooftops from homeowners and sell that electricity back to the public utility, like Duke Energy.[162] However, this could become a very costly to not only rent the homeowners rooftops, but also to supply the solar energy equipment and maintenance and operation.[163] If the homeowners are going to be required to pay for any of the solar energy equipment, maintenance, or operation, then the up-front costs become steep and will exclude many homeowners from the renewable energy market that cannot afford the upfront costs.

One option to offset part of the upfront costs is to take out a loan with the public utility and the payments are tacked on to the energy bill.[164] As long as the solar energy facilities on the homeowners' rooftops are producing enough electricity, their energy bills should be lower, and then the extra loan payments are not as burdensome. This method creates many obstacles for homeowners and potential lessors of solar facilities. Lessors have to ensure they are not making agreements with customers to be paid for any of the electricity being produced and can only make money from leasing the solar facilities to the homeowners. So, while third-party leasing can create a positive impact on accessibility to the renewable energy market, with too many burdens and obstacles, it can create a negative impact as well. For third-party leasing to make renewable energy more accessible, the Commission and legislature would have to agree to remove some of the burdens on lessors and create a market that values renewable energy in a fair and effectual manner. The value placed on solar energy and renewable energy plays a big role in how financing models are structured. If solar energy is valued in an impartial and reasonable manner, then residential customers may be more apt to enter the market. With higher demand for solar energy, lessors would

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[161] *State ex rel. Utils. Comm'n*, 805 S.E.2d at 715.

[162] Sorg, *supra* note 153.

[163] Marie Donahue, *States Agree: Third-Party Ownership Enables Distributed Solar, But What's Next?*, INST. FOR LOC. SELF-RELIANCE (Mar. 23, 2018), https://ilsr.org/states-agree-third-party-ownership-enables-distributed-solar-but-whats-next/.

[164] *Your 2019 Guide to Getting Solar Panels for Your Home in North Carolina*, SOLAR POWER ROCKS, https://www.solarpowerrocks.com/north-carolina/#incentives (last visited Dec. 25, 2019) [hereinafter *2019 Guide*].

be more willing to enter and stay in the market, because they are sure they can make profits. When the demand for residential solar declines, solar energy is not reasonably valued through net metering, and the Commission and legislature creates barriers to entry, third-party lessors and solar developers will not stay or enter the market for fear of lost profits or bankruptcy. Public utilities will monopolize yet another market by usurping profits and power from the third-party developers and financers.

D. Solar Incentives in North Carolina

North Carolina has been a leader in the Southeast in encouraging the use of solar energy for many years now and has continued to grow. Solar incentives play a huge role in residential customers investing in solar energy because of the typically large up-front costs of solar panels and installation.[165] There is a federal Solar Investment Tax Credit ("ITC") that acts as a direct tax credit of thirty percent of the cost to install a solar system, however, installations completed after December 31, 2019, will not be eligible for this credit as the amount of the credit will decrease each year.[166] This is one of the largest incentives offered outside state incentives, so it will be important for states to ensure that their state incentives are still encouraging solar energy growth after the decline of federal tax credits. North Carolina had their own state solar ITC, but that expired in 2015 and nothing has replaced it yet.[167] Post H.B. 589, Duke Energy customers are eligible for a rebate on a first come, first serve basis.[168] For homeowners, the program offers $0.60 per Watt for systems up to ten kilowatts.[169] A system that is five kilowatts typically costs around $3.15 per watt to install, which is around $15,750 in total.[170] With the rebate, the cost to install would be closer to $12,750.[171] Saving three-thousand dollars on installation is a huge incentive to residential customers with the ability to finance the project. However, since the

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[165] *Id.*

[166] Ben Zientara, *Frequently Asked Questions About the 30% Federal Solar Tax Credit for 2019*, SOLAR POWER ROCKS, https://www.solarpowerrocks.com/affordable-solar/frequently-asked-questions-about-the-30-percent-federal-solar-tax-credit/ (last updated Oct. 25, 2019).

[167] *2019 Guide*, *supra* note 164.

[168] *Id.*

[169] *Id.*

[170] *Id.*

[171] *Id.*

rebate program began, the money allotted for each year has run out within one to two days, leaving many customers on a wait list for the next year.[172] Duke has allotted $62 million in rebates over five years, which was part of the agreement with regulators and memorialized in H.B. 589.[173] After five years and all the money in the rebate fund has been allocated,[174] there is no set plan for a rebate or tax incentive program, which leaves an opening for legislators and regulators to create an incentive that will be sustainable and continue to encourage the installation of residential solar energy. There are some other energy providers that give performance-based incentives and some local municipalities that give small rebates, but these are few and far between considering Duke Energy is the largest energy provider in the state.[175]

North Carolina also offers a property tax exemption for the increase in value of property resulting from installation of a solar power system.[176] When a solar energy system is installed on a property, it increases the value of the property because the resident now has anticipated savings in electricity costs.[177] In turn, this would increase the taxes a resident would pay for their state property taxes.[178] North Carolina will exempt the property value increase by 100% of the value for residential customers, but all others only get an 80% exemption.[179] Some states offer sales tax exemptions for the purchase of solar energy systems, but North Carolina does not offer this incentive.[180] The third-party financing and revolving loan programs can also act as incentives to invest in solar energy, but as demonstrated in the above sections, these can also present many obstacles. Revolving loan programs in North Carolina were expanded to cities and counties in 2010 under H.B. 1829, which allows them to offer low interest

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[172] David Boraks, *Duke Solar Rebates Have Already Run Out for the Year*, WFAE (July 26, 2018), https://www.wfae.org/post/duke-solar-rebates-have-already-run-out-year#stream/0.

[173] *Id.*

[174] *See id.*

[175] *See North Carolina Solar Incentives*, WHOLESALE SOLAR, https://www.wholesalesolar.com/solar-information/state-solar-incentives/north-carolina (last visited Dec. 25, 2019).

[176] *2019 Guide*, *supra* note 164.

[177] *Id.*

[178] *Id.*

[179] DSIRE, *Property Tax Abatement for Solar Electric Systems*, NC CLEAN ENERGY TECH. CTR., https://programs.dsireusa.org/system/program/detail/3036 (last updated June 19, 2019).

[180] *2019 Guide*, *supra* note 164.

loans for solar panels and other energy upgrades.[181] These loans can be no longer than twenty years and have an interest rate cap set at eight percent, which provides for another way residents can finance their solar energy systems.[182]

Overall, North Carolina's state incentives can add up to a substantial amount of savings over a long period of time if a consumer is able to take advantage of everything the state offers. With time and budget constraints on some of the offers or programs, it can be difficult to navigate options and this may be discouraging for some potential solar energy customers. North Carolina residents that want solar energy or that already have solar energy must be able to patch together incentives to make it work for them. However, with the ability to finance the solar energy systems through leasing and loans there have been more companies entering the field and willing to help residents navigate the regulations. North Carolina still has options to increase incentives by monitoring other states' incentive programs and creating a program that works for North Carolina residents.

V. CONCLUSION

As a leader in solar energy and with H.B. 589, North Carolina has set the stage for continued growth in residential solar energy systems. In order to continue encouraging residential solar energy systems, North Carolina must ensure that the public utilities and the monopolies they control do not interfere with incentives to invest in solar energy. If utilities are allowed to set their own rates for net metering, which H.B. 589 has allowed them to do, then the regulators must ensure those rates value the solar energy in a fair and complete manner. Customers of solar energy and residents that install solar energy programs need to have the confidence that their investment is not going to be a loss due to unfair rates and fees. Solar energy provides more benefits than just renewable, sustainable energy to the electricity grid, because of the environmental and infrastructure benefits as well. Even though studies have shown some benefits can be

[181] *North Carolina Solar Incentives*, ENERGYSAGE, https://www.energysage.com/solar-panels/solar-rebates-incentives/nc/ (last visited Dec. 25, 2019).

[182] *Id.*

difficult to calculate,[183] studies have also shown that solar energy must be valued analyzing all the possible benefits to the utility and the environment.[184] Other incentives like property tax exemptions and rebates are also going to encourage investments in solar energy systems, but without a properly valued metering rate the willingness of residential customers and third-party investors will decrease due to an unstable environment. Investors, whether residential customers or third-party investors, want to ensure they are spending their money wisely and will have a positive return on their investment. With net metering rates being set by the largest utility in the state and without an uninterested party reviewing the research behind the rates, investors of any kind may be hesitant to spend money on solar energy systems, because they may not be getting a return that values what they have given. The success of the Competitive Energy Solutions Act of 2017 ultimately should be judged by the public's willingness to continue to invest in solar energy systems.

[183] *See generally* HARARI & KAUFMAN, *supra* note 80; Weissman & Fanshaw, *supra* note 70 at 3; Nancy Averett, *Solar Power Saves Everyone Money*, BRINK (July 25, 2016), https://www.bu.edu/articles/2016/solar-energy-advantages/.

[184] *See* HARARI & KAUFMAN, *supra* note 80.